A real-world competency framework for Evidence-Based General Practice

Kevin Galbraith MBChB MPH MRCGP

A thesis submitted for the degree of Doctor of Philosophy

University of Oxford

Michaelmas Term 2018

Kellogg College

ABSTRACT

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BACKGROUND: Evidence-Based Health Care (EBHC) has become established as a cornerstone of modern medicine. Its guiding principle is that decisions should be based upon an integration of the best available evidence from research, the practitioner's expertise and the patient's values. General Practitioners (GPs) describe numerous constraints to EBHC. They lack an EBHC competency framework that acknowledges these constraints. The aim of this thesis was to construct such a framework for use in performance appraisal and routine practice.

METHODS: A multi-source synthesis was conducted in three stages: (1) a synthesis of qualitative and quantitative evidence from the research literature about EBHC competence in general practice resulted in five themes, which formed the basis of a preliminary 'straw model' competency framework; (2) a Delphi process among a panel of experts refined the straw model framework and generated a further seven themes; (3) themes from stages 1 and 2 were synthesised, resulting in a final real-world competency framework for general practice. A content analysis was carried out on a sample of GP performance appraisals to determine the content validity of the new framework. It also generated behavioural descriptors for emerging and full competence, and illustrative clinical vignettes to assist GPs in its application.

RESULTS: The real-world framework comprised three competencies: (1) mindfulness in one's approach towards EBHC itself, and to the influences on decision-making; (2) pragmatism in one's approach to finding and evaluating evidence; and (3) knowledge of the patient as the most useful resource in effective communication of evidence. The content validity of the new framework was confirmed.

CONCLUSION: A new real-world EBHC competency framework was developed for use in GPs' performance appraisals and in their routine practice. Behavioural descriptors and illustrative vignettes accompany the framework to assist its application.

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There are many others without whose support the thesis would not have been possible. Gabriel Leung in the School of Public Health at the University of Hong Kong was a great mentor and taught me much of what I know about Evidence-Based Health Care. He showed faith in me by allowing me to take over the organisation and delivery of the Masters in Public Health module in Evidence-Based Practice, which was very much his creation. This work inspired my interest in the field. I am indebted to Faith Hill and Chris Stevens at the University of Southampton Medical Education Development Unit, who accommodated this venture while I was working as a Lecturer in Medical Education. Daiga Heisters and Val Buxton at Parkinson's UK have been equally supportive while I have been working there as Evidence and Best Practice Adviser. I would also like to thank all the general practitioners who kindly consented to an analysis of their performance appraisal.

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Thank you.

Statement of contribution

The study, analyses and interpretation in this thesis are the independent and original work of the author. It was carried out under the supervision of Professor Carl Heneghan and Dr. Alison Ward at the Nuffield Department of Primary Care Health Sciences at the University of Oxford.

Other individuals have also contributed:

Janet Harris of the School of Health and Related Research (ScHARR) at the University of Sheffield advised on systematic review methods.

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> Kamal Mahtani advised on an initial draft of a Delphi study questionnaire.
>
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CHAPTER ONE

Introduction

1. Introduction

1.1 Overall aim of the thesis

The general purpose of this thesis is to promote a particular approach to medical care among general practitioners. The particular approach is called Evidence-Based Health Care (EBHC). It emerged in the early nineteen-nineties,[1] and became established as a cornerstone of modern medical practice.[2] The guiding principle of EBHC is that decisions should be based upon an integration of the best available evidence from research, the practitioner's expertise and the patient's values.[3] This thesis aims to promote EBHC among general practitioners (GPs) by constructing and validating a framework of educational goals, or *competencies* that address the barriers that have made EBHC difficult in the general practice setting.[4] The new competency framework will have two practical purposes: (1) as a set of personal educational goals for practising GPs to work towards in their annual performance appraisal; and (2) as a guide to developing EBHC competence in routine general practice.

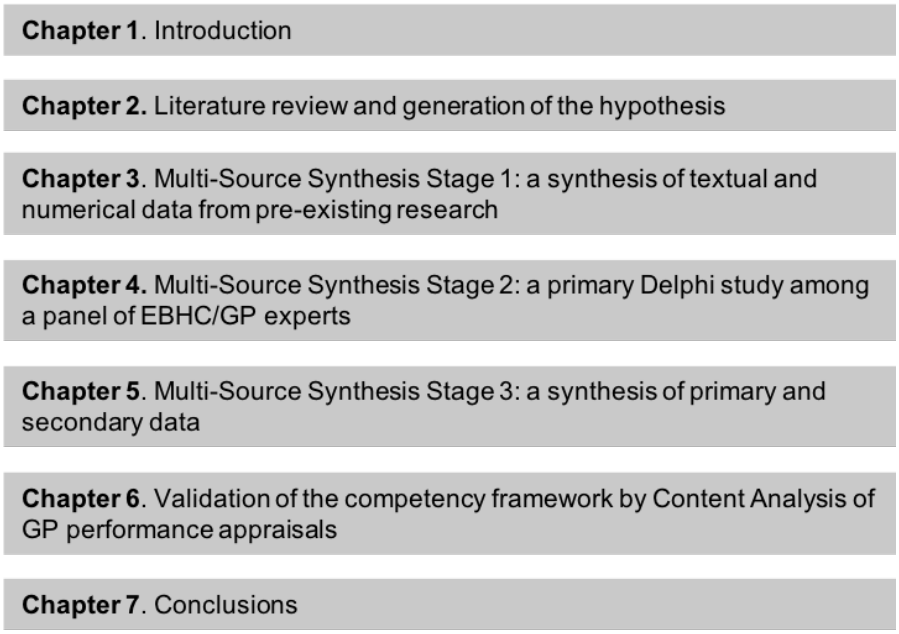
1.2 Objective of the thesis

The specific objective of the thesis is to construct a new competency framework for EBHC in general practice, for use in annual appraisal, and in routine work.

1.3 Overall structure of the thesis

Figure 1.1. illustrates the chapter structure. It also indicates the methodological approaches used in chapters three to six. There are seven chapters in total. Chapters 3 to 5 have been published as a single article in a peer-reviewed academic journal of medical education.[5] A blog about the publication has also been posted online.[6]

Figure 1.1. Thesis chapter structure, outlining methods.



Chapter 2. Literature review, and generation of the hypothesis

This chapter opens with a description of how and why I arrived at a decision to write a doctoral thesis on this particular topic. After outlining the chapter structure, I provide context to the thesis by introducing four areas that must be understood to follow my arguments throughout the thesis:

1. EBHC as an evolving discipline

2. The philosophy of care underpinning modern general practice
3. Educational theories with impact on learning in general practice and EBHC
4. The evolving field of research synthesis

I then explore the relationship between EBHC and general practice. My exploration includes a review of the research literature on strategies to integrate the two disciplines. I also investigate existing EBHC competency frameworks in general practice that have been published by educational bodies. The chapter concludes with a statement of the research gap I identified, how I proposed to address it, and a statement of the hypothesis I aimed to test.

Chapter 3. Multi-source synthesis Stage 1: a synthesis of qualitative and quantitative data from pre-existing research

This chapter describes the first stage of a multi-source synthesis, a technique which brings together qualitative (in this case textual) and quantitative (numerical) data from pre-existing literature and synthesises them with new data from a fresh primary study. The chapter opens with an account of how and why multi-source synthesis was chosen as the most appropriate method for developing a new competency framework. It then details the first stage – the synthesis of qualitative and quantitative data from existing research studies. It closes by describing how the outputs of this stage would inform the conduct of Stage 2.

Chapter 4. Multi-source synthesis Stage 2: a primary Delphi study among experts in EBHC and general practice.

This chapter details the second stage of the multi-source synthesis: the generation of new data from a primary Delphi study among a panel of experts in EBHC and general practice. It follows the same structure as Chapter 3, explaining first why this particular methodological approach was taken. It describes the conduct of the Delphi study, and ends with an account of how the findings fed into the next stage.

Chapter 5. Multi-source synthesis Stage 3: synthesis of primary and secondary data.

This chapter describes the third stage of the multi-source synthesis in which primary (newly generated) data from the Delphi study were synthesised with the secondary data generated from existing research in Chapter 3. This final synthesis resulted in a simple real-world competency framework comprising three competencies. These are discussed in detail and compared with other existing competency frameworks, curricula and models of learning. A clinical scenario illustrates how the new competency framework could be applied in everyday practice.

Chapter 6. Validation of the final competency framework by content analysis of GP performance appraisals

Chapter 6 describes the validation of the new competency framework as an educational tool for application in annual appraisal and routine practice. It explains how content validity was established by content analysis of a sample of GP performance appraisal documents. An account is given of the construction of additional tools to help GPs use the new framework. These comprised a series of behavioural descriptors, defining emerging and full

competence; a set of clinical vignettes adapted from appraisal content to illustrate the development of competence in practice; and a guide to appropriate sections of the appraisal document for the demonstration of each competency.

Chapter 7. Conclusions

This final chapter of the thesis opens with a summary of the research findings. I then summarise the step-by-step refinement of the final competency framework, to illustrate how the various component studies were integrated. I revisit the limitations of the thesis, highlight those that were the most important, and consider their impact on the research findings. The potential applications of the new competency framework are described, both as an educational tool within the performance appraisal process, and as a practical tool to guide the engagement with EBHC in routine general practice work. Some thought is given to how uptake of the new competency framework might be encouraged. I end the chapter with consideration of the implications of my work for future research.

1.4 References

1. EBM Working Group. Evidence-based medicine. A new approach to teaching the practice of medicine. *JAMA.* 1992;268(17):2420-2425.
2. Heneghan C, Godlee F. Where next for evidence based healthcare? *BMJ.* 2013;346:f766.
3. Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. *BMJ.* 1996;312(7023):71-72.
4. Zwolsman S, te Pas E, Hooft L, Wieringa-de Waard M, van Dijk N. Barriers to GPs' use of evidence-based medicine: a systematic review. *Br J Gen Pract.* 2012;62(600):e511-521.
5. Galbraith K, Ward A, Heneghan C. A real-world approach to Evidence-Based Medicine in general practice: a competency framework derived from a systematic review and Delphi process. *BMC medical education.* 2017;17(1):78.

6. Galbraith K. Keeping it real: evidence-based competence among GPs. 2017. http://www.cebm.net/keeping-real-evidence-based-competence-among-gps/. Accessed 21.07.2017.

CHAPTER TWO

Literature review and generation of the hypothesis

2. Literature review and generation of the hypothesis

2.1 Introduction

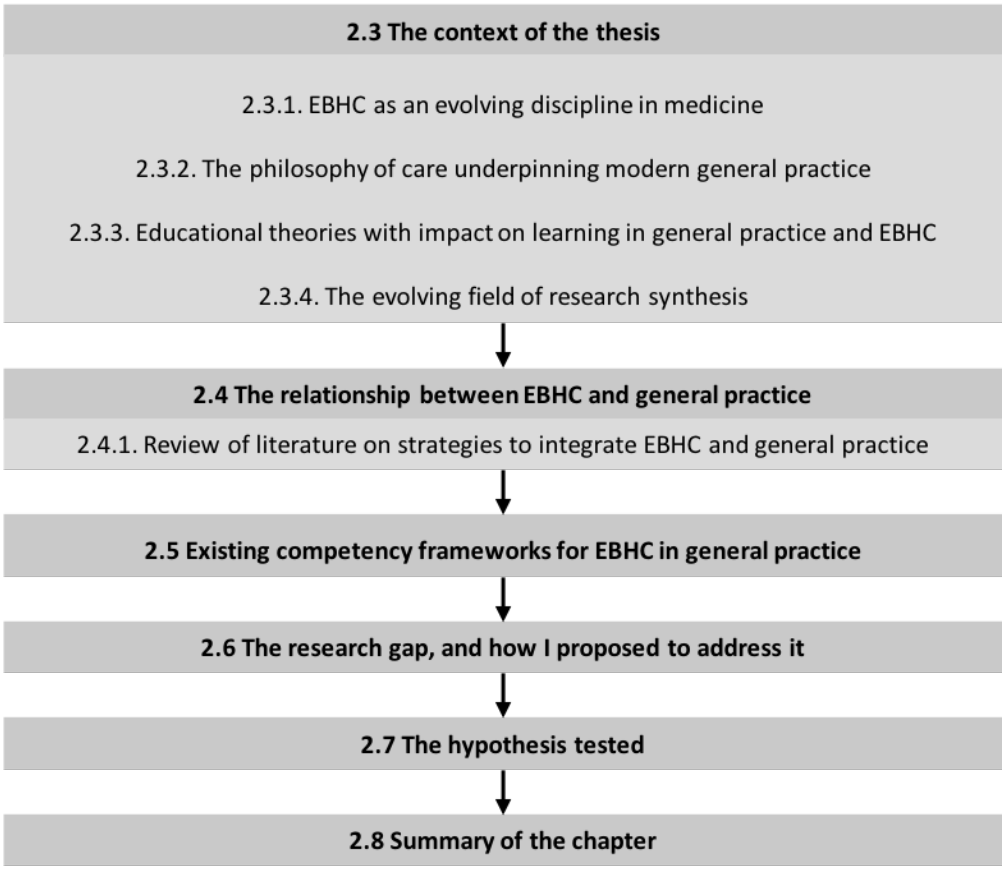
Twelve years ago, while working as a general practitioner, I was also teaching Evidence-Based Health Care (EBHC) on a Master of Public Health course at the University of Hong Kong. The curriculum followed a seminal textbook: '*Evidence-Based Medicine: How to Practice and Teach EBM*' by Sackett et al.[1] The book promoted a five-step framework describing the skills and process of EBHC. My own experience, however, was that the five steps weren't feasible in busy general practice. They appeared to represent a highly structured approach at odds with the complexity of general practice. An initial exploration of the research literature at that time revealed that despite an impressive rise to prominence in the broader field of medicine, there was little evidence that the five-step framework of EBHC had assimilated into general practice. I looked for alternative versions of EBHC, tailored specifically for general practice. I found the five-step framework to be ubiquitous, even forming the basis of EBHC competence in national general practice curricula.[2-5] I pondered whether there might be some way of strengthening the integration of EBHC and general practice. In addition to direct benefit in general practice, I wondered whether addressing this challenge might also assist the broader evolution of EBHC as an emerging discipline. This thought was prompted by Paul Glasziou, then Director of the Centre for Evidence-Based Medicine at Oxford University. He posed an intriguing question at the International Conference for EBHC Teachers and Developers in Sicily in 2009: *'Eighteen years later [after its inception] is EBHC really adult?'*[6] I considered that one sign of maturity might be the effective adaptation of EBHC to different disciplines. If I could find

a way of integrating EBHC with general practice, it might spark similar developments in other specialties. This was the moment I decided to write this thesis. In doing so, my aim was to develop a strategy to facilitate the integration of EBHC and general practice, with the aspiration that it would contribute to an improvement of the quality of care in general practice, and also serve as a model for other researchers to develop similar strategies to promote EBHC in other specialties.

2.2 The structure of this chapter

The structure of the chapter is illustrated in Figure 2.1. To follow my lines of argument throughout the thesis, a reader will first need a broad understanding of four key areas: (1) EBHC as an evolving discipline in medicine; (2) the philosophy of care underpinning modern general practice; (3) Educational theories with impact on learning in general practice and EBHC; and (4) the evolving field of research synthesis. I will therefore explain each area in turn. Following this, I will discuss the relationship between EBHC and general practice, detailing the difficulties that GPs have reported in assimilating the two disciplines. I will give an account of the research that has been carried out to date, on the integration of EBHC and general practice, and of the EBHC content of existing general practice competency frameworks I will argue that GPs lack a suitable alternative to a traditional EBHC framework that has failed to guide them. I will then articulate in clear terms the gap I perceived in the research literature, and how I proposed to address it. I will end the chapter by stating the hypothesis that will be tested.

Figure 2.1 The structure of this chapter



2.3 The context of the thesis

The context of the thesis is provided by four topics: (1) EBHC as an evolving discipline in medicine; (2) the philosophy of care underpinning modern general practice; (3) educational theories with an impact on learning in general practice and EBHC; and (4) the evolving field of research synthesis. It is not assumed that readers of the thesis will have any expertise or experience in these areas. Each is therefore explained to a depth that will allow them to follow the work presented.

2.3.1. EBHC as an evolving discipline in medicine

EBHC first appeared in the medical literature in 1991, in an editorial published from McMaster University.[7] It outlined a scenario in which a junior doctor faced a clinical problem. It described two alternative approaches: one approach ('the way of the past') involved following the advice of her seniors; the other approach ('the way of the future') was to seek immediate help from the research literature. The latter approach was termed 'Evidence-Based Medicine' ('EBM' - the original designation that predated 'EBHC'). The first significant clarification appeared the following year, with the publication of an article by the EBM Working Group, most of whom again, were from McMaster University.[8] This proclaimed EBHC as a 'new paradigm' in medical practice. It described it as follows:

'Evidence-Based Medicine de-emphasises intuition, unsystematic clinical experience, and pathophysiological rationale as sufficient grounds for clinical decision-making and stresses the examination of evidence from clinical research.'

Clinical experience and instinct were valued, although they were considered subordinate to '*systematic attempts to record observations in a reproducible and unbiased fashion*.' While an understanding of the workings of the human body, and the mechanisms of disease were also valued, they were considered insufficient in themselves to guide clinical practice. The new skills of EBHC were outlined: (1) precisely defining a patient problem, and the information required to resolve it; (2) conducting an efficient search of the literature; (3) selecting the best of the relevant studies and applying rules of evidence to determine their validity; (4) succinctly presenting to colleagues the content of the article and its strengths and weaknesses; (5) extracting the clinical message; and (6) applying it to

the patient problem. The EBHC practitioner was also expected to display traditional attributes of sensitivity to the patient's emotional needs, and an understanding of human physiology and disease. The authors were criticised for devaluing clinical experience, knowledge of physiology and the mechanisms of disease.[9] In response, a new definition of EBHC appeared in 1996:[10]

'Evidence based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research. By individual clinical expertise, we mean the proficiency and judgment that individual clinicians acquire through clinical experience and clinical practice. Increased expertise is reflected in many ways, but especially in more effective and efficient diagnosis and in the more thoughtful identification and compassionate use of individual patients' predicaments, rights, and preferences in making clinical decisions about their care. By best available external clinical evidence we mean clinically relevant research, often from the basic sciences of medicine, but especially from patient-centred clinical research into the accuracy and precision of diagnostic tests (including the clinical examination), the power of prognostic markers, and the efficacy and safety of therapeutic, rehabilitative, and preventive regimens.'

This definition indicated a shift in emphasis. The 1991 definition had highlighted a negative facet of clinical experience – that it can be unsystematic and subjective. By 1996, however, a more positive notion of clinical experience had emerged, as a precursor of 'clinical expertise,' which should be integrated with the best available evidence in decision-making.

This fluidity in the definition of EBHC is evident throughout its history. Howick notes changing definitions across consecutive editions of the seminal textbook *Evidence-Based Medicine: How to Practice and Teach EBM*.[9] In the first edition of 1997, Sackett and others echoed the version offered in the 1996 article.[10] In the second edition published in 2000, clinical expertise became central to EBHC:[1]

'*Evidence-Based Medicine is the integration of best research evidence with clinical expertise and patient values.'*

The explanatory text continued:

'By clinical expertise, we mean the ability to use our clinical skills and past experience to rapidly identify each patient's unique health state and diagnosis, their individual risks and benefits of potential interventions, and their personal values and expectations.'

Another fundamental shift evident in this definition was that best research evidence was no longer afforded primacy in decision-making. It gave equal weight to clinical experience and patient values. The notion of patient values, highlighted since 1992, was explained further:[1]

'By patient values we mean the unique preferences, concerns and expectations each patient brings to a clinical encounter and which must be integrated into clinical decisions if they are to serve the patient.'

The 2005 and 2011 editions added '*patient circumstances*' to patient values, referring to their '*individual clinical state and the clinical setting*.'

Another concept central to the EBHC philosophy has been a hierarchy of evidence.[8] For example, the randomised controlled trial (RCT) was considered the strongest research design for determining the efficacy of treatments.[8] At the other extreme, untested opinion was considered the weakest evidence.[8] As this included the views of established experts, EBHC became imbued with anti-establishment credentials.[11]

Alternatives to the term 'Evidence-Based Medicine' have been introduced to accommodate interest in the approach among allied health care workers such as nurses, dentists, physiotherapists and occupational therapists.[12] The term 'Evidence-Based Practice' was coined to be more inclusive and to highlight the importance of outcomes with direct impact on clinical practice.[13] Throughout this thesis, I will use the term 'Evidence-Based Health Care' (EBHC), as it has been adopted by the Nuffield Department of Primary Health Care Sciences at the University of Oxford.[14] The use of the term 'health care' extends the concept to all the professions associated with health care, including those involved in purchasing and management,[15] and policy making.[16]

The delegates of a major conference arrived at a definition by consensus in 2003.[17] The result was the landmark Sicily Statement on Evidence-Based Practice.[18] This presented a five-step approach to EBHC:

1. *Translation of uncertainty to an answerable question.*
2. *Systematic retrieval of best evidence available.*
3. *Critical appraisal of evidence for validity, clinical relevance, and applicability.*
4. *Application of results in practice.*
5. *Evaluation of performance.*

The five steps represented a minimal skill set for clinicians to '*practice in an evidence-based way*', and a '*curriculum outlining the minimum standard educational requirements for training health professionals in EBP*.' An opportunity had arguably been missed in Sicily, to respond to concerns about the feasibility of EBHC in real-world practice.[19-21] What had emerged was a mere reiteration of the five-step model that was evident in the work of the EBM Working Group in 1992,[8] and further promoted in the text '*Evidence-Based Medicine: How to Practice and Teach EBM*.'[1]

Despite continued protestations that EBHC is hard to apply to individual patients, and that it devalues patients' values and clinical expertise,[22] it nevertheless rose dramatically to prominence.[23] It made the 2001 'Ideas of the Year' list in The New York Times;[24] and was among a shortlist of the most important medical milestones of the last 160 years in a survey carried out by the British Medical Journal.[25] Sheridan ascribes to the rise of EBHC a broad appreciation in the modern era that '*all written evidence is not equal*' and that we must pay particular attention to the quality of evidence on which we base health and policy

recommendations.[26] He attributes the success of EBHC to commitment among the movement's founders, well-organised advocacy and rhetorical skill. He also notes that EBHC emerged at a time of significant technological development in medicine, resulting in a surge of political and economic interest in the delivery of health care. EBHC addressed this new economic interest, offering managers and policy makers improved efficiency, meaningful targets and defined quality of health care. At the same time, there was renewed interest in a purchaser-provider model of funding medical research, in which funders would commission what it deemed important. There was a demand for more cost-effective care, and policy makers looked to EBHC to fulfil that aspiration.[26]

EBHC can lay claim to some direct improvements in health care. Though a detailed defence of the discipline is beyond the scope of this brief introduction, some examples may help understand how it has exerted positive effects. One recent and indicative example relates to the use of transvaginal mesh to treat prolapse and stress incontinence. An evidence-based systematic review of the literature comparing it to an alternative procedure concluded that although permanent transvaginal mesh may reduce the rate of recurrent prolapse, it is associated with higher rates of reoperation and bladder damage.[27] A comprehensive study of the approval process for transvaginal mesh revealed a parlous lack of evidence to underpin licensing; and where evidence did exist, it was often published too late to inform clinical practice.[28] Furthermore, medical devices were approved on the basis of 'substantial equivalence' with a previously approved device, without any clinical trial evidence. In July 2018, the UK government finally halted the use of transvaginal mesh in National Health Service hospitals.[29] Another recent example was an appraisal of the

evidence for using oseltamivir to treat uncomplicated influenza. Concerned about an outbreak of avian influenza, and the possibility of a forthcoming influenza pandemic in 2009, the UK government stockpiled oseltamivir at a cost of £600 million.[30] On a recommendation from the Center for Disease Control and Prevention, the US government also stockpiled it at a cost of $1.5 billion;[31] and in 2010, the World Health Organisation (WHO) added oseltamivir to its list of 'essential medicines.'[32] These actions were found to be based on limited evidence.[30] There was a failure to publish all available evidence, failure to make the data available at the individual patient level, and failure to recognise the limitations of observational data (as opposed to randomised controlled trial data, which would normally be expected for the evaluation of a medical intervention). After a prolonged campaign to obtain full clinical study reports of the oseltamivir trial programme, a systematic review was conducted, comprising a larger number of unpublished studies than previous reviews.[33] The authors found that in treatment studies, oseltamivir only modestly reduced the time to first alleviation of symptoms but caused nausea and vomiting and increased the risk of headaches and renal and psychiatric syndromes. They concluded that '*the evidence of clinically significant effects on complications and viral transmission is limited because of rarity of such events and problems with study design. The trade-off between benefits and harms should be borne in mind when making decisions to use oseltamivir for treatment, prophylaxis, or stockpiling*.'[33] The WHO has since downgraded the status of oseltamivir.[30] The positive influence of EBHC extends beyond specific conditions and their treatment. Greenhalgh[34] highlights the establishment of the Cochrane Collaboration to collate and summarise evidence from clinical trials;[35] setting standards for the methodology and reporting of research;[36] building national and international

infrastructures for developing and updating clinical practice guidelines;[37] promoting widespread development of critical appraisal skills;[38] and contributing to the new discipline of knowledge translation.[39] Djulbegovic[11] lauds among other achievements the attention drawn to overdiagnosis and overtreatment;[40] improving publishing standards;[36,41-43] promoting the registration of trials to avoid selective publication of positive results;[44] and highlighting the problem of wasteful research that is poorly designed, inaccessible or focuses on the wrong areas.[45,46]

There is still much more to be done, however. A recently published 'Evidence-based medicine manifesto for better health care' highlighted some of the challenges.[47] Among them were a lack of uptake of research findings into practice;[48] that most published research is still misleading to some extent;[47] that there are conflicts of interest among authors and sponsors of clinical practice guidelines;[49] failure of the research agenda to take into account the patient perspective;[50] failure to publish research because results were deemed unfavourable;[51] institutional corruption in the pharmaceutical industry;[52] overinterpretation or misuse of trial results by pharmaceutical companies;[53] and uncorrected errors in reported research.[54] The manifesto articulates clearly the steps that need to be taken:[47]

1. Expand the role of patients, health professionals and policy makers in research.

2. Increase the systematic use of existing evidence.

3. Make research evidence relevant, replicable and accessible to end users.

4. Reduce questionable research practices, bias and conflicts of interests.

5. Ensure drug and device regulation is robust, transparent and independent.

6. Produce better usable clinical guidelines.

7. Support innovation, quality improvement and safety through the better use of real-world data.

8. Educate professionals, policy makers and the public in EBHC to make informed choices.

9. Encourage the next generation of leaders in evidence-based medicine.

To conclude, the story of EBHC since its inception 25 years ago is one of both change and by contrast, consistency. There has been an increased emphasis on clinical experience, and the need to adapt decisions depending on the unique values and perspectives of the individual patient. The purview of EBHC has also changed, extending to allied health professions and the spheres of management and policy making. More consistent over time have been both the perceived skills of EBHC, which remain based on a five-step framework, and the notion of a hierarchy of evidence regarding research methods. Despite continued criticism that EBHC is hard to apply to individual patients, and that it devalues patients' values and clinical expertise,[22] it has rapidly gained prominence in the broad field of medicine. It has brought a number of demonstrable benefits to clinical care and has improved the processes of evidence generation, synthesis and distribution. Challenges remain, though they have at least been identified. We can take some reassurance from the new EBHC manifesto, in that the first step in arriving at a desired destination is to know

how to get there. The route has been planned for the next twenty years of EBHC.

2.3.2. The philosophy of care underpinning modern general practice

To provide a suitable introduction to general practice for the reader who is unfamiliar with the discipline, I sought from the literature a description that is authoritative, maintains relevance in the modern era, is sufficiently detailed and has been widely applied across health care systems in which general practice plays an important part. Two descriptive frameworks stood out from the literature and fulfilled these criteria: (1) the definition of general practice proposed by by the European Society of General Practice/Family Medicine (the 'European definition'),[55] which has been endorsed and supported by its 47 member organisations, including the Royal College of General Practitioners;[56] and (2) the 'four pillars of primary care' (first contact care, longitudinality, comprehensiveness and coordination) proposed in 1992 by Barbara Starfield,[57] who is widely regarded as a pathfinder in the discipline.[58] The structure of the European definition lends itself to a clear point-by-point account. I will therefore start by presenting each of its components in turn, adding elements from the work of Starfield (and occasionally insights from others) as I proceed.

The European Society of General Practice/Family Medicine definition of general practice was first proposed in 2002 and revised in 2005 and 2011. The 2011 version is as follows:

'General practice/family medicine is an academic and scientific discipline, with its own educational content, research, evidence base and clinical activity, and a clinical speciality orientated to primary care.'[55]

An immediate clarification is needed at this point: the term 'primary care' refers to first-contact, continuous, comprehensive, and coordinated care provided to populations undifferentiated by gender, disease, or organ system.[59] General practice is but one type of primary care - community pharmacists, opticians and dentists, for example, are also considered primary care providers.

Returning to the European definition, it is elaborated as a series of 'characteristics' of general practice:

1. *It is normally the point of first medical contact within the health care system, providing open and unlimited access to its users, dealing with all health problems regardless of the age, sex, or any other characteristic of the person concerned.*

2. *It makes efficient use of health care resources through coordinating care, working with other professionals in the primary care setting, and by managing the interface with other specialities taking an advocacy role for the patient when needed.*

3. *It develops a person-centred approach, orientated to the individual, his/her family, and their community.*

4. *It promotes patient empowerment.*

5. *It has a unique consultation process, which establishes a relationship over time, through effective communication between doctor and patient.*

6. *It is responsible for the provision of longitudinal continuity of care as determined by the needs of the patient.*

7. *It has a specific decision-making process determined by the prevalence and incidence of illness in the community.*

8. *It manages simultaneously both acute and chronic health problems of individual patients.*

9. *It manages illness which presents in an undifferentiated way at an early stage in its development, which may require urgent intervention.*

10. *It promotes health and well-being both by appropriate and effective intervention.*

11. *It has a specific responsibility for the health of the community.*

12. *It deals with health problems in their physical, psychological, social, cultural and existential dimensions.*

Each characteristic is explained below:

The GP is the usual first point of contact for a member of the public seeking medical attention. They have a significant role, therefore, in controlling access to expensive

hospital-based care.[60] This 'gatekeeper' role is an important feature of the health care systems in the United Kingdom, the Netherlands and Scandinavia, less so in Belgium, France and Germany, with some other countries, including Canada and Australia, lying between those extremes.[61] The primary purpose of gatekeeping is to improve the cost-effectiveness of a health care system.[62] Starfield also highlighted the importance of first contact access to patients who often lack the medical knowledge required to make well-informed decisions about their care.[63] She also noted that the gatekeeper role is challenging for the general practitioner, as patients' problems often present at an early stage when symptoms and signs of disease are ill-defined; they are often complex, and complicated by their social context; and the variety of problems is considerable.

The European definition also underlines the universality of general practice care across all demographic groups and all kinds of medical problems. Starfield remarked that care extends to disease in its social context, and therefore often demands outreach services that specialties would rarely provide, such as home visits.[63] The GP can only provide such comprehensive care if they have a wide array of resources at their disposal, such as allied health services and social workers.

The concept of the GP as a hub around which other services revolve is picked up in the second characteristic, that the GP often coordinates the care from several providers, ensuring access to appropriate care and communication between all parties.[64] Starfield noted two particular difficulties in the coordination of health care: (1) there is a multitude of possible reasons for referral; and (2) there are technical challenges in transferring and

tracking information from many sources, although improvements in computerised patient records and other information technology solutions have made this easier in recent years.[57] The GP also has a patient advocacy role, protecting the patient from the potential harms of excessive screening, testing and overtreatment, and guiding them through the complexity of the health care system.[64] Starfield specified a number of other contexts in which GPs fulfil this role: securing needed improvements in housing, work conditions, neighbourhood safety, and sanitation; and in obtaining financial support where needed for improvement and maintenance of health.[63]

A person-centred approach integrates the patient's viewpoint with the diagnostic and decision-making process. The GP explores the disease and the illness experience simultaneously, weaving back and forth between them as the exploration continues. They seek common ground with the patient, and this strengthens the relationship.[62] This aspect of general practice echoes the 'patient values and perspectives' that form a central pillar of EBHC in the more recent definitions.[9,15] Starfield differentiated the person-centred approach from one orientated to disease. Unlike the disease-oriented approach, the person-centred alternative revolves around a personal relationship with the patient, developed over time, independent of the type of health problem experienced, or even the presence of a health problem.[63]

The empowerment of patients has been added in the 2011 review of the European definition. The GP is uniquely placed to empower patients and encourage self-management. Health care is perceived as an '*educational process,*' which the GP is in a

unique position to administer, given their longitudinal, multidisciplinary approach, centred on the patient. Starfield recalled traditional theories of doctor-patient interaction in which the role of the GP was considered dominant, and that of the patient more passive.[63] This was assumed because of the functions of the GP professional role. She contrasted this with later conceptualisations such as that of Szasz and Hollander, who described an ideal 'mutual participation' model in which the physician and patient contribute their unique perspectives and negotiate problem management.[65] There are many consultation models. It is beyond the scope of this literature review to describe them all in detail, but a brief description of two illustrative examples follows. Balint proposed that psychological problems often manifest physically.[66] Doctors have feelings themselves, which have a role in the consultation; and they need to be trained to be sensitive to the patient's thought processes. Another famous model for the GP consultation is that of Neighbour, who described 'checkpoints' within the consultation:[67]

- *'Connecting', in which the GP establishes rapport with the patient.*
- *'Summarising', to clarify the patient's reason for consulting.*
- *'Handing over', in which the GP and patient negotiate a management plan.*
- *'Safety netting', which is about managing uncertainty, planning for the unexpected.*
- *'Housekeeping', in which the GP is aware of his or her own emotions.*

The consultation process is the cornerstone of general practice and hinges upon successful communication.[62] Starfield described communication as an essential, though not unique feature of primary care.[63] Indicators of successful communication are agreement on the

patient's problems, shared understanding of diagnostic procedures and management strategies, and the patient's satisfaction with the GP's attempt to understanding their needs. No account of communication between the GP and patient would be complete in the modern era without some consideration of the now widespread use of computers in the consultation room. They are used for many aspects of the consultation, including prescribing, recall systems, progress notes and decision-support.[68] Perhaps the most profound impact however, may be on the very nature of the GP consultation. The use of a computer during the consultation has been found to reduce eye-contact and verbal interaction between the GP and the patient.[69] Pearce and colleagues analysed 141 videotaped consultations by 20 GPs in Australia.[70] They found that use of computers in the consultation changes the doctor-patient relationship by altering the distribution of power and authority. Patients were able to draw the doctor's attention to the computer and used it to challenge the GP's statements. Noordman and colleagues videotaped consultations carried out by the same sample of GPs on two occasions, in 2001 and 2008.[69] Although use of the computer was associated with less verbal and non-verbal communication, use of the computer declined over the time-period studied. The reason was unclear. It may be that the GPs became better over time at integrating computer use and patient-communication, or they may have learned to use the computer before or after the consultation. As Pearce suggests, it is likely the future will bring more engagement of patients with computers, through online communication and use of patient-held records.[70] Co-ownership of computer-held information may change patient health outcomes and deserves further study.

Continuity of care allows a personal relationship to develop over time. It improves patients' satisfaction with the consultation, increases their adherence to medications, and helps encourage disclosure of psychological problems.[71] Trust and understanding enhance an interaction that may itself be therapeutic; and decision-making is rendered easier.[71] Starfield preferred the term 'longitudinality' to 'continuity' as interruptions in the continuity of care need not, in themselves, disrupt the relationship.[63] She pointed out that longitudinality could be provided by an individual GP, a particular team of GPs or even a specific place of care provision. Where a GP provides care to their own personal list of allocated patients, the challenge of providing longitudinal and comprehensive care is greater than where the responsibility for an individual patient is shared among a group of GPs. However, for such a group, the task of *coordinating* care among various service providers is more challenging.[63] Either way, Stewart maintains that it is the combined primary care attributes of availability, longitudinality, comprehensiveness and communication that determine quality of care, rather than whether a personal or group list is the mode of delivery.[72]

When the European definition referred to a '*specific decision-making process determined by the prevalence and incidence of illness in the community*,' it defined an approach to problem-solving that differs from that of a specialist. A specialist investigates a patient's condition until they reach a diagnosis. The GP, by contrast, has too many patients to investigate to this degree.[62] Most of the GP's patients will have minor, self-limiting illness, presenting at an earlier point in its natural history. They must, therefore, exercise judgement, weighing up the probability of severe disease. Otherwise, they would

investigate or refer all their patients to specialists, placing undue strain on the health care system. A report commissioned by the Royal College of General Practitioners explains how GPs make these judgements by weighing probabilities:[73]

'…the onus is on the generalist to differentiate the undifferentiated. The doctor…must assess the individual's condition and arrive at a general diagnosis or arrange further investigation to do so. Central to this is an understanding of the probabilities within the population in question.'

Another component of the European definition is that the GP '*manages both acute and chronic health problems' of individual patients simultaneously*.' An 'acute' health issue is one of sudden onset, and often brief, whereas a 'chronic' problem is more long-lasting.[74] The simultaneous management of both echoes another model of general practice proposed by Stott and Davies in 1979.[75] According to the model, each consultation should comprise the management of both acute presenting problems, and chronic continuing problems, together with modification of health-seeking behaviour on the part of the patient, and a strategy to promote ongoing health. The same dual approach is central to Howie's decision-making framework of 2009,[76] which combined Stott and Davies' model with that of Balint. Starfield refers to 'comprehensiveness' as a vital component of primary care. Though the concept includes the management of both acute and chronic problems, it embraces the wider recognition of patients' health-related needs and the arrangement of resources to deal with them.[63] The importance of comprehensive care lies in the opportunity it presents to prevent illness and its further progression.[63]

The GP '*promotes health and well-being.'* This means supporting people in maintaining good health, rather than only treating established disease. GP care embraces the full spectrum of health care, from prevention, through detection of the first symptom, to eventual palliation.[77]

GPs have a specific responsibility for the health of the community.[73] Every GP practice in England must belong to a clinical commissioning group (CCG), covering part of a local authority boundary. Commissioning involves assessing the needs of the local population and planning services accordingly; offering contracts out to tender; monitoring delivery; and revising the contracts as needs change.[62] According to Starfield, a community orientation flows directly from appropriately comprehensive care, as all the health-related needs of patients have a social context. The GP providing comprehensive care will be aware of the social context, understanding the distribution of health characteristics within the the community, and knowing the resources available to manage problems that arise.[63]

The GP deals with health problems in their physical, psychological, social, cultural and existential dimensions. This view of health care is less about episodic clinical interventions, and more focused on sustaining the overall well-being of the individual, over time.[73] It follows the World Health Organisation definition of health: [78]

'Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.'

The principle is central to the concept of 'generalism,' which has received much attention from the Royal College of General Practitioners in recent years,[61,73,79] and merits brief description here. The RCGP definition is as follows:[79]

'…an approach to the delivery of health care that routinely applies a broad and holistic perspective to the patient's problems. Its principles will be needed wherever and whenever people receive care and advice about their health and well-being, and all healthcare professionals need to value and be able to draw on this approach when appropriate. The ability to practise as a generalist depends on one's training, and on the routine use of skills that help people to understand and live with their illnesses and disabilities, as well as helping them to get the best out of the healthcare options that are available and appropriate for their needs. It involves:

- *Seeing the person as a whole and in the context of his or her family and wider social environment.*

- *Using this perspective as part of one's clinical method and therapeutic approach to all clinical encounters.*

- *Being able to deal with undifferentiated illness and the widest range of patients and conditions.*

- *In the context of general practice, taking continuity of responsibility for people's care across many disease episodes and over time.'*

We can see in this definition convergence with the characteristics of general practice described by the European Society of General Practice/Family Medicine. The holistic principle of '*seeing the person as a whole and in the context of his or her family and wider social environment*' echoes the assertion that general practice '*deals with health problems in their physical, psychological, social, cultural and existential dimensions*.'[55] It also reminds us of the global appreciation of patient values, perspectives and life context at the heart of EBHC.[9] Generalism also reiterates the concepts of 'undifferentiated illness', 'continuity of care' and the GP as 'gatekeeper.'

In summary, there is repeated reference in both of the chosen descriptive frameworks to general practice as a vital organisational hub within health care economies. It provides universal first contact with the health care system; it focuses uniquely on the health and well-being of the individual patient in the context of their life, both within and beyond the medical context; and it is unique in its broad clinical, social and psychological purview and the longitudinal care it provides. Widespread computerisation of general practice has facilitated many of these functions but has also altered the dynamic of the doctor-patient relationship. Further research is needed to fully understand its impact on the nature of general practice.

2.3.3. Educational theories with impact on learning in general practice and EBHC

In constructing a new competency framework, this thesis addresses how EBHC can be learned in the context of general practice. To follow the arguments presented, a reader unfamiliar with the field of medical education may need a simple introduction to some of the more pertinent educational theories and movements that have influenced learning in both disciplines. I will begin with adult learning theory, and the emergence of its derivative - problem-based learning (PBL) - which, together with EBHC, emerged from the same well-spring of innovative medical education at McMaster University in Ontario.[80] I will draw attention to similarities between the practice of EBHC and a particular member of the adult learning family of educational theories, namely Kolb's experiential learning cycle. I will then explore one element of the learning cycle, namely *reflection*, which owing much to the influential work of Schön,[81] has become a cornerstone of medical education.[82] These developments constitute a lineage through recent medical education that has gradually departed from didactic teacher-centred learning towards a more self-determining, learner-centred approach, and is thought to better prepare the doctor in training for the challenges of real-world practice.[83] I will describe competency-based medical education, which focuses less on the *process* of learning, and more on the *outcomes*, or *learner attributes* that enable them to perform a professional role. I will end with performance appraisal, a recent development in medical education that draws on all of these preceding influences. It is also the context in which this thesis attempts to contribute to the development of EBHC learning in general practice.

2.3.3.1. Adult learning theory

Adult learning theory is in fact a broad group of educational theories that focus on the characteristics of adult learners, the influence of an adult's life situation on their learning, and how adults construct meaning from experience.[84] The most widely applied – andragogy - comes from the first of those categories. In view of its influence on medical education, this is where I will focus.[85]

Malcolm Knowles and colleagues introduced the term 'andragogy' in their seminal work 'The Adult Learner,' defining it as '*the art and science of helping adults learn*.'[86] They claimed more emphasis has been placed in educational research on the learning needs of children, and that those of adults needed renewed attention.[86] Andragogy is based on a number of assumptions:[85,86]

1. As a person matures, their view of themselves changes from that of a dependent person to one who is self-determining. Adults are capable of identifying their own learning needs, and of finding ways to meet them.

2. Adults accumulate a growing reservoir of experience, which can assist learning new knowledge and skills.

3. Adults value learning that integrates with the demands placed on them in everyday life.

4. Adults are more problem-centred than subject-centred in their learning. They value learning that can be applied to authentic problems that they encounter in everyday life.

5. Adults are motivated to learn by internal factors (such as the desire to succeed, or the satisfaction of learning, or the fulfilment of personal goals) rather than external incentives and rewards.

These assumptions guided the formulation of a number of principles for the design of learning activities.[85] First, an effective learning climate should be established, in which learners are comfortable to express themselves without fear of judgement. Secondly, learners should be involved in the planning of their learning, ensuring its relevance to their needs. They should also be involved in identifying their own learning needs. This will trigger their internal motivation and promote self-reflection and integration of learning. They should be encouraged to construct their own learning objectives and identify resources and strategies for fulfilling them. It should be recognised that learners will need support, otherwise they may become demotivated. Finally, learners should be encouraged to evaluate their own learning. This demands critical reflection and is a vital component of self-directed learning.

When McMaster University opened in 1969, the design of the new medical curriculum borrowed a case-study method used by Harvard Business School,[85] and combined it with the self-directed learning principle from adult learning theory.[87] The resulting model of learning - Problem Based Learning (PBL) - has since become widespread across the globe.[88]

It has been introduced as the main learning format in medical schools in Canada and the United States, and has been incorporated into more traditional curricula in Australia, Brazil, India and several European countries.[89] Six characteristics of the McMaster PBL model are described by Barrows:[80]

1. Learning was student-centred. The students assumed responsibility for their own learning, identifying what they need to know to better understand and manage a defined problem. They also determine appropriate sources of information. Teaching staff across several disciplines were available for advice. Each student's learning was effectively personalised, and they were encouraged to address their knowledge gaps and pursue areas of interest.

2. Learning took place in small groups of around ten students. At the end of each learning module, students and tutors were reorganised into different groups so the students could experience working in different teams.

3. Tutors assumed a facilitative role. They did not give students factual information, did not tell them whether they were right or wrong in their thinking, and did not tell them what they ought to study or read. Instead, they asked the students the kinds of questions that they should be asking themselves to better understand and manage the problem, though students would eventually assume this role themselves. To reinforce the facilitative role of tutors, those assigned to particular modules were not always content experts.

4. A patient or community health problem formed the focus and stimulus for learning. It would be presented in some format, such as a written case, case vignette, simulated patient, computer simulation or videotape. This was meant to replicate the sort of challenge they would face in actual practice, providing motivation and encouraging them to integrate information from different disciplines.

5. Problems were designed to stimulate the development of problem-solving skills. Students would simulate actual practice by composing questions to ask the patient, suggesting physical examinations and laboratory tests. The results of these inquiries would be revealed as they worked their way through the problem.

6. Students acquired new information by self-directed exploration. They worked together, however, to discuss, compare, review and debate what they had learned.

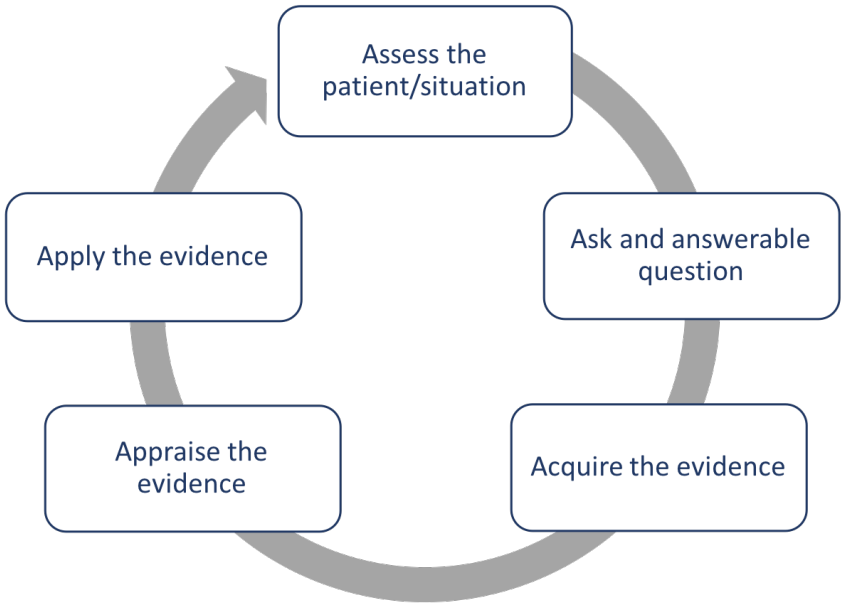
The influence of adult learning theory was evident in the Internal Medicine Residency Programme at McMaster University, where EBHC was first taught.[8] Learning centred around a clinical problem. Residents would critically appraise research articles relating to the problem and summarise their findings as a 'clinical bottom line.' These summaries were compiled as a useful resource on the ward.[15]

The Master's Programme in Evidence-based Health Care at the University of Oxford is also designed on the principle that students bring clinical problems to the course, for which they are supported in self-directed learning to find and critically appraise the best available

evidence.[89] Tutors titrate the level of support they offer, gradually withdrawing as the students learn to solve problems among themselves.

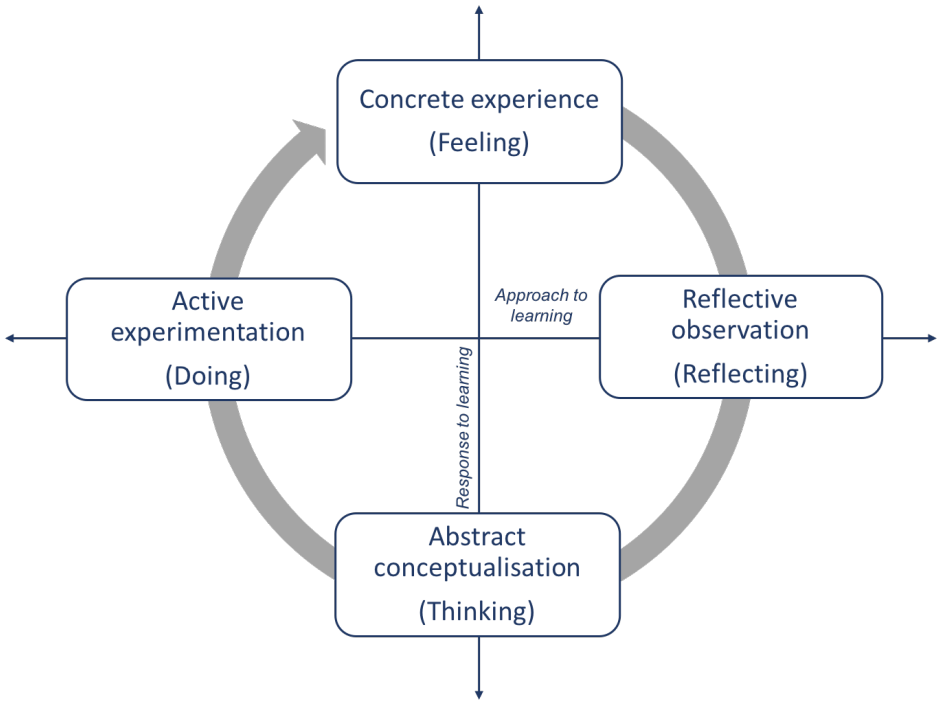
The self-directed, problem-oriented elements of adult learning are not only evident in the way EBHC is taught. It is also implicit in the five-step model of EBHC practice described by the EBM Working Group at McMaster,[8] and in the Sicily Statement.[18] I propose that a particular model of adult learning theory – experiential learning – is clearly evident within those five steps. I have been unable to find confirmation in the literature that this was intentional, but it would be no surprise given the attention paid to adult learning theory by the group at McMaster University in the design of their EBHC programme. Figure 2.2 below is adapted from an introductory article used in the Masters in Public Health programme at the University of Hong Kong (which I both studied and taught).[90] Here, the five steps are depicted as an iterative cyclical process, which a clinician undergoes as they encounter new clinical problems and uncertainties. The first stage in the cycle (assess the patient/situation) is a response to the experience of a knowledge gap occurring during clinical work. The next stage (ask an answerable clinical question) is a reflective one, in which the experience of uncertainty is explored and expressed as a question. The search for, and identification of evidence (acquire), and its subsequent critical appraisal (appraise) are analytical activities. From a learning perspective, the next stage (apply the evidence) is experimental: the evidence is put to the patient for further consideration in light of their unique perspectives and values, and the clinician assesses whether the initial problem has been addressed. This assessment represents a return to the first stage of the cycle. If the problem has not been addressed adequately, the cycle will continue in light of this new

Figure 2.2 The EBHC process depicted as an iterative cycle



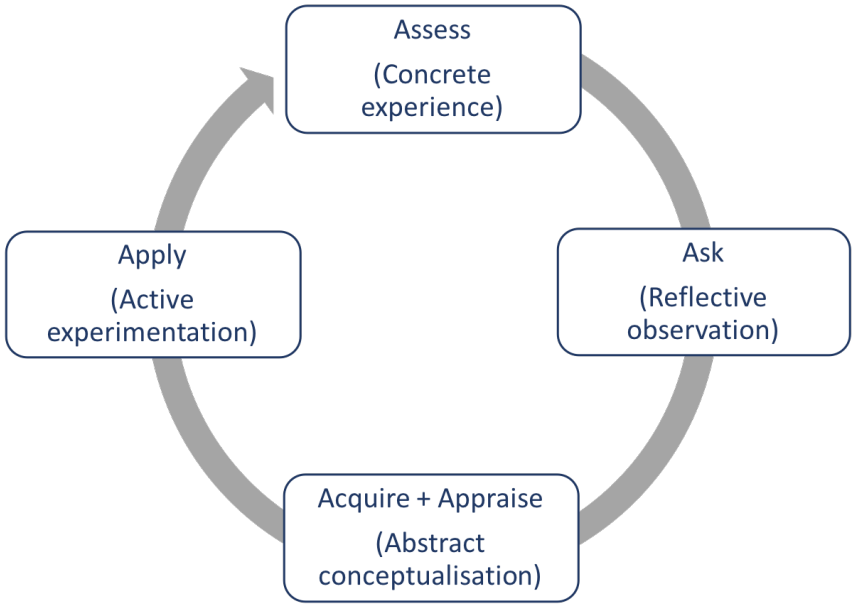
information. The process I have just described is an example of Kolb's experiential learning cycle (Figure 2.3).[91] According to Kolb, learning is a cyclical process comprising four stages. In order, these are: (1) a concrete experience; (2) reflection on that experience, and what it means personally; (3) abstract conceptualisation, in which the learner critically analyses the experience to better understand it; and (4) active experimentation, in which the learner tries out ways of modifying the next occurrence of the experience. In Figure 2.3, concrete experience and abstract conceptualisation are depicted as opposite poles along a vertical axis. This axis represents the learners' *approach* to learning along a continuum: those who are situated towards the upper pole *feel* an experience sharply, whereas those situated towards the lower pole approach learning more by *thinking*. The horizontal axis represents the *response* to learning along a continuum. At the right end of the axis, learners tend to

Figure 2.3 Kolb's experiential learning cycle



reflect on the experience, whereas those situated at the opposite end tend to *act* on the experience. All learners lie somewhere along these two axes in their approach and response to learning. Individuals' orientation towards learning can be assessed using a Learning Style Inventory.[91] When scores are plotted along the same horizontal and vertical axes, those oriented in the upper right quadrant are said to be *diverging* in their learning style; those in the lower right are *assimilating*; those in the lower left *converging*; and those in the top left *accommodating*. A learning activity is thought to be particularly valuable if it is designed in such a way that it contains elements requiring all four learning styles.[91] The model therefore not only describes a theory of how we learn, but also provides a useful template for designing a learning activity or curriculum.[92] Figure 2.4 assimilates the five-step approach to EBHC and Kolb's experiential learning cycle. I have placed 'Acquire' and

Figure 2.4 Framing the EBHC process as experiential learning



'Appraise' together as the 'abstract conceptualisation' element of the learning cycle as both activities involve the application of theories to solve problems. In acquiring the evidence, the clinician starts with a theory of how bibliographic databases work and applies it to their clinical question to construct a suitable search strategy; and selection of evidence is guided by a theory of what constitutes appropriate inclusion and exclusion criteria. In critically appraising the evidence, the clinician applies theory-based frameworks to determine whether the evidence is important, valid and applicable. I found it useful to frame the EBHC process as experiential learning in this way, and I return to it later in the thesis.

2.3.3.2. Reflective practice

The reflective element of adult learning has received much attention in medical education,[82] and merits further exploration in its own right. In recent years, reflection has

been considered an essential attribute of the modern health care professional, who works in a complex and ever-changing system of service delivery and must continuously update their knowledge to deal with complex clinical problems.[82] It was defined by Dewey as '*active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends.*'[93] Defined thus, it resembles a form of critical thinking. Boud developed the concept further, emphasising a focus on personal experience and one's emotional response: '*a generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to a new understanding and appreciation*.'[94] In his seminal work of 1983,[81] Schön defined reflective practice as '*the practice by which professionals become aware of their implicit knowledge base and learn from their experience*.' He challenged the traditional notion of professional practice as guided predominantly by theoretical knowledge acquired in professional preparation.[81,85] He proposed that such knowledge is often insufficient in itself to address the complex problems of real-world practice. He argued that the professional also requires what he termed 'knowing-in-action' – the spontaneous, skilful execution of performance in a live situation.[81] Knowing-in-action is based on tacit knowledge, which is difficult to articulate, and would appear impressive to a novice observer.[95] Shapiro and Talbot likened knowing-in-action to our ability to ride a bicycle.[95] Schön also coined the term 'reflection-in-action.'[81] Continuing the bicycle-riding analogy, when the bicycle skids, the rider encounters a surprise or 'ill-structured problem' for which they are unprepared. The rider responds by continuing to ride, while simultaneously making innumerable adjustments based on previous experience of riding, and feedback from the movement of the bicycle. This response is what Schön referred to

as 'reflection-in-action.'[81] Like knowing-in-action it usually occurs automatically at a subconscious level. In the clinical context, the GP finds theory driven knowledge suddenly insufficient when presented with a more complex problem. The 'reflective practitioner' will then engage in skilled reflection as they manage the problem, forming hypotheses on the nature of the problem, and how it might be tackled. This leads to experimentation, feedback and finally the design of a tentative novel solution. Reflection-in-action is therefore characterised by real-time experimentation and improvisation. Newly-acquired and unanticipated data are weighed up along with book knowledge, clinical experience, knowledge of the perceptions, values and capacity of the patient, and the social context in which their problem has arisen.[95] Reflection-in-action requires a patient-centred approach to medical care, and is therefore considered key to general practice.[95]

2.3.3.3. Competency-Based Medical Education

'Competency' refers to *a complex set of behaviours built on the components of knowledge, skills and attitudes*, and 'competence' refers simply to *personal ability.*[96]. 'Competency-Based Medical Education' (CBME) was defined by an International CBME Collaborators group in 2009[97] as:

'An outcomes-based approach to the design, implementation, assessment, and evaluation of medical education programmes, using an organising framework of competencies.'

CBME differs from the traditional approach to medical education.[98] Demonstration that the learner is competent to perform the required tasks of their profession is considered more

important than the *processes* by which the teacher must teach or the learner must learn.[98] Competency-based education explicitly defines the professional abilities needed ('outcomes' in the above definition), and these drive the development of curricula, assessment and evaluation. Time spent in a particular specialty is considered less important than in the traditional approach.[98] The learner plays a stronger role, working with the teacher to plan their learning.[96] The goal of education is knowledge *application*, rather than *acquisition*. Assessment uses a greater variety of objective measures, applied in a realistic setting.[96]

Caraccio reviewed the literature to determine whether CBME is an improvement on traditional time-and-process-driven education.[96] One example cited was the adoption of a competency-based approach at Brown University School of Medicine in the early 1990s.[99] The result was equivocal, the examination scores of students on the revised programme reflecting the national mean.[100] A pilot program at the University of Southern California assessed the value of a competency-based clinical skills assessment among third-year medical students.[101] Scores compared poorly with those from standardised national board examinations, though they improved with clarification of the expectations placed on students. Students in a surgery residency programme at Staten Island University Hospital undertook a competency-based instruction module.[102] It resulted in a reduction in the residents' trauma resuscitation time in the clinical setting. Overall, the evidence in favour of a CBME approach is (from Caraccio's review) moderate at best.

I explored the literature on the effectiveness of CBME in general practice. I searched the bibliographic database MEDLINE[103] for articles in English by combining the terms 'competency-based education' AND (general practi$ OR General Practice/ OR family practi$ OR Family Practice/). I adapted the search for the educational database ERIC.[104] Across both databases, 13 relevant articles were found, of which the best evidence was from a systematic review conducted in 2006.[105] This explored a number of measures of CBME effectiveness in general practice. Only patient access to medical services was improved. There was no direct evidence that CBME was effective in achieving better integration and multidisciplinary care, better management of chronic disease, greater focus on prevention and early intervention, greater community support, or professional satisfaction and teamwork.[105] Grant cites the complexity and heterogeneity of curriculum design as reasons for the paucity of supporting evidence.[106] The competency-based approach is not without critics. One line of criticism is that a simple statement of competencies cannot encapsulate the complex nature of professional practice, which requires gathering and processing of information, judgment, interactions and a host of other attributes that are difficult to pin down.[107] Brightwell puts this criticism simply:[108]

'Being a doctor is much more than the sum of the individual tasks performed.'

It has also been asserted that 'product-oriented curricula' remove control of learning from the learner, and similarly disempower their teachers.[109] The strength of evidence in favour of a competency-based approach is therefore moderate at best. Iobst nevertheless describes a 'quiet revolution' in medical training[98] towards a competency-based approach, starting with the launch in 1993 of Tomorrow's Doctors in the United Kingdom, a set of

outcomes and standards for undergraduate medical education[110] The approach spread internationally with the CanMEDS framework in Canada,[111,112] the ACGME Outcomes Project in the U.S.,[113] the Australian Curriculum Framework for Junior Doctors,[114] and the 2009 Framework for Undergraduate Medical Education in the Netherlands.[115] In general practice, a competency-based approach to training is evident among Anglophone countries. Examples are the curricula published by the Royal College of General Practitioners (RCGP) in the UK,[5] and the Royal Australian College of General Practitioners (RACGP)[2] Other examples are the competency frameworks published by the Accreditation Council for Graduate Medical Education (ACGME) for Family Medicine in the U.S.,[4] and the College of Family Physicians of Canada.[3]

2.3.3.4. Performance appraisal and revalidation in general practice

One particular development in CBME that is of interest to this thesis is the introduction in the UK of mandatory annual performance appraisal and periodic 'revalidation' of the license to practice as a GP. I will describe the background to their introduction, and the format of the appraisal.

Irvine described the reasons behind the introduction of performance appraisal.[116] The perception existed that the culture of British medicine was paternalistic, concerned primarily with the doctor. It paid scant attention to the humanities of medicine, particularly communication with the patient. There was a tolerance of poor standards and a lack of transparency. High profile cases of bad practice fueled mistrust of the medical profession. An example was the Bristol heart surgery case, in which surgeons and the chief executive

at the Bristol Royal Infirmary were judged to have failed to act on evidence of unsafe practice.[117] An ensuing public enquiry revealed deeper, systemic problems with management and governance within the National Health Service.[118] The findings galvanised the General Medical Council to enact reforms and culminated in a new government framework for regulation of medicine, putting the safety of patients treated by the NHS first. Following recommendations made in the 1999 Department of Health report 'Supporting Doctors, Protecting Patients,'[119] GP appraisal became compulsory in England in 2004.

An appraisal is a structured process of facilitated self-reflection[120] carried out annually. A standardised model was adopted, based on the Good Medical Practice framework published by the GMC (Table 2.1).[121] The appraisal is formative, based on a confidential conversation with a trained appraiser, supported by documentation around the domains specified in *'Good Medical Practice*.' For documentation, GPs have at their disposal a number of 'appraisal tools.' These are documents with standard key sections,[122] much of which are filled in by the GP before discussion with the appraiser:

- Continuing professional development (CPD) activity. Examples are courses, online modules, case reviews and background reading. The GP describes how these supported their work and reflects on how their CPD fulfilled the criteria for Good Medical Practice. A minimum number of educational credits must be achieved per year.

Table 2.1 The Good Medical Practice framework (GMC, 2013)

Domain	Attributes	Examples
Knowledge, skills and performance	Maintain your professional performance	Keep knowledge and skills about your current work up to date. Participate in professional development and educational activities.
	Apply knowledge and experience to practice	Provide effective treatments based on the best available evidence. Consult colleagues, or refer patients to colleagues, when this is in the patient's best interests.
	Ensure that all documentation (including clinical records) formally recording your work is clear, accurate and legible	Make and/or review records at the same time as the events are documented or as soon as possible afterwards. Ensure that any documentation that records your findings, decisions, information given to patients, drugs prescribed, and other information or treatment is up to date and accurate.
Safety and quality	Contribute to and comply with systems to protect patients	Take part in systems of quality assurance and quality improvement. Comply with risk management and clinical governance procedures.

Continued

Domain	Attributes	Examples
	Respond to risks to safety	Report risks in the healthcare environment to your employing or contracting bodies. Safeguard and protect the health and well-being of vulnerable people, including children and the elderly and those with learning disabilities.
	Protect patients and colleagues from any risk posed by your health	Make arrangements for accessing independent medical advice when necessary. Be immunised against common serious communicable diseases where vaccines are available.
Communication, partnership and teamwork	Communicate effectively	Listen to patients and respect their views about their health. Give patients the information they need in order to make decisions about their care in a way they can understand.
	Work constructively with colleagues and delegate effectively	Treat colleagues fairly and with respect. Support colleagues who have problems with their performance, conduct or health.

Continued

Domain	Attributes	Examples
	Establish and maintain partnerships with patients	Encourage patients to take an interest in their health and to take action to improve and maintain it. Be satisfied that you have consent or other valid authority before you undertake any examination or investigation, provide treatment or involve patients in teaching or research.
Maintaining trust	Show respect for patients	Implement and comply with systems to protect patient confidentiality. Be polite, considerate and honest and respect patients' dignity and privacy.
	Treat patients and colleagues fairly and without discrimination	Be honest and objective when appraising or assessing colleagues and when writing references. Respond promptly and fully to complaints.
	Act with honesty and integrity	Be honest in any formal statement or report, whether written or oral, making clear the limits of your knowledge or competence. Inform patients about any fees and charges before starting treatment.

- Quality improvement activity. This is a record of activities undertaken to evaluate the quality of the GP's work. Examples include clinical audit and case reviews. The GP describes the impact of these activities on their practice, and how they demonstrated fulfilment of GMC criteria for Good Medical Practice.

- Significant events. These are unintended or unexpected events, which could - or did - lead to harm of one or more patients. The GP reflects upon and draws useful learning from the event. A minimum number of significant events must be recorded per year.

- Achievements, challenges and aspirations. This encourages the GP to review their progress and plan for further development.

- Personal development plan (PDP). This is a list of personal objectives. A target date is set for completion. The PDP is agreed by discussion between the GP and their appraiser at the end of each appraisal.

- Review of the previous year's personal development plan. Progress towards previously set goals is reviewed.

- Summary of appraisal. This is an account of the discussion between the GP and their appraiser.

Appraisal documents are all similar in design and gather the same information. Reflection, feedback and an agreed action plan follow the discussion, guiding the GP's further learning and professional development. All doctors are revalidated every five years by demonstrating through their annual appraisals that they have fulfilled the requirements of '*Good Medical Practice*.' Retention on the General Medical Council's list of registered practitioners is contingent on successful revalidation.

2.3.4 The evolving field of research synthesis

A major part of the thesis involved synthesis of findings from multiple research studies into an integrated whole. Research synthesis is an evolving field, with many methodological approaches described in the literature, and as yet, no consensus on a single best approach.[123] Once again, it may help the reader to understand the methodological justifications given throughout the thesis if some relevant background, terminology and concepts are outlined at this stage. In this section I will provide a background to the emergence of different forms of research synthesis. I will focus on mixed methods synthesis, providing the reader some illustrative examples and a useful taxonomy. I will describe the controversy around combining diverse forms of evidence and will present some authors' justifications amidst continued demand for this kind of synthesis. I will conclude with a description of the factors recommended for consideration in choosing an approach to mixed methods synthesis, and the need for flexibility in its execution.

2.3.4.1 Research synthesis as an integral aspect of EBHC

Synthesis of study findings was promoted by the epidemiologist Archie Cochrane, one of the most influential voices in the development of EBHC.[124] In his landmark 1972 publication '*Effectiveness and Efficiency: Random Reflections on Health Services*' he highlighted 'collective ignorance' at the time about the effects of health care.[125] In 1979 he recommended that each clinical specialty maintain a regularly updated critical summary of all relevant clinical trials.[126] What he was calling for we now know as 'systematic reviews.' Porta defines a systematic review as '*the application of strategies that limit bias in assembly, critical appraisal and synthesis of all relevant studies on a particular topic.'*[74] In response to Cochrane's recommendation, funds were provided by the UK National Health Service in the early 1990s to establish a Cochrane Centre in Oxford.[127] The approach gained further impetus at an international meeting organised by the New York Academy of Sciences in 1993, and this was followed the same year by the foundation of the Cochrane Collaboration. The Collaboration has since grown to become a worldwide organisation with 11,000 members and over 35,000 supporters from more than 130 countries.[10] It produces reviews of the best available evidence to inform decisions about health across all medical specialities.[128]

2.3.4.2 A perceived need for mixed methods syntheses

Initially, systematic review methods favoured synthesis of only quantitative data (which put simply, is data in the form of numbers[129]), usually derived from randomised controlled trials. Traditional systematic reviews completely omitted qualitative data (non-numerical data, typically but not necessarily in the form of words[129]).[130] However, policy-makers and

practitioners became increasingly aware that their work was severely limited if randomised controlled trials were regarded as the sole source of evidence.[130] Harden noted that systematic reviews often concluded that there was insufficient good-quality evidence to answer a research question or inform policy and practice.[131] A number of authors maintained that by including other forms of evidence from different types of research, systematic reviews would be more relevant, and could better inform policy and practice.[123,131-135] Mixed methods research, in which quantitative and qualitative methods are combined, became increasingly valued and practiced, as it was perceived that it could combine the strengths of each approach.[136] Before explaining mixed methods research further, it is useful to first describe and compare quantitative and qualitative research in more detail.

2.3.4.3 Quantitative and qualitative research explained

Quantitative research aims to classify features, count them and construct statistical models in an attempt to explain what is observed.[137] McCusker and Gunaydin highlight the main defining features of quantitative research:[137]

- The researcher knows clearly in advance what he or she is looking for, testing a hypothesis that has already been formed, often in earlier research.

- The second feature follows from the first: quantitative research is therefore recommended during latter phases of research projects.

- All aspects of the study are carefully designed before data is collected. The researcher starts the project with a clear objective and derives objectivity from adhering to it throughout.

- The researcher uses tools, such as questionnaires or equipment, to collect numerical data.

- Rather than focus on the perspectives of individuals, quantitative data are generated in larger volume. They aim to be representative of a larger population so that inferences can be made about that population.

- Quantitative data are efficient, able to test hypotheses, but may miss contextual detail.

- The researcher tends to remain objectively separated from the subject matter.

Qualitative research aims to understand social phenomena in natural (as opposed to experimental) settings, emphasising the meaning of experiences and views of all the participants, who may be patients, the community or healthcare workers.[137,138] Holloway describes four methodological 'commitments' that enable qualitative research to focus on the views of participants:[139]

1. It gives priority to obtaining and analysing textual data, such as transcripts of interviews, free-text comments on a questionnaire or entries in medical records. Textual data allow participants to express their thoughts and beliefs in their own terms.

2. Qualitative research relies on extensive interaction between the researcher and those who are being studied. Those interactions are often open and unstructured. Data are not perceived to exist in a fixed, pure form, as discrete items that can be '*collected*'; rather, the qualitative researcher acknowledges that data arise in a more fluid manner, through interactions with participants.

3. Inquiry is flexible. The qualitative researcher must respond reflexively to the ideas expressed by participants. The plan of enquiry may therefore evolve as the study progresses, and there may not be a rigid pre-defined protocol for sampling, data collection and analysis. The standardised procedures employed in quantitative research for reducing bias and ensuring reproducibility do not apply. Rather, the qualitative researcher must continually reflect critically and transparently on the decisions made as they proceed. They rely on reflexivity and transparency to provide assurance about the credibility of the evidence they generate.

4. As far as possible, interactions with participants occur in a 'naturalistic' setting that resembles normal social interaction. It follows that the research itself is regarded as a social interaction, and as such, open to interpretation. Furthermore, the generalisation of findings to other situations does not depend (like quantitative research) on sampling

theory, but on the extent to which findings fit with general theories on how social interactions occur. Such theories are essentially explanatory stories that help us make sense of our experience. The qualitative researcher acknowledges that all evidence generated during an empirical inquiry is the result of either explicit or implicit use of such theories.

2.3.4.4 Examples of mixed methods synthesis

Mixed methods research has been defined as '*research in which the investigator collects and analyses data, integrates the findings and draws inferences using both qualitative and quantitative approaches*.'[140] A number of authors have argued that mixed methods research can do greater justice to the complexity of phenomena studied in health care.[130,131,133,134] A traditional systematic review comprising only randomised controlled trials would focus on the question '*what interventions work?*'[131] Often however, and particularly in areas such as public health, health interventions are of a social nature rather than clinical, surgical or medication-based. In these cases, we may want to explore policy and practice considerations alongside questions of effectiveness.[131] It may be important to address not only '*what works?*' but also '*for whom?*' and '*in what circumstances?*'[141] As an illustrative example, Harden cites a mixed methods systematic review about children and healthy eating, commissioned by the English Department of Health.[142] The study comprised three syntheses:

1. A quantitative synthesis of trials of interventions to promote fruit and vegetable consumption. This used a technique called 'meta-analysis', in which quantitative data are pooled statistically.[143]

2. A qualitative synthesis of studies reporting children's own perspectives on eating fruit and vegetables, and healthy eating in general. The technique employed was called 'thematic synthesis,' in which line-by-line coding of text results in the generation of 'descriptive themes.' These are developed inductively, using the researcher's own understanding of the data into more explanatory 'analytic themes.'[144]

3. A synthesis of these two initial syntheses. From the analytical themes, the researchers generated a set of recommendations for interventions that reflected children's views. They then used those recommendations to interrogate the findings of the trials and assess how well the interventions matched their recommendations. This enabled a final set of recommendations to be drawn up, which identified ways to improve interventions and their implementation.

This particular example of mixed methods synthesis appears several times in the literature[144-151] and is clearly explained in each case. I found this degree of clarity – appropriate for an early-years researcher - to be otherwise rare. The only other example I found approaching the same level of clarity was a multi-source synthesis published by Pedersen in 2011, in which the psychosocial needs of chronic fatigue syndrome sufferers

were investigated.[152] In this example, there were four steps, three of which were syntheses:

1. Synthesis 1: a synthesis of qualitative and quantitative studies. In this example, the quantitative data were derived from an array of study designs, not just trials. Qualitative data were combined using thematic synthesis. Quantitative findings addressing the same issues were grouped under descriptive headings. Qualitative themes and quantitative headings were compared and merged if they were reported findings on the same subject.

2. Themes derived from Synthesis 1 were used to guide the conduct of a primary (that is, 'new') qualitative study.

3. Synthesis 2: the findings from the primary qualitative study were synthesised with those of Synthesis 1.

4. Synthesis 3: the findings of synthesis 2 were synthesised with thematic data derived from non-scientific literature found in the literature search for Synthesis 1.

In this example of mixed methods research, Pedersen synthesised four different sources of data: qualitative and quantitative data from pre-existing literature; data from a primary qualitative study; and data from non-scientific literature.

2.3.4.5 A lack of clarity in the methodological literature

I am not the first to comment on the lack of clarity in the field. Lucas observed that

'*innovative methods are often developed during the course of research, but in general, papers report methods only briefly. As a result, the material that could inform learning is more often to be found in filing cabinets than in journals*.'[153]

Dixon-Woods commented in 2005 that methods of synthesising diverse forms of evidence were under-developed and under-evaluated.[130] In 2012, Sandelowski put forward a similar view, maintaining that '*the current impetus in the literatures of mixed methods research and mixed research synthesis is multiplicity rather than parsimony*.'[141] A lack of consensus on the most appropriate method has been noted by a number of authors,[132,133,153,154] including as recently as 2018.[123] Mays ventured that hard and fast methodological 'rules' for the synthesis of qualitative and quantitative evidence are inappropriate given the state of development in the field, and that the emphasis should be on encouraging critical thought, transparency and explicitness in reporting.[133] Harden viewed this situation positively, suggesting that '*the field remains wide open, offering researchers the potential to do a variety of interesting and exciting work*.'[131] A good example of this innovative approach is provided by Goldsmith and colleagues, who synthesised qualitative and quantitative research in updating a systematic review of evidence to inform guidelines for the content of patient information related to cervical screening.[155] Their innovation was to synthesise data on the basis of the strength of evidence across both qualitative and quantitative studies. Another example is Dixon-Woods and colleagues' synthesis to explore

access to healthcare among vulnerable groups,[156] which led to a new approach which they named 'critical interpretive synthesis':

'*Our experiences of working with a large sample of papers using multiple methods led us to refine and re-specify some of the concepts and techniques of meta-ethnography in order to enable synthesis of a very large and methodologically diverse literature. Eventually we had made so many amendments and additions to the original methodology that we felt it was more appropriate, helpful and informative to deem it a new methodology with its own title and processes*.'

Others have sought to bring order where they see chaos, by constructing a taxonomy of mixed research synthesis methods.[132,133,157] The most intuitive and enduring version I encountered was published by Sandelowski and colleagues.[157] I will describe this taxonomy below.

2.3.4.6 A useful taxonomy of mixed methods synthesis

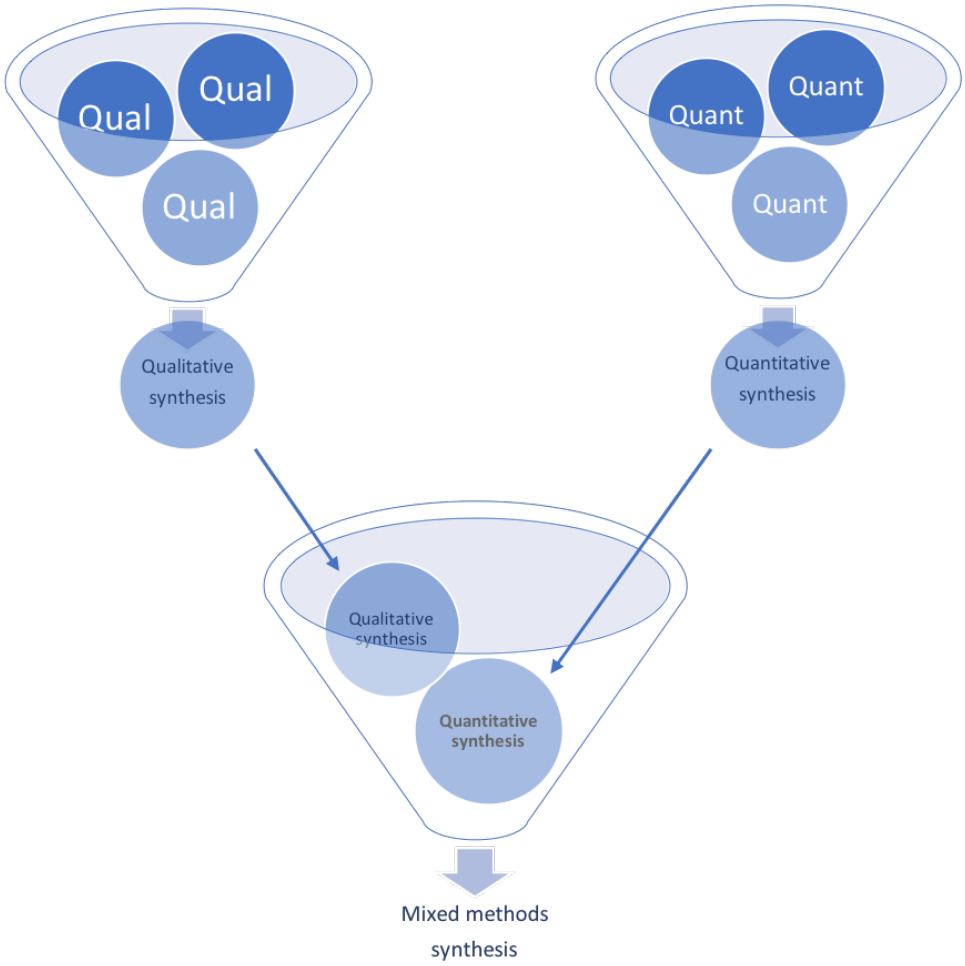
Sandelowski and colleagues distilled the field of mixed methods syntheses into three distinct types - segregated, integrated and contingent:[157]

1. Segregated

In this design, qualitative and quantitative research are initially treated separately. Qualitative data are synthesised using a method considered suitable for qualitative data; and quantitative data are synthesised separately, again using a method considered suitable

for that kind of data. Only then are the findings of each synthesis configured together as a mixed research synthesis (Figure 2.5).

Figure 2.5 Segregated design of mixed methods synthesis



Funnels represent a process of synthesis. Qualitative and quantitative studies are synthesised separately. A third synthesis combines the findings of the first two.

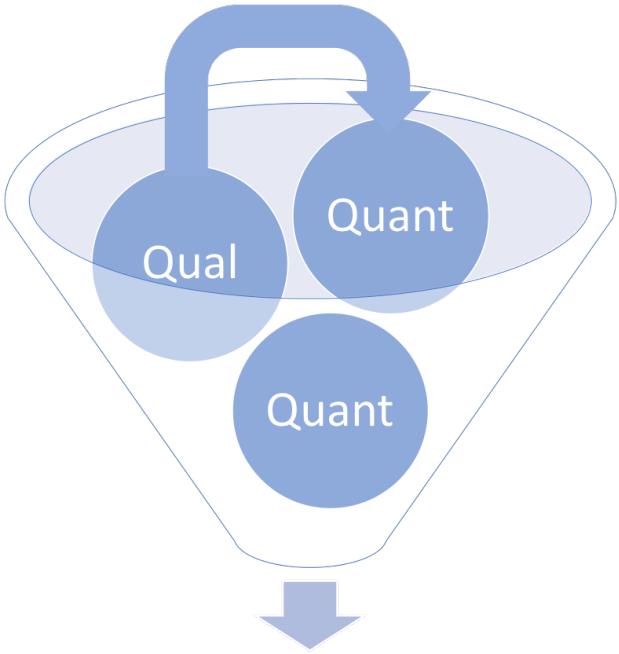
This design assumes that qualitative and quantitative studies are very different entities and therefore should be treated separately. It is recommended when qualitative and quantitative findings are considered to 'complement' (as opposed to confirm or refute)

each other. 'Complementary' findings are those that support each other while addressing similar, but not identical questions, whereas 'confirmatory' and 'refutational' findings address the *same* question and either agree or disagree respectively. The complementary findings of a segregated synthesis are 'configured' into a particular line of argument. The synthesis I described earlier about healthy eating in children[142] is an example of a segregated design. The other example I gave (about psychosocial needs among chronic fatigue syndrome sufferers[152]) used a segregated design to synthesise qualitative and quantitative data from the literature.

2. Integrated

In this design, qualitative and quantitative studies are not treated separately. It is assumed that any differences between them do not warrant separate analyses. Studies are grouped and synthesised on the basis that they examine the same phenomenon, not because they are all qualitative or all quantitative (Figure 2.6). Findings are sometimes transformed in order to be combined: quantitative findings into a qualitative form ('qualitised'), or qualitative into quantitative ('quantitised'). The integrated design is recommended when qualitative and quantitative findings on a particular topic are confirmatory or refutational (as opposed to complementary); and when mixed research synthesis is defined as the direct assimilation (as opposed to configuration) of research findings.

Figure 2.6 Integrated design of mixed methods synthesis

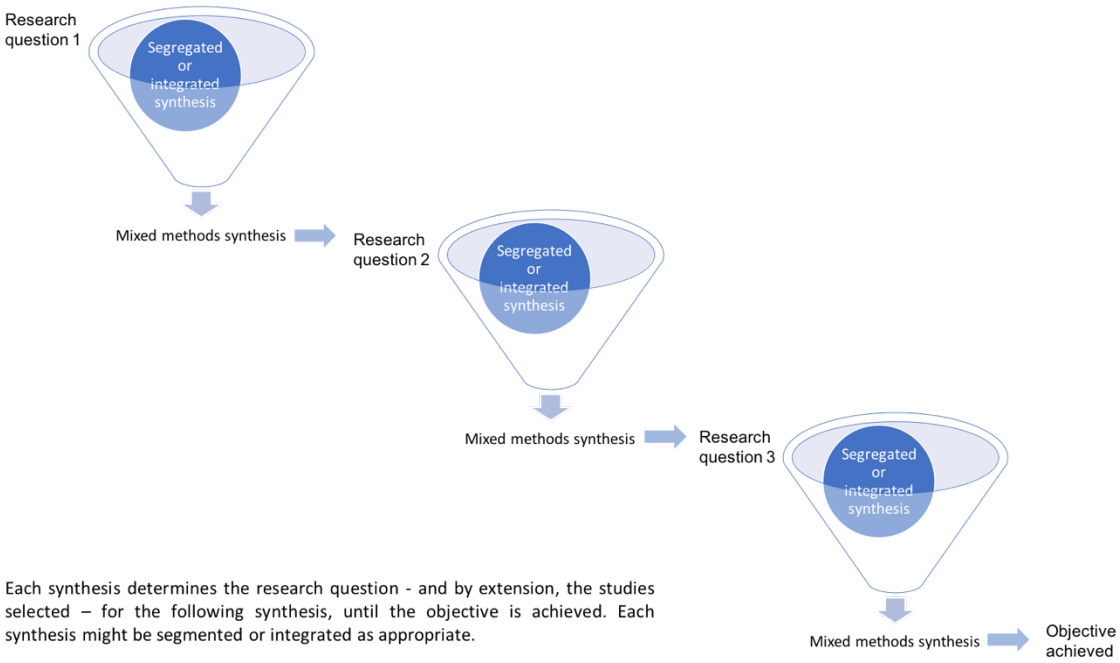


Qualitative and quantitative studies are combined in a single synthesis. Qualitative studies are quantitised, or quantitative studies are qualitised (the process illustrated here is quantitisation).

3. Contingent

A contingent design follows an iterative pattern (Figure 2.7). An initial research question (1) is addressed by a suitable synthesis of studies. This could be segregated or integrated. The findings determine research question (2) and which studies are synthesised to address it. Again, the synthesis could be segregated or integrated. The findings of that synthesis determine the next research question and so on, until a comprehensive synthesis can be presented that addresses the researcher's objective. Studies are not grouped on the basis of whether they are qualitative or quantitative, but by their appropriateness to answer

Figure 2.7 Contingent design of mixed methods synthesis



questions raised by preceding syntheses. A good example of a contingent design is again provided by Pedersen's study of the psychosocial needs of people with chronic fatigue syndrome.[152] As I noted earlier, the initial synthesis of qualitative and quantitative studies was segregated. However, the study as a whole was largely contingent, as most stages were contingent on the findings of that which preceded it.

2.3.4.7 Controversy about the legitimacy of combining qualitative and quantitative data

Concerns have been expressed about the legitimacy and feasibility of combining the findings of qualitative and quantitative studies.[133] Some have expressed concern that qualitative and quantitative methods are based on different assumptions about the nature

of reality, about the relationship between the researcher and those being studied, and the best methods to use.[158] Others have argued that aggregation erodes the integrity of individual studies.[159] In favour of synthesising qualitative and quantitative evidence however, Noyes argues that such work '*has a role to help establish how an intervention works, for whom and in what contexts, and to shed light on how best to implement it*.' Sandelowski cites its '*distinctive capacity for reaching facets of human experience unreachable with quantitative methods; its central role in the development and testing of culturally-sensitive instruments and participant-centred interventions; and (its role) in enhancing the practical significance, and even salvaging, of quantitative research findings*.'

2.3.4.8 The continued demand for mixed methods syntheses

Despite continued debate, mixed methods designs have continued to gain popularity.[132] Gough offers a number of possible drivers to this change:

- An increased awareness of systematic reviews in general has brought widespread acceptance as a suitable method in all areas of research.

- More training in systematic review methods, and an increase in funding have both increased the capacity to conduct such varied review work.

- Some initial anxieties about systematic reviews being used to control research agendas around particular ideologies may have subsided.

Östlund proposes that the rise in use of mixed methods syntheses has been driven by (1) pragmatic issues of an increased demand for cost-effective research; and (2) a departure from theoretically driven research towards a new variety that meets policymakers' and practitioners' needs amidst a climate of increased competition for research funding.[136] The field continues to evolve: the Cochrane Qualitative and Implementation Methods Group was formed in the late 1990s[123] to provide methodological guidance. At the time of writing, it cites more than 30 methods for conducting a qualitative evidence synthesis, and ten evolving methods commonly used for mixed methods synthesis.[123]

2.3.4.9 The choice of mixed methods synthesis design

The choice of design will depend on a number of factors.[133] Most fundamentally, it will be guided by the aim of the synthesis. This could be, for example, to summarise the evidence base on a particular topic, or to make a recommendation. It will also depend on the specific questions to be addressed, the nature of evidence available (for example, qualitative versus quantitative), and the context in which the research takes place. An example of context offered by Mays is the particular stage that policy development has reached.[133] Sandelowski calls for flexibility in execution, whichever design is chosen: '*In research synthesis studies, methods must always be accommodated to the actual reports of research under review and to the nature of the findings presented in them*.'[135] She proposes that the 'novel combinations' of approaches described in reports of research synthesis studies testify to an appropriate and necessary adjustment of those methods as the task unfolds. Dixon-Woods and colleagues provided a good example of this flexibility in their synthesis

to explore access to healthcare among vulnerable groups.[156] This echoes the 'reflexivity' that I described earlier as one of the 'commitments' implicit in qualitative research.[139]

To summarise, I have described the central role played by research synthesis in the EBHC project, with the influence of Archie Cochrane in the 1970s and the launch of the Cochrane Collaboration in the 1990s. I have explained the perceived need for a more eclectic approach to synthesis, to address not only '*what works?*' in policy and practice, but also '*for whom, and in what circumstances?*'[141] I have recounted how this led to the combining of two distinct 'heritages' in research - qualitative and quantitative – in mixed methods syntheses. I have sought to provide the reader with lucid examples of mixed methods syntheses and have offered a useful taxonomy of its variant forms, in an effort to cut through what many authors agree is an opaque literature on the subject. I have also touched on the controversy around combining qualitative and quantitative evidence and presented several authors' justifications amidst a continued demand for the approach. I have concluded with an account of the factors recommended for consideration in the choice of mixed methods synthesis approach, and of an acknowledged need for flexibility. This introductory account will clarify the decisions described in subsequent chapters.

2.4 The relationship between EBHC and general practice

There is evidence that uptake of EBHC among GPs is limited. Several studies published between 1998 and 2010 have indicated poor uptake of EBHC in general practice.[19,21,160-162] A study by Willis and colleagues published as recently as 2017 analysed electronic primary care data from 89 general practices in West Yorkshire to elicit the proportion fulfilling a set

of evidence-based 'high-impact' quality indicators (QI) for primary care.[163] The results revealed stark variation between practices in terms of evidence-based practice uptake: median practice achievement of QIs ranged from 43.2% (diabetes control) to 72.2% (blood pressure control in chronic kidney disease). There was marked inter-practice variation for all QIs, with a 26.3% difference between highest and lowest performing practices for risky prescribing, a 100% difference for anticoagulation in atrial fibrillation and a greater than ten-fold difference in the likelihood of achieving the hypertension indicator. Patient characteristics, in particular age, gender and comorbidity, were associated with QI achievement. Age and comorbidity among patients[164] were among a number of unique barriers to EBHC in general practice cited by Willis,[163] along with rising workload, demands on practice[165] and rising public expectations,[166] all occurring against a backdrop of strain on practice organisational capacity[167] and continuous organisational reform.[168,169] A comprehensive synthesis was published in 2012, describing multiple barriers to EBHC in general practice (Table 2.2).[48] Barriers related to the nature of the evidence, the GPs' perceptions, the patients' perceptions and the general practice setting.[48] For example, the evidence itself was often considered to lack relevance[170] and quality,[170,171] and was seen as inaccessible,[19,160,170-180] contradictory[170,171,176,177] and often out of date.[170] Also problematic was the sheer volume of evidence produced in the modern era.[19,180] Among barriers relating to GP perceptions, negative attitudes towards EBHC among GPs[177,181] and their colleagues,[19,175,180] were cited, together with a lack of knowledge and skills.[19,21,170,171,180-182] Patients' preferences, expectations and beliefs were perceived to limit EBHC.[21,161,171,176,180] This is perhaps surprising, given the primacy afforded to patient perspective in later

Table 2.2 Perceived barriers to the use of EBHC among GPs (adapted from Zwolsman et al., 2012)

Evidence	GP perceptions	Patient perceptions	Practice setting
Difficulty translating trials into practice	Limited knowledge of EBHC	Treatment expectations differ from evidence	Limited applicability of evidence to general practice
Use of evidence is complicated	Difficulty keeping up	Adaptation to patient preferences, beliefs and demands at odds with evidence	Lack of time
Changes in existing evidence	Difficulty finding information	Reluctance to adhere to treatment	Lack of managerial support
Need for improved presentation formats	Limited EBHC skills	GP's desire for patient's appreciation	Lack of investment/incentives
Lack of good quality evidence	Negative attitude towards EBHC	Difficulty in discussions about evidence	Fear of litigation
Contradictions in the evidence	Lack of training	Not accepting uncertainty of evidence	Financial requirements unmet
Too much evidence	Experience at odds with evidence	Confidence in GP reduced by guidelines	Rural location
Lack of resources	Fear of patient harm	Relationship between GP and patient	Morale
Available sources of evidence not helpful	Limited harmonisation of guidance	Experiences of the patient differ from evidence	
Poor access to evidence	Practicalities of real life	Limited tolerance of uncertainty in the evidence	
Lack of trust in the origin of evidence	Lack of confidence	Barriers from clinical symptoms, disease	

Continued

Evidence	GP perceptions	Patient perceptions	Practice setting
Lack of evidence using best methods for context	Lack of familiarity with new role	Psychosocial context	
Implications of evidence	Personal and organisational inertia	Influence of the media	
Language barrier	Cultural barriers	Information retrieval by patient	
Lack of expert interpretation	Influence of peers	Poor wording of information by GP	

definitions of EBHC.[15] GPs may feel that any deviation from evidence-based guidelines to accommodate their patient's preferences would contradict the principles of EBHC.[161] The applicability of evidence to general practice was found to be a significant barrier. There was a common perception that the participants in RCTs rarely resembled the patients encountered in general practice.[161,171,172,177,180,182-185] GPs cited a lack of time for searching and appraising evidence,[19,21,160,162,170,171,174,175,178-182,185] and a lack of managerial or institutional support.[162,177] EBHC uptake in general practice may be lower than in other medical specialties. To my knowledge, Upton et al. provide the only published example.[178] They compared 500 general practitioners with 500 hospital specialists for their knowledge and skills of EBHC in a postal questionnaire. The GPs rated their EBHC skills lower than their hospital-based counterparts and reported using EBHC steps less frequently. GPs reported greater difficulty accessing a library and making time available.

In conclusion, though EBHC has had a considerable influence on the practice of medicine more broadly, there is consistent evidence that uptake has been limited in general practice,

where there are significant barriers. Given the pivotal role of general practice in many health care systems, this could lead to unnecessary, widespread delivery of sub-standard care.

Two questions occurred to me at this point in my investigation: (1) '*Is there a suitable alternative to the traditional framework of EBHC, that is tailored specifically for general practice?*' or failing that, (2) '*Does there exist some other strategy to integrate the two disciplines?'* My next task was to answer these questions by reviewing the existing research literature. My review is described in the following section.

2.4.1. Review of literature on strategies to integrate EBHC and general practice

To explore the research already undertaken regarding the integration of EBHC with general practice, I conducted a comprehensive, systematic literature search using the bibliographic databases Ovid MEDLINE, Education Resources Information Centre (ERIC) and the Cochrane Library. My question was '*What strategies have been applied to the integration of EBHC and general practice?*' The search terms were the thesaurus subject headings 'general practice,' 'Evidence-Based Medicine' and 'Evidence-Based Practice.' Articles were sought in which the subject headings were considered the major point. The search was limited to English language and a publication date from 1992 onwards, reflecting the year in which EBHC first emerged in the literature. The search yielded 582 articles. Titles and abstracts were assessed against inclusion criteria. Studies were included if they described an empirical evaluation of a strategy to integrate EBHC and general practice. Narrative reviews were excluded, as were studies focusing on EBHC relating to a specific medical

condition. The search yielded 31 articles describing interventions to improve EBHC uptake in general practice. One important article[186] was missing from among the 582 articles returned. The search strategy was therefore reviewed. The search terms were appropriate for identifying articles describing attempts to integrate EBHC and general practice. They were very broad, allowing an extremely sensitive search that was unlikely to miss relevant articles, so I queried whether I had made an error subsequent to the search, either through accidental deletion or failure to select relevant articles. I ran the search again, unchanged. This time the key article was returned and was added to the other 31 included studies. No other additional relevant articles were found. It was assumed that the initial absence of the key article occurred because of accidental deletion, and that the search strategy was sound. Appendix 1 describes the search in detail. The 32 relevant studies referred to:

- Provision of EBHC resources (7 studies)
- EBHC teaching (10 studies)
- Academic detailing (8 studies)
- Other interventions to improve prescribing (2 studies)
- Journal clubs (2 studies)
- Enlisting the help of information experts (2 studies)

Studies were heterogeneous in terms of setting, interventions and methods of evaluation, so I did not attempt to synthesise findings. A description of each strategy follows, with comments on the quality of evidence.

2.4.1.1. Provision of EBHC resources

Among the seven studies describing the delivery of EBHC resources (Table 2.3), three took place in the US, two in the UK and one each in Germany and Canada. Four were among GPs, one among Family Medicine Residents (FMRs), one among GP trainers and one recruited two GPs and a Nurse Practitioner. The EBHC resources evaluated were electronic

Table 2.3 Studies about the provision of EBHC resources

Study	Objective(s)	Design	Main outcome(s)	Important limitations
Alper 2001[187]	To determine whether electronic medical databases could provide adequate answers to the clinical questions of family physicians.	2 family physicians attempted to answer 20 questions with each of the databases evaluated. Adequacy of answers was determined by the physician searchers, and an arbitration panel of 3 family physicians was used if there was disagreement.	Good agreement between family physician searchers regarding the adequacy of answers (k=0.94). 5 databases answered at least half of the clinical questions. Some combinations of databases answered 75% or more.	The databases were tested using few subjects.
Alper 2005[188]	To determine whether primary care clinicians would answer more clinical questions, change clinical decision making, and alter search time using DynaMed in addition to their usual information sources.	RCT. 52 primary care clinicians naive to DynaMed searched for answers to 698 of their own clinical questions using the Internet. Randomized to have access to DynaMed (A) or not (N) in addition to usual information sources.	Participants found answers for 263 (75.8%) of 347 A questions and 250 (71.2%) of 351 N questions. Answers changed clinical decision making for 224 (64.6%) of the A questions and 209 (59.5%) of the N questions.	Possible Hawthorne Effect.
Butzlaff 2004[174]	To study knowledge increase among German GPs after implementation of guidelines, and to identify and analyse potential barriers to individual professional learning with computerized guidelines.	RCT among 72 GPs. Intervention group (n=38) had access to clinical guidelines via Internet or CD-ROM. Control group had not (n = 34). Knowledge measured with multiple choice questions (MCQ). Reasons for using /not using computerised guidelines analysed after access open to all.	No significant knowledge increase in intervention group (P = 0.69). 22 (58%) of intervention group had used the guidelines. Main reasons for use were unspecified curiosity (76%) and a specific medical question (38%) .For non-use, the main reason was lack of time (78% of non-users).	The intervention was very brief. No validation of the MCQ as a test of knowledge.

Continued

Study	Objective(s)	Design	Main outcome(s)	Important limitations
Labrecque 2013[189]	To compare ability of InfoClinique and Trip databases, to provide correct answers to clinical questions, and explore the effects of the tools on the clinical decision-making process.	Randomised trial. 15 Family Medicine Residents generated 30 structured questions about therapy or preventive treatment based on clinical encounters. Each resident answered 20 questions before and after searching for information with 1 of the 2 search engines. For each question, 5 residents were randomly assigned to begin their search with InfoClinique and 5 with the Trip database.	Both databases produced an increase in the proportion of correct answers after searching (26% to 62% for InfoClinique, for an increase of 36%; 24% to 63% for the Trip database, for an increase of 39%; P = 0.68). Perceptions of each engine's effect on the decision-making process were similarly positive.	Use of a single independent evaluator. Few topics were included. Findings may not have been generalisable to the wider population of GPs.
MacAuley 1999[190]	To evaluate the READER tool for critical appraisal in a practical teaching setting.	Modified RCT. Two groups of GP trainers critically appraised 2 articles using either the READER tool or a semi-structured free appraisal.	Both groups attributed the lowest score to paper 2. Median total scores were higher using the READER method, although only significant for paper 2 (P<0.05). Median score attributed to the methodology was lower using the READER method than the free appraisal, although this difference was only significant for paper 1 (P<0.05).	No attempt to demonstrate a meaningful clinical outcome beyond the critique of research literature.
MacAuley 1998[191]	To evaluate the READER model for critical reading by comparing it with a free appraisal, and to explore what factors influence different components of the model.	RCT in which two groups of general practitioners assessed three articles. An epidemiologist independently appraised the articles.	READER method (intervention group) gave a significantly lower total score ($P \leq 0.01$) and a lower score for the scientific quality ($P \leq 0.0001$) for all three papers. No intrinsic factors influenced scores, so the method was appropriate for all GPs regardless of seniority, location, training experience, and the number of articles they read regularly.	No attempt to demonstrate a meaningful clinical outcome beyond the critique of research literature. Possible selection bias.
McGowan 1999[192]	To evaluate a clinical decision support tool called Problem Knowledge Couplers.	Pilot study. 6 patients had a regular consultation with either of two GPs or a Nurse Practitioner. After the consultation, they received an assessment using the Problem Knowledge Couplers, conducted by trained nurses.	The Problem Knowledge Couplers gleaned some clinical data not revealed in the initial consultation that could have had an impact on the ability of the providers to make a clinical decision. They also revealed risk factors unrelated to the presenting problem.	Small sample with a narrow range of clinical problems.

databases for searching literature (three studies), a critical appraisal framework (two studies), a clinical practice guideline and a decision support tool (one study each). Alper et al. evaluated 14 electronic literature databases for their capacity to provide answers to 20 clinical questions generated by GPs.[187] Five databases addressed at least half the questions, and some combinations answered 75% or more. In 2005, one of the better performing databases in that study (Dynamed[193]) was evaluated among 46 GPs, each GP randomly allocated for each question to have access to Dynamed, or not.[188] 23 (50%) answered a greater proportion with access to Dynamed and 13 (28.3%) answered a greater proportion without. Answers changed decisions for 224 (64.6%) questions with access to Dynamed, and for 209 (59.5%) without. In 2013, Labrecque et al. evaluated two electronic databases.[189] 15 FMRs each addressed 20 questions. For each question, five were randomly assigned to begin their search with the InfoClinique database,[194] and five with the TRIP database.[195] Both databases similarly raised the proportion of correct answers after use (26% to 62% for InfoClinique and 24% to 63% for TRIP, an absolute increase of 39%). Each of these studies demonstrated moderate success in answering clinical questions. They had a number of limitations however. The use of a single independent evaluator did not provide a comparative 'gold standard.'[189] The databases were tested using few subjects,[187] and few topics were included.[189] Subjects may have been susceptible to the Hawthorne Effect,[74] in which their performance is enhanced merely by their knowledge of being under study.[188] Findings may not have been generalisable to the wider population of GPs.[189] Finally, investigations of electronic search databases quickly become out-of-date, because the availability and sophistication of the resources have increased rapidly over recent years.[196]

MacAuley evaluated a framework for critical appraisal of research literature called the READER tool.[191] The tool was used to score an article across five domains: Relevance, Education, Applicability, Discrimination, and overall Evaluation. 243 GPs were randomly allocated to assess papers from the British Medical Journal either with, or without the tool. An epidemiologist independently appraised the articles. GPs using the tool gave consistently lower overall scores and provided the better appraisals. The study may, however, have been susceptible to selection bias, in that the subjects might have been more enthusiastic, or adept at critical appraisal than the average GP. In a second study, 92 GP trainers were randomised to use either the READER tool or semi-structured free appraisal on two articles.[190] Trainers using the READER tool attributed a higher overall score but were more critical of the methodology than those using a free appraisal. A major limitation of both of these studies was that there was no attempt to demonstrate a meaningful clinical outcome beyond the critique of research literature.

Butzlaff evaluated knowledge increase among 72 GPs randomised to either have access to an online clinical practice guideline (one of four published guidelines chosen for the study), or no access.[174] There was no significant increase in knowledge among those with access to the guideline, assessed on multiple-choice questions (MCQ). The study was limited, however, in that the intervention was very brief. This could explain the null findings. Furthermore, there was no validation of the MCQ as a test of knowledge, so successes and failures on the test could represent cases of misclassification.

The last of the studies evaluating EBHC resources was a pilot study to evaluate a clinical decision support tool called Problem Knowledge Couplers.[192] Problem Knowledge Couplers represent a collaborative effort among clinicians, informaticians, and librarians. They differ from other decision support tools in that they are designed to generate a broad list of diagnoses that are *possible* rather than narrowing down to what is *probable*. The principle underpinning the design is a more individualised approach to decision making. In the pilot study, six patients had a regular consultation with either of two GPs or a Nurse Practitioner. After the consultation, they received an assessment using the Problem Knowledge Couplers, conducted by trained nurses. The Problem Knowledge Couplers gleaned some clinical data not revealed in the initial consultation that could have had an impact on the ability of the providers to make a clinical decision. They also revealed risk factors unrelated to the presenting problem. This unique approach would require much more research, among more patients with a wider array of presentations, and among a much larger sample of GPs before it could be considered a realistic option.

To summarise, there is only low-quality evidence that electronic databases and decision support software were helpful, and that access to one particular online clinical practice guideline was not. Though this appraisal is up-to-date, the provision and management of information online is subject to rapid technological advance. There may be a time lag before the literature catches up with the advances that are finding their way into practice. We may hope that more useful technological advances are in development.

2.4.1.2. EBHC teaching

Among the 11 studies describing teaching interventions (Table 2.4), six were from the United States, two each from Canada and the Netherlands and one from Spain. Ten involved teaching postgraduate GP trainees (or FMRs, their North American counterparts). One was among fully registered GPs and teaching faculty. Six studies employed a variety of teaching strategies, including large and small group classroom teaching, practical and clinical teaching. Two described blended online and face-to-face teaching. One used the development of an evidence-based guideline as a learning exercise; another examined whether accreditation of learning activities for their EBHC content resulted in improved uptake in practice, and one evaluated a form of assessment simulating real-life clinical scenarios.

Only one study used a randomised controlled trial design.[186] GP trainees in the Netherlands were randomised in clusters (defined by time of course entry) to either a clinically-integrated course in EBHC (39 trainees) or a non-integrated course at their training institute (40 control trainees). Clinically integrated EBHC training included tutorials with a supervisor (who also received training), the aim of which was to integrate evidence with the supervisor's experience, and joint assignments with the supervisor, focusing on the application of evidence in practice. Adherence of the trainee to key guidelines was assessed using a validated instrument. Adherence data (and data on information-seeking behaviour) were collected by trainees themselves using a logbook. No significant differences were found between groups, in either guideline adherence or information-seeking behaviour.

Table 2.4 Studies about EBHC teaching

Study	Objective(s)	Design	Main outcome(s)	Important limitations
Argimon-Pallas 2011[197]	To assess the effectiveness (change in knowledge and skills measured by the Fresno test) of a short course in EBHC carried out in a group of family medicine residents	Before-after study among 152 Family Medicine Residents. Intervention was a training course designed to develop the knowledge and skills required to practice evidence-based care.	Mean difference between pre-test and post-test was 47.7 (95% CI 42.8-52.5, $p < 0.0001$). Improvement observed in questions related to sensitivity, specificity, absolute risk reduction and the number needed to treat. A more modest increase was found in the residents' knowledge and skills in searching and critical appraisal for validity and applicability.	Possible Hawthorne Effect. Use of surrogate outcomes of no direct clinical impact.
Davis 2009[198]	To explore the effect of Evidence-Based accreditation by American Academy of Family Physicians (AAFP) of medical education activities.	Subjects were faculty presenters and participants at the 2006 AAFP Annual Scientific Assembly. Comparison of presenters and participants of sessions with accreditation to those without, assessing faculty preparation and participants' perceptions of educational quality and value.	Accredited faculty preparation was more likely to use EBHC resources and less likely to rely upon books, journals, or personal experiences. Accredited sessions were associated with perceptions of better scientific evidence presented, less commercial bias, and better application of information to practice.	Possible Hawthorne Effect. Use of surrogate outcomes of no direct clinical impact.

Continued

Study	Objective(s)	Design	Main outcome(s)	Important limitations
Epling 2002[199]	Evaluation of a curriculum of evidence-based guideline writing among Family Medicine Residents.	Each resident was supervised working through the steps of EBHC. Answers to clinical questions were compiled into a guideline and distributed in the residency practice. An evaluation was based on focus group and survey data.	Learners appreciated the skills and knowledge gained in devising guidelines in an evidence-based manner but were uncertain that their searches were complete. However, use of the guideline resulted in demonstrable improvements in patient care.	Generalisability of findings to other settings or learning institutions was limited.
Goulet 2002[200]	Evaluation of a 90-minute interactive EBHC workshop	Self- administered questionnaire. Opinions on the achievement of three workshop objectives were evaluated using a seven-point Likert scale (-3 to +3) representing perception of the direct impact of the workshop on their practice.	The workshop objectives were reached with scores of 2.1 (sd 0.90) for prescribing a proper check-up for adults; 1.83 (sd 1.02) for explaining test ordering decisions to patients; 2.09 (sd 0.93) for using useful tools facilitating the integration of preventive measures in practice.	Surrogate outcomes of no direct clinical impact. Poor generalisability. Possible SDR.*
Grad 2001[201]	To evaluate a seminar series designed to stimulate Family Medicine Residents to seek evidence-based answers to clinical questions and incorporate evidence into practice.	86 of 89 (97%) residents completed a baseline needs-assessment questionnaire. Post-course self-assessment questionnaires measured change from the first to the final seminar session in six domains of interest and skill, as well as residents' preferred sources of information for clinical problem solving up to 2 years after the course.	58 of 75 (77%) residents completed the first post-course questionnaire. They reported increases in skill at formulating clinical questions and searching for evidence-based answers, appraising reviews, and deciding when and how to incorporate new findings into practice. Use of secondary sources of information such as 'Best Evidence' increased in importance after the course.	Susceptible to the Hawthorne Effect. Use of surrogate outcomes of no direct clinical impact.

Continued

Study	Objective(s)	Design	Main outcome(s)	Important limitations
Kortekaas 2016[186]	To evaluate clinically-integrated EBHC training among GP trainees	A cluster randomised controlled trial. 39 final year GP trainees received clinically integrated EBHC training, including joint assignments for the trainee and supervisor in daily practice, and teaching sessions based on dilemmas from actual patient consultations. 40 control trainees (also final year) received only stand-alone EBHC training at the training institute.	Logbook-recorded adherence to key general practice guidelines and information-seeking behaviour were not significantly different between groups. Relative risks for guideline adherence varied between 0.96 and 0.99 (95% CI 0.86 to 1.11) at the end of training, and 0.99 and 1.10 (95% CI 0.92 to 1.25) one year after training, and for information-seeking behaviour between 0.97 and 1.16 (95% CI 0.70 to 1.91) and 0.90 and 1.10 (95% CI 0.70 to 1.32), respectively.	Variability in the delivery of the intervention; possible misclassifications due to poor recording of guideline adherence and information-seeking behaviour; and the clinical case-based component of the control intervention may have reduced the difference between control and experimental interventions.
Ross 2003[202]	To investigate whether teaching an EBHC curriculum increased the knowledge and use of EBHC principles in Family Medicine Residents' continuity clinics.	Resident-preceptor interactions during outpatient continuity clinic were tape-recorded prior to and six months following introduction of an EBHC workshop series. A multiple-choice examination (MCQ) was administered before and after the workshop series. Residents at another residency at the same university served as a control group. Tape recordings were analysed for key EBHC phrases or words.	Pre-intervention MCQ results were similar. Post-intervention test scores for the experimental group were significantly improved (mean 72%, p <.001). There was no significant improvement in test results among controls (p >.05). In the recordings, an increase in use of EBHC terms indicated awareness and/or use in the experimental group.	Use of surrogate outcomes of no direct clinical impact. Poor generalisability.

Continued

Study	Objective(s)	Design	Main outcome(s)	Important limitations
Shaughnessy 2012[203]	To determine the effect of a curriculum of information mastery on Family Medicine Residents' EBHC knowledge and skills, and confidence at critically appraising medical literature and using evidence to inform clinical decisions.	Before-after study in a single residency over 5 years. Residents completed the Fresno Test and an attitude questionnaire at the start of the curriculum and then again before graduation.	23 residents completed the study. Modified Fresno Test scores significantly improved from 104.0 to 121.5. 9 residents (40.1%) passed the test at the start of training, increasing to 17 (73.4%) at the end. Confidence in critical appraisal scores increased from an average 17.90 (95% CI 16.55-19.25) to 21.10 (95% CI 19.49-22.71), out of a possible score of 25. Confidence scores were significantly lower in residents who did not pass the post-test (18.5 versus 21.9). Attitudes regarding confidence in the use of evidence and a decreased reliance on experts were also improved following the curriculum.	Use of surrogate outcomes of no direct clinical impact. Unable to differentiate the effectiveness of several learning modalities. Poor generalisability.
te Pas 2015[204]	To investigate the effectiveness of blended EBHC learning in increasing GP trainers' EBHC competence.	129 GP trainers received blended learning consisting of face-to-face meetings and an intensive e-course before each meeting over a 12-month period. Data were collected before the start of the intervention (T0), at the end (T1) and four months later (T2).	Mean changes in scores on the Fresno test were T1-T0=40.8 (SD +/- 36.7, p<.001) and T2-T0=20.8 (+/-39.9, p<.001). Mean changes in scores on the McColl test were T1-T0=2.2 (SD +/-12.8, p=0.16) and T2-T0=-0.87 (SD +/-10.0, p=0.49).	Surrogate outcomes of no direct clinical impact. Possible SDR.*

Continued

Study	Objective(s)	Design	Main outcome(s)	Important limitations
Thom 2004[205]	To evaluate the impact of an information mastery curriculum for interns using clinical questions generated by a family practice inpatient service.	Interns (n = 13) self-assessed confidence in EBHC before and after their 2-week EBHC rotation. Residents (n = 21) and faculty (n = 12) assessed how often the answers provided by the EBHC intern to the inpatient service changed medical care.	Interns increased in confidence. Residents and faculty felt that the answers provided by the EBHC interns led to changes in patient care. Faculty reported incorporating EBHC into their teaching (92%) and practice (75%).	Poor generalisability of findings to other settings or learning institutions. Susceptible to SDR.*
Tudiver 2009[206]	To test the reliability and validity of an EBHC Objective Structured Clinical Examination (OSCE) station for assessment of FMRs.	A 30-minute station within a regular OSCE exam, using an 8-point checklist and global measure. Test results were subjected to psychometric statistical assessment.	The OSCE demonstrated satisfactory psychometric properties, including construct validity, interrater reliability (correlation=0.96), and internal reliability (Cronbach's alpha=0.58).	Surrogate outcomes of no direct clinical impact.

*Note: SDR refers to 'socially desirable responding.'

The study was limited by inconsistency in the delivery of the intervention and poor recording of guideline adherence and information-seeking behaviour. The experimental and control interventions may have been too similar, as the latter included clinical case-based components; and the self-recording of EBHC-related behaviour may have left the study susceptible to 'socially desirable responding' (SDR) – a form of 'response' bias arising from a tendency among participants to respond in a way that they deem most socially desirable.[207]

One study stood out from the others, both for the careful design of the intervention tested and for divergence from the traditional teaching of basic EBHC skills.[203] It evaluated the

delivery of a curriculum in 'information mastery' among a cohort of 23 FMRs in the U.S. in 2012. 'Information mastery' describes an approach to addressing clinical uncertainty using evidence sources that have already been critically appraised by EBHC experts. The authors commented:

'Only a fraction of clinicians need comprehensive training in critical appraisal of the original literature and even fewer need training in EBM research techniques. Focusing on teaching at these higher levels leaves graduates without the real-world training to manage new information. As the adage goes, it is like teaching children how to tell time by showing them how to build a clock.'

The curriculum comprised 30 hours of intensive instruction, and a series of conferences integrated with clinical teaching. Content was determined by a needs assessment among faculty and residents. A generous amount of faculty development underpinned teaching quality. Knowledge and skills were compared before and after teaching, using a modified version of the Fresno test, a validated tool for assessing the effectiveness of EBHC teaching. Modified Fresno test scores improved significantly from 104 to 121.5. Nine residents (40.1%) passed the test at the start, and 17 (73.4%) passed at the end of the teaching. Confidence in critical appraisal, tested using a questionnaire, increased from an average of 17.9 (95% CI 16.55 to 19.25) before teaching to 21.1 (95% CI 19.49 to 22.71) afterwards.

The literature includes other useful teaching interventions. Each is described below. Limitations were similar and are therefore presented together. A Spanish study evaluated

change in EBHC knowledge and skills with a four-session training course among 152 FMRs, again using a before and after evaluation with the Fresno test.[197] The mean difference in score was a significant 47.7 (95% CI 42.8 to 52.5; p<0.0001). Also useful were two Canadian teaching interventions: a 90-minute interactive workshop conducted among 593 GPs[200] and a seminar series among 75 FMRs[201] were both evaluated using a self-administered questionnaire (SAQ). A mixed modality course among 18 FMRs in the US also bore positive results. It included workshops, lectures and practical sessions, evaluated by multiple choice test, and recordings of resident-faculty teacher interactions.[202]

Epling et al. took an innovative educational approach.[199] 11 FMRs in the U.S. were tasked with developing an evidence-based clinical practice guideline, which they distributed for use in their training practice. Focus group and survey data demonstrated that FMRs gained an appreciation of the skills and knowledge required in the development of the guideline, though they were unsure whether their searches had been adequate. Use of the guideline resulted in demonstrable improvements in patient care.

Davis et al. investigated whether EBHC accreditation of postgraduate educational activities resulted in better teaching than non-accredited learning.[198] 50 teaching staff delivered accredited teaching, and 19 gave non-accredited teaching to 514 learners. Evaluation relied on self-administered questionnaires. Those delivering accredited teaching were more likely to have prepared using evidence-based resources. The evidence used in accredited sessions was perceived to be of better quality, less subject to commercial bias, and more applicable to practice.

Two studies evaluated blended face-to-face and e-learning.[204,205] One was conducted among 129 GP trainers in the Netherlands and comprised face-to-face meetings and an intensive 12-hour preparatory e-learning course.[204] The Fresno test demonstrated improvements in knowledge and skills. Attitudes towards EBHC did not change significantly. 16.7 % of trainers claimed to have met their intentions to change EBHC-related practice behaviour; 47.6 % met them partially; and 35.7 % did not meet them at all. The other programme was evaluated among 13 Family Medicine interns (first year residents), 21 FMRs and 12 faculty in the U.S.[205] The intervention for interns comprised a concentrated, individualised EBHC clinical rotation; writing evidence-based summaries based on inpatient encounters; attendance of a tutorial given by a librarian; a web-based tutorial; and a presentation at a journal club. Interns increased in confidence with EBHC. Residents and faculty felt the evidence-based summaries written by the interns were useful, and changed their practice, and faculty incorporated EBHC into their teaching (92%) and practice (75%). 86% of residents reported applying EBHC skills in patient care, and all residents (and 11 of 12 faculty) concluded that the EBHC curriculum had improved care.

Another educational approach was to develop an assessment tool for EBHC. Tudiver et al. developed a 30-minute Objective Structured Clinical Examination (OSCE) station to test the EBHC knowledge and skills of 42 FMRs.[206] An OSCE consists of multiple stations, in which each learner is asked to perform a defined task, assessed using a standardised marking scheme.[208] The EBHC OSCE proved to be both valid, in that scores gave an accurate reflection of EBHC competence, and reliable, with scores achieved in successive attempts, or provided by successive examiners, correlating well.

All the studies had limitations, however. Some[197,201] were susceptible to the Hawthorne Effect, in which subjects' performance is enhanced merely by their knowledge of being under study.[74] A common methodological limitation was the use of surrogate outcomes of no direct clinical impact.[197,198,200-204,206] The use of the Fresno test is an example.[197,203,204] This instrument measures the knowledge and skills of the learner, rather than the translation of those attributes into improved clinical behaviour, or improved patient experience.[209] Another problem, exemplified in the evaluation of a curriculum in information mastery,[203] was determining which of several learning modalities were effective. Generalisability of findings to other settings or learning institutions was also limited.[199,200,202,203,205] Other institutions will necessarily deliver some variant of the intervention, administered differently, by different teachers. A further limitation common to several studies was the use of self-administered questionnaires to gather outcome data.[200,204,205] This may leave the study susceptible to SDR.

To summarise the evidence on teaching EBHC, a variety of interventions appear to improve the uptake of EBHC in general practice, though the strength of evidence is moderate. Of particular note was the development of a guideline,[199] and evidence-based summaries[205] by learners. Both were judged to have resulted in actual changes in practice. The evidence of effectiveness was more robust for the guideline development initiative, as the intervention was objectively evaluated using a review of patient records. One study abandoned traditional EBHC skills as outlined by the Sicily Statement,[18] in favour of a more pragmatic approach to information mastery.[203] This is particularly apposite, given the

evidence cited earlier in this chapter that the use of pre-appraised secondary sources was preferred over searching and appraising evidence.

2.4.1.3. Academic detailing

Among six studies describing academic detailing (Table 2.5), two were conducted in the United Kingdom, and one each in Spain, U.S., Australia and Croatia. Five were among GPs, and one among FMRs. Three studies were before-and-after comparisons of EBHC knowledge and attitudes, two were RCTs, and one was a post hoc assessment of knowledge, satisfaction and change in practice behaviour.

One RCT was conducted in rural Spain, to evaluate the effectiveness of an EBHC group educational outreach visit on the prescribing habits of 158 GPs.[210] The intervention group received education from a pharmacist, based on a comprehensive study, which had demonstrated no difference in effectiveness between three particular anti-inflammatory drugs. A recommendation was made to prescribe the anti-inflammatory drug diclofenac over tenoxicam because of price differences. A placebo group received a non-structured educational visit, and the control group received no intervention. The results were reported 'effective' but on closer scrutiny were equivocal. For tenoxicam, the intervention group reduced prescriptions by 22.5% (95% CI: 34.42 to -10.76), a reduction that was not statistically significant. This compared with a significant reduction of 9.78% (95% CI: -17.70 to -1.86) in the placebo group and a significant increase of 14.44% (95%CI: 5.22 to 23.66) in the control group. The average cost per prescription decreased by 1.91% (95% CI: -0.33% to -3.49%) in the intervention group, decreased by 0.16% (95%CI: -0.27% to -2.93%) in the

Table 2.5 Studies about academic detailing

Study	Objective(s)	Design	Main outcome(s)	Important limitations
Bernal-Delgado 2002[210]	To evaluate the effectiveness of an evidence-based group educational outreach visit on prescription patterns of non-steroidal anti-inflammatory drugs (NSAIDs) in primary care.	Randomised controlled simple blind trial, with randomisation into three groups: experimental (evidence-based educational outreach visit - 48 GPs), placebo (conventional education session – 54 GPs), and control (without intervention – 56 GPs). Both educational sessions emphasised that there are no differences in the effectiveness of the NSAIDs reviewed (diclofenac, piroxicam, and tenoxicam); a recommendation was made to prescribe diclofenac over tenoxicam because of price difference.	Prescriptions for NSAIDs decreased similarly in the three groups. For tenoxicam, the experimental group reduced prescriptions by a statistically non-significant 22.5% (95%CI: 34.42 to -10.76), compared with a reduction of 9.78% (95%CI: -17.70 to -1.86) in the placebo group and an increase of 14.44% (95%CI: 5.22 to 23.66) in the control group. The average cost per prescription decreased by 1.91% (95% CI: -0.33% to -3.49%) in the intervention group, decreased by 0.16% (95%CI: -0.27% to -2.93%) in the placebo group, and rose by 1.76% (95% CI: 0.35% to 3.17%) in the control group.	Effects were equivocal. Cost savings were of dubious significance at a health care system level.
Freemantle 2002[211]	To estimate the effectiveness of educational outreach visits on UK general practice prescribing and to examine the extent to which practice characteristics influenced outcome.	RCT. Educational outreach visits were made to 75 general practices that received two of four guidelines. Each practice provided data on treatment of patients for all four guidelines for both pre- and post-intervention periods.	Educational outreach was associated with a significant adherence to guideline-led prescribing (odds ratio [OR] 1.24 [95% CI 1.07 to 1.42]). Smaller practices improved prescribing in line with the guidelines by 13.5% (95% CI 6% to 20.9%) attributable to outreach, while larger practices improved by only 1.4% (95% CI -2.4% to 5.3%, P- value for interaction <0.001).	Did not account for the reasons behind non-adherence.

Continued

Study	Objective(s)	Design	Main outcome(s)	Important limitations
George 2012[212]	To evaluate a curriculum in information mastery for FMRs, comprising monthly individual meetings with a learning coach over 1 year.	Before and after survey assessing attitudes toward EBHC and a quiz assessing knowledge of EBHC. Semi-structured interviews with each resident after the intervention.	Attitudes toward EBHC and information mastery were positive. EBHC knowledge increased by 31.8%, and reported use of EBHC during patient encounters increased.	Surrogate outcomes of no direct clinical impact. Poor generalisability of findings to other settings or learning institutions. Unclear which elements of the intervention were most important.
				Continued
Markey 2001[213]	To measure the impact of academic detailing on GP attitudes and knowledge of EBHC.	132 GPs were randomised to receive either academic detailing during the study period or to be visited at a later date. The visit comprised a 30-45 minute discussion about EBHC and barriers to its practice. Pre- and post-intervention questionnaires measured change in knowledge of, and attitudes, to EBHC.	Knowledge and self-perceived understanding of EBHC improved. There was little influence on GP attitudes.	Surrogate outcomes of no direct clinical impact.
Nazareth 2002[214]	To evaluate the impact of educational outreach visits by pharmacists on GPs' prescribing.	Quantitative and qualitative assessment of a hypothetical pathway of change leading to altered prescribing among 75 randomly selected practices.	Pharmacists' and GPs' satisfaction with the outreach visits did not lead to prescribing changes after the practice visit. and the GPs' knowledge of guidelines promoted by the pharmacists did not translate into changes in clinical practice.	Surrogate outcomes of no direct clinical impact. Possible SDR.*
Vrdoljak 2015[215]	To investigate whether EBHC knowledge and attitudes can be improved among mentors in general practice by involving sixth-year medical students as academic detailers.	Before-and-after survey among 49 GPs in the intervention group of mentors and 49 non-mentor GP controls. Each mentor chose two cases from real life, and tasked the student with forming an answerable clinical question, finding the evidence-based answer and writing a brief report. The mentor reviewed the report and discussed it with the student.	Academic EBCH detailing by students led to significant improvement in knowledge and attitudes about EBHC among mentors in general practice compared to control GPs (relative increase in knowledge 20 +/- 46.9% vs 6 +/- 12.1%, respectively; P = 0.042).	Surrogate outcomes of no direct clinical impact. Possible SDR.*

*Note: SDR refers to 'socially desirable responding.'

placebo group and rose by 1.76% (95% CI: 0.35% to 3.17%) in the control group. It is unclear whether such small decreases in expenditure would amount to significant savings at a health care system level. A RCT of educational outreach by community pharmacists was conducted among 75 general practices in England.[211] It promoted the recommendations of four clinical practice guidelines. Smaller practices with two or fewer full-time equivalent practitioners improved prescribing in line with guidelines by 13.5% (95% CI = 6% to 20.9%). Larger practices improved by only 1.4% (95% CI = -2.4% to 5.3%), a proportion that failed to reach statistical significance. Prescribing data were objectively collected using records from the Prescription Prescribing Authority. However, the study did not account for the reasons behind non-adherence. These could legitimately relate to individual patient choice and the flexibility inherent in shared decision making.

George conducted a before-and-after comparison of knowledge and attitudes among 26 FMRs, who received a monthly meeting with a learning coach for one year.[212] Each meeting focused on information mastery. Knowledge and attitudes were assessed using a survey, a quiz based on the Fresno tool, assessments by the learning coaches, and semi-structured interviews. FMRs' confidence in and knowledge of EBHC improved significantly. However, these outcomes are further examples of 'surrogate' outcomes with no direct clinical impact. Objective improvement in the quality of care would have been more meaningful. Given delivery by a single coach, the intervention would be difficult to reproduce faithfully in other GP training programmes. It was unclear which elements of the intervention were most important. The effect of the intervention was modest, FMRs scoring an average of 58% on the posttest.

Another before-and-after comparison of knowledge and attitudes was conducted among 132 GPs in Australia, to assess a single 30-45 minute discussion about EBHC and barriers to its practice.[213] Academic detailing led to a significant improvement in knowledge scores and self-perceived understanding of EBHC, but there was no significant influence on attitude. Once again, the major limitation was outcome surrogacy. What would have been more meaningful is altered behaviour leading to quantifiable patient benefit. A third before-and-after comparison of EBHC knowledge and attitudes was conducted among 98 GPs in Croatia.[215] A novel approach was taken, giving sixth-year medical students the task of providing academic detailing in EBHC. GP mentors each chose two cases from real life. The students generated clinical questions about the cases and wrote brief evidence-based reports. Mentors reviewed and discussed the reports with students. The intervention led to a significant improvement in EBHC knowledge and attitudes among GP mentors, compared to control GPs who did not receive the intervention (relative increase in knowledge was 20 +/- 46.9% versus 6 +/- 12.1% respectively; p = 0.042). Though the comparison of GP mentors and controls reached statistical significance, the increase in knowledge *within* either group did not. A major limitation of the study was that the outcomes were self-evaluated, leaving it susceptible to SDR. Once again, the problem of outcome surrogacy arose.

Nazareth conducted a post-hoc analysis of GP prescribing after academic detailing by community pharmacists.[214] The intervention took the form of an outreach meeting promoting new clinical guidelines. GPs in small practices of one or two partners were almost seven times as likely to attend the outreach meeting than those in larger practices

(odds ratio 6.7; 95% CI 4.4-23.5). Six months after the intervention, however, few GPs had applied the guidelines in practice. Self-assessed change in prescribing was a surrogate outcome, inferior to measures of patient benefit. Furthermore, GPs may have overestimated the degree of change.

To sum up the quality of evidence about academic detailing as a means of improving EBHC uptake in general practice, there was evidence that it is effective, but the quality of that evidence was poor. Specific limitations were the use of surrogate outcomes, the potential for SDR in self-assessed outcome measures, small incremental effects on knowledge or practice, and a failure to isolate the active ingredients of the intervention. These closely resembled the limitations of other educational interventions described earlier in the chapter.

2.4.1.4. Other interventions to improve prescribing

Two RCTs evaluated other strategies to improve GP prescribing behaviour (Table 2.6). Notably, in contrast to many other studies described here, the outcomes were clinically meaningful. One was conducted in Canada and evaluated the provision of an evidence-based 'Therapeutic Letter.'[216] 258 GPs in the intervention group received the letters three to eight months before 241 GPs in the control group. The impact on prescribing among new patients was measured using a drug claims database. Prescribing in line with the letter was increased by 30% (95% CI 13 to 52%) in the three months after the mailing of the letter relative to the preceding three months. Apart from resulting in a clinically meaningful change in prescribing, another strength of this study was the random selection of GPs,

Table 2.6 Studies about other interventions to improve prescribing

Study	Objective(s)	Design	Main outcome(s)	Important limitations
Dormuth 2004[216]	To measure the impact of a series of evidence-based drug therapy letters mailed to GPs on prescribing to newly treated patients.	A paired, cluster randomised community trial. 12 issues of an evidence-based series called Therapeutics Letter were sent to 258 GPs (intervention group) and 3-8 months later, to 241 GPs in the control group. The impact on prescribing to newly treated patients was analysed using a drug claims database.	Prescribing in line with the letter was increased by 30% (95% CI 13 to 52%) in the 3 months after mailing, compared to the preceding 3 months.	Brief follow-up of 3 months.
Skoglund 2013[217]	To investigate whether tailored evidence-based drug information (EBDI) can change GPs' prescribing.	RCT. 408 GPs in the intervention group received EBDI using motivational interviewing (MI) technique, tailored to GPs' thoughts on prompt and pragmatic benefit, and 583 GPs in the control group received EBDI without MI.	Prescribing within both groups became more evidence-based, although no significant difference occurred in prescribing between intervention and control groups.	Possible selection bias.

protecting it against selection bias and the effects of confounding. The brief follow-up of only three months, however, was a limitation. The other RCT was conducted in Sweden.[217] The intervention was tailored evidence-based drug information (EBDI) using motivational interviewing (MI). MI capitalised on GPs' perceptions that immediate and pragmatic benefit is essential for successful evidence-based drug prescribing. 408 GPs received the intervention. 538 control GPs received 'usual' EBDI (without MI). Prescribing within both groups became more evidence-based, although no significant difference occurred in prescribing *between* intervention and control groups. The study was susceptible to selection bias, in that GPs in volunteer practices may have been more motivated than those in practices that did not volunteer. Also, the MI relied on the findings of a single focus group among GPs.

Taken together, RCT evidence of moderate strength demonstrated that a series of evidence-based therapeutic letters or evidence-based drug information could result in a clinically meaningful change in GPs' prescribing behaviour.

2.4.1.5. Journal Clubs

Two studies evaluated the effectiveness of Journal Clubs (Table 2.7). In a journal club evaluation in 2001 in the U.S, 35 FMRs attended journal clubs in which they discussed and critically appraised chosen pieces of research.[218] At each journal club, FMRs completed a pre-session and post-session test of EBHC principles, and of learning from the research papers. Performance on the pre-session test demonstrated a significant improvement from a median of 54.5 % to 78.9 % over the course of the year (F 89.17, p <0.001). The post-session test results also increased from 63.6 % to 81.6% (F 85.84, p <0.001). Unfortunately, however, the pre- and post-session tests were not validated as instruments to test knowledge and understanding. A second study was a well-conducted comprehensive systematic review of the literature pertaining to journal clubs, published in 2011.[219] The question addressed was of direct clinical importance: 'Is the journal club an effective intervention in supporting clinical decision-making?' It included eighteen studies. Of 11 studies reporting on research reading behaviour, five showed some improvement. Of seven examining confidence in critical appraisal, all showed an improvement. Critical appraisal test scores improved in five of seven studies examining this outcome, and the ability to use findings improved in five of seven studies. Unfortunately, none of the eighteen studies reported on patient outcomes. Sixteen studies used self-reported measures, and only four

Table 2.7 Studies about Journal Clubs

Study	Objective(s)	Design	Main outcome(s)	Important limitations
Cramer 2001[218]	Evaluation of a Journal Club restructured to introduce, reinforce and evaluate Family Medicine Residents' understanding of EBHC.	35 Family Medicine Residents attended the restructured Journal Club over 1 year. Structured pre-session and post-session tests assessed understanding of EBHC.	Performance on the pre-session test demonstrated a significant improvement from a median of 54.5 % to 78.9 % over the course of the year (F 89.17, p < .001). The post-session test results also exhibited a significant increase from 63.6 % to 81.6% (F 85.84, p < .001).	The tests were not validated as instruments to test knowledge and understanding.
Harris 2011[219]	To determine whether the Journal Club (JC) is an effective intervention for supporting clinical decision making.	Systematic review of studies evaluating whether JCs promote changes in learner reaction, attitudes, knowledge, skills, behaviour or patient outcomes.	18 studies included. Improvements occurred in reading behaviour (N=5/11), confidence in critical appraisal (N=7/7), critical appraisal test scores (N=5/7), and ability to use findings (N=5/70. No studies reported patient outcomes. Realist synthesis identified mentoring, brief training in clinical epidemiology, structured appraisal tools, adult learning principles, multifaceted teaching approaches and integration of the JC with other clinical and academic activities to be potential 'active educational ingredients.'	Poor quality of included studies. Sixteen studies used self-reported measures, and only four used validated tests.

used validated tests. The strength of evidence was insufficient to conclude that journal clubs support clinical decision-making.

Overall, there was insufficient evidence from empirical research, to be able to claim with confidence that journal clubs positively influence the uptake of EBHC in general practice.

2.4.1.6. Information experts

Two studies explored the effect of providing the services of an information expert trained to conduct evidence searches (Table 2.8). One was carried out in Australia, among 58

Table 2.8 Studies about provision of information experts

Study	Objective(s)	Design	Main outcome(s)	Important limitations
Del Mar 2001[220]	To test the feasibility of an evidence-based clinical literature search service to help answer GPs' clinical questions.	Two search services supplied 58 GPs who submitted 160 questions with the best available empirical evidence over 9 months. GPs provided feedback on the value of the service, and concordance of answers from the two search services was assessed.	Answering a question took a mean of 3 hours 32 minutes of personnel time (95% CI, 2.67-3.97); Evidence of suitable quality was available for 126 (79%) questions. Feedback data for 84 (53%) questions, provided by 42 GPs, showed that they appreciated the service, and asking the questions changed clinical care.	Potential selection bias. Potentially poor external validity as other search services may not perform to the standard of those recruited in this study. Possible SDR.*
Verhoeven 2004[221]	To determine the feasibility of an evidence-based answering service providing searches and critical appraisals to GPs.	After attending a workshop on building well-formulated questions, 26 GPs sent 61 questions to an informationist. A questionnaire was used to assess the effect of the answers on the GP and the patient, and the perceived barriers to implementing the answers.	For 12% of questions, information was found with the highest evidence level, while for 36%, no information was found. 81% of all the answers had an effect on the GP, and, according to the GP, 52% had an effect on the patient. Few barriers to implementing the evidence were perceived.	Potential SDR.*

*Note: SDR refers to 'socially desirable responding.'

GPs.[220] Clinical questions generated by GPs from their consultations were distributed between two information specialist services. Of 160 questions, suitable evidence was available for 126 (79%). Feedback data for 84 (53%) questions, provided by 42 GPs, indicated an appreciation for the service, and that asking the questions had changed clinical care. There were substantial differences in the evidence found for 4 of 14 questions addressed by both services. An implication of this difference is potential selection bias. The standard of search services may vary, and those recruited for this study may compare well or poorly to others. External validity may also be poor: other search services may not perform to the standard of those recruited in this study.

The other study was conducted among 26 GPs in the Netherlands.[221] GPs attended teaching by an information specialist on how to form well-constructed questions. The information specialist then addressed 61 questions generated by the GPs from their work. No evidence was found for 12% of questions. However, GPs claimed that a defined absence of evidence still changed their practice. 81% of all the answers had an effect on the GP, and, according to the GPs, 52% had an effect on the patient. For both of these studies, however, measurement of outcomes relied on the subjective opinion of the GPs, which may have been subject to SDR. The use of information specialists was promising as it encouraged GPs to address uncertainties with evidence, without having to reduce precious patient contact time. Stronger evidence is needed, however, preferably from RCTs.

2.4.1.7. Closing comments on research exploring integration of EBHC and general practice

In summary, the existing literature about the integration of EBHC in general practice mainly comprised a variety of educational strategies, ranging from practical and classroom teaching, academic detailing and Journal Clubs to EBHC curricula. Other approaches have included the provision of EBHC resources and the help of information experts. Studies were heterogeneous in terms of setting, interventions and methods of evaluation, so I did not attempt to synthesise findings. Most studies had methodological limitations. Particularly prevalent were the use of surrogate outcomes without direct impact on patient care, susceptibility to SDR and limited generalisability to other settings and curricula. However, two studies were judged to have resulted in actual change in patient care. These were novel interventions involving the development of a practice guideline by Family Medicine Residents,[199] and the production of evidence-based summaries by Family Medicine Interns.[205] The evidence of effectiveness was more robust for the guideline development

initiative, as the intervention was objectively evaluated using a review of patient records. Again however, its generalisability to other settings was in doubt. Notably, one study departed from the traditional model of EBHC skills as outlined by the Sicily Statement,[18] in favour of a more pragmatic approach to information mastery.[203] This was particularly pertinent given the evidence cited earlier in this chapter that GPs generally prefer to use pre-appraised secondary sources of evidence than to search for it and appraise it themselves.

I conducted this review to answer the questions: (1) *'Is there a suitable alternative to the traditional framework of EBHC, that is tailored specifically for general practice?*' or failing that, (2) '*Does there exist some other strategy to integrate the two disciplines?*' My conclusion to the first question was that I could as yet find no suitable alternative framework of EBHC. My conclusion to the second question was that although there are promising approaches that might impact patient care, their poor generalisability to other locations and contexts makes their widespread emergence doubtful in the foreseeable future.

Having failed to find suitable alternatives to the traditional EBHC framework within the research literature, I decided to extend my investigation to competency frameworks published by educational bodies within general practice. I reasoned that they might represent powerful platforms for promoting EBHC. If used by national-level training bodies they would have the weight of the medical establishment behind them. The following section describes an exploration of key competency frameworks and my findings.

2.5 Existing competency frameworks for EBHC in general practice

It was impractical to search for every competency framework in existence, so I sought a reasonable and representative sample from the websites of major organisations coordinating general practice training in Anglophone countries. I chose the EBHC curricula and competency frameworks of the Royal College of General Practitioners (RCGP) in the UK,[5] the Royal Australian College of General Practitioners (RACGP),[2] the College of Family Physicians in Canada,[3] and the Accreditation Council for Graduate Medical Education (ACGME) for Family Medicine in the US.[4] I wanted to know how they compared to the competencies comprising the Sicily Statement. I therefore mapped the EBHC competencies published by training bodies onto those comprising the Sicily Statement.[18] This is described in the following section.

2.5.1. Mapping existing competency frameworks to those of the Sicily Statement

The mapping exercise required a degree of careful judgment. For most competencies, there was no precisely matching Sicily Statement competency. Judgment was required to match the *meaning* of competencies rather than the precise wording. As an example, let us look at the first RCGP competency listed in Table 2.9:

'Be able to demonstrate and provide high-quality, evidence-based health care and health care practice.'

I mapped this competency to the Sicily Statement competency 'evaluation of performance.' The judgment here was that it was close enough in essential meaning. Given this

Table 2.9 EBHC competencies from The RCGP curriculum 2016, mapped to competencies comprising the Sicily Statement

RCGP competency	Translation of uncertainty to an answerable question	Systematic retrieval of best evidence available	Critical appraisal of evidence	Application of results in practice	Evaluation of performance
Be able to demonstrate and provide high quality evidence-based healthcare and healthcare practice.					✓
Have an understanding of basic research methodology (e.g. you must understand the difference between qualitative and quantitative data and studies using social science methods, as well as bioscience) and how different types of research activity may contribute to patient care.			✓		
Have the skills to appraise research findings critically with a working knowledge of statistics.			✓		
Apply the findings from research, national guidance and audit in the context of day-to-day clinical and organisational management of patients.				✓	
Provide effective and evidence-based prescribing, adhering to the GMC's principles of good medical prescribing.		✓		✓	✓
Be able to communicate to the patient the rationale for evidence-based interventions to encourage patient participation within a therapeutic aim, taking into account the patient's objective, values and priorities.				✓	
Indicate the lack of evidence-based interventions at the appropriate time and have a clear understanding of how this lack of evidence might have arisen (rare conditions, conditions that have low morbidity or low pharmacological input).			✓	✓	
Be aware of how you impart information about evidence so that patients can best understand relevant evidence and be helped in making a decision.				✓	

Continued

RCGP competency	Translation of uncertainty to an answerable question	Systematic retrieval of best evidence available	Critical appraisal of evidence	Application of results in practice	Evaluation of performance
Acquire the research and academic skills required of a general practitioner that aid decision-making which include a non-judgmental evidence-based approach to problem solving and recognising how individual bias may affect your interpretation.			✓		✓
Take into account psychosocial factors, learning disabilities, the vulnerability of patients, and cultural backgrounds when taking an evidence-based approach and apply the findings on both an individual and a population level.				✓	
Deal with uncertainty and manage uncertainty through retrieval of best evidence available and communicate that uncertainty with appropriate safety netting.		✓		✓	
Have a basic knowledge of how to define a research question and then how the appropriate research methodology is chosen to answer that question.	✓		✓		
Apply findings from multi-morbidity research, taking into account limitations in the evidence and the fact that certain groups, e.g. the elderly, are excluded from research trials.			✓	✓	
Have an understanding of the evidence base behind health promotion and preventative medicine which may help the individual and the practice develop an integrated approach to developing the quality agenda.			✓	✓	
Recognise the inequalities of healthcare delivery and how some evidence may not reflect the diverse nature of the population where you work.				✓	
Understand that patients may wish to self-manage, independent of or according to their own interpretation of scientific knowledge, making their own choices based on their own understanding and values.				✓	

Continued

RCGP competency	Translation of uncertainty to an answerable question	Systematic retrieval of best evidence available	Critical appraisal of evidence	Application of results in practice	Evaluation of performance
Base decision-making on good evidence-based practice, taking into account patient values in order to provide the most appropriate care for the patient.				✓	
Recognise the importance of how occupation can affect the health of patients and their ability to self-manage illnesses and follow through with evidence-based interventions, recognising how your understanding of an occupation can enable patients to return to work in a safe and timely manner.				✓	
When you are asked for your expert opinion, take care to ensure this is evidence based, and be clear when you are stating an opinion based on experience rather than evidence.					✓
Have an evidence-based perspective and recognise that primary care research may lead to greater understanding around the prevention and treatment of disease, disease causation and the implementation of effective health policies and practice.					✓
Include a non-judgmental evidence-based approach to problem-solving, taking into account your patients' values.					✓
Have an awareness of your own attitudes, values, professional capabilities and ethics so that, through the process of reflective and critical appraisal, you are not overwhelmed by personal issues and gaps in knowledge.					✓
Understand how to critically appraise data. Extrapolate evidence using meta-analysis to individual patient care.			✓	✓	
Be able to search for valid information using the process of evidence-based practice (as in the Sicily Statement).	✓	✓	✓	✓	✓

subjectivity, no quantitative statement could be made about the degree to which the various competency frameworks matched the Sicily Statement, though I could gain a broad sense of how closely they matched.

2.5.1.1. RCGP competencies

The RCGP competencies focus mainly on the implementation of evidence in practice (Table 2.9). They focus less on the translation of uncertainty into answerable questions or systematic retrieval of the best available evidence. Two characteristics are particularly noticeable. First, there is recognition of limitations to EBHC. For example, there is acknowledgement that sometimes there is no helpful evidence:

'Indicate the lack of evidence-based interventions at the appropriate time and have a clear understanding of how this lack of evidence might have arisen…'

Another limitation is that evidence is not always applicable to the population with which the GP works:

'*Recognise the inequalities of healthcare delivery and how some evidence may not reflect the diverse nature of the population where you work.'*

Secondly, the RCGP curriculum reflects a significant evolution in the definition of EBHC, highlighted earlier in this chapter: the importance of integrating evidence with the individual patient's values, situation and perspective. An example is found in the competency:

'Be able to communicate to the patient the rationale for evidence-based interventions to encourage patient participation within a therapeutic aim, taking into account the patient's objective, values and priorities.'

Another example is:

'Understand that patients may wish to self-manage, independent of or according to their own interpretation of scientific knowledge, making their own choices based on their own understanding and values.'

Crucially, the RCGP curriculum does not *explicitly* acknowledge the barriers to EBHC. There is no explicit accommodation for the lack of time GPs have experienced searching for evidence,[48] or for the burgeoning volume of evidence that flows through a GP's in-tray.[48]

The final competency requires complete mastery of the competency framework set out in the Sicily Statement. Perhaps the inclusion of such a 'cover-all' competency was felt imperative given the role of the RCGP in practice governance. Such a role might also explain the lack of explicit reference to barriers to EBHC, the effects of which might be difficult to unravel from instances of sub-standard practice.

2.5.1.2. RACGP competencies

The RACGP curriculum – like the RCGP curriculum - focuses on the implementation of evidence in practice (Table 2.10). Again, there is recognition of the limitations of EBHC:

Table 2.10 EBHC competencies from the RACGP Curriculum for Australian General Practice 2016, mapped to competencies comprising the Sicily Statement

RACGP competency	Translation of uncertainty to an answerable question	Systematic retrieval of best evidence available	Critical appraisal of evidence	Application of results in practice	Evaluation of performance
Diagnosis and management is evidence-based and relevant to the needs of the patient.					✓
Identify approaches to communicating evidence effectively to patients				✓	
Demonstrate effective counselling regarding management options.				✓	
Validate treatment recommendations against quality evidence-based resources.	✓	✓	✓		
Formulate safe strategies to provide care for patients who decline evidence-based management options.				✓	
Implement or review processes to maintain currency of evidence-based knowledge to provide quality care.					✓
Identify and utilise quality and unbiased resources to assist in appropriate prescribing of treatments.		✓		✓	
Identify useful evidence-based guidelines to assist in prescribing appropriately.		✓			
Outline strategies and obstacles to implementing an evidence-based approach to management of common undifferentiated conditions.					✓
Quality evidence-based resources are critically analysed and utilised.		✓	✓	✓	
Define and critique evidence-based medicine as an approach to care.			✓		
Critically analyse research relevant to common clinical presentations.			✓		
Review and revise utilisation of evidence-based resources and skills in critical analysis.					✓

Continued

RACGP competency	Translation of uncertainty to an answerable question	Systematic retrieval of best evidence available	Critical appraisal of evidence	Application of results in practice	Evaluation of performance
Identify commonly used resources and their evidence basis.			✓		
Support colleagues in utilising and critically interpreting evidence-based resources relevant to practice.	✓	✓	✓	✓	
Describe and develop skills in critical appraisal of resources.			✓		✓
Differentiate between the various levels of evidence for common therapies.			✓		
Outline the challenges in applying research evidence to individual patients.				✓	✓
Identify factors important in determining validity and relevance of research to an individual patient.				✓	✓
Devise strategies to manage clinical scenarios where evidence is lacking.				✓	✓

'Devise strategies to manage clinical scenarios where evidence is lacking.'

The RACGP curriculum differs from the RCGP curriculum, however, in that it appears to assume a more liberal approach. For example, GPs are encouraged to explore and question the very basis of the EBHC philosophy:

'Define and critique evidence-based medicine as an approach to care.'

And the notion of barriers to EBHC is more explicitly acknowledged:

'Outline strategies and obstacles to implementing an evidence-based approach to management of common undifferentiated conditions.'

But if we examine this apparent liberalism more closely, we can see that it has limits. While a GP is encouraged to critique the EBHC approach, the curriculum as a whole makes it quite clear that EBHC is the accepted norm. Furthermore, the 'obstacles' to EBHC - though referred to directly - remain undefined, and are to be outlined at the level of individual undifferentiated conditions, rather than as barriers to the overall EBHC approach. Despite these difficulties, the GP is still expected to spend time on critically appraising research evidence:

'Critically analyse research relevant to common clinical presentations.'

A further departure from the RCGP curriculum is to encourage a collegiate approach to EBHC:

'Support colleagues in utilising and critically interpreting evidence-based resources relevant to practice.'

In the RCGP curriculum, EBHC is by contrast very much an individual pursuit.

2.5.1.3. ACGME competencies

The ACGME competency framework is much simpler, and arguably, therefore much clearer and practicable (Table 2.11).

Table 2.11 ACGME EBHC competencies, mapped to competencies comprising the Sicily Statement

ACGME competency	Translation of uncertainty to an answerable question	Systematic retrieval of best evidence available	Critical appraisal of evidence	Application of results in practice	Evaluation of performance
Use multiple information sources to develop a patient care plan based on current medical evidence.		✓	✓	✓	
Must demonstrate proficiency in their ability to evaluate evolving medical knowledge and incorporate it into meaningful clinical practice.			✓	✓	
Residents must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and life-long learning.			✓	✓	✓
Locate, appraise, and assimilate evidence from scientific studies related to their patients' health problems.	✓	✓	✓	✓	

The competencies relate mainly to the critical appraisal and implementation steps of the Sicily Statement. It may, though, be *too* brief. Unlike the RCGP and RACGP curricula, there is no acknowledgement of the limitations of EBHC. Nor does it give attention to the sharing of decisions between doctor and patient – a prominent feature particularly of the RCGP

curriculum. However, like the RCGP curriculum, there is a 'catch-all' competency covering most of the traditional EBHC steps:

'Locate, appraise, and assimilate evidence from scientific studies related to their patients' health problems.'

2.5.1.4. CCFP competencies

The Canadian College of Family Physicians (CCFP) objectives share the brevity of the ACGME framework (Table 2.12). The first objective has a strong flavour of the Sicily Statement:

'The physician practices evidence-based medicine skillfully. This implies not only critical appraisal and information-management capabilities, but incorporates appropriate learning from colleagues and patients.'

We can also detect in this objective the more collegiate approach to EBHC of the RACGP curriculum, but extended to an acknowledgement that GPs can also learn from patients. Learning from colleagues and patients is reiterated in the most striking objective:

'Does not give undue weight to evidence-based medicine: incorporates the patient's and family's expertise about the uniqueness of their situation; incorporates the experience and expertise of colleagues and team members, as well as his or her own.'

Here we have an unambiguous and strongly worded caution against giving undue credence to evidence in making decisions.

Table 2.12 CCFP EBHC evaluation objectives in family medicine, mapped to competencies comprising the Sicily Statement

CCFP competency	Translation of uncertainty to an answerable question	Systematic retrieval of best evidence available	Critical appraisal of evidence	Application of results in practice	Evaluation of performance
The physician practices evidence-based medicine skilfully. This implies not only critical appraisal and information-management capabilities, but incorporates appropriate learning from colleagues and patients.	✓	✓	✓	✓	✓
Does not give undue weight to evidence-based medicine: incorporates the patient's and family's expertise about the uniqueness of their situation; incorporates the experience and expertise of colleagues and team members, as well as his or her own.				✓	✓
When a patient questions care or makes suggestions, is open to respectful discussion; responds positively to patients who bring materials from the Internet.					✓
When using guidelines or the results of clinical trials (on large populations), customises and adapts them to ensure applicability to the individual patient in question.				✓	
Checks as to whether practice is consistent with recent evidence, and makes changes consistent with this evidence.		✓		✓	✓
Identifies knowledge gaps in own clinical practice, and develops a strategy to fill it; frames clinical questions that will facilitate the search for "answers" to these gaps.	✓	✓			✓

2.5.2. Concluding comments on the exploration of existing competency frameworks

Taken together, these frameworks all attempt to adapt the traditional model of EBHC (as conveyed in the Sicily Statement) for general practice. They do this mainly by highlighting

one of the core general practice values noted earlier in this chapter - that of patient-centredness. Some also recognise sources of useful knowledge aside from research evidence and extend this to a collegiate model of EBHC. There is recognition of the limitations of EBHC in general practice and acknowledgement of some barriers to EBHC. But this only goes so far. Crucially, there is an assumption of the traditional competencies of the Sicily Statement. There is no specific preference for using pre-appraised, rather than primary sources of evidence. The various bodies publishing these frameworks have been more inclined to add caveats to the traditional model than to subtract any elements. None of the competency frameworks provided a simple, flexible approach to EBHC that could easily be translated into practice. I have already described my failure to find a suitable EBHC competency framework among the research literature. In conclusion, GPs are not yet equipped with an appropriate tool to guide their approach to EBHC. By this stage in my investigation, I was confident that this represented an important research gap. I will rearticulate the gap in clear terms in the following section, and discuss my approach to addressing it.

2.6 The research gap, and how I proposed to address it

The research gap I identified was that *no suitable alternative to the traditional five-step EBHC framework described in the Sicily Statement has been developed for general practice.* Such a framework would acknowledge in its design the barriers to EBHC described in section 2.4. I proposed to address the research gap by constructing a new EBHC competency framework, tailored specifically for real-world general practice. Like the

traditional five-step framework, it would be a tool to help GPs integrate EBHC with their routine work, but with greater flexibility. I also saw in the advent of mandatory performance appraisal a potential source of powerful leverage to enhance the uptake of such a new framework. The performance appraisal process already requires demonstration of competence in EBHC. GPs are required to demonstrate that they are fulfilling the requirements of the General Medical Council guidance 'Good Medical Practice.'[121] The guidance stipulates that '*in providing clinical care*,' the GP '*must provide effective treatments based on the best available evidence.'* The mandatory nature of the appraisal process applies pressure on the GP to fulfil a demand that is difficult to demonstrate within the boundaries described by the traditional model of EBHC, as advocated in the Sicily Statement.[18] A busy GP may welcome a more flexible framework that makes attainment and demonstration of EBHC competence easier within the appraisal process. As an example of the competency-based paradigm in medical education, the GP performance appraisal could easily accommodate an EBHC competency framework. The Personal Development Plan (PDP) component of the appraisal would be the most obvious place within the appraisal process to apply it. I decided therefore, that the new real-world competency framework would be designed with two applications in mind: (1) as a *practical* tool to help integrate EBHC with routine general practice work; and (2) as an *educational* tool, to enhance EBHC competence within the appraisal process. I perceived that the two applications would be synergistic in that demonstration of competence in appraisal would *equate to*, and *further facilitate*, competence in routine work.

I was mindful in my decision, of the limitations of the competency-based approach to medical education. I have already described (in section 2.3.3) misgivings on the part of some authors about the competency-based approach in medical education, that it over-simplifies what is undeniably a complex role. I have also noted the moderate strength of evidence in its favour. That said, a 'revolution' has taken place in medical education, and CBME is now the dominant paradigm.[98] The competency-based approach has become the 'lingua franca' of medical education. GPs are well-acquainted with the competency-based approach, and as already discussed, it fits easily into the appraisal process. I decided on balance, to proceed with my plan to construct a competency framework, but to maintain a degree of flexibility in its design, so that it could adapt to the complexity inherent in general practice.

2.7 The hypothesis tested

To give my research clarity, and to maintain my focus on the desired outcome, I articulated my aim in the form of a hypothesis. *The hypothesis tested was that a flexible competency framework could be constructed, which underpins important, achievable and demonstrable attributes for engaging successfully with EBHC in general practice.*

2.8 Summary of the chapter

This chapter can be summarised as follows:

- I have provided a context for the thesis, introducing the reader to four broad topics: (1) EBHC as an evolving discipline in medicine; (2) the philosophy of care underpinning

modern general practice; (3) educational theories with an impact on learning in general practice and EBHC; and (4) the evolving field of research synthesis.

- I have discussed the relationship between EBHC and general practice, which has been made difficult by a number of barriers to their integration.

- I have explored both the literature on integration of EBHC and general practice, and the existing competency frameworks published by educational bodies. I was unable to find a suitable, flexible alternative to the traditional five-step model of EBHC for GPs.

- I have defined the lack of a suitable alternative to the traditional five-step model, tailored specifically for general practice as a research gap.

- I have stated my approach to addressing the research gap: the construction of a new real-world EBHC competency framework, designed for two synergistic applications: (1) as a practical tool to help integrate EBHC with routine general practice work; and (2) as an educational tool, to enhance EBHC competence within the appraisal process.

- I have articulated my aim in the form of a hypothesis: *that a flexible competency framework could be constructed, which underpins important, achievable and demonstrable attributes for engaging successfully with EBHC in general practice.* The following chapters will describe how I attempted to test the hypothesis.

2.9 References

1. Sackett DL, Straus SE, Richardson WS, Rosenberg W, Haynes RB. *Evidence-based medicine: how to practice and teach EBM.* Second ed. Edinburgh: Churchill Livingstone; 2000.
2. The RACGP Curriculum for Australian General Practice 2011. 2011; http://curriculum.racgp.org.au Accessed 27 July 2015.
3. Defining competence for the purposes of certification by the College of Family Physicians of Canada: The evaluation objectives in family medicine. Report of the Working Group on the Certification Process. 2010; http://www.cfpc.ca/EvaluationObjectives/ Accessed 27 July 2015.
4. ACGME Program Requirements for Graduate Medical Education in Family Medicine. 2015; http://www.acgme.org/acgmeweb/ Accessed 27 July 2015.
5. Royal College of General Practitioners curriculum. http://www.rcgp.org.uk/GP-training-and-exams/GP-curriculum-overview.aspx Accessed 06.05.2016.
6. Glasziou P. Eighteen years later, is Evidence-Based Practice really adult? 5th International Conference for EBHC Teachers and Developers; 2009; Taormina, Sicily.
7. Guyatt G. Evidence-based medicine. *Ann Inter Med.* 1991;114 (ACP J Club. Suppl 1):A-16.
8. EBM Working Group. Evidence-based medicine. A new approach to teaching the practice of medicine. *JAMA.* 1992;268(17):2420-2425.
9. Howick JH. *The philosophy of evidence-based medicine.* John Wiley & Sons; 2011.
10. Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. *BMJ.* 1996;312(7023):71-72.
11. Djulbegovic B, Guyatt GH, Ashcroft RE. Epistemologic inquiries in evidence-based medicine. *Cancer control: journal of the Moffitt Cancer Center.* 2009;16(2):158-168.
12. Guyatt G, Rennie D. *Users' guides to the medical literature: a manual for evidence-based clinical practice.* Vol 706.
13. Glasziou P, Del Mar C, Salisbury J. *Evidence-Based Practice Workbook.* 2nd ed. Oxford: Blackwell; 2007.
14. Weerkamp NJ, Tissingh G, Poels PJ, et al. Nonmotor symptoms in nursing home residents with Parkinson's disease: prevalence and effect on quality of life. *Journal of the American Geriatrics Society.* 2013;61(10):1714-1721.
15. Straus SE, Richardson WS, Glasziou P, Haynes RB, eds. *Evidence-Based Medicine; How to practice and teach EBM.* 3rd ed: Elsevier; 2005.
16. Walshe K, Rundall TG. Evidence-based management: from theory to practice in health care. *The Milbank Quarterly.* 2001;79(3):429-457.
17. Claveria LE, Duarte J, Sevillano MD, et al. Prevalence of Parkinson's disease in Cantalejo, Spain: a door-to-door survey. *Movement Disorders.* 2002;17(2):242-249.
18. Dawes M, Summerskill W, Glasziou P, et al. Sicily statement on evidence-based practice. *BMC Med Educ.* 2005;5(1):1.

19. McColl A, Smith H, White P, Field J. General practitioner's perceptions of the route to evidence based medicine: a questionnaire survey. *BMJ.* 1998;316(7128):361-365.
20. Callen JL, Fennell K, McIntosh JH. Attitudes to, and use of, evidence-based medicine in two Sydney divisions of general practice. *Australian Journal of Primary Health.* 2006;12(1):40-46.
21. Young JM, Ward JE. Evidence-based medicine in general practice: beliefs and barriers among Australian GPs. *Journal of Evaluation in Clinical Practice.* 2001;7(2):201-210.
22. Straus SE, McAlister FA. Evidence-based medicine: a commentary on common criticisms. *Canadian Medical Association Journal.* 2000;163(7):837-841.
23. Reynolds S. *Evidence-based practice: A critical appraisal.* John Wiley & Sons; 2008.
24. J H. The Year in Ideas: A to Z; Evidence-based Medicine. *The New York Times*2001.
25. Dickersin K, Straus SE, Bero LA. Evidence based medicine: increasing, not dictating, choice. *BmJ.* 2007;334(suppl 1):s10-s10.
26. Sheridan DJ. *Evidence-Based Medicine: Best Practice or Restrictive Dogma.* World Scientific; 2016.
27. Maher C, Feiner B, Baessler K, Christmann-Schmid C, Haya N, Marjoribanks J. Transvaginal mesh or grafts compared with native tissue repair for vaginal prolapse. *Cochrane Database Syst Rev.* 2016;2(2).
28. Heneghan CJ, Goldacre B, Onakpoya I, et al. Trials of transvaginal mesh devices for pelvic organ prolapse: a systematic database review of the US FDA approval process. *BMJ open.* 2017;7(12).
29. Government halts vaginal mesh surgery in NHS hospitals. https://www.theguardian.com/society/2018/jul/09/government-halts-vaginal-mesh-surgery-in-nhs-hospitals Accessed 08.08.2016.
30. Ebell MH. WHO downgrades status of oseltamivir. *BMJ: British Medical Journal (Online).* 2017;358.
31. Abbasi K. The missing data that cost $20 bn. British Medical Journal Publishing Group; 2014.
32. WHO model list of essential medicines. 16th list (updated). 2010; http://apps.who.int/iris/bitstream/handle/10665/70643/a95060_eng.pdf Accessed 08.08.2018.
33. Jefferson T, Jones M, Doshi P, Spencer EA, Onakpoya I, Heneghan CJ. Oseltamivir for influenza in adults and children: systematic review of clinical study reports and summary of regulatory comments. *Bmj.* 2014;348:g2545.
34. Greenhalgh T, Howick J, Maskrey N. Evidence based medicine: a movement in crisis? *Bmj.* 2014;348:g3725.
35. Levin A. The cochrane collaboration. *Annals of internal medicine.* 2001;135(4):309-312.
36. Simera I, Moher D, Hirst A, Hoey J, Schulz KF, Altman DG. Transparent and accurate reporting increases reliability, utility, and impact of your research: reporting guidelines and the EQUATOR Network. *BMC medicine.* 2010;8(1):24.
37. Hill J, Bullock I, Alderson P. A summary of the methods that the National Clinical Guideline Centre uses to produce clinical guidelines for the National Institute for Health and Clinical Excellence. *Annals of internal medicine.* 2011;154(11):752-757.

38. Critical Appraisal Skills Programme. https://casp-uk.net Accessed 08.08.2018.
39. Straus S, Tetroe J, Graham ID. *Knowledge translation in health care: moving from evidence to practice.* John Wiley & Sons; 2013.
40. Moynihan R, Henry D, Moons KG. Using evidence to combat overdiagnosis and overtreatment: evaluating treatments, tests, and disease definitions in the time of too much. *PLoS medicine.* 2014;11(7):e1001655.
41. Schulz KF, Altman DG, Moher D. CONSORT 2010 statement: updated guidelines for reporting parallel group randomised trials. *BMC medicine.* 2010;8(1):18.
42. Bossuyt PM, Reitsma JB, Bruns DE, et al. Towards complete and accurate reporting of studies of diagnostic accuracy: the STARD initiative. *Clinical chemistry and laboratory medicine.* 2003;41(1):68-73.
43. O'brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. *Academic Medicine.* 2014;89(9):1245-1251.
44. Goldacre B. Make journals report clinical trials properly: there is no excuse for the shoddy practice of allowing researchers to change outcomes and goals without saying so. *Nature.* 2016;530(7588):7-8.
45. Chalmers I, Glasziou P. Avoidable waste in the production and reporting of research evidence. *The Lancet.* 2009;374(9683):86-89.
46. Chalmers I, Bracken MB, Djulbegovic B, et al. How to increase value and reduce waste when research priorities are set. *The Lancet.* 2014;383(9912):156-165.
47. Heneghan C, Mahtani KR, Goldacre B, Godlee F, Macdonald H, Jarvies D. Evidence based medicine manifesto for better healthcare: A response to systematic bias, wastage, error and fraud in research underpinning patient care. Royal Society of Medicine; 2017.
48. Zwolsman S, te Pas E, Hooft L, Wieringa-de Waard M, van Dijk N. Barriers to GPs' use of evidence-based medicine: a systematic review. *Br J Gen Pract.* 2012;62(600):e511-521.
49. Lenzer J. Why we can't trust clinical guidelines. *Bmj.* 2013;346:f3830.
50. Greenhalgh T, Snow R, Ryan S, Rees S, Salisbury H. Six 'biases' against patients and carers in evidence-based medicine. *BMC medicine.* 2015;13(1):200.
51. Song F, Parekh S, Hooper L, et al. Dissemination and publication of research findings: an updated review of related biases. *Health Technol Assess.* 2010;14(8):1-193.
52. Light DW, Lexchin J, Darrow JJ. Institutional corruption of pharmaceuticals and the myth of safe and effective drugs. SAGE Publications Sage CA: Los Angeles, CA; 2013.
53. Goldacre B. *Bad pharma: how drug companies mislead doctors and harm patients.* Macmillan; 2014.
54. Ioannidis JP. Why most published research findings are false. *PLoS medicine.* 2005;2(8):e124.
55. *The European definition of general practice/family medicine.* Barcelona: WONCA Europe (The European Society of General Practice / Family Medicine), the Regional Organisation of the World organisation of Family Doctors (WONCA).2011.

56. Royal College of General Practitioners. http://www.rcgp.org.uk Accessed 29.07.2018.
57. Starfield B. *Primary care: concept, evaluation, and policy.* Oxford University Press, USA; 1992.
58. Stange KC. Barbara Starfield: passage of the pathfinder of primary care. *Ann Fam Med.* 2011;9(4):292-296.
59. Starfield B. Is primary care essential? *The lancet.* 1994;344(8930):1129-1133.
60. Scott A. Economics of general practice. *Handbook of health economics.* 2000;1:1175-1200.
61. Harris MA, Koehoorn M, Teschke K. Ongoing challenges to finding people with Parkinson's disease for epidemiological studies: a comparison of population-level case ascertainment methods. *Parkinsonism & Related Disorders.* 2011;17(6):464-469.
62. Simon C, Everitt H, Van Dorp F, Burke M. *Oxford handbook of general practice.* Oxford University Press; 2014.
63. Starfield B. *Primary care: balancing health needs, services, and technology.* Religion in America; 1998.
64. *The European Definition of General Practice/Family Medicine.* London: WONCA Europe;2005.
65. Szaz T, Hollender MH. A contribution to the philosophy of medicine. *Archives of Internal Medicine.* 1956;97(5):585-592.
66. Balint M. The doctor, his patient and the illness. 1957.
67. Neighbour R. The inner consultation. Lancaster: MTP Press; 1987.
68. Pearce C, Dwan K, Arnold M, Phillips C, Trumble S. Doctor, patient and computer--a framework for the new consultation. *Int J Med Inform.* 2009;78(1):32-38.
69. Noordman J, Verhaak P, van Beljouw I, van Dulmen S. Consulting room computers and their effect on general practitioner-patient communication. *Fam Pract.* 2010;27(6):644-651.
70. Pearce C, Arnold M, Phillips C, Trumble S, Dwan K. The patient and the computer in the primary care consultation. *Journal of the American Medical Informatics Association.* 2011;18(2):138-142.
71. Kearley KE, Freeman GK, Heath A. An exploration of the value of the personal doctor-patient relationship in general practice. *Br J Gen Pract.* 2001;51(470):712-718.
72. Stewart AL, Grumbach K, Osmond DH, Vranizan K, Komaromy M, Bindman AB. Primary care and patient perceptions of access to care. *The Journal of family practice.* 1997;44(2):177-185.
73. Guiding patients through complexity: modern medical generalism. Report of an independent commission for the Royal College of General Practitioners and the Health Foundation. 2011; http://www.rcgp.org.uk/policy/rcgp-policy-areas/medical-generalism.aspx Accessed 15.04.2017.
74. Porta M. *A dictionary of epidemiology.* Oxford University Press; 2008.
75. Stott NC, Davis RH. The exceptional potential in each primary care consultation. *J R Coll Gen Pract.* 1979;29(201):201-205.
76. Howie J. Diagnosis in general practice and its implications for quality of care. *Journal of health services research & policy.* 2010;15(2):120-122.

77. Olesen F, Dickinson J, Hjortdahl P. General practice—time for a new definition. *Bmj.* 2000;320(7231):354-357.
78. Marttila RJ, Rinne UK. Epidemiology of Parkinson's disease in Finland. *Acta Neurologica Scandinavica.* 1976;53(2):81-102.
79. Medical generalism: impact report, May 2013. 2013; http://www.rcgp.org.uk/policy/rcgp-policy-areas/medical-generalism.aspx Accessed 15.04.2017.
80. Barrows HS. Problem-based learning in medicine and beyond: A brief overview. *New directions for teaching and learning.* 1996;1996(68):3-12.
81. Schon DA. *The reflective practitioner: how professionals think in action.* London: Maraca Temple Smith; 1983.
82. Mann K, Gordon J, MacLeod A. Reflection and reflective practice in health professions education: a systematic review. *Advances in health sciences education.* 2009;14(4):595-621.
83. Spencer JA, Jordan RK. Learner centred approaches in medical education. *Bmj.* 1999;318(7193):1280-1283.
84. Merriam SB. Adult learning and theory building: A review. *Adult Education Quarterly.* 1987;37(4):187-198.
85. Kaufman DM, Mann KV. Teaching and learning in medical education: how theory can inform practice. *Understanding medical education: Evidence, theory and practice*2010:16-36.
86. Knowles MS, Holton EF, Swanson RA. *The adult learner: The definitive classic in adult education and human resource development.* Burlington, MA: Elsevier; 2005.
87. Neville AJ, Norman GR. PBL in the undergraduate MD program at McMaster University: three iterations in three decades. *Acad Med.* 2007;82(4):370-374.
88. Boud D, Feletti G. *The challenge of problem-based learning.* Routledge; 2013.
89. Davies P. Approaches to evidence-based teaching. *Medical Teacher.* 2000;22(1):14-21.
90. Leung GM. Evidence-based practice revisited. *Asia Pacific Journal of Public Health.* 2001;13(2):116-121.
91. Kolb DA. Experiential learning: Experience as the source of learning and development. 1984.
92. Armstrong E, Parsa-Parsi R. How can physicians' learning styles drive educational planning? *Academic Medicine.* 2005;80(7):680-684.
93. Dewey J. *How we think.* Courier Corporation; 1997.
94. Boud D, Keogh R, Walker D. Reflection: Turning learning into experience. *Kongan Page, London.* 1985.
95. Shapiro J, Talbot Y. Applying the concept of the reflective practitioner to understanding and teaching family medicine. *Family medicine.* 1991;23(6):450-456.
96. Carraccio C, Wolfsthal SD, Englander R, Ferentz K, Martin C. Shifting paradigms: from Flexner to competencies. *Academic Medicine.* 2002;77(5):361-367.
97. Frank JR, Snell LS, Cate OT, et al. Competency-based medical education: theory to practice. *Medical teacher.* 2010;32(8):638-645.
98. Iobst WF, Sherbino J, Cate OT, et al. Competency-based medical education in postgraduate medical education. *Medical teacher.* 2010;32(8):651-656.

99. Smith S, Fuller B. MD2000: a competency-based curriculum for the Brown University School of Medicine. *Medicine and health, Rhode Island.* 1996;79(8):292.
100. Smith SR. AMEE Guide No. 14: Outcome-based education: Part 2-Planning, implementing and evaluating a competency-based curriculum. *Medical teacher.* 1999;21(1):15-22.
101. Dunnington GL, Wright K, Hoffman K. A pilot experience with competency-based clinical skills assessment in a surgical clerkship. *The American journal of surgery.* 1994;167(6):604-607.
102. Martin M, Vashisht B, Frezza E, et al. Competency-based instruction in critical invasive skills improves both resident performance and patient safety. *Surgery.* 1998;124(2):313-317.
103. Strang RR. The treatment of the "anxiety-tension syndrome", in Parkinson's disease with fluphenazine (Pacinol). *Acta Neurologica et Psychiatrica Belgica.* 1966;66(3):218-222.
104. Cohen ML, Aita S, Mari Z, Brandt J. The Unique and Combined Effects of Apathy and Depression on Cognition in Parkinson's Disease. *Journal of Parkinsons Disease Print.* 2015;5(2):351-359.
105. Glasgow NJ, Wells R, Butler J, Gear A. The effectiveness of competency-based education in equipping primary health care workers to manage chronic disease in Australian general practice settings. *Medical Journal of Australia.* 2008;188(8 Suppl):S92-96.
106. Grant J. Principles of curriculum design. Association for the Study of Medical Education, Blackwells Press; 2006.
107. Grant J. The incapacitating effects of competence: a critique. *Advances in Health Sciences Education.* 1999;4(3):271-277.
108. Brightwell A, Grant J. Competency-based training: who benefits? *Postgraduate medical journal.* 2013;89(1048):107-110.
109. Rees CE. The problem with outcomes-based curricula in medical education: insights from educational theory. *Medical education.* 2004;38(6):593-598.
110. Committee GMCE. *Tomorrow's doctors: recommendations on undergraduate medical education.* General Medical Council London; 1993.
111. Frank J. The CanMEDS physician competency framework: better physicians better care. *Ottawa: Royal College of Physicians and Surgeons of Canada.* 2005.
112. Frank JR, Danoff D. The CanMEDS initiative: implementing an outcomes-based framework of physician competencies. *Medical teacher.* 2007;29(7):642-647.
113. Swing SR. The ACGME outcome project: retrospective and prospective. *Medical teacher.* 2007;29(7):648-654.
114. Graham IS, Gleason AJ, Keogh GW, et al. Australian curriculum framework for junior doctors. *Medical Journal of Australia.* 2007;186(7):S14.
115. Van Herwaarden C, Laan R, Leunissen R. The 2009 framework for undergraduate medical education in the Netherlands. *Utrecht: Dutch Federation of University Medical Centres.* 2009.
116. Irvine D. The performance of doctors. I: Professionalism and self regulation in a changing world. *BMJ: British Medical Journal.* 1997;314(7093):1540.

117. Teasdale G. Learning from Bristol: report of the public inquiry into children's heart surgery at Bristol Royal Infirmary 1984-1995. *British journal of neurosurgery.* 2002;16(3):211-216.
118. The Report of the Public Inquiry into children's heart surgery at the Bristol Royal Infirmary 1984-1995. Learning from Bristol. 2001; http://webarchive.nationalarchives.gov.uk/20090811143822/http://www.bristol-inquiry.org.uk/final_report/the_report.pdf Accessed 26.10.2018.
119. Supporting Doctors, Protecting Patients. *NHS Executive, London.* 1999.
120. Conlon M. Appraisal: the catalyst of personal development. *BMJ: British Medical Journal.* 2003:389-391.
121. General Medical Council. Good Medical Practice. Working with doctors Working for patients. 2013; http://www.gmc-uk.org/guidance/good_medical_practice.asp Accessed 30 April 2017.
122. NHS England. Medical Appraisal Guide. A guide to medical appraisal for revalidation in England. https://www.england.nhs.uk/medical-revalidation/appraisers/med-app-guide/ Accessed 12.11.2018.
123. Noyes J, Booth A, Cargo M, et al. Cochrane Qualitative and Implementation Methods Group guidance series—paper 1: introduction. *Journal of clinical epidemiology.* 2018;97:35-38.
124. Daly J. *Evidence-based medicine and the search for a science of clinical care.* Vol 12: Univ of California Press; 2005.
125. Cochrane AL. Effectiveness and Efficiency: Random Reflections on Health Services. 1972.
126. Cochrane AL. 1931-1971: a critical review, with particular reference to the medical profession. *Medicines for the year.* 2000;1979:1.
127. Glasziou PP, Del Mar C, Salisbury J. *Evidence-based practice workbook.* John Wiley & Sons; 2009.
128. Kessler, II. Parkinson's disease perspectives on epidemiology and pathogenesis. *Preventive Medicine.* 1973;2(1):88-105.
129. Robson C. *Real World Research.* Oxford: Blackwell; 2002.
130. Dixon-Woods M, Agarwal S, Jones D, Young B, Sutton A. Synthesising qualitative and quantitative evidence: A review of possible methods. *Journal of Health Services Research and Policy.* 2005;10(1):45-53.
131. Harden A. Mixed-methods systematic reviews: integrating quantitative and qualitative findings. *Focus.* 2010;2010(25):1-8.
132. Gough D. Qualitative and mixed methods in systematic reviews. BioMed Central; 2015.
133. Mays N, Pope C, Popay J. Systematically reviewing qualitative and quantitative evidence to inform management and policy-making in the health field. *Journal of health services research & policy.* 2005;10(1_suppl):6-20.
134. Pearson A, White H, Bath-Hextall F, Salmond S, Apostolo J, Kirkpatrick P. A mixed-methods approach to systematic reviews. *International journal of evidence-based healthcare.* 2015;13(3):121-131.
135. Sandelowski M, Voils CI, Leeman J, Crandell JL. Mapping the mixed methods–mixed research synthesis terrain. *Journal of mixed methods research.* 2012;6(4):317-331.

136. Östlund U, Kidd L, Wengström Y, Rowa-Dewar N. Combining qualitative and quantitative research within mixed method research designs: a methodological review. *International journal of nursing studies.* 2011;48(3):369-383.
137. McCusker K, Gunaydin S. Research using qualitative, quantitative or mixed methods and choice based on the research. *Perfusion.* 2015;30(7):537-542.
138. Pope C, Mays N. Qualitative research: reaching the parts other methods cannot reach: an introduction to qualitative methods in health and health services research. *Bmj.* 1995;311(6996):42-45.
139. Holloway I. *Qualitative research in health care.* McGraw-Hill Education (UK); 2005.
140. Tashakkori A, Creswell JW. The new era of mixed methods. Sage Publications; 2007.
141. Pawson R. *Evidence-based policy: a realist perspective.* Sage; 2006.
142. Thomas J, Sutcliffe K, Harden A, et al. Children and healthy eating: a systematic review of barriers and facilitators. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London. 2003.
143. Khan K, Kunz R, Kleijnen J, Antes G. *Systematic reviews to support evidence-based medicine.* Crc Press; 2011.
144. Thomas J, Harden A. Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Med Res Methodol.* 2008;8:45.
145. Oliver S, Harden A, Rees R, et al. An emerging framework for including different types of evidence in systematic reviews for public policy. *Evaluation.* 2005;11(4):428-446.
146. Shepherd J, Harden A, Rees R, et al. Young people and healthy eating: a systematic review of research on barriers and facilitators. 2001.
147. Shepherd J, Garcia J, Oliver S, et al. Barriers to, and facilitators of, the health of young people: a systematic review of evidence on young people's views and on interventions in mental health, physical activity and healthy eating. Vol. 1, Overview. Vol. 2, Complete report. *EPPI-Centre, Social Science Research Unit, London.* 2002.
148. Harden A, Thomas J. Methodological issues in combining diverse study types in systematic reviews. *International Journal of Social Research Methodology.* 2005;8(3):257-271.
149. Harden A, Garcia J, Oliver S, et al. Applying systematic review methods to studies of people's views: an example from public health research. *Journal of Epidemiology & Community Health.* 2004;58(9):794-800.
150. Thomas J, Harden A, Oakley A, et al. Integrating qualitative research with trials in systematic reviews. *Bmj.* 2004;328(7446):1010-1012.
151. Gough D, Oliver S, Thomas J, eds. *An introduction to systematic reviews.* 1st ed. London: SAGE Publications Ltd; 2012.
152. Pedersen VH, Dagenais P, Lehoux P. Multi-source synthesis of data to inform health policy. *Int J Technol Assess Health Care.* 2011;27(3):238-246.
153. Lucas PJ, Baird J, Arai L, Law C, Roberts HM. Worked examples of alternative methods for the synthesis of qualitative and quantitative research in systematic reviews. *BMC medical research methodology.* 2007;7(1):4.

154. Khan KS, Ter Riet G, Glanville J, Sowden AJ, Kleijnen J. *Undertaking systematic reviews of research on effectiveness: CRD's guidance for carrying out or commissioning reviews.* NHS Centre for Reviews and Dissemination; 2001.
155. Goldsmith MR, Bankhead CR, Austoker J. Synthesising quantitative and qualitative research in evidence-based patient information. *Journal of Epidemiology & Community Health.* 2007;61(3):262-270.
156. Dixon-Woods M, Cavers D, Agarwal S, et al. Conducting a critical interpretive synthesis of the literature on access to healthcare by vulnerable groups. *BMC medical research methodology.* 2006;6(1):35.
157. Sandelowski M, Voils CI, Barroso J. Defining and designing mixed research synthesis studies. *Research in the schools: a nationally refereed journal sponsored by the Mid-South Educational Research Association and the University of Alabama.* 2006;13(1):29.
158. Barbour RS. Mixing qualitative methods: quality assurance or qualitative quagmire? *Qualitative health research.* 1998;8(3):352-361.
159. Sandelowski M, Docherty S, Emden C. Focus on qualitative methods Qualitative metasynthesis: issues and techniques. *Research in nursing and health.* 1997;20:365-372.
160. Chan GC, Teng CL. Primary care doctors' perceptions towards evidence-based medicine in Melaka State: a questionnaire study. *Medical Journal of Malaysia.* 2005;60(2):130-133.
161. Freeman AC, Sweeney K. Why general practitioners do not implement evidence: qualitative study. *BMJ.* 2001;323(7321):1100-1102.
162. López MCS, de Torres MM, Sánchez JAS, Puche JFM, Ontoso EA. ¿ Qué pensamos los médicos de familia sobre la medicina basada en la evidencia? Un estudio con grupos focales. *Atención primaria.* 2010;42(10):507-513.
163. Willis TA, West R, Rushforth B, et al. Variations in achievement of evidence-based, high-impact quality indicators in general practice: An observational study. *PloS one.* 2017;12(7):e0177949.
164. Wallace E, Salisbury C, Guthrie B, Lewis C, Fahey T, Smith SM. Managing patients with multimorbidity in primary care. *Bmj.* 2015;350:h176.
165. Hobbs FDR, Bankhead C, Mukhtar T, et al. Clinical workload in UK primary care: a retrospective analysis of 100 million consultations in England, 2007-14. *Lancet.* 2016;387(10035):2323-2330.
166. Baird B, Charles A, Honeyman M, Maguire D, Das P. *Understanding pressures in general practice.* King's Fund London; 2016.
167. Dawda P, Jenkins R, Varnam R. Quality improvement in general practice. *London: The King's Fund.* 2010;30:30.
168. Berwick D. 'A transatlantic review of the NHS at 60.' Speech to NHS Live conference, 1 July . 2008; http://www.pnhp.org/news/2010/may/a-transatlantic-review-of-the-nhs-at-60 Accessed 20.08.2018.
169. Dixon A, Ham C. Liberating the NHS: The right prescription in a cold climate. *The King1s Fund response to the 2010 Health White Paper.* 2010.
170. Hannes K, Leys M, Vermeire E, Aertgeerts B, Buntinx F, Depoorter A-M. Implementing evidence-based medicine in general practice: a focus group based study. *BMC Family Practice.* 2005;6:37.

171. Trevena LJ, Irwig L, Isaacs A, Barratt A. GPs want tailored, user friendly evidence summaries--a cross sectional study in New South Wales. *Australian Family Physician.* 2007;36(12):1065-1069.
172. Tracy CS, Dantas GC, Upshur REG. Evidence-based medicine in primary care: qualitative study of family physicians. *BMC Family Practice.* 2003;4:6.
173. Gupta L, Ward JE, Hayward RS. Clinical practice guidelines in general practice: a national survey of recall, attitudes and impact. *Medical Journal of Australia.* 1997;166(2):69-72.
174. Butzlaff M, Vollmar H, Floer B, Koneczny N, Isfort J, Lange S. Learning with computerized guidelines in general practice? A randomized controlled trial. *Family Practice.* 2004;21(2):183-188.
175. Cotton P, Sullivan F. Perceptions of guidelines in primary and secondary care: implications for implementation. *Journal of Integrated Care.* 1999;3(2):79-83.
176. Taylor J, Wilkinson D, Blue IA, Dollard JT. Evidence-based rural general practice: barriers and solutions in South Australia. *Rural Remote Health.* 2002;2(1):116.
177. McKenna HP, Ashton S, Keeney S. Barriers to evidence-based practice in primary care. *Journal of Advanced Nursing.* 2004;45(2):178-189.
178. Upton D, Upton P. Knowledge and use of evidence-based practice of GPs and hospital doctors. *Journal of Evaluation in Clinical Practice.* 2006;12(3):376-384.
179. Amin FA, Fedorowicz Z, Montgomery AJ. A study of knowledge and attitudes towards the use of evidence-based medicine among primary health care physicians in Bahrain. *Saudi Medical Journal.* 2006;27(9):1394-1396.
180. Barghouti F, Halaseh L, Said T, Mousa AH, Dabdoub A. Evidence-based medicine among Jordanian family physicians: awareness, attitude, and knowledge. *Canadian Family Physician.* 2009;55(7):e6-13.
181. Yew KS, Reid A. Teaching evidence-based medicine skills: an exploratory study of residency graduates' practice habits. *Family Medicine.* 2008;40(1):24-31.
182. Carlsen B, Norheim OF. "What lies beneath it all?"--an interview study of GPs' attitudes to the use of guidelines. *BMC Health Services Research.* 2008;8:218.
183. Cranney M, Warren E, Barton S, Gardner K, Walley T. Why do GPs not implement evidence-based guidelines? A descriptive study. *Family Practice.* 2001;18(4):359-363.
184. Mayer J, Piterman L. The attitudes of Australian GPs to evidence-based medicine: A focus group study. *Family Practice.* 1999;16(6):627-632.
185. Oswald N, Bateman H. Treating individuals according to evidence: why do primary care practitioners do what they do? *Journal of Evaluation in Clinical Practice.* 2000;6(2):139-148.
186. Kortekaas MF, Bartelink ME, Zuithoff NP, van der Heijden GJ, de Wit NJ, Hoes AW. Does integrated training in evidence-based medicine (EBM) in the general practice (GP) specialty training improve EBM behaviour in daily clinical practice? A cluster randomised controlled trial. *BMJ Open.* 2016;6(9):e010537.
187. Alper BS, Stevermer JJ, White DS, Ewigman BG. Answering family physicians' clinical questions using electronic medical databases. *Journal of Family Practice.* 2001;50(11):960-965.

188. Alper BS, White DS, Ge B. Physicians answer more clinical questions and change clinical decisions more often with synthesized evidence: a randomized trial in primary care. *Annals of Family Medicine.* 2005;3(6):507-513.
189. Labrecque M, Ratté S, Frémont P, et al. Decision making in family medicine: randomized trial of the effects of the InfoClinique and Trip database search engines. *Canadian family physician Médecin de famille canadien.* 2013;59(10):1084-1094.
190. MacAuley D, McCrum E. Critical appraisal using the READER method: a workshop-based controlled trial. *Family Practice.* 1999;16(1):90-93.
191. MacAuley D, McCrum E, Brown C. Randomised controlled trial of the READER method of critical appraisal in general practice. *BMJ (Clinical research ed).* 1998;316(7138):1134-1137.
192. McGowan JJ, Winstead-Fry P. Problem Knowledge Couplers: reengineering evidence-based medicine through interdisciplinary development, decision support, and research. *Bulletin of the Medical Library Association.* 1999;87(4):462-470.
193. Leentjens AF, Lousberg R, Verhey FR. Markers for depression in Parkinson's disease. *Acta Psychiatrica Scandinavica.* 2002;106(3):196-201.
194. Biemiller R, Richard IH. Managing depression in Parkinson's patients: risk factors and clinical pearls. *Neurodegenerative Disease Management.* 2014;4(4):329-336.
195. Morris ME, Martin C, McGinley JL, et al. Protocol for a home-based integrated physical therapy program to reduce falls and improve mobility in people with Parkinson's disease. *BMC Neurology.* 2012;12 (no pagination)(54).
196. de Brun C. *Searching skills toolkit: Finding the evidence.* Vol 8. second ed: John Wiley & Sons; 2014.
197. Argimon-Pallas JM, Flores-Mateo G, Jimenez-Villa J, Pujol-Ribera E. Effectiveness of a short-course in improving knowledge and skills on evidence-based practice. *BMC Family Practice.* 2011;12:64.
198. Davis NL, Lawrence SL, Morzinski JA, Radjenovich ME. Improving the value of CME: impact of an evidence-based CME credit designation on faculty and learners. *Family Medicine.* 2009;41(10):735-740.
199. Epling J, Smucny J, Patil A, Tudiver F. Teaching evidence-based medicine skills through a residency-developed guideline. *Family Medicine.* 2002;34(9):646-648.
200. Goulet F, Saucier D, Beaulieu M-D, et al. Participants' perception of impact of a workshop on their preventive practices. *Medical Teacher.* 2002;24(3):330-334.
201. Grad R, Macaulay AC, Warner M. Teaching evidence-based medical care: description and evaluation. *Family Medicine.* 2001;33(8):602-606.
202. Ross R, Verdieck A. Introducing an evidence-based medicine curriculum into a family practice residency--is it effective? *Academic Medicine.* 2003;78(4):412-417.
203. Shaughnessy AF, Gupta PS, Erlich DR, Slawson DC. Ability of an information mastery curriculum to improve residents' skills and attitudes. *Family Medicine.* 2012;44(4):259-264.
204. te Pas E, Wieringa-de Waard M, de Ruijter W, van Dijk N. Learning results of GP trainers in a blended learning course on EBM: a cohort study. *BMC Medical Education.* 2015;15:104.

205. Thom DH, Haugen J, Sommers PS, Lovett P. Description and evaluation of an EBM curriculum using a block rotation. *BMC Medical Education.* 2004;4:19.
206. Tudiver F, Rose D, Banks B, Pfortmiller D. Reliability and validity testing of an evidence-based medicine OSCE station. *Family Medicine.* 2009;41(2):89-91.
207. Paulhus DL. Measurement and control of response bias. In: Robinson JP, Shaver PR, Wrightman LS, eds. *Measures of Personality and Social Psychological Attitudes. Volume 1 in Measures of Social Psychological Attitudes series*. San Diego: Academic Press Inc; 1991.
208. Amin Z, Chong YS, Khoo HE. *Practical Guide to Medical Student Assessment.* Singapore: World Scientific Publishing Co.; 2006.
209. Ramos KD, Schafer S, Tracz SM. Validation of the Fresno test of competence in evidence based medicine. *BMJ: British Medical Journal.* 2003;326(7384):319-321.
210. Bernal-Delgado E, Galeote-Mayor M, Pradas-Arnal F, Peiró-Moreno S. Evidence based educational outreach visits: effects on prescriptions of non-steroidal anti-inflammatory drugs. *Journal of epidemiology and community health.* 2002;56(9):653-658.
211. Freemantle N, Nazareth I, Eccles M, Wood J, Haines A. A randomised controlled trial of the effect of educational outreach by community pharmacists on prescribing in UK general practice. *The British journal of general practice : the journal of the Royal College of General Practitioners.* 2002;52(477):290-295.
212. George P, Reis S, Nothnagle M. Using a learning coach to teach residents evidence-based medicine. *Family Medicine.* 2012;44(5):351-355.
213. Markey P, Schattner P. Promoting evidence-based medicine in general practice-the impact of academic detailing. *Family practice.* 2001;18(4):364-366.
214. Nazareth I, Freemantle N, Duggan C, Mason J, Haines A. Evaluation of a complex intervention for changing professional behaviour: the Evidence Based Out Reach (EBOR) Trial. *Journal of health services research & policy.* 2002;7(4):230-238.
215. Vrdoljak D, Petric D, Diminic Lisica I, et al. Knowledge and attitudes towards evidence-based medicine of mentors in general practice can be influenced by using medical students as academic detailers. *European Journal of General Practice.* 2015;21(3):170-175.
216. Dormuth CR, Maclure M, Bassett K, Jauca C, Whiteside C, Wright JM. Effect of periodic letters on evidence-based drug therapy on prescribing behaviour: a randomized trial. *CMAJ Canadian Medical Association Journal.* 2004;171(9):1057-1061.
217. Skoglund I, Bjorkelund C, Petzold M, Gunnarsson R, Moller M. A randomized controlled trial comparing two ways of providing evidence-based drug information to GPs. *Scandinavian Journal of Primary Health Care.* 2013;31(2):67-72.
218. Cramer JS, Mahoney MC. Introducing evidence based medicine to the journal club, using a structured pre and post test: a cohort study. *BMC Medical Education.* 2001;1:6.
219. Harris J, Kearley K, Heneghan C, et al. Are journal clubs effective in supporting evidence-based decision making? A systematic review. BEME Guide No. 16. *Med Teach.* 2011;33(1):9-23.

220. Del Mar CB, Silagy CA, Glasziou PP, et al. Feasibility of an evidence-based literature search service for general practitioners. *Medical Journal of Australia.* 2001;175(3):134-137.
221. Verhoeven AA, Schuling J. Effect of an evidence-based answering service on GPs and their patients: a pilot study. *Health Information & Libraries Journal.* 2004;21 Suppl 2:27-35.

CHAPTER THREE

Multi-source synthesis Stage 1: *synthesis of qualitative and quantitative data from research literature*

3. Multi-source synthesis Stage 1: *synthesis of qualitative and quantitative data from research literature*

Note: the work described in this chapter has been published in a peer-review journal.[1]

3.1 Abstract

Background. A five-step model for EBHC was proposed in 1992, and consolidated in the Sicily Statement in 2005. The five sequential steps represent both a curriculum for learning EBHC, and a competency framework for practice of EBHC. There is a body of opinion among GPs that this traditional model is unsuited to general practice. This chapter describes the first step of a three-step multi-source synthesis, the aim of which was to generate a preliminary 'straw model' competency framework that would guide step two.

Methods. A synthesis was conducted, of qualitative and quantitative evidence from the research literature about EBHC competence in general practice. A search was conducted across MEDLINE, Embase, Cochrane Central Register of Controlled Trials, ERIC, Australian Education Index, British Education Index, HMIC, PsychINFO, Science Citation Index and Social Science Citation Index. Studies were included if published in English between 1991 (when EBHC first appeared in the literature) and August 2011, reporting on general or family practitioners, and on competence relating to EBHC as an overarching approach to patient care. A thematic synthesis of qualitative data was conducted. Quantitative findings were grouped according to strength of evidence, derived from risk of bias, consistency across studies and (where derived from a single study) generalisability to other settings.

Those for which the strength of evidence was poor were excluded. Related qualitative and quantitative data were grouped together and compared, providing new insights. Those judged credible were presented as a final set of themes, representing the factors that should be considered in construction of a new competency framework for EBHC in general practice. To transform the themes into information that could guide stage two of the multi-source synthesis, they were presented as a preliminary ('straw model') competency framework. To enhance the motivation of GPs as learners, the wording of the preliminary framework was refined to align with androgogical principles. Consideration was also given to its demonstrability in standard GP performance appraisal tools.

Results. The search yielded 3444 articles, of which 38 were included. These comprised 14 quantitative studies (all cross-sectional surveys); 21 qualitative studies; and three studies of mixed methods. The five final themes were (1) attitude towards EBHC; (2) major influences on decision making; (3) use of pre-appraised sources of evidence; (4) integration of evidence and clinical expertise; (5) communication skills. The preliminary framework comprised six GP competencies: (1) Reflects on instances in which risk and benefit were difficult to explain to a patient, and develops a concise, clear explanation for future use; (2) Demonstrates an ability to identify decisions they found challenging, and to reflect upon their reasoning in terms of '4Es' - Evidence (availability, quality and applicability), Experience (their own accumulated on-the-job knowledge), Empathy (appropriate consideration of the patient's perspective, capacity and circumstances) and Environment (the influence of external factors such as time pressure or access to resources); (3) Demonstrates a commitment to checking newly acquired knowledge from colleagues, media, pharmaceutical companies and other sources against the best available evidence,

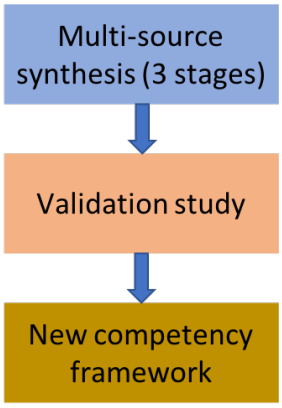
using secondary sources such as guidelines, evidence-based summaries and systematic reviews; (4) Demonstrates a commitment to efficiently addressing clinical uncertainty, using secondary sources of evidence, and the best available information technology; (5) Works with colleagues to share the tasks of identifying and prioritising clinical questions, finding, appraising and presenting evidence, and refreshing knowledge of EBHC concepts and resources; and (6) Demonstrates advocacy and leadership in identifying and addressing barriers to EBP within their practice.

Conclusion. Five themes captured the meaning of EBHC competence in general practice. From those themes, a preliminary framework of six competencies was constructed, which will guide the conduct of stage two of the multi-source synthesis. The five themes will themselves be reintegrated in stage three of the multi-source synthesis.

3.2 Introduction

GPs have described barriers to EBHC. They include time constraints,[2-8] patients' expectations[2-6] and insufficient evidence relevant to general practice.[3-7,9] I have demonstrated in Chapter 2 that a significant gap exists in the literature: we need an effective strategy to enhance the uptake of EBHC in general practice, which explicitly acknowledges the real-world constraints. I decided to construct an EBHC competency framework tailored for general practice. It would make no assumptions *a priori* regarding the EBHC competencies required; it could be applied to the standard performance appraisal tool; and it could be used in routine practice. To achieve this, I planned a multi-source synthesis followed by a validation study (Figure 3.1). I described multi-source synthesis in Chapter 2 (section 2.3.4.4). It can bring together diverse sources of research

Figure 3.1 Overall plan of the thesis

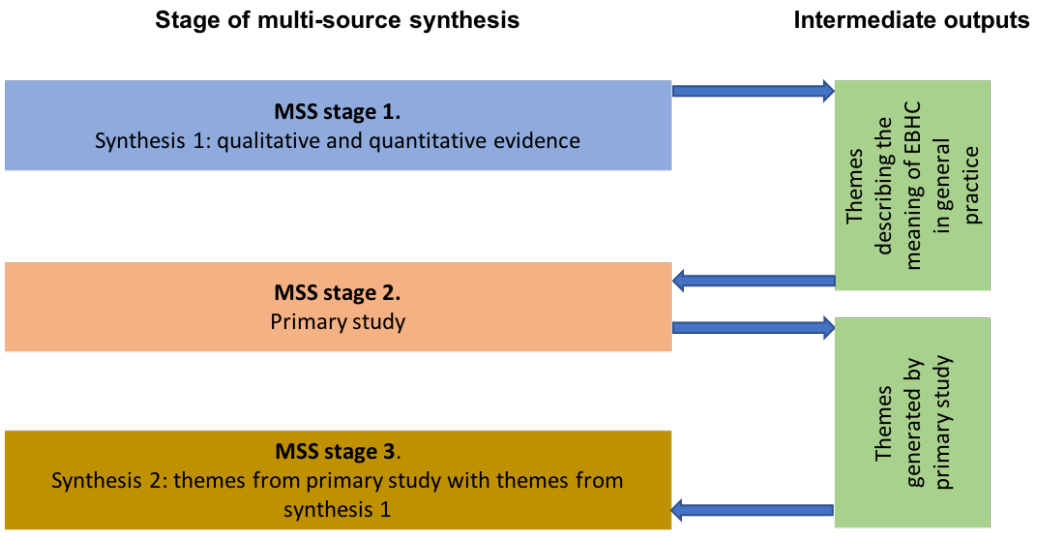


evidence. Qualitative and quantitative data from previously-published studies (secondary data) are used to inform the design of a new (primary) study, the findings of which are synthesised with the secondary data to form a whole that reflects a broad range of perspectives.[10] This chapter describes the first stage of the multi-source synthesis - the synthesis of qualitative and quantitative data from previously-published studies (Figure 3.2).

3.2.1 An initial exploration of methodological approaches

Multi-source synthesis was not the first approach I considered for constructing a new competency framework. I explored a number of alternatives. An exploration of the history of competency frameworks led beyond the field of medicine, back to their origin in the work of McClelland for the American government in the early 1970s.[11] McClelland's method focused on determining what leads to superior performance. He identified top performers and analysed how they performed their role.[12] After discussion with my supervisors, however, it was decided that this method, drawing on principles of industrial

Figure 3.2 The structure and process of the multi-source synthesis



Themes generated by synthesis 1 guide the design of MSS stage 2 (primary study).
Themes generated by MSS stage 2 are synthesised with the themes from synthesis 1.

psychology, was beyond the experience of departmental staff. Little support would, therefore, be available, and I sought an alternative method. Further exploration of the medical literature failed to identify a consensus on the best approach to developing competency frameworks. Myriad techniques have been used, including practice profiling, task analysis,[13] focus groups, questionnaires,[14] critical incident interviews[15] and direct observation.[15] As I explored the general practice and EBHC literature, it was evident that there was a rich trove of qualitative and quantitative data that could contribute to the development of a competency framework. It occurred to me that synthesis might be a suitable method for harnessing those data, as it could distil from the vast literature something of the meaning of EBHC competence in general practice. I found examples of competency framework development that used a synthesis of existing research evidence

as the first step.[16,17] I already had a solid grounding in the theory of systematic review methods from both study and teaching at Masters level. Considering all these advantages together, I decided a synthesis of existing literature would be an appropriate strategy. The question remained, however, of which particular type of synthesis would be most appropriate. As I discussed in Chapter 2 (section 2.3.4), synthesis of qualitative and quantitative studies is still an evolving field, with no consensus on the best approach.[18-22] Recall Mays' contention that hard and fast methodological rules for the synthesis of qualitative and quantitative evidence are inappropriate given the state of development in the field, and that the emphasis should be on encouraging critical thought, transparency and explicitness in reporting,[19] and Harden's assertion that '*the field remains wide open, offering researchers the potential to do a variety of interesting and exciting work*.'[23] From this perspective, the methodological options were abundant. An example of methodological flexibility and innovation was the synthesis of qualitative and quantitative research on patient information related to cervical screening, which was published by the Nuffield Department of Primary Care Health Sciences.[24] Data were synthesised on the basis of the strength of evidence across both qualitative and quantitative studies. The department had also recently published a synthesis to determine the effectiveness of journal clubs in supporting evidence-based decision-making.[25] As the latter shared my focus on EBHC learning, I was advised to consider the study as a possible example to follow. It used a particular method of synthesis called 'realist synthesis.' However, this assumed an epistemological standpoint that was unfamiliar to my supervisors. For example, hypotheses – in quantitative studies established before the start and tested in subsequent investigation – are revisited and modified continually in a realist synthesis.[26] My supervisors felt unable to offer supervision on such unfamiliar ground. Furthermore, the lead author of

the journal club study had since left the department, narrowing the scope for support further. My search for an appropriate method continued with an exploration of the work of the EPPI-Centre, an organisation based in the Social Science Research Unit at University College London.[27] This specialist centre develops methods for synthesising research evidence. An example was a review by Thomas and colleagues about children and healthy eating[28] that appeared in a number of methodological articles and book chapters as an illustrative example of how a synthesis of methodologically diverse research could be conducted.[29-34] Together, these articles formed a lucid, step-by-step guide to the synthesis of qualitative studies by thematic synthesis. This technique is based on thematic analysis, a method of analysing primary qualitative data that I had learned in a course on qualitative research methods run by the department. Furthermore, my supervisor had already authored a study using similar methods,[35] so I was confident that there would be sufficient methodological support. The articles also described the synthesis of qualitative data with quantitative data, though the quantitative data were derived from randomised controlled trials, which did not reflect the kinds of data I was likely to glean from the literature. The only other clearly understandable methodological article I could find was an example of multi-source synthesis published by Pedersen.[10] Investigating the psychosocial needs of chronic fatigue syndrome sufferers, the study also used thematic synthesis (as employed by Thomas and colleagues[28]) to combine qualitative data. The qualitative data were then synthesised with quantitative data derived not only from trials, but from a range of study designs including cross-sectional surveys. From my initial exploration of the literature, these were the kinds of quantitative data I was likely to encounter. The themes derived from the synthesis were then used to guide the design of an additional primary qualitative study to add a perspective grounded in a local context. This echoed my own plan, which

was to supplement a synthesis of data from the literature with the opinions of a group of experts in EBHC and general practice (described in further detail in Chapter 4). Between Thomas and colleagues' account of qualitative synthesis,[29] and Pedersen's account of both primary and secondary data synthesis, and synthesis of qualitative and quantitative data,[10] I had a clear guide to synthesising the sort of data I would be working with. I would conduct a three-stage multi-source synthesis: stage one would be a synthesis of qualitative and quantitative data; stage two would be a primary study; and stage three would synthesise the primary data with secondary data from stage one. This would be a relatively new approach to synthesis, employing a combination of segregated and contingent synthesis. I could find only one other example in the literature – a study of the factors leading to delay in breast cancer screening.[36] This was not surprising however, given that the field of synthesis is still emerging. My final step was to follow the recommendation of Mays[19] and check whether the choice of methods would fit (1) the aim of the synthesis; (2) the question addressed; (3) the nature of available evidence; and (4) the broad context in which the research was taking place. Addressing these in turn:

1. The aim of the qualitative-quantitative synthesis was to generate a preliminary 'straw model' competency framework that could be used to garner expert opinion in the next stage of the thesis. I anticipated that the combined application of Thomas'[29] and Pedersen's[10] approaches would result in a series of themes that could capture the meaning of EBHC in general practice, and that these would be suitable to map to appropriate educational theory to generate a preliminary competency framework.

2. The research question I planned at the outset was *'What real-world competencies are required for evidence-based general practice?'* Again, I was confident that a thematic approach could address this question.

3. My exploration of the literature had indicated that there was a wealth of qualitative and quantitative cross-sectional survey data available, and a method that could synthesise such types of data was suitable.

4. In terms of the context in which the research was taking place: it was clear from my literature review that the field of EBHC education in general practice was still at a stage of evolution at which theory development is appropriate. The techniques I proposed would generate such theories (in the form of themes) grounded in the research literature, and which would be suitable for further refinement in light of expert opinion later in the thesis.

To summarise, my exploration of methodological approaches identified multi-source synthesis as an appropriate choice, starting (as described in this chapter) with a synthesis of qualitative and quantitative data from existing literature ('synthesis 1'), progressing to a primary study, and concluding with a second synthesis (synthesis 2')', of primary study findings with those of synthesis 1. I could justify my choice of methods on the following points:

1. They fulfilled the criteria proposed by Mays: that the methods should fit the aim, research question, the nature of the evidence and the context in which the research is conducted.[19]

2. They allowed me to garner a rich and extensive source of data.

3. There were previous examples of syntheses being used in the development of competency frameworks, which, given a lack of methodological consensus, was reassuring.

4. I had already attended courses in qualitative research methods and systematic reviews and had a grasp of the principles I would be applying.

5. My supervisor had prior experience in thematic analysis, upon which thematic synthesis is based.

6. The methodological articles by Thomas et al.[29] and Pedersen[10] gave a clear step-wise guide to the methods that I could easily follow.

3.3 Objective

The aim of this chapter was to complete Stage 1 of a three-stage multi-source synthesis by constructing a preliminary competency model for EBHC in general practice from a synthesis of existing qualitative and quantitative literature.

3.4 Methods

3.4.1 Focused question and definitions used

The focused question of the synthesis was initially *'What real-world competencies are required for evidence-based general practice?'* As I examined the literature more closely however, it became apparent that very few studies addressed this research question directly. I decided to pose an alternative question: *'What factors should be considered in constructing a real-world competency model for evidence-based general practice?'* 'Evidence-based Health Care (EBHC)' was defined as *'the conscientious, judicious and explicit use of current best evidence in making decisions about the care of individual patients.'*[37] 'Competency' was defined as *a complex set of behaviours built on the components of knowledge, skills and attitudes*, and 'competence' simply as *personal ability.*[38] A 'competency framework' was defined as '*the set of skills which are to be performed at a particular standard by a worker who undertakes specific duties*.'[39]

3.4.2 Search strategy

The search identified empirical studies, published in English, reporting on general or family practitioners (fully-trained or undergoing training, and working in the community), and on competencies relating to EBHC as an overarching approach to patient care. The date range was from 1991 (when EBHC first emerged[40]) to 2011, when I conducted the search. Beyond the scope of the search were non-empirical expressions of opinion, and reports on other kinds of primary care physician (such as doctors not trained in family medicine, internists, general paediatricians and surgeons) and on specialists other than family medicine

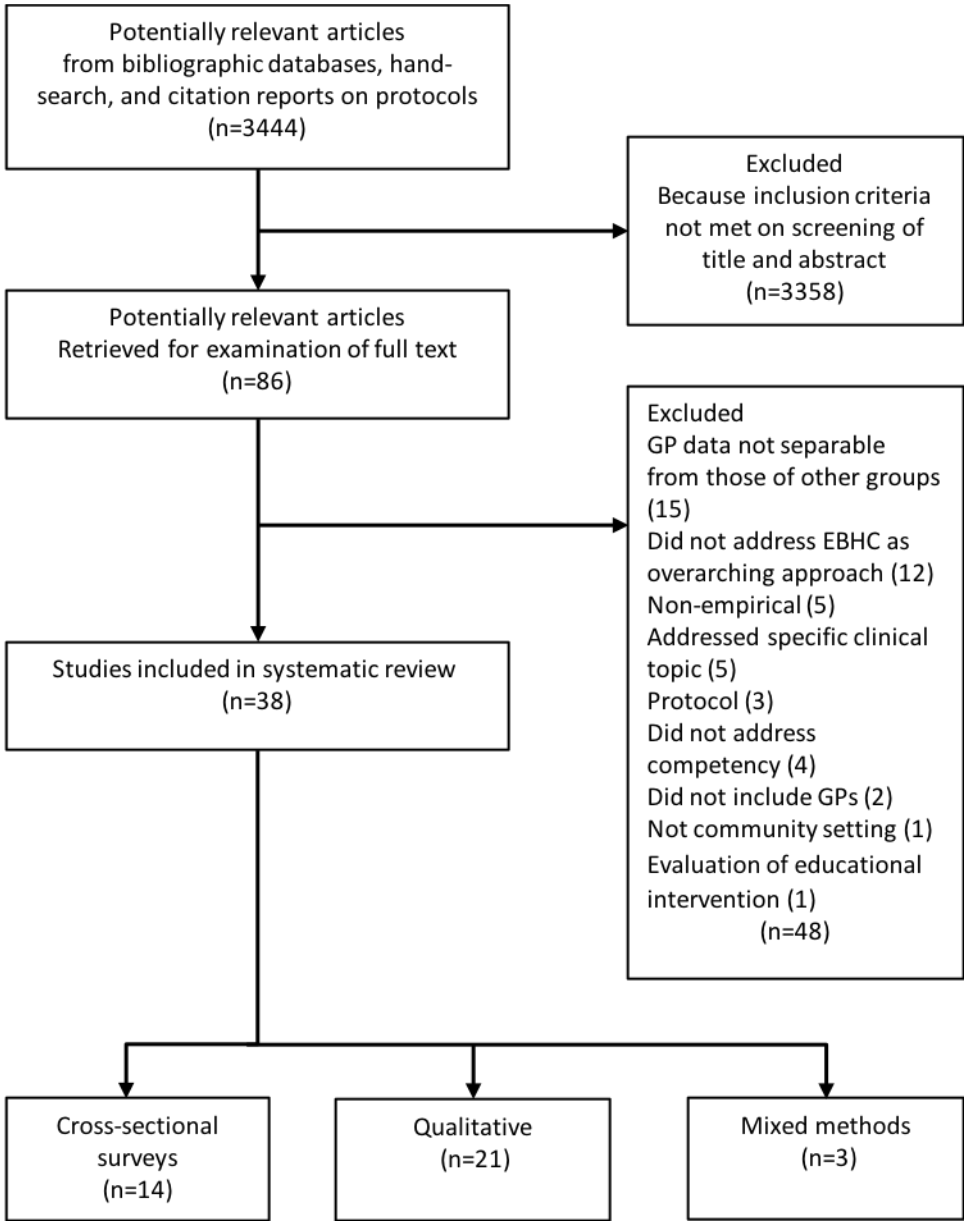
specialists. Also beyond the scope of the search were studies addressing specific elements of EBHC or a particular clinical topic, and studies evaluating educational interventions.

MEDLINE (1950-2011) was searched, limiting the search to studies published after 1991, in the English language, and using a maximally sensitive search strategy. Search terms included 'general practitioner,' 'evidence-based practice,' 'competency' and all the variations and synonyms of these terms that I could glean from the Oxford Dictionary & Thesaurus,[41] and an initial scoping of known key studies in this area. One such term was 'knowledge translation,' of which there were many synonyms, making the location of relevant articles difficult. A suitable search filter[42] was therefore used, comprising a selection of terms identified empirically as those most useful for finding relevant articles. I modified the search for other databases: Embase (1974-2011), Cochrane Central Register of Controlled Trials, ERIC (1966-2011), Australian Education Index (1979-2011), British Education Index (1975-2011), HMIC (1979-2011), PsychINFO (1967-2011), Science Citation Index (1945-2011) and Social Science Citation Index (1956-2011). Appendix 2 shows the full search strategy.

3.4.3 Study selection

I selected relevant articles by examination of the title and abstract, and then by scrutiny of their full text. The reference list of each included article was hand-searched for other, additional relevant articles. Where included articles took the form of a protocol describing a future study, citation reports were used to determine whether publication followed. Figure 3.3 shows the selection process.

Figure 3.3 Flow-chart for selection of studies



3.4.4 Assessment of quality

Criteria proposed by Giacomini and Cook[43 44] were used to assess the quality of included qualitative studies. For quantitative studies, I used a modification of the Strengthening the

Reporting of Observational Studies in Epidemiology (STROBE) statement[45] as employed by authors of similar reviews of clinicians' engagement with EBHC.[46,47] For studies using both qualitative and quantitative methods, I applied both frameworks. This resulted in three quality categories: high, moderate and low risk of bias. I critically appraised an example from each category, to determine whether my judgement of quality matched that suggested by the chosen criteria. The result was perfect agreement. I concluded that these criteria were a reasonable choice for this systematic review. The criteria are shown in Appendix 3 together with judgements on the quality of each included study. Quality categories were as follows:

- High risk of bias: met fewer than half of the quality criteria.
- Moderate risk of bias: met at least half, but not all quality criteria.
- Low risk of bias: met all quality criteria.

3.4.5 Extraction of data

I extracted data from included studies about location, objectives, methods, response rate, characteristics of subjects and quality. Outcome data about GPs that were conflated with those of other professional groups were regarded as unusable. Following the method of Pedersen et al.,[10] quantitative outcome data were extracted and organised under simple descriptive headings. These headings were not the product of analysis, but a simple descriptive categorisation of the aspects of EBHC to which outcome data were related. They were set aside for later use in synthesis with qualitative data.

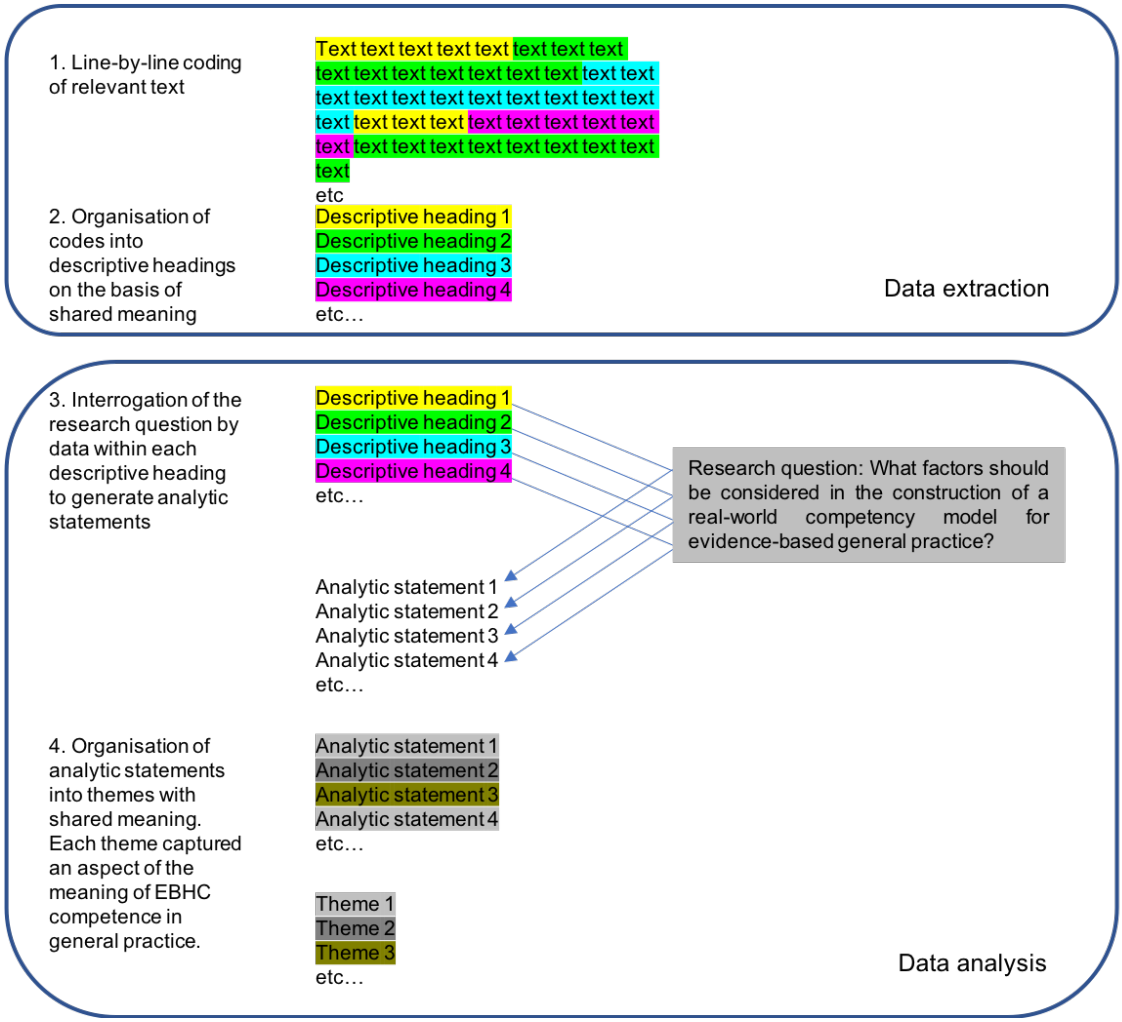
For the extraction of qualitative data, it was necessary to define what could be considered 'data.' Following the method of Thomas and Harden,[29] a decision was made *in advance* to extract all text labelled 'results' or 'findings.' Text marked as 'conclusions' was considered

more likely to reflect the authors' subjective interpretations, and was not extracted.[29] From each individual study, every relevant portion of the text was assigned a code to describe its meaning. Codes were collected and organised using QRS NVivo, version 10. Successive portions of text were either assigned a new code if its meaning was unique or assigned to an existing code if its meaning fit. The generation of new codes declined progressively as data increasingly fit existing codes. This is termed 'data saturation.' Similar to the initial treatment of quantitative data, the qualitative codes were organised under descriptive headings. Again, these were not the product of analysis, but a simple descriptive categorisation of codes on the basis of shared meaning.

3.4.6 Thematic synthesis of qualitative data

This stage was more interpretive, extending beyond the original meaning of the data, and developing new explanations and conceptualisations.[34] For each descriptive heading, I posed the question: 'How does this relate to the research question: '*What factors should be considered in the construction of a real-world competency model for evidence-based general practice?*' This exercise resulted in a series of analytic statements such as '*GPs are reluctant to challenge expert opinion*.' These statements were themselves organised into a set of overarching categories of shared meaning. This generated a set of themes, which represented the factors that should be considered in constructing a competency model. The extraction and synthesis of qualitative data is illustrated in Figure 3.4.

Figure 3.4 Thematic synthesis of qualitative data



Note: colour highlights represent categorisations based on the interpreted meaning of the data. Codes sharing common meaning (denoted here by the same colour) were grouped together in stage 2. Analytic statements sharing common meaning (denoted by the same colour) were grouped together in stage 4.

3.4.7 Synthesis of qualitative and quantitative data

A segregated design was employed (as described in Chapter Two), in which qualitative and quantitative data were synthesised separately before being combined together.[48] I categorised quantitative survey findings according to the strength of underlying evidence:

'Moderate'

- Non-conflicting findings from one or more surveys with low/moderate risk of bias; or
- Findings from a single survey with external validity (could reasonably be assumed to apply in other settings) and low/moderate risk of bias.

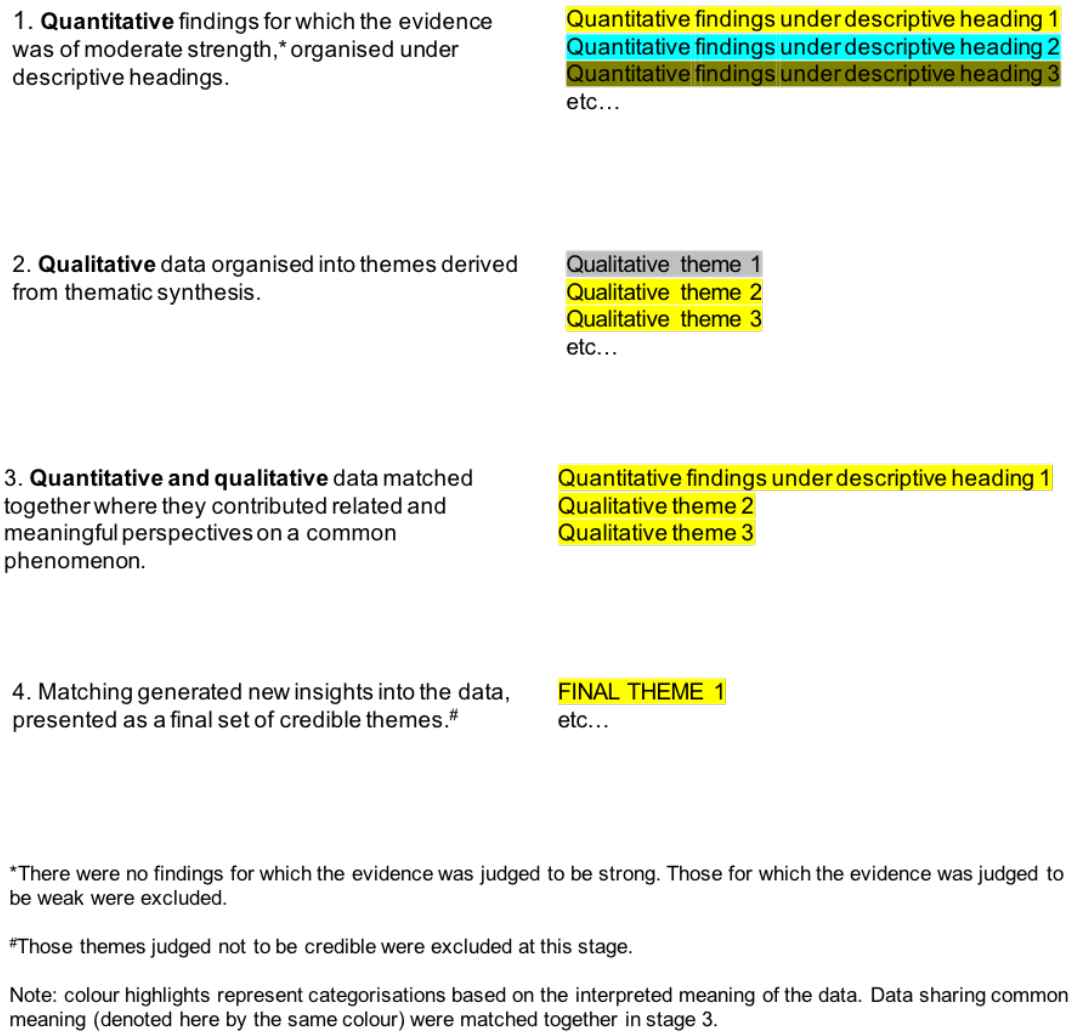
'Weak'

- Conflicting findings from two or more surveys; or
- Non-conflicting findings, but from surveys with a high risk of bias.

Given the well-known propensity of all such self-reported survey data towards misunderstood questions and skipped responses,[49] it was considered inappropriate that there should be a category designated 'strong evidence.' I excluded quantitative survey findings for which the strength of evidence was considered 'weak.' The remaining quantitative data were retained under their descriptive headings. All qualitative data were included irrespective of the quality of the studies from which they were derived. This is not unusual in qualitative syntheses,[19] as it is thought that the worth of particular studies may only become apparent later in synthesis.[50] Adhering to the methods described by Pedersen[10] I then synthesised qualitative and quantitative data. This brought together the quantitative data extracted under descriptive headings with the themes derived from qualitative synthesis. The quantitative data within each heading were matched with the qualitative themes where they both contributed related and meaningful perspectives on a common phenomenon. This generated new insights into the data. The credibility of each qualitative theme was judged according to whether it was supported by related

quantitative data. Those not considered credible were excluded at this stage, leaving a final set of credible themes (Figure 3.5).

Figure 3.5 Synthesis of qualitative and quantitative data



3.4.8 Sensitivity analyses

To test the effect of including or excluding qualitative studies of differing propensity towards bias, 'sensitivity analyses' were carried out, using the method described by Thomas and Harden.[29] A review was conducted, of the quality of studies contributing data

to each credible theme derived from the qualitative synthesis. For each theme, I determined the extent to which it depended upon data from studies with a high risk of bias.

3.4.9 Construction of the preliminary competency model

The final set of themes, which represented '*factors that should be considered in constructing a new competency framework*' were transformed into a preliminary set of competencies. The first step was to ask of each factor: '*What behaviour does it demand on the part of the GP?*' It was not sufficient, however, to produce a simple list of recommended behaviours. Consideration was also required of how GPs (as adult learners) might be motivated to develop each competency. The next step, therefore, was to refine the wording of each competency so that (as far as possible) it embodied the androgogical principles proposed by Knowles (described in Chapter 2).[51] Although the competencies were only preliminary, I wanted them to fit with existing appraisal tools in the same way that I envisaged the final set would fit. Consideration was given to whether each competency could be demonstrated in the standard sections of performance appraisal tools. After refinement of the wording, the themes were revisited to make sure that they were still implicit in the competencies, and any necessary readjustments were made.

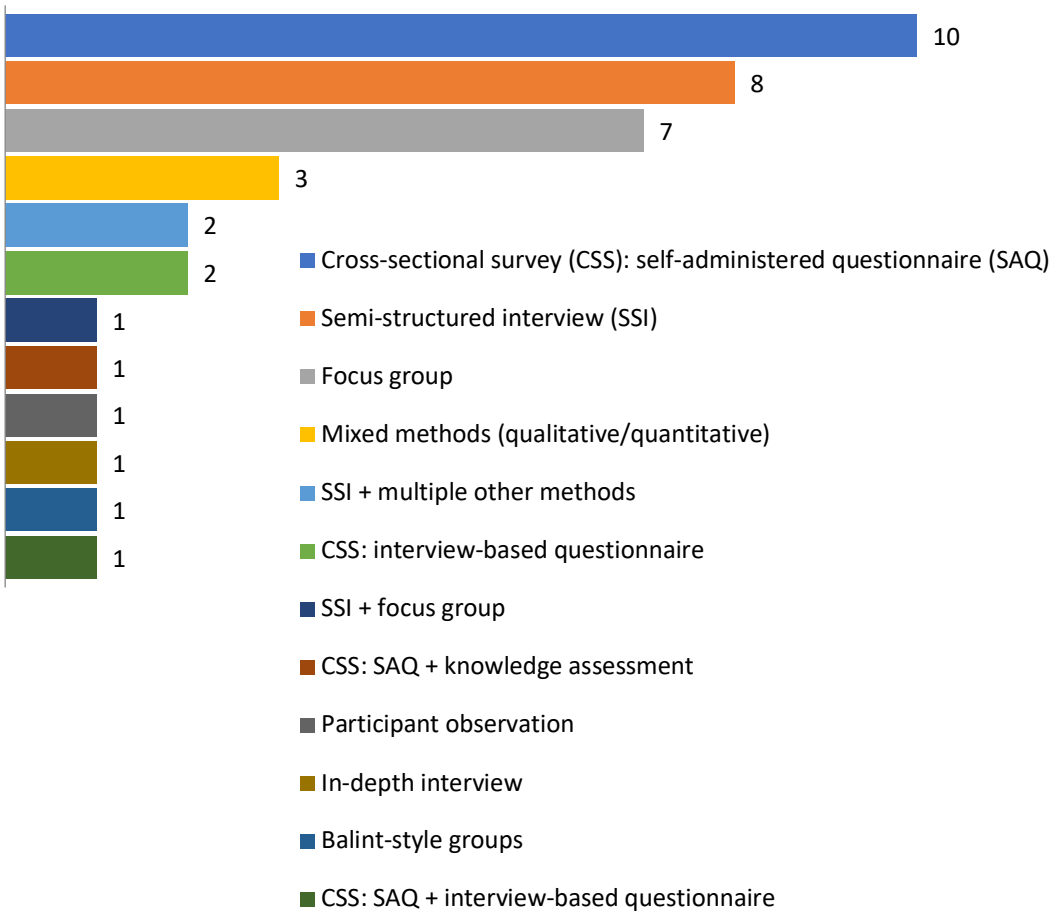
3.5 Results

3.5.1 Study selection

A total of 3,444 articles were retrieved by the search strategy (Appendix 2) and examined for relevance. A total of 38 were considered suitable for inclusion in the review (Figure 3.3),

comprising 14 quantitative studies (all cross-sectional surveys); 21 qualitative studies; and three studies of mixed qualitative and quantitative methods (Figure 3.6).

Figure 3.6 Characteristics of included studies: methods (N=38)



3.5.2 Characteristics of included studies

Of the 14 cross-sectional surveys, 12 used self-administered questionnaires. The most commonly used methods among the qualitative studies were semi-structured interviews (11 studies), followed by focus groups (7 studies). Most of the studies (22) were conducted in the UK. Other European countries and Australia were the locations for five studies each.

Three were carried out in Canada, two in the US and one in Jordan (Figure 3.7). The characteristics of included studies are shown in Appendix 5.

Figure 3.7 Characteristics of included studies: location (N=38)



3.5.3 Characteristics of GP participants

The most widely reported characteristic was sex distribution, with 65% male and 35% female across 25 studies reporting these data specifically for GPs (Table 3.1). Comparable data were available from the NHS General and Personal Medical Services Survey, England 2011 (54% male)[52] and the Australian Institute of Health and Welfare Medical Labour Force Survey 2009 (61% male).[53] These proportions differed significantly (X^2 321.4; df=2; $p<0.05$). The mean age across only eight studies that included specific GP data was 44.4 years (95%CI 42.3 to 46.4). This differed significantly from the Australian Labour Force Survey (49 years; t=3.81; df=15; $p<0.05$).[53] The proportion aged under 40 was 37% (combined data from only six studies). This differed significantly from the proportion among the NHS survey data (28%; X^2 38.6; df=1; $p<0.05$).[52] 33% worked part-time (combined data from nine studies); and 73% worked in group practices (combined data from 11 studies).

Table 3.1 Characteristics of GP participants

Variable(s) reported		No. studies reporting specific GP data*	Summary statistic combining specific GP data
Age	Mean	8	44.4 (95% CI 42.3, 46.4)
	No. (%) aged <40	6	357/965 (37%)
	No. (%) aged 40+		608/965 (63%)
Sex	No. (%) male	25	1274/1946 (65%)
	No. (%) female		672/1946 (35%)
Work pattern	No. (%) full-time	9	466/699 (67%)
	No. (%) part-time		233/699 (33%)
Personnel	No. (%) working solo	11	194/826 (23%)
	No. (%) working in group practice		632/826 (77%)
GP training activity in practice	No. (%) working in training practice	3	206/664 (31%)
Experience	Mean years in practice	6	16 (95% CI 15, 17)
Postgraduate GP qualification	No. (%) holding postgraduate GP qualification	7	776/1272 (61%)
Prior EBHC training	No. (%) trained in searching literature	3	90/573 (16%)
	No. (%) trained in critical appraisal	4	254/810 (31%)
	No. (%) trained in unspecified EBHC skills	2	141/248 (57%)

* 'Specific GP data' refers to data that are separable from those of other professional groups

3.5.4 Quality of included studies

Five studies had a low risk of bias, having met all the quality criteria in the framework shown in Appendix 3. Three studies met fewer than half the criteria and were considered to have a high risk of bias. The remaining 30 studies were considered to be of moderate risk. Among the surveys, the most common methodological problems were a failure to explore reasons for non-participation and losses to follow-up, and an inadequate description of the design and quality of the survey instrument. Among the qualitative studies, the most common problems were in the analysis of data, specifically: a failure to iterate data collection to the point at which no further new findings arose ('saturation'); and a failure to consolidate the credibility of results by triangulating several different methods of data collection. Overall, the quality of included studies was considered to be moderate.

3.5.5. Synthesis of qualitative and quantitative data

Quantitative data from the 14 cross-sectional surveys and three mixed methods studies were organised under the following descriptive headings:

- Knowledge of EBHC
- Attitudes towards EBHC
- Awareness of EBHC
- Perceived barriers to EBHC
- Implementation of EBHC
- Proposed strategies to promote EBHC

Synthesis of qualitative data from the 21 qualitative studies and three mixed methods studies generated a number of qualitative themes, representing important factors that should be considered in the construction of a competency framework:

- Attitude towards EBHC
- Major influences on decision making
- Use of pre-appraised sources of evidence
- Integration of evidence and clinical expertise
- Communication skills
- Skill in searching for primary sources of best evidence
- Skill in critical appraisal of evidence.

The findings relating to each qualitative theme are described below, together with the related quantitative findings with which they were matched.

3.5.5.1. Attitude towards EBHC

There was a widespread perception that EBHC fails to acknowledge the complexity and constraints of general practice:

'One sees it at times as dogma... what I mean is that not all patients are the same and many times you are in front of a patient that EBM says has this or that, and you don't see it '[54]

This was evident from 19 qualitative studies.[7,54-71] Four surveys indicated that a minority of GPs (range 11% to 42%) perceived EBHC to be of limited value in primary care,[3,4,6,72]

although these and four additional surveys found a clear majority of respondents felt positive or welcoming towards EBHC.[3-7,64,72,73] In a survey among 137 Australian GPs, 37 (27%) agreed that EBHC could be described as 'cookbook medicine,' suggesting some perceived EBHC to be rigid in its application.[4] Time constraint was widely perceived to be a barrier to EBHC,[2-8] as were patients' expectations[2-7] and a lack of relevance of research evidence to general practice.[3-7,9] In one Australian survey of 107 GPs, 10 (9%) cited difficulty in tailoring evidence to the individual patient or general practice context.[2] Some GPs viewed EBHC as a threat to their traditional role.[54,57,60-62,66,70,74] However, there were no survey findings relating specifically to this opinion. Some GPs perceived that implementation of EBHC is associated with a narrowing of their role, as specialists tighten evidential criteria for referral:[60]

'The last month I got two patients back... look, your patient does not fulfil our criteria and so he does not have to come. And I think: 'Is that the kind of medicine I will be forced to do? That person comes with his complaints, whether he is fulfilling my criteria or not. But that will be the future task of the GP: helping the people who do not fit the criteria of the specialists.'

GPs also associated EBHC with restriction on individualised care,[55] restriction of therapeutic choices,[54,55,60,66,70] and with devaluation of the 'art' (as opposed to the 'science') of medicine.[70] Some GPs viewed EBHC as a form of reflective practice. One focus group found that GPs valued being encouraged to reflect on their decisions, prescribing habits, and perceptions of therapeutic freedom.[60] Another reported that EBHC was regarded by some GPs as a means of critically reviewing personal clinical practice, and an opportunity to pose

questions to be addressed using evidence from published research.[54] There were no surveys addressing this issue specifically.

3.5.5.2. Major influences on decision-making

The doctor-patient relationship exerts a powerful influence on decisions. The desire to preserve it can outweigh considerations of evidence.[63,69] In one survey of 60 Australian GPs, 44 (73%) agreed that '*regardless of research findings, patients have unrealistic expectations which drive my treatment choices*' and 49 (82%) agreed that '*patients demand treatment despite lack of evidence for effectiveness*.'[7] A qualitative study using direct observation of GPs in two UK practices found GPs rarely searched for, appraised and applied evidence directly from research. Instead, they relied upon what the investigators termed '*mindlines*.' These were internalised tacit practice guidelines, derived from knowledge drawn from their own reading, training and practical experience, and from social interaction among practice colleagues, specialists, pharmaceutical company representatives and patients.[75] Whether seeking advice from a colleague, or reading clinically oriented material such as practice guidelines, several studies found the decision to act on that information depended on trust, rather than any attempt to analyse the information critically.[56,59,62,76] A focus group of 5 to 7 GPs in the UK explored factors influencing uptake of new evidence. They identified a tendency to look for evidence that fitted pre-existing beliefs.[59] They also identified a belief among GPs that they should be conservative in the implementation of new evidence, as part of their role in ensuring the patient's safety.[59]

3.5.5.3. Use of pre-appraised sources of evidence

A preference emerged among GPs for acquiring clinical information passively, through the post or electronically (sometimes described as information 'push'[77]) rather than engaging actively in their own independent search (described as information 'pull'[77]). It was a strong theme, emerging from 10 qualitative studies:[7,59-61,64,68,70,71,75,78]

'I think EBM is predicated upon there being well-supported and financed independent reviewers who are doing the meta-analyses and the broader views which have become the key to evidence-based medicine and then selecting which ones are quality enough to include. It's just not practical for the family practitioner to be able to do that, even if you do have the tools, the time just isn't going to be there.' [70]

Surveys showed a stronger preference amongst GPs for using pre-appraised evidence than for seeking evidence themselves,[4,5] and also showed pre-appraised evidence was perceived as more appropriate to general practice.[4,5,7] Surveys conducted in the period between 1997 and 2009 showed a minority of GPs had used MEDLINE[3,4,79] and the Cochrane Library.[3,4] GPs are more inclined to rely on personal experience,[66] or other opinion-based sources of information[2] than to use these databases. One survey found the resources endorsed by the greatest proportion of GPs as 'very useful' were evidence-based guidelines (55%) and journals containing evidence summaries (52%); access to MEDLINE, and primary research articles were both rated 'very useful' by fewer GPs (27% and 25% respectively).[7] Requests for improved formats of evidence[2,6] may suggest a preference for evidence that is delivered to the GP, pre-appraised and ready to apply where appropriate. In a survey of 104 GPs in

Australia, it was proposed that even guidelines could be summarised and collated to facilitate EBHC.[6]

3.5.5.4. Integration of best evidence with clinical expertise, and the needs of the individual patient

There is a belief that evidence must be integrated with experience and tailored for individual patients. This was among the strongest themes to emerge from qualitative studies, with numerous expressions of the principle that evidence should be integrated with both knowledge gained from experience, and considerations relating to the individual patient.[54,55,57-60,62-65,67-71,74,76] Evidence on its own is perceived to be inadequate:[70]

'The guidelines will only take you so far and they're a useful stepping off point, but each individual case has so many factors at play beyond what the guidelines cover and that's where the art and the pleasure of medicine comes in using your clinical judgement to realise that what the protocol says doesn't apply to that person or it applies in a different way. That takes a good understanding of what the meaning is behind the protocol so I don't think you're ever just a technician.'

In one UK survey, from a random sample of 500 GPs, 90% of 302 respondents claimed to integrate evidence and clinical experience.[8] The study was vulnerable however, to socially desirable responding (SDR) and bias arising from non-responders being potentially less likely than responders to integrate evidence with experience. A survey of 116 family practitioners in Turkey found 103 (89%) disagreed with the statement that EBHC devalues clinical experience.[73] While this finding does not provide direct support for the notion that

both EBHC and clinical experience should be integrated, it does at least suggest that the two entities were not widely considered to be mutually exclusive. GPs do appear to acknowledge the importance of personal clinical experience in making decisions.[2,66] Finally, in a survey among 107 Australian GPs, in response to the prompt: 'Is there anything that you believe would assist you generally in making clinical decisions about the care of your patients?' 10 (9%) suggested mechanisms for tailoring evidence to the individual patient, and 5 (5%) suggested mechanisms for informing patients and eliciting their preferences.[2] This principle has not percolated fully through general practice, however. A variable proportion of GPs actually regard patient expectation as a *barrier* to EBHC, rather than a necessary component.[2-6]

3.5.5.5. Communication skills

There is a perceived need for competence in explaining complex information, including the risk and benefit of proposed interventions. This theme arose within a single qualitative study,[71] in which GPs offered perspectives on the ingredients of a successful 'evidence-based patient choice' consultation. GPs expressed the view that risks and benefits should be described for each treatment option, including that of no treatment.[71] In a survey conducted among Australian GPs, 20/60 (33%) agreed that insufficient skill to explain the implications of research to patients is a barrier to EBHC.[7] Other surveys, however, have demonstrated that the level of understanding among GPs, of technical terms relating to expression of risk and benefit, is low.[3-5,7] GPs value an ability to establish a doctor-patient relationship that is conducive to implementation of evidence. An emergent theme was that successful implementation of such evidence can only be achieved after the patient's trust has been won, and that this requires empathy and the establishment of rapport:

'So you need to get a rapport, and the trust of the patient, there's no good enforcing treatment.'[74]

'We have to know, aside from diagnosing the patient, what he or she feels, and empathise with the person.'[54]

The ingredients of a successful 'evidence-based patient choice' consultation included elements normally expected of any doctor-patient encounter: trust, respect, honesty and partnership building.[71] Support for this theme was offered by the survey of 107 Australian GPs, in which 102 (95%) preferred some degree of patient involvement in decision-making.[2] The GP is required to educate patients about the nature of their condition, and also to guide them towards other relevant sources of information.[71] GPs participating in focus groups conducted in Belgium viewed patients as 'consumers' of health care, who could be taught to approach health information critically, though some envisaged a role here for consumer organisations.[60] The survey finding from 60 Australian GPs that 20 (33%) perceived a lack of skill in explaining the implications of research to patients as a barrier to EBHC[7] suggests that an ability to educate patients would be valued by some GPs.

3.5.5.6. Skill in searching for evidence

Some GPs believe that they should be able to conduct searches for research evidence. This emerged as a theme from four qualitative studies.[7,56,60,78] GPs participating in a workshop exploring the management of information concluded that EBHC skills, particularly those needed to search for evidence, should be included in medical curricula.[78] The perceived

need for search skills emerged in more equivocal terms in interviews among 50 GPs in Australia, in which 21 (42%) viewed literature searching as a useful skill 'in theory,' but also perceived that time constraints would prevent implementation in practice.[7] Focus groups exploring EBHC implementation found that most participating GPs were willing to search for evidence with the patient during a consultation.[60] A lack of search skills was found to be an obstacle to EBHC when GPs were observed searching for evidence to answer clinical questions,[56] but this study did not directly address the question of whether literature searching is a necessary part of the GP's skill set. Surveys indicated that awareness of major literature search databases such as MEDLINE[3,4] and the Cochrane Library[3-5,73] were variable, and that few GPs have been trained in conducting searches.[4,5] Other survey findings also challenged the credibility of this theme: a variable proportion of GPs regarded lack of search skills as a barrier to EBHC;[2,6,7,9] GPs preferred pre-appraised evidence to searching,[4,5] and thought use of pre-appraised evidence to be more appropriate to general practice.[4,5,7] After synthesis with survey data, this theme was regarded as lacking in credibility.

3.5.5.7. Skill in critical appraisal of evidence

Some GPs perceive a need for competence in critical appraisal of research evidence. However, this theme arose from only one qualitative study, conducted among GPs practicing in Australia: three quarters of the 50 GPs interviewed agreed that GPs need some ability to critically appraise medical literature.[7] One survey supported this theme directly: conducted amongst 116 family practitioners in Turkey, it found that nearly all, 114 (98%), agreed that physicians must critically appraise literature.[73] Two surveys indicated widespread self-perceived ability to critically appraise research literature.[8,73] One survey

explored the frequency at which GPs critically appraise literature: conducted among 302 GPs in UK, it found that 37% claimed to critically appraise literature at least 'sometimes.' Evidence gleaned from other surveys was less supportive. One survey conducted in Jordan[3] explored 141 GPs' views regarding the most appropriate method of EBHC in general practice, between learning and using EBHC skills, finding/applying evidence summaries, or using guidelines and protocols. No significant preferences were found. Another three surveys exploring the same question found a clear preference for guidelines over learning and using search or critical appraisal skills.[4,5,7] Furthermore, three surveys found only a small proportion of GPs (range 7% to 23%) agreed that a lack of skill in critical appraisal is a barrier to EBHC.[2,3,5] One further survey among GPs who had participated previously in research (and therefore potentially vulnerable to selection bias) found a higher level of agreement at 55%.[7] As previously noted, GPs prefer to use pre-appraised sources of evidence rather than seek and critically appraise evidence themselves.[4,5] Three surveys reported widely variable proportions of GPs claiming to have received training in critical appraisal.[4,5,73] GPs' have a poor understanding of technical terms that have traditionally been key elements of critical appraisal teaching.[3-5,7] This poor understanding was consistent across four surveys, comprising 638 GPs, in 3 countries and spanning 11 years between earliest and latest publication dates. After synthesis with survey data, this theme was regarded as lacking in credibility.

None of the themes considered credible were dependent solely on data from the three studies with a high risk of bias (Appendix 4).

3.5.6 The preliminary competency model

The preliminary competency framework was based on the credible themes derived from the synthesis of qualitative and quantitative data. The wording was refined to reflect the assumptions underpinning principles of andragogy, and consideration was also given to its potential demonstrability using standard appraisal tools. The preliminary competencies were as follows:

1. *The EBHC-competent GP reflects on instances in which risk and benefit were difficult to explain to a patient, and develops a concise, clear explanation for future use.* This competency encourages GPs to identify their own learning needs through reflection on patient interactions they found challenging. It is problem oriented (the problem being communication difficulty in explaining risk and benefit) and mastery of the competency will help them meet a real challenge that often crops up in routine work. It could be demonstrated within the quality improvement activity (QIA), significant event (SE) or personal development plan (PDP) sections of the appraisal.

2. *The EBHC-competent GP demonstrates an ability to identify decisions they found challenging, and to reflect upon their reasoning in terms of '4Es' - Evidence (availability, quality and applicability), Experience (their own accumulated on-the-job knowledge), Empathy (appropriate consideration of the patient's perspective, capacity and circumstances) and Environment (the influence of external factors such as time pressure or access to resources).* This competency also gives scope for the GP to identify their own learning needs. Again, it focuses on problems likely to be encountered in routine

practice. It also invites the GP to call upon their tacit experience. It could be addressed in the QIA, SE and PDP sections of the appraisal.

3. *The EBHC-competent GP demonstrates an ability to assess newly acquired knowledge from colleagues, media, pharmaceutical companies and other sources against the best available evidence, using secondary sources such as guidelines, evidence-based summaries and systematic reviews.* This competency was more difficult to align with andragogical principles. It asks the GP to look beyond their own perceived learning needs, and beyond the clinical problems that they necessarily perceive. It does, however, focus on the problem of time-pressure in assessing newly acquired knowledge. It could be demonstrated in the continuing professional development (CPD), QIA and PDP sections of the appraisal.

4. *The EBHC-competent GP demonstrates an ability to efficiently address clinical uncertainty, using secondary sources of evidence, and the best available information technology, keeping an up-to-date log of such queries for quick future reference.* This competency addresses a practical problem (clinical uncertainty) that crops up regularly in practice. It could be demonstrated in the CPD, QIA and PDP sections of the appraisal.

5. *The EBHC-competent GP works with colleagues to share the tasks of identifying and prioritising clinical questions, finding, appraising and presenting evidence, and refreshing knowledge of EBHC concepts and resources.* This competency focuses on real clinical problems that the GPs identify themselves. It also provides scope for social learning as a group. It could be demonstrated in the QIA and PDP sections of the

appraisal.

6. *The EBHC-competent GP demonstrates advocacy and leadership in identifying and addressing barriers to EBHC within their practice.* This addresses the androgogical principle that learners are motivated when the knowledge or skills they acquire can be expected to help them deal with tangible problems in everyday work. However, the problems here (barriers to EBHC) may only be perceived if the GP already has a level of commitment to EBHC. The competency could be demonstrated within the QIA, SE or PDP sections of the appraisal.

It should be understood that attempts to align the competencies with androgogical principles, and the structure of the appraisal were at this stage preliminary, and that the preliminary framework would be subject to further refinement in the next stage of the thesis.

3.6. Discussion

This study, the first of three that together will constitute a multi-source synthesis, had two outputs: (1) a set of themes representing the important factors to consider in constructing a competency framework; and (2) a preliminary ('straw model') competency framework. The preliminary competency framework will be used as the basis of a primary study described in the next chapter (MSS stage 2 in Figure 3.2). The themes will be synthesised with the findings of the primary study (MSS stage 3 in Figure 3.2).

The lack of methodological consensus in the field of evidence synthesis presented a challenge. The choice of multi-source synthesis as the preferred approach was reached after much consideration and exploration. Although it was a relatively new approach, it matched my aim, the research question, the nature of the available evidence and the context of current developments in the field. It allowed me to garner rich and extensive data from the literature, and represented the technique with the best available guidance, from my own previous learning; from the experience of my supervisors; and from the methodological literature.

To my knowledge, the study reported here is the most comprehensive exploration to date, of EBHC competence in the field of general practice. The preliminary competency framework explicitly set out to acknowledge and accommodate the constraints on EBHC that GPs encounter. Another aim was to maximise its utility as a learning tool by incorporating the principles of andragogy. The extent to which the preliminary framework met these objectives is explored by a panel of experts in the next stage (Chapter 4). At this stage, I wanted to ascertain whether the preliminary framework was moving towards, or away from the traditional framework and other existing curricula. I therefore compared it to the Sicily Statement,[80] and the curriculum of the Royal College of General Practitioners.[81]

3.6.1 Comparison with the traditional five-step framework of EBHC in the Sicily Statement

The preliminary competency framework moved away from the traditional concept of EBHC as an individual activity, to one that included team effort. Acknowledging the time restraints on conducting literature searches and critically appraising evidence, GPs shared

the burden of these tasks. This resembled the traditional journal club, but with an emphasis on common ownership of the topics prioritised for presentation. Team activity also presented an opportunity to teach and learn the clinical epidemiological concepts required for critical appraisal, which are poorly understood among GPs.[3-5,7] Making learning a group activity acknowledged the social constructivist model of learning, which emphasises the individual learning that occurs through collaborative construction of knowledge when learners interact in a group.[82] Observation of GPs has shown that new knowledge is indeed constructed socially in this way.[75] However, receptivity would depend upon the culture and level of collaboration within the particular group. There was still a place, however, for individual pursuit of EBHC. GPs were required to perform their literature searches to address clinical uncertainty and to check the validity of newly acquired knowledge. But in these circumstances, the GP was expected to save time by seeking secondary, pre-appraised evidence rather than primary research studies. Another difference from the traditional concept of EBHC was a role for the GP as EBHC advocate within the practice. This acknowledged the upstream barriers to EBHC relating to practice organisation. Another important theme distilled from this systematic review was the concept of EBHC as a form of reflective practice. GPs were required to identify and reflect upon instances when they found difficulty describing the risk and benefit of an intervention to the patient, and to use these as opportunities to rehearse more clear and concise communication. They were also required to reflect on difficult decisions. GPs were offered a simple framework to facilitate the process. It described four domains of influence (the '4Es'): Evidence (availability, quality and applicability), Experience (their own accumulated on-the-job knowledge), Empathy (appropriate consideration of the patient's perspective, capacity and

circumstances) and Environment (the influence of external factors such as time pressure or access to resources).

In summary, the preliminary framework differed from the traditional Sicily Statement in that there was a new focus on EBHC as a collaborative activity; GPs were explicitly encouraged to seek pre-appraised sources of evidence; there was a new role as an advocate for EBHC within the practice; and the importance of reflective learning was reinforced and presented as an easily recalled '4E' framework.

3.6.2 Comparison with the Royal College of General Practitioners curriculum

The Royal College of General Practitioners (RCGP) published a curriculum statement, which defined the knowledge, skills and qualities expected of GPs, and included a number of EBHC competencies.[81] This was introduced in Chapter 2. A comparison of the competencies described in the RCGP curriculum with those of the preliminary competency framework highlighted several differences (Table 3.2). The preliminary competency model described behavioural outcomes more precisely. For example, it proposed that the EBHC-competent GP '*reflects on instances in which risk and benefit were difficult to explain to a patient, and develops a concise, clear explanation for future use.*' This requires both recall of real instances of difficulty, and the construction of a concrete solution. The RCGP competencies demand the same commitment to reflection, and the same communication skills, but do not require a demonstrable outcome (such as an improved explanation of risk and benefit). In this sense, the RCGP competencies more closely represent learning *objectives,* written from the perspective of the teacher, rather than learning *outcomes*, which guide the

Table 3.2 Comparison of proposed competencies with competencies identified as closest in meaning, from the RCGP curriculum

Proposed competencies	Competencies identified to be closest in meaning, from the RCGP curriculum
Reflects on instances in which risk and benefit were difficult to explain to a patient, and develops a concise, clear explanation for future use.	Demonstrate the ability to communicate risks and benefits in a way that is meaningful to patients. Be able to communicate to the patient the rationale for evidence-based interventions to encourage patient participation within a therapeutic aim, taking into account the patient's objective, values and priorities. Being aware of how you impart information about evidence so that patients can best understand relevant evidence and be helped in making a decision.
Demonstrates an ability to identify decisions they found challenging, and to reflect upon their reasoning in terms of '4Es' – Evidence, Experience, Empathy and Environment.	Recognise the range of values that influence decisions by your patients, their families and health professionals, and where these values conflict. Exploring patient values and placing them in context with clinical evidence, so that you can develop an appropriate shared-management plan. Base decision-making on good evidence-based practice, taking into account patient values in order to provide the most appropriate care for the patient. Including a non-judgmental evidence-based approach to problem-solving, taking into account your patients' values.
Demonstrates a commitment to checking newly acquired knowledge from colleagues, media, pharmaceutical companies and other sources against the best available evidence, using secondary sources such as guidelines, evidence-based summaries and systematic reviews	Develop your skills and attitudes so that you seek and use the best evidence in practice. Developing and maintaining continuing learning and quality improvement.
Demonstrates a commitment to efficiently addressing clinical uncertainty, using secondary sources of evidence, and the best available information technology.	Develop your skills and attitudes so that you seek and use the best evidence in practice. Formulate appropriate diagnoses, rule out serious illness and manage clinical uncertainty. Manage uncertainty through retrieval of best evidence available and communicate that uncertainty with appropriate safety netting. Dealing with uncertainty.
Works with colleagues to share the tasks of identifying and prioritising clinical questions, finding, appraising and presenting evidence, and refreshing knowledge of EBHC concepts and resources.	Develop your skills and attitudes so that you seek and use the best evidence in practice. Familiarity with the general principles, methods and concepts of scientific research and the fundamentals of statistics (incidence, prevalence, predictive value, etc.). Reading and assessing medical literature critically and putting the lessons from the literature into practice. Developing and maintaining continuing learning and quality improvement.

Continued

Proposed competencies	Competencies identified to be closest in meaning, from the RCGP curriculum
	Understanding the principles of evidence-based practice and how you can apply these principles, given the condition of the patient and the healthcare system Developing and maintaining an approach to continuing learning and quality improvement. Demonstrate the ability to be an effective member and, where appropriate, be a willing leader of a team. Promote the sharing of information and resources. Understanding the process of change and factors that influence it, and using resources for obtaining support in developing and leading change. Have an understanding of basic research methodology (e.g. you must understand the difference between qualitative and quantitative data and studies using social science methods, as well as bioscience) and how different types of research activity may contribute to patient care. Have the skills to appraise research findings critically with a working knowledge of statistics. Be able to teach and mentor others within the team effectively, including giving effective feedback as described in the General Medical Council's guidance document Good Medical Practice. Using the type of best evidence relevant to the needs of your patients with an awareness of the principles and limitations of evidence-based practice. Applying evidence using meta-analysis, which allows you to extrapolate down to individual patient care, with an understanding of how to critically appraise the data. Being able to search for valid information using the process of evidence-based practice (as in the Sicily statement, 2003,2) which involves: translation of uncertainty into answerable questions; systematic retrieval of the best evidence available; critical appraisal for validity, clinical relevance and applicability; application of results in practice; evaluation of performance (either at an individual or organisational level).
Demonstrates advocacy and leadership in identifying and addressing barriers to EBHC within their practice.	Be able to work as a team member and team leader in providing services to patients.

learner by describing precisely how they should demonstrate the objective.[83] This is perhaps appropriate, given the function of the RCGP curriculum as a comprehensive statement of *all* the professional attributes that GPs are required to possess. If they were too specific, critical competencies could be omitted, or the total number of competencies might become inflated to the degree that would render them unhelpful. Another difference

is that several of the competencies in the preliminary framework referred to real situations encountered in everyday work – challenging decisions, consultations in which a decision was difficult, and instances when new knowledge is sought or received from colleagues or other agents such as pharmaceutical company representatives. This was a deliberate strategy in constructing the preliminary framework, as adult learners are better motivated when they apply knowledge to problems encountered in everyday life.[51] Both the preliminary framework and the RCGP curriculum require the traditional EBHC skills described in the traditional five-step model of EBHC, and the acquisition of EBHC technical knowledge. But the preliminary framework allowed these skills to be exercised, and the knowledge acquired in the context of team activity. Team activity extends to advocacy and leadership in identifying and addressing barriers to EBHC within the practice. The RCGP curriculum does encourage a team approach: *'Be able to work as a team member and team leader in providing services to patients.'* It is not, however, explicitly applied in EBHC.

In summary, the preliminary framework was designed for maximum utility to the individual GP learner, who wishes to enhance their competence in EBHC, and who has little time to engage in traditional EBHC activities such as searching for evidence and critically appraising it. It placed a stronger accent on demonstrable behavioural outcomes. This was possible because unlike the RCGP curriculum, the preliminary framework was not bound by a further requirement to function as a comprehensive, complete statement of attributes required by the profession. The preliminary framework was more explicit in its reference to situations that arise in everyday work, and specifically called for a collaborative approach among GPs regarding EBHC.

3.6.3 Limitations

The search strategy included studies that addressed engagement with EBHC as an *overarching approach* to patient care and excluded those that addressed individual steps in the traditional model of EBHC. It was felt that it would not be fruitful to explore competencies for individual steps, as these effectively constitute a form of prior consensus regarding the required competencies. It was also felt that each step, in isolation, did not constitute the EBHC approach to patient care. I excluded studies that evaluated educational interventions because my initial scoping of the literature revealed in each case that the competencies were pre-defined at the start of the investigation, and represented the five steps of EBHC. Furthermore, trials in education are notoriously prone to contamination (participants receiving the teaching intended for those in another group)[84] and lack of external validity (where few situations mirror the conditions or participants in the original study, making conclusions inapplicable elsewhere).[85] It is unlikely that competencies other than those described by the traditional steps of EBHC were missed. Also excluded were studies in languages other than English. This was because resources for translation were unavailable. It is possible that some relevant studies have been missed as a result, though most general practice research is likely to be in English given its prominence as a specialty in Anglophone countries.

As a result of a fellow student becoming unavailable, only one reviewer made decisions on selection of relevant studies, assessment of their quality and extraction of data. This may have led to bias, and the review would have been strengthened by the provision of a second independent reviewer to perform the same functions, blinded to the decisions made by the first reviewer.

The quality of included studies was limited, and this could have impacted upon the validity of my findings. However, my findings were intended to be preliminary. The broader design of the thesis ensured that they were subject to refinement by expert opinion in the following stages of the multi-source synthesis, and to a validation step in the final stage of the thesis.

Like authors of similar syntheses,[46,47] when I was conducting the study I was unable to identify a suitable *validated* framework for assessing the quality of included cross-sectional surveys, and made a pragmatic decision to use a modified version of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.[45] There were other frameworks available - Sanderson et al. conducted a review of quality assessment tools for observational studies and identified as many as 86.[86] However, in evaluating the tools, they described frequent problems: lack of clarity about their design, development and purpose; variation in the number and nature of items; lack of evidence of validity and reliability; and many were designed for specific topics. They concluded that there was no single obvious candidate tool. They did propose, however, that the STROBE statement, although designed primarily to improve the reporting of studies, could '*provide a suitable starting point for development of a quality assessment tool*.' Their reasons were twofold: (1) its development involved '*extensive discussion among numerous experienced epidemiologists and statisticians*'; and (2) the selection of items was based in many cases on their association with susceptibility to bias. Others have argued that use of the STROBE criteria for study quality assessment is inappropriate because of its primary purpose to ensure the inclusion of certain important elements of methods in reporting studies.[87]

However, as has previously been pointed out,[88] in the 'explanation and elaboration' paper that accompanied publication of the STROBE statement, the authors themselves proposed that it '*facilitates critical appraisal and interpretation of studies by reviewers, journal editors and readers*.'[89] In the absence of a clearly preferable alternative, I followed the example of the other authors conducting similar syntheses and made a pragmatic decision to use a modification of the STROBE statement to assess the quality of the cross-sectional surveys included in my synthesis. It had the advantage of providing a transparent account of my decisions about study quality that readers can easily refer to and understand.

The preliminary competency model constructed from this review does not represent a consensus. There would have been less susceptibility to bias if agreement were sought among several investigators, independently constructing their own version of the model, from the data available. Limited availability of resources restricted the study to a single investigator. However, an advantage of thematic synthesis is that the process of translating key concepts from each study and translating them to others is transparent to peer review, and the method ensures that the themes developed are well grounded in the primary data from which they were drawn.[29]

3.7 Conclusions

This chapter describes the first stage in the construction of a new, pragmatic competency framework for evidence-based general practice, for GPs to use in their annual performance appraisal exercise and in routine practice. It resulted in a preliminary competency framework and a set of five credible themes describing the factors that should be

considered in constructing a competency framework. Both outputs will contribute to an overarching multi-source synthesis to derive a final competency framework. To my knowledge, this was the most comprehensive review of EBHC competence in the context of general practice conducted to date. As the initial step in developing the competency framework, it benefited from a rich source of data. The preliminary competency framework differs from the traditional five-step model of EBHC, and from the EBHC competencies included in the RCGP curriculum. It has shifted towards a more collaborative, reflective approach, one that includes a role in advocacy for EBHC at the practice level and is more explicitly focused on demonstrable outcomes that matter in everyday practice. The following chapter will describe how this preliminary framework was used as a 'straw model' to aid the development of a consensus among subject experts on the appropriate characteristics of an EBHC competency framework for general practice.

3.8 Summary of conclusions

- A preliminary competency framework comprising six competencies was derived from a qualitative-quantitative synthesis representing Stage 1 of a three-stage mixed methods synthesis.

- A set of five themes described the important factors to consider in constructing a competency framework.

- These outputs will contribute to an overarching multi-source synthesis which will generate a final competency framework.

- Compared to the traditional five-step EBHC framework and the RCGP curriculum, the preliminary framework derived in this review is more collaborative and reflective, and focused on outcomes that matter in practice. It also includes a role as EBHC advocate at a practice level. It will be used as a 'straw model' to aid the development of a consensus among subject experts on the appropriate characteristics of an EBHC competency framework for general practice.

3.9 References

1. Galbraith K, Ward A, Heneghan C. A real-world approach to Evidence-Based Medicine in general practice: a competency framework derived from a systematic review and Delphi process. *BMC medical education.* 2017;17(1):78.
2. Trevena LJ, Irwig L, Isaacs A, Barratt A. GPs want tailored, user friendly evidence summaries--a cross sectional study in New South Wales. *Australian Family Physician.* 2007;36(12):1065-1069.
3. Barghouti F, Halaseh L, Said T, Mousa AH, Dabdoub A. Evidence-based medicine among Jordanian family physicians: awareness, attitude, and knowledge. *Canadian Family Physician.* 2009;55(7):e6-13.
4. Callen JL, Fennell K, McIntosh JH. Attitudes to, and use of, evidence-based medicine in two Sydney divisions of general practice. *Australian Journal of Primary Health.* 2006;12(1):40-46.
5. McColl A, Smith H, White P, Field J. General practitioner's perceptions of the route to evidence based medicine: a questionnaire survey. *BMJ.* 1998;316(7128):361-365.
6. Taylor J, Wilkinson D, Blue IA, Dollard JT. Evidence-based rural general practice: barriers and solutions in South Australia. *Rural Remote Health.* 2002;2(1):116.
7. Young JM, Ward JE. Evidence-based medicine in general practice: beliefs and barriers among Australian GPs. *Journal of Evaluation in Clinical Practice.* 2001;7(2):201-210.
8. Upton D, Upton P. Knowledge and use of evidence-based practice of GPs and hospital doctors. *Journal of Evaluation in Clinical Practice.* 2006;12(3):376-384.
9. McKenna HP, Ashton S, Keeney S. Barriers to evidence-based practice in primary care. *Journal of Advanced Nursing.* 2004;45(2):178-189.
10. Pedersen VH, Dagenais P, Lehoux P. Multi-source synthesis of data to inform health policy. *Int J Technol Assess Health Care.* 2011;27(3):238-246.

11. Lucia AD, Lepsinger R. *Art & Science of Competency Models.* Jossey-Bass San Francisco, CA; 1999.
12. McClelland DC. Testing for competence rather than for" intelligence.". *American psychologist.* 1973;28(1):1.
13. Frank JR, Snell LS, Cate OT, et al. Competency-based medical education: theory to practice. *Medical teacher.* 2010;32(8):638-645.
14. Mirabile RJ. Everything you wanted to know about competency modeling. *Training & Development.* 1997;51(8):73-78.
15. Flanagan JC. The critical incident technique. *Psychological bulletin.* 1954;51(4):327.
16. LeFebvre RP, Peterson DH, Haas M, et al. Training the evidence-based practitioner: university of Western States document on standards and competencies. *Journal of Chiropractic Education.* 2011;25(1):30-37.
17. Ladhani Z, Scherpbier AJ, Stevens FC. Competencies for undergraduate community-based education for the health professions–A systematic review. *Medical teacher.* 2012;34(9):733-743.
18. Khan KS, Ter Riet G, Glanville J, Sowden AJ, Kleijnen J. *Undertaking systematic reviews of research on effectiveness: CRD's guidance for carrying out or commissioning reviews.* NHS Centre for Reviews and Dissemination; 2001.
19. Mays N, Pope C, Popay J. Systematically reviewing qualitative and quantitative evidence to inform management and policy-making in the health field. *Journal of health services research & policy.* 2005;10(1_suppl):6-20.
20. Lucas PJ, Baird J, Arai L, Law C, Roberts HM. Worked examples of alternative methods for the synthesis of qualitative and quantitative research in systematic reviews. *BMC medical research methodology.* 2007;7(1):4.
21. Gough D. Qualitative and mixed methods in systematic reviews. BioMed Central; 2015.
22. Noyes J, Booth A, Cargo M, et al. Cochrane Qualitative and Implementation Methods Group guidance series—paper 1: introduction. *Journal of clinical epidemiology.* 2018;97:35-38.
23. Harden A. Mixed-methods systematic reviews: integrating quantitative and qualitative findings. *Focus.* 2010;2010(25):1-8.
24. Goldsmith MR, Bankhead CR, Austoker J. Synthesising quantitative and qualitative research in evidence-based patient information. *Journal of Epidemiology & Community Health.* 2007;61(3):262-270.
25. Harris J, Kearley K, Heneghan C, et al. Are journal clubs effective in supporting evidence-based decision making? A systematic review. BEME Guide No. 16. *Med Teach.* 2011;33(1):9-23.
26. Pawson R. *Evidence-based policy: a realist perspective.* Sage; 2006.
27. Ransmayr G. Physical, occupational, speech and swallowing therapies and physical exercise in Parkinson's disease. *Journal of Neural Transmission.* 2011;118(5):773-781.
28. Thomas J, Sutcliffe K, Harden A, et al. Children and healthy eating: a systematic review of barriers and facilitators. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London. 2003.
29. Thomas J, Harden A. Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Med Res Methodol.* 2008;8:45.

30. Oliver S, Harden A, Rees R, et al. An emerging framework for including different types of evidence in systematic reviews for public policy. *Evaluation.* 2005;11(4):428-446.
31. Harden A, Thomas J. Methodological issues in combining diverse study types in systematic reviews. *International Journal of Social Research Methodology.* 2005;8(3):257-271.
32. Harden A, Garcia J, Oliver S, et al. Applying systematic review methods to studies of people's views: an example from public health research. *Journal of Epidemiology & Community Health.* 2004;58(9):794-800.
33. Thomas J, Harden A, Oakley A, et al. Integrating qualitative research with trials in systematic reviews. *Bmj.* 2004;328(7446):1010-1012.
34. Gough D, Oliver S, Thomas J, eds. *An introduction to systematic reviews.* 1st ed. London: SAGE Publications Ltd; 2012.
35. Balla J, Heneghan C, Goyder C, Thompson M. Identifying early warning signs for diagnostic errors in primary care: a qualitative study. *BMJ open.* 2012;2(5).
36. Akuoko CP, Armah E, Sarpong T, Quansah DY, Amankwaa I, Boateng D. Barriers to early presentation and diagnosis of breast cancer among African women living in sub-Saharan Africa. *PloS one.* 2017;12(2):e0171024.
37. Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. *BMJ.* 1996;312(7023):71-72.
38. Carraccio C, Wolfsthal SD, Englander R, Ferentz K, Martin C. Shifting paradigms: from Flexner to competencies. *Academic Medicine.* 2002;77(5):361-367.
39. Segen's Medical Dictionary. 2011; https://medical-dictionary.thefreedictionary.com/competence+framework Accessed 24.09.2018.
40. EBM Working Group. Evidence-based medicine. A new approach to teaching the practice of medicine. *JAMA.* 1992;268(17):2420-2425.
41. *Oxford Dictionary and Thesaurus* [computer program]. Version 1.0.2: Oxford University Press; 2007.
42. McKibbon KA, Lokker C, Wilczynski NL, et al. A cross-sectional study of the number and frequency of terms used to refer to knowledge translation in a body of health literature in 2006: a Tower of Babel? *Implement Sci.* 2010;5:16.
43. Giacomini MK, Cook DJ. Users' guides to the medical literature: XXIII. Qualitative research in health care A. Are the results of the study valid? Evidence-Based Medicine Working Group. *JAMA.* 2000;284(3):357-362.
44. Giacomini MK, Cook DJ. Users' guides to the medical literature: XXIII. Qualitative research in health care B. What are the results and how do they help me care for my patients? Evidence-Based Medicine Working Group. *JAMA.* 2000;284(4):478-482.
45. von Elm E, Altman DG, Egger M, Pocock SJ, Gotzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet.* 2007;370(9596):1453-1457.
46. Zwolsman S, te Pas E, Hooft L, Wieringa-de Waard M, van Dijk N. Barriers to GPs' use of evidence-based medicine: a systematic review. *Br J Gen Pract.* 2012;62(600):e511-521.

47. van Dijk N, Hooft L, Wieringa-de Waard M. What are the barriers to residents' practicing evidence-based medicine? A systematic review. *Acad Med.* 2010;85(7):1163-1170.
48. Sandelowski M, Voils CI, Barroso J. Defining and designing mixed research synthesis studies. *Research in the schools: a nationally refereed journal sponsored by the Mid-South Educational Research Association and the University of Alabama.* 2006;13(1):29.
49. Rothman KJ, Greenland S, Lash TL. *Modern epidemiology.* Lippincott Williams & Wilkins; 2008.
50. Noblit GW, Hare RD, Hare R. *Meta-ethnography: Synthesizing qualitative studies.* Vol 11: sage; 1988.
51. Knowles MS, Holton EF, Swanson RA. *The adult learner: The definitive classic in adult education and human resource development.* Burlington, MA: Elsevier; 2005.
52. NHS Workforce: summary of staff in the NHS: results from September 2011 census. 2011; https://catalogue.ic.nhs.uk/publications/workforce/numbers/nhs-staf-2001-2011-gene-prac/nhs-staf-2001-2011-gene-prac-work-rep.pdf Accessed 15.01.2013.
53. Balla JI. Personal communication: model for reflection for good clinical practice. 2013.
54. Calderon C, Sola I, Rotaeche R, et al. EBM in primary care: a qualitative multicenter study in Spain. *BMC Fam Pract.* 2011;12:84.
55. Adams J. General practitioners, complementary therapies and evidence-based medicine: The defence of clinical autonomy. *Complementary Therapies in Medicine.* 2000;8(4):248-252.
56. Ely JW, Osheroff JA, Ebell MH, et al. Obstacles to answering doctors' questions about patient care with evidence: qualitative study. *BMJ.* 2002;324(7339):710.
57. Ford S, Schofield T, Hope T. Barriers to the evidence-based patient choice (EBPC) consultation. *Patient Education & Counseling.* 2002;47(2):179-185.
58. Freeman AC, Sweeney K. Why general practitioners do not implement evidence: qualitative study. *BMJ.* 2001;323(7321):1100-1102.
59. Hall LA, Eccles M. *Listening to clinicians: using a qualitative approach to explore factors which influence the uptake of new evidence by health care professionals.* University of Newcastle upon Tyne, Centre for Health Services Research; 1999.
60. Hannes K, Leys M, Vermeire E, Aertgeerts B, Buntinx F, Depoorter A-M. Implementing evidence-based medicine in general practice: a focus group based study. *BMC Family Practice.* 2005;6:37.
61. Lipman T. The doctor, his patient, and the computerized evidence-based guideline. *Journal of Evaluation in Clinical Practice.* 2004;10(2):163-176.
62. Mayer J, Piterman L. The attitudes of Australian GPs to evidence-based medicine: A focus group study. *Family Practice.* 1999;16(6):627-632.
63. Mears R, Sweeney K. A preliminary study of the decision-making process within general practice. *Family Practice.* 2000;17(5):428-429.
64. Patterson JV, Stewart-Brown SL. What are general practitioners' attitudes towards evidence-based medicine, and are these changing? *Journal of Clinical Excellence.* 1999;1(1):27-34.

65. Putnam W, Twohig PL, Burge FI, Jackson LA, Cox JL. A qualitative study of evidence in primary care: what the practitioners are saying. *Canadian Medical Association Journal.* 2002;166(12):1525-1530.
66. Rohrbacher R, Marx P, Schaufler T, Schneider H. Patient-based medicine: Aligning patients' perspectives on disease and treatment with evidence-based medicine criteria. *Journal of Public Health.* 2009;17(3):167-176.
67. Short D, Frischer M, Bashford J, Ashcroft D. Why are eligible patients not prescribed aspirin in primary care? A qualitative study indicating measures for improvement. *BMC Family Practice.* 2003;4:9.
68. Skoglund I, Segesten K, Bjorkelund C. GPs' thoughts on prescribing medication and evidence-based knowledge: the benefit aspect is a strong motivator. A descriptive focus group study. *Scandinavian Journal of Primary Health Care.* 2007;25(2):98-104.
69. Summerskill WSM, Pope C. 'I saw the panic rise in her eyes, and evidence-based medicine went out of the door.' An exploratory qualitative study of the barriers to secondary prevention in the management of coronary heart disease. *Family Practice.* 2002;19(6):605-610.
70. Tracy CS, Dantas GC, Upshur REG. Evidence-based medicine in primary care: qualitative study of family physicians. *BMC Family Practice.* 2003;4:6.
71. Ford S, Schofield T, Hope T. What are the ingredients for a successful evidence-based patient choice consultation?: A qualitative study. *Social Science & Medicine.* 2003;56(3):589-602.
72. Tracy CS, Dantas GC, Moineddin R, Upshur RE. Contextual factors in clinical decision making: national survey of Canadian family physicians. *Canadian family physician Medecin de famille canadien.* 2005;51:1106-1107.
73. Kahveci R, Meads C. Is primary care evidence-based in Turkey? A cross-sectional survey of 375 primary care physicians. *Journal of Evidence-based Medicine.* 2009;2(4):242-251.
74. Armstrong D. Clinical autonomy, individual and collective: the problem of changing doctors' behaviour. *Social Science & Medicine.* 2002;55(10):1771-1777.
75. Gabbay J, le May A. Evidence based guidelines or collectively constructed "mindlines?" Ethnographic study of knowledge management in primary care. *BMJ.* 2004;329(7473):1013.
76. Lorenz KA, Ryan GW, Morton SC, Chan KS, Wang S, Shekelle PG. A qualitative examination of primary care providers' and physician managers' uses and views of research evidence. *International Journal for Quality in Health Care.* 2005;17(5):409-414.
77. Glasziou P, Del Mar C, Salisbury J. *Evidence-Based Practice Workbook.* 2nd ed. Oxford: Blackwell; 2007.
78. Wood F, Palmer J, Ellis D, Simpson S, Bacigalupo R. Information in primary health care. *Health Libraries Review.* 1995;12(4):295-308.
79. Samuel O. Evidence-based general practice : what is needed right now. *Audit Trends.* 1997;5(4):111-115.
80. Dawes M, Summerskill W, Glasziou P, et al. Sicily statement on evidence-based practice. *BMC Med Educ.* 2005;5(1):1.
81. Royal College of General Practitioners curriculum. http://www.rcgp.org.uk/GP-training-and-exams/GP-curriculum-overview.aspx Accessed 06.05.2016.

82. Morris C, Blaney D. Work-based learning. In: Swanwick T, ed. *Understanding medical education: Evidence, theory and practice*: Wiley. com; 2011.
83. Harden RM. Learning outcomes and instructional objectives: is there a difference? *Medical teacher.* 2002;24(2):151-155.
84. Keogh-Brown MR, Bachmann MO, Shepstone L, et al. Contamination in trials of educational interventions. *Health Technol Assess.* 2007;11(43):iii, ix-107.
85. Harden RM, Grant J, Buckley G, Hart IR. Best Evidence Medical Education. *Advances in health sciences education : theory and practice.* 2000;5(1):71-90.
86. Sanderson S, Tatt ID, Higgins JP. Tools for assessing quality and susceptibility to bias in observational studies in epidemiology: a systematic review and annotated bibliography. *Int J Epidemiol.* 2007;36(3):666-676.
87. da Costa BR, Cevallos M, Altman DG, Rutjes AW, Egger M. Uses and misuses of the STROBE statement: bibliographic study. *BMJ open.* 2011;1(1):e000048.
88. Johansson D, Malmgren K, Alt Murphy M. Wearable sensors for clinical applications in epilepsy, Parkinson's disease, and stroke: a mixed-methods systematic review. *J Neurol.* 2018;265(8):1740-1752.
89. Vandenbroucke JP, von Elm E, Altman DG, et al. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): explanation and elaboration. *International journal of surgery (London, England).* 2014;12(12):1500-1524.

CHAPTER FOUR

Multi-source synthesis Stage 2: *thematic representation of EBHC competence in general practice derived by expert consensus - a Delphi process*

4. Multi-source synthesis Stage 2: *thematic representation of EBHC competence in general practice derived by expert consensus - a Delphi process*

Note: The work presented in this chapter has been published in a peer-review journal.[1]

4.1 Abstract

Background. The first stage of a multi-source synthesis (synthesis of qualitative and quantitative evidence from the literature) resulted in the construction of a preliminary 'real-world' competency framework for EBHC in general practice. In this second stage, the preliminary competency framework was used as a 'straw model' for further development among a group of experts in a new primary study. The aim was to develop by expert consensus an EBHC competency framework for general practice, gather opinions on the appropriate characteristics of such a framework, and to use those data to generate a set of themes that underpin the meaning of EBHC competence among general practitioners. Those themes will be synthesised in the next stage (Stage 3) of the multi-source synthesis with those derived from the Stage 1, towards a final competency framework.

Methods. A two-round Delphi process was conducted among a panel of ten experts in general practice and Evidence-Based Health Care. Panelists were experienced full time general practitioners, and academic clinicians with experience in general practice, medical education and relevant EBHC research. In Round 1, the preliminary competency framework was rated by panelists for importance, achievability and demonstrability. In Round 2, a

revised framework was rated, and component competencies ranked across the same dimensions of importance, achievability and demonstrability. Free-text comments were invited in each round. A consensus framework was generated in light of the data from both rounds. This, and the free-text comments were treated as qualitative data and analysed thematically. The credibility of emergent themes was checked against quantitative findings.

Results. Seven themes emerged from the study: (1) decisions are influenced by information drawn from a complex array of sources; (2) there are social, cognitive, informational and organisational barriers to the notion of ideal EBHC; (3) EBHC involves tailoring decisions to the needs and perspective of the individual patient; (4) a sense of pragmatism must underpin the approach to seeking and critically appraising evidence, and to the development of competence in EBHC, given the constraints implicit in general practice; (5) EBHC requires commitment; (6) reflection is a continuous background process, and should be objective; and (7) EBHC is difficult to demonstrate using currently available appraisal tools.

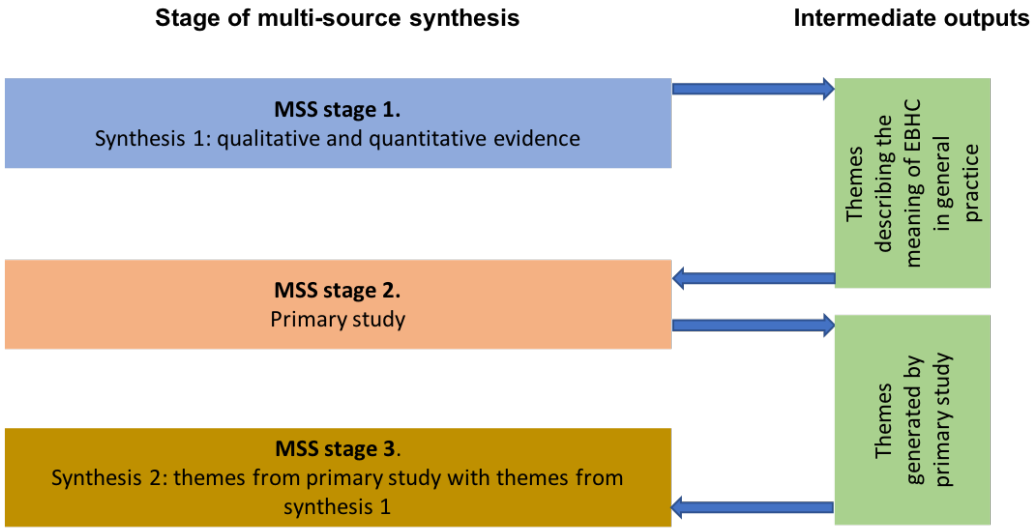
Conclusions. This Delphi process distilled an expert consensus on EBHC competence in general practice. It shares with the traditional definition a focus on the individual patient, but is more explicitly at ease with a pragmatic approach, acknowledging real-world constraints. It recognises a wider array of influences in the decision-making process, and is underpinned by a more continuous, sympathetic and objective reflective process. The themes generated in this study will be synthesised with those derived from the first stage

of the multi-source synthesis, to construct a final real-world competency framework that is grounded both in the extensive literature, and in the opinions of experts in EBHC and general practice. Demonstrability of EBHC competence remains challenging. This will be addressed by the next stage of the thesis.

4.2 Introduction

The previous chapter described Stage 1 of a three-stage multi-source synthesis: the construction of a preliminary competency framework, based on a synthesis of relevant qualitative and quantitative literature. This chapter describes Stage 2: a primary study (informed by Stage 1) that will provide important additional context and insights from experts in the field (Figure 4.1). In iterative fashion, themes generated by this study will be re-synthesised with those of Stage 1 to produce a final competency framework. The importance of supplementing my literature-based research with expert opinion was highlighted in a preliminary viva (the 'Transfer of Status' viva) which is an early part of all doctoral programmes at the University of Oxford. One of my examiners (himself an expert in general practice and EBHC) likened the development of a competency framework without expert opinion to the task of exploring the jungle without a map. This drew me towards the Delphi method, because it is a useful method of reaching consensus among a group of experts.[2] The method has been used extensively in health care;[3] it is particularly useful where there is insufficient information on the problem, and where there is little information on present and future developments.[2] Both of these conditions held, as demonstrated in the first stage of the multi-source synthesis (Chapter 3).

Figure 4.1 The structure and process of the multi-source synthesis



Themes generated by synthesis 1 guide the design of MSS stage 2 (primary study).
Themes generated by MSS stage 2 are synthesised with the themes from synthesis 1.

4.2.1. The Delphi Method

The Delphi method is a process for achieving convergence of opinion solicited from experts in the particular field.[4] A facilitator, often with the help of a small 'monitor team' of fellow researchers,[5] designs a questionnaire which is sent to a preselected panel of experts. The monitor team (including the facilitator) collates and summarises the responses, develops a new questionnaire based on the findings and sends it to the panel of experts for another iteration. The panel is usually given at least one opportunity to reassess their opinions and make a revised judgement in light of the group response. Anonymity of opinions is maintained throughout, thus removing the potential for dominant members to exert disproportionate effects and allowing panelists the freedom to express controversial opinions. The number of rounds is variable, though it is seldom more than one or two

iterations, by which time most of the change in panelists' responses is expected to have occurred.[6] It is advisable that at least one member of the monitor team has a working knowledge of the discipline concerned, as expert panelists who feel the Delphi organisers are unfamiliar with the topic under discussion are less likely to commit to the process.[7] A small expert panel of 10 to 15 is adequate when the participants are homogeneous; a larger group is appropriate when the members are drawn from a number of different disciplines, or vary markedly for some other defining characteristic.[2] There are many variations of the Delphi process, and there are no universally accepted guidelines for its conduct.[3] For example, panelists may be asked in Round 1 to rank a series of items according to some criterion, such as importance, or level of agreement. Or their views may be solicited in response to a number of open-ended questions. The questionnaire in Round 2 may be identical to that presented in Round 1, but this time accompanied by a summary of the whole group's Round 1 responses; or the Round 2 questionnaire might be designed differently from that used in Round 1, in light of an assessment of the panelists' responses. There is no standard approach to the analysis of data from Delphi rounds.[3] Qualitative and quantitative methods of analysis may be employed, and data combined.[8]

4.3 Objective

The aim of this chapter was to distil from a panel of experts a set of themes that underpin the meaning of EBHC competence among general practitioners, which I could then synthesise with those generated in the first stage of the multi-source synthesis, towards a final competency framework.

4.4 Methods

4.4.1. Preliminary discussion

The design of this Delphi study drew on the experience of departmental staff who had employed the technique in a study of prioritisation criteria for the assessment of new diagnostic technologies.[9] Before embarking on my own Delphi process, I consulted the authors. We discussed the required number of participants, the use of anonymity, the importance of piloting the questionnaire, the number of rounds, the frequency and composition of monitor team meetings and the proper use of Likert scales. A number of expert panelists were suggested from the department. We also discussed my own potential inclusion in the panel in light of (1) the knowledge I could bring from my familiarity with the data; (2) the protection afforded by the Delphi method against undue influence from any individual panelist;[6] and (3) the philosophical position in qualitative research that the researcher's influence on research is both inevitable[10,11] and acceptable.[12] It was recommended that a monitor team, composed from four or five members of the expert panel, should meet face-to-face on three occasions: (1) prior to the initial questionnaire, to refine the structure of questionnaires, and pilot the first; (2) after collation of data from the first questionnaire, to develop the second questionnaire; and (3) after collection of data from the second questionnaire, to agree upon the wording of a consensus competency framework.

4.4.2. Recruitment

The recruitment process for the expert panel sought academics with clinical experience and expertise in both disciplines (general practice and EBHC) and GPs who were

representative of those facing the real-world challenges I identified in the first stage of the multi-source synthesis, such as time constraints[13-19] and patients' expectations.[13-17] I set the following invitation criteria for academic experts: (1) clinical experience as a GP; (2) experience in teaching general practice or EBHC; and (3) published in aspects of EBHC related to the themes that emerged in the first stage of the multi-source synthesis. I ascertained these characteristics from published research on relevant topics and from profiles provided on the websites of the academic institutions to which the authors were affiliated. An invitation was sent by email, together with a study protocol. Given the strong qualitative nature of the study, I included myself among the academic GP experts as I would be able to bring in-depth knowledge of the data from stage one of the multi-source synthesis. For the remainder of the expert panel, I set the following criteria for invitation: (1) at least ten years of experience as a GP; (2) working full-time; and (3) holding a postgraduate qualification in general practice. I approached a general practice in my home town that was representative of many across the UK. The practice comprises seven GPs, serving around 12,000 patients in the town and surrounding rural villages. To make up sufficient numbers, I also approached two GPs from similar group practices, whom I knew fit the criteria. The target number of participants was 10 to 15,[3] with a 50:50 distribution between academic and full-time general practice experts. Participants were sent an initial description of the aim of the study, and an outline of the Delphi process, including an expected timeline (Appendix 6). They were asked to keep their involvement in the study confidential and were invited to contribute by email. Recruitment of the monitor team from among the expert panel was challenging because of the time commitment involved in three face-to-face meetings. The panel was composed of busy full-time GPs and

academics widely dispersed geographically across the UK, for whom the task would be unfeasible. I therefore approached members of the academic staff in the department who were not on the panel. The term 'monitor team' was opaque to prospective members, so it was renamed the 'decision committee' to clarify its function. Three departmental staff agreed, forming a decision committee (including myself) of four.

4.4.3. Pilot testing

The first task of the decision committee was to pilot-test an initial draft of the Round 1 questionnaire. Because of logistic difficulty in meeting face-to-face, it was decided that this task would be completed by email. The draft questionnaire, and an accompanying draft email cover letter were sent to two members of the decision committee. Feedback was received on the wording of the cover letter, the design of the questionnaire, its wording and its accessibility on Windows and Mac operating systems. Revisions were further piloted until a final version was agreed upon.

4.4.4. The Round 1 questionnaire (Q1)

The first page of Q1 (Appendix 7) presented themes derived from the first stage of the multi-source synthesis. Panelists were invited to consider these in composing their responses to the questionnaire. The preliminary framework constructed in Chapter 2 was used as a 'straw model' to focus the efforts of the panel on the concept of EBHC competence. They were asked to read the preliminary framework, which is given here as a reminder:

Competency 1. The EBHC-competent GP reflects on instances in which risk and benefit were difficult to explain to a patient, and develops a concise, clear explanation for future use.

Competency 2. The EBHC-competent GP demonstrates an ability to identify decisions they found challenging, and to reflect upon their reasoning in terms of '4Es' - Evidence (availability, quality and applicability), Experience (their own accumulated on-the-job knowledge), Empathy (appropriate consideration of the patient's perspective, capacity and circumstances) and Environment (the influence of external factors such as time pressure or access to resources).

Competency 3. The EBHC-competent GP demonstrates a commitment to checking newly acquired knowledge from colleagues, media, pharmaceutical companies and other sources against the best available evidence, using secondary sources such as guidelines, evidence-based summaries and systematic reviews.

Competency 4. The EBHC-competent GP demonstrates a commitment to efficiently addressing clinical uncertainty, using secondary sources of evidence, and the best available information technology.

Competency 5. The EBHC-competent GP works with colleagues to share the tasks of identifying and prioritising clinical questions, finding, appraising and presenting evidence, and refreshing knowledge of EBHC concepts and resources.

Competency 6. The EBHC-competent GP demonstrates advocacy and leadership in identifying and addressing barriers to EBHC within their practice.

Panelists were then asked to rate each competency across three dimensions:

- *Importance*, regarding delivery of the best possible care;
- *Achievability* in the general practice setting; and
- *Demonstrability*, using existing appraisal tools.

The competencies were rated for each dimension on a 7-point Likert scale. The extremes of the scale were as follows:

- Importance: (1) not important at all; and (7) very important.
- Achievability: (1) completely unachievable; and (7) fully achievable.
- Demonstrability: (1) not demonstrable at all; and (7) fully demonstrable.

Intermediate points on the scale (2, 3, 4, 5, 6) were unlabelled. Panelists were also invited to add any further comments and to suggest any additional competencies that they felt should have been included.

4.4.5. First face-to-face meeting of the decision committee

After collation and analysis of the Q1 responses, I circulated two alternative draft versions of Questionnaire 2 (Q2) among members of the decision committee by email for feedback.

In preparation for our first face-to-face meeting, I circulated (1) a description of how the preliminary 'straw model' competency framework had been derived from the first stage of the multi-source synthesis; (2) background information on the conduct of the study up to that point; (3) feedback received on the draft versions of Q2; (4) the proportion of panelists scoring each competency positively (5 to 7) across the three domains of importance, achievability and demonstrability; and (5) the raw free-text comments. For the meeting itself, I also provided all the raw scoring data for reference. I facilitated the meeting, which was conducted in the Nuffield Department of Primary Care Health Sciences at the University of Oxford. It lasted two hours. I proposed a format for the meeting, starting by examining together a further draft version of the Round 2 questionnaire (Q2) I had prepared earlier as a starting point for discussion. We worked through each competency in turn, adjusting the draft after reference to the quantitative data and free text comments. The meeting was not recorded. However, I kept hand-written notes and summarised the committee's decisions for my own reference, and the revised Q2 was circulated among committee members the following day to check that the wording correctly reflected decisions made in the meeting. The design of the agreed Q2 was similar to Q1 in that the revised competencies were rated for importance, achievability and demonstrability, using the same Likert scale (Appendix 8). Additionally, however, panelists were asked to place the revised competencies into rank order for importance, achievability and demonstrability (from 1 = least- to 6 = most-). Panelists were invited once again to add comments and to suggest any additional competencies they felt should have been included.

4.4.6. Second face-to-face meeting of the decision committee

After collation and analysis of the Q2 responses, and in advance of the second face-to-face meeting of the decision committee, I circulated the following:

- A proposed revision for each competency as a starting-point for discussion.

- The mean overall score and standard deviation for each competency, in Round 1 and Round 2.

- Median Likert ratings, interquartile range, maximum and minimum for each competency, across each domain in Round 1 and Round 2.

- The sum of rankings in each domain, and for all domains combined, for each competency in Round 2, with Kendall's W coefficient of concordance. (Statistical analyses were conducted using IBM SPSS version 22).

- Free text comments from Round 2.

The meeting was attended by three of the four members. I recorded the meeting with the verbal consent of the other committee members. Again, I facilitated the meeting. Each revised competency was discussed in light of the Q2 scores and rankings. After discussion, a final version was agreed for each competency. After the meeting I confirmed the precise wordings of agreed competencies by referring to the recording.

4.4.7. Qualitative analysis

The competency framework was treated as textual qualitative data and coded together with the free-text comments from both rounds using thematic analysis. The 'one sheet of paper (OSOP) method proposed by Ziebland and MacPherson was employed. Data were coded on a single sheet of paper, and codes with similar meaning grouped under descriptive headings.[20] Practical limitations dictated that I was the only investigator available to code the data. The reliability of coding was tested by coding the data a second time after an interval of ten days. The next stage was more interpretive than descriptive.[21] For each descriptive heading, the question was asked: 'How do these data address the question: *'What is the meaning of EBHC in general practice*?' This exercise resulted in a series of statements such as '*Knowledge is generated among colleagues*.' These statements were themselves organised into a set of overarching themes. I checked the credibility of each theme against the quantitative findings as I had done previously in the qualitative-quantitative synthesis in Chapter 3.

4.5 Results

4.5.1. Composition of the expert panel and decision committee

The expert panel comprised five academic experts (all with experience in clinical practice, teaching in primary care or EBHC, and research related to EBHC), and five full-time general practitioners with at least ten years of experience in full-time clinical general practice, and holding a postgraduate qualification in general practice. Four of the five academic experts were currently in clinical practice. One had a research interest in complexity in general practice and patient-centred EBHC; one had research interest in risk communication and

shared decision-making; and two in epidemiology and EBHC learning. Equal numbers of academics and full-time GPs had a role in undergraduate education; three academics, and one full-time GP had a role in postgraduate education; and none of the full-time GPs had a research role (Table 4.1).

Table 4.1 Distribution of professional roles among the expert panel

Professional role	Academic GP experts	Full-time GP experts
Clinical practice	4	5
Undergraduate education	3	3
Postgraduate education	3	1
Research	5	0

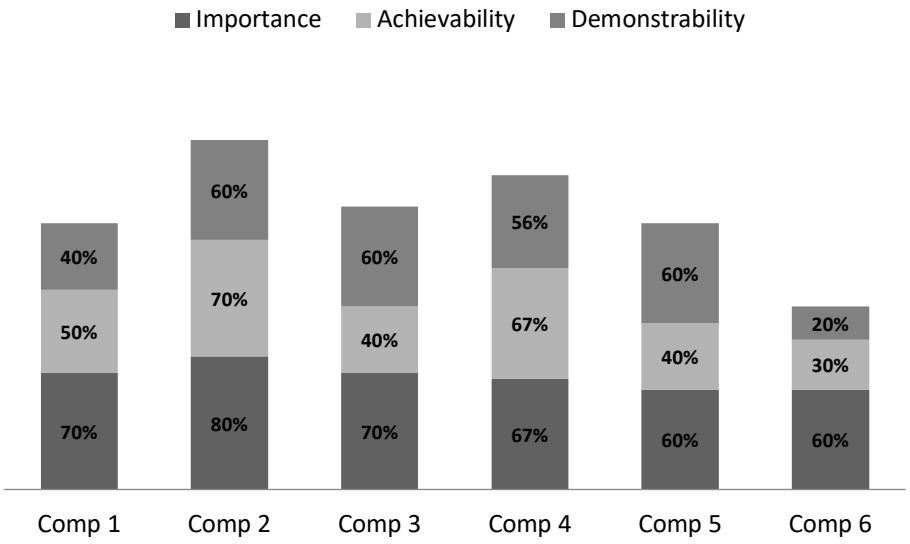
Apart from myself, the decision committee was completed by three members of the academic staff in the department, one of whom was also an academic GP on the expert panel. Three had experience of clinical general practice. The remaining member held a doctoral degree in general practice. All were experienced in undergraduate and postgraduate education. Apart from myself, the other members were experienced researchers.

4.5.1. Round 1 findings

In Round 1, all ten panelists responded. One panelist did not provide ratings for Competency 4, citing uncertainty about the number and type of elements included, and an

impression that the competency made an implicit assumption about the 'right' source of evidence. Summing the proportion of respondents rating competencies positively (5-7) across each domain (Figure 4.2), most favoured were competencies 2 and 4; competencies 1, 3 and 5 received similar ratings, and the least favoured was competency 6. The free-text comments are summarised below. Appendix 9 shows the complete set of comments.

Figure 4.2 Proportion of respondents in Round 1 who scored competencies positively (5-7) across three domains: importance, achievability and demonstrability.



Competency 1. One panelist appeared to interpret the competency as an ability to identify the evidence for risk and benefit, rather than an ability to communicate such an abstract concept effectively. This panelist thought GPs should be able to challenge specialist opinions about risk and benefit for common scenarios, but not for more specialised areas of practice. Others interpreted the competency as an ability to construct a 'one-size-fits-

all' explanation of risk and benefit. They pointed out that individual patients require individually tailored communication. One panelist thought the competency would be better developed as a collective activity among GPs, generating shared frameworks rather than rigid explanations. Opinions varied regarding achievability, with time constraint a significant limitation. Opinions also differed regarding demonstrability, with one suggestion that the competency could be demonstrated in case study reflections using existing appraisal tools.

Competency 2. One panelist felt the competency failed to capture the decision-making process, and offered alternative wording: *'The EBHC-competent GP demonstrates a commitment to reflecting on decisions that transpired to be suboptimal, assessing the contribution of non-evidence-based assumptions, tacit experience, consideration of the patient's situation and perspective, and the work environment.'* Another panelist offered an alternative model for reflection on decisions, namely 'interpretive practice' in which the GP reflects on the use of multiple sources of knowledge in constructing individually tailored decisions.[22] The panelist did acknowledge that the '4E' model appeared more user-friendly, but was unsure whether it captured everything, or supported critical reflection on the process of knowledge generation. Other comments included support for the demonstrability of the competency and a query as to whether there is too much focus on reflective learning.

Competency 3. Comments reflected doubts about achievability, particularly given time constraint, though one panelist suggested that familiarity with a database such as TRIP[23]

would facilitate rapid acquisition of secondary evidence. Only 40% of panelists rated this competency positively (5 to 7) for achievability. One panelist remarked that the competency reflected a traditional view of EBHC in which scientific evidence trumps other forms and sources of knowledge and that a broader view is required.

Competency 4. Comments questioned the appropriateness of the sources of evidence suggested in the competency. One panelist deemed research evidence unfit for purpose, and another noted an implicit assumption that secondary sources trump other sources of knowledge. One panelist did not provide ratings for this competency, citing uncertainty about the number and type of elements included, and an implicit assumption about the 'right' source of evidence. One panelist suggested protected time would be required to develop this competency, and another suggested the National Institute for Health and Care Excellence (NICE) Clinical Knowledge Summaries[24] as a suitable database for seeking evidence.

Competency 5. Most comments focused on achievability. Possible limitations included time constraint, adverse change culture, relationship dynamics and work patterns within practices, and a trade-off regarding reduced patient contact time. Other comments, however, suggested that journal clubs represent an achievable forum and that a competent GP will make time available. One panelist identified an implicit 'traditional' view of EBHC. The panelist felt guidelines fulfil the functions described in the competency, and drew attention to the work of John Gabbay. Gabbay and colleagues found that GPs rarely searched for, appraised and applied evidence directly from research.[25] Instead, they relied

upon what the researchers termed ‘mindlines.' These were internalised tacit practice guidelines, derived from knowledge drawn from their reading, training and practical experience, and from social interaction among other players in the healthcare setting. These ‘mindlines' were reinforced socially among the various protagonists. The panelist opined that working with colleagues is about building such ‘*beyond guideline/protocol/scientific evidence knowledge*.'

Competency 6. Two panelists challenged the very notion of EBHC. One maintained that EBHC focuses on identifying and appraising evidence rather than application to patients. Gabbay's work (see Competency 5) was cited as evidence that GPs use ‘mindlines' rather than guidelines. The panelist felt that this should be taken into account and that a return to person-centred care (from a ‘command-and-control' model) will require leadership and advocacy to promote ‘beyond protocol/technical care.' The other panelist challenged the premise that EBHC functions at all, citing a methodologically inadequate evidence-base, which is contradictory, subject to inappropriate aggregation and interpreted to fit whatever outcome is desired. One other panelist, however, expressed a contrasting view that EBHC is currently the subject of negative pre-conceived ideas. Other comments reflected concerns about achievability, including that the particular change culture and relationship dynamics within a practice might constitute barriers.

General comments. One panelist raised the issue of how EBHC should be defined. They proposed contrasting versions: a traditional, technical, guideline-driven approach; and one in which the GP integrates and interprets multiple sources of knowledge towards finding

an individualised plan of action, tailored to the patient's unique experience of illness. This latter version is essentially a description of 'interpretive medicine,' an approach to health care advanced and published by the panelist.[22] The issue was also raised that GPs have differing roles, and might use evidence differently. A further question was posed, of whether a set of core, shared competencies should be expected, or whether individual GPs could show strength in different areas. Another panelist maintained that GPs are reluctant to resist the wishes of their patients, or to challenge the opinion or advice of specialists, regardless of the evidence (or lack of it) in support of a particular treatment. A view was also expressed that 'over-analysis' interferes with the task of tending to patients. A further comment was made about the need for competence to be sustained over time, and that a strategy would have to be demonstrated in the appraisal, to ensure sustained competence.

4.5.2. Refinement of Q1 competencies by the decision committee

The committee discussed each competency in turn, in light of the findings from Round 1. The anonymity of expert panelists' free-text comments was upheld throughout discussion. This was important as my own comments were among them and I did not wish to introduce bias from undue attention to my comments. The committee agreed that opening each competency with the phrase '*The EBHC-competent GP…*' might invoke feelings among GPs of 'top-down' control by advocates of EBHC. Furthermore, it was felt that EBHC competence is a facet of general competence as a GP. The phrase was therefore changed to '*A competent GP…*' It was agreed that Q2 would appear too cumbersome if Q1 and the revised competencies were both presented for comparison, and therefore only the revised competencies would be presented. The committee concurred that expert panelists would

be asked in Q2 to score each revised competency for importance, achievability and demonstrability (as in Round 1), but that it might yield useful information about the relative merits of competencies if panelists were also asked to place them in rank order.

Competency 1. The committee discussed a lack of clarity in the Q1 version of competency 1, leading to confusion about whether it referred to the communication skill needed to describe risk and benefit to a patient (the intended meaning), or to competency in identifying evidence for risk and benefit. It was also noted that the Q1 version had been interpreted as a call for a 'one-size-fits-all' explanation of risk and benefit. It was agreed that the revised version should specify that steps taken to develop skill in communication of risk and benefit should be based on the best available evidence. The agreed revision was: '*A competent GP reflects on instances in which risk and benefit were difficult to explain to a patient, identifies any limitations in their communication skills in this context, and takes clearly defined steps to develop these skills, using the best available clinical evidence*.'

Competency 2. Discussion centred on whether the '4E' framework for reflection (Evidence, Experience, Empathy and Environment) covered the multiple sources of knowledge upon which GPs draw, and whether the competency accounted for the possibility that apparently 'easy' decisions might on occasions be the ones that merit more reflection. The agreed revision was: *'A competent GP demonstrates an ability to reflect on their decisions and reasoning, in terms of evidence, experience, empathy and environment.'*

Competency 3. The committee discussed the achievability of this competency (the scores for which were relatively low). However, it was also agreed that it is important that a GP manages their time, so they are able to consider the evidence underpinning newly-acquired information. The agreed revision was: '*A competent GP values an evidence-based approach and can demonstrate that they have structured their work to allow time for the evaluation of newly-acquired information.'*

Competency 4. The committee agreed that specifying 'summaries and synopses' as appropriate sources of evidence was too restrictive. The agreed revision was: *'A competent GP demonstrates an ability to identify high quality evidence to address gaps in clinical knowledge.'*

Competency 5. Discussion centred on the achievability of this competency. It was concluded that a collective approach to EBHC among colleagues was feasible and had been demonstrated (in the experience of committee members) by numerous examples of successfully run journal clubs. The agreed revision was: *'A competent GP shares gaps in clinical knowledge with colleagues and uses evidence-based tools to collectively improve practice.'*

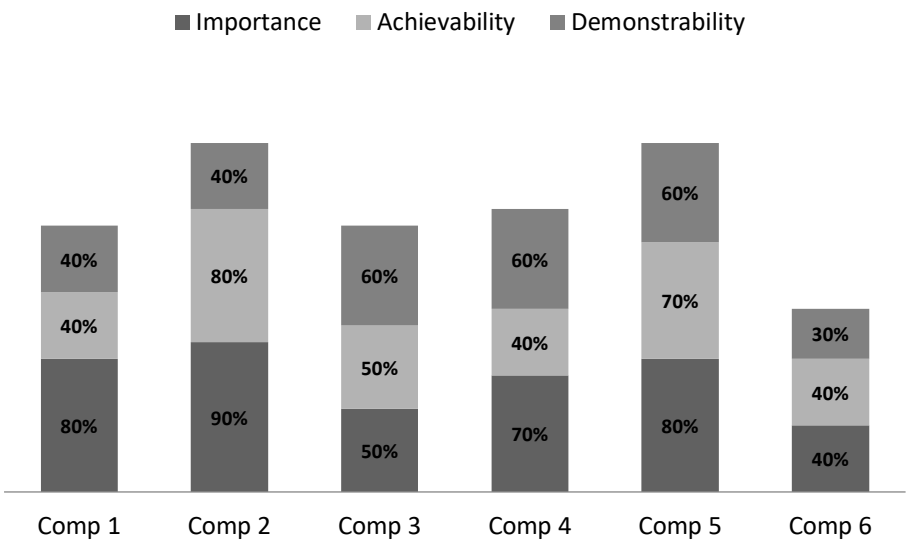
Competency 6. The committee discussed the relatively poor scores for achievability and demonstrability, and panelists' free-text comments about logistic and cultural barriers to advocacy and leadership for EBHC within practices. However, it was agreed that there should be such a role for GPs, and the competency was left unchanged apart from removal

of the phrase '*The EBHC competent GP…*' The agreed revision was: '*A competent GP demonstrates advocacy and leadership identifying and addressing barriers to EBHC within their practice.*'

4.5.3. Round 2 findings

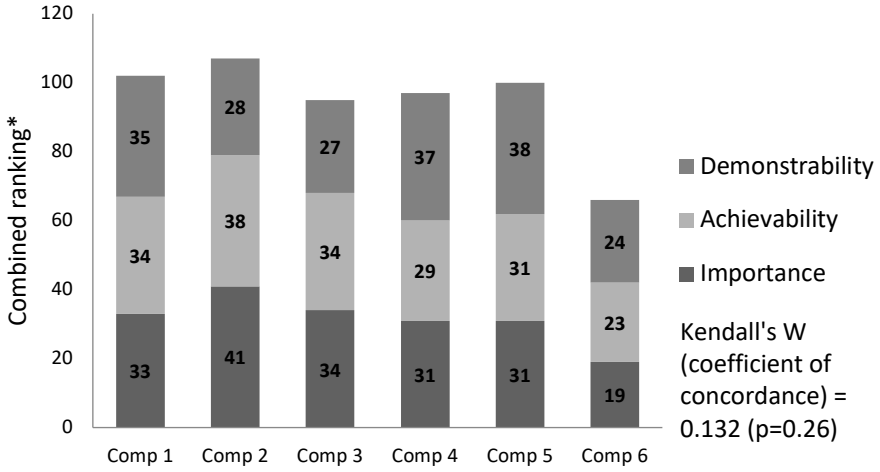
In this round, a complete set of ratings was obtained. Summing the proportion of respondents rating competencies positive (5-7) across each domain (Figure 4.3), competencies 2 and 5 were most favoured (whereas the most favoured in Round 1 were competencies 2 and 4), and competencies 1, 3 and 4 achieved similar ratings. Competency 4 was less favoured than in Round 1, and competency 6 was again the least favoured.

Figure 4.3 Proportion of respondents in Round 2 who scored competencies positively (5-7) across three domains: importance, achievability and demonstrability.



Combined rankings for each competency, for importance, achievability and demonstrability, are shown in Figure 4.4. Rankings were available for nine panelists. Low rankings were allocated across all domains for competency 6. A Kendall's W statistic of 0.132 indicated little concordance of rankings between panelists, beyond that which would be expected by random chance. Free-text comments are summarised below. Appendix 10 shows the complete set of comments.

Figure 4.4. Combined rankings for each competency, across 3 domains (importance, achievability and demonstrability) for 9 respondent panelists.



*Rankings between 1 (least) and 6 (most) were expressed as integers and summed across all 9 respondent panelists

Competency 1. A question was posed by one panelist: '*does the definition of 'best available evidence' extend beyond clinical knowledge and epidemiology?*' One other panelist felt the competency characterised real-world pragmatism because it demanded only *progress*

towards improved risk communication, rather than an ideal absolute level of competence. Two panelists commented that individual patients differ regarding their needs and responses concerning risk communication. One panelist drew attention to the little time GPs can afford to spend on reflection.

Competency 2. One panelist commented that reflection is often assumed to occur after clinical encounters, whereas GPs should be using all sources of knowledge in real time. This panelist also felt that GPs tend to reflect less when there are external stresses, or when there is a clear path of action. Another panelist felt that the competency was fundamental to medical practice in all contexts, but noted that there is little time for reflection. Two expressed opinions that the current appraisal tools are not suited to demonstration of this competency.

Competency 3. One panelist posed the questions: '*How does evaluation (of newly acquired information) differ from the task of keeping up-to-date?*'; and '*Do we evaluate quality of knowledge or utility for the individual patient?*' Another comment was that work is structured around patients, rather than around the demonstration of intellectualisation. Further comments centred on time constraint and whether current appraisal tools support demonstration of the competency.

Competency 4. One panelist commented that the definition of 'high quality' should be broad and that there is little time available to seek evidence. Another panelist felt that finding secondary evidence (evidence already critically appraised by an expert) should be

prioritised over finding and appraising primary evidence (original studies, not yet critically appraised). One other panelist commented that the only feasible source of evidence is 'review style pieces on major topics.'

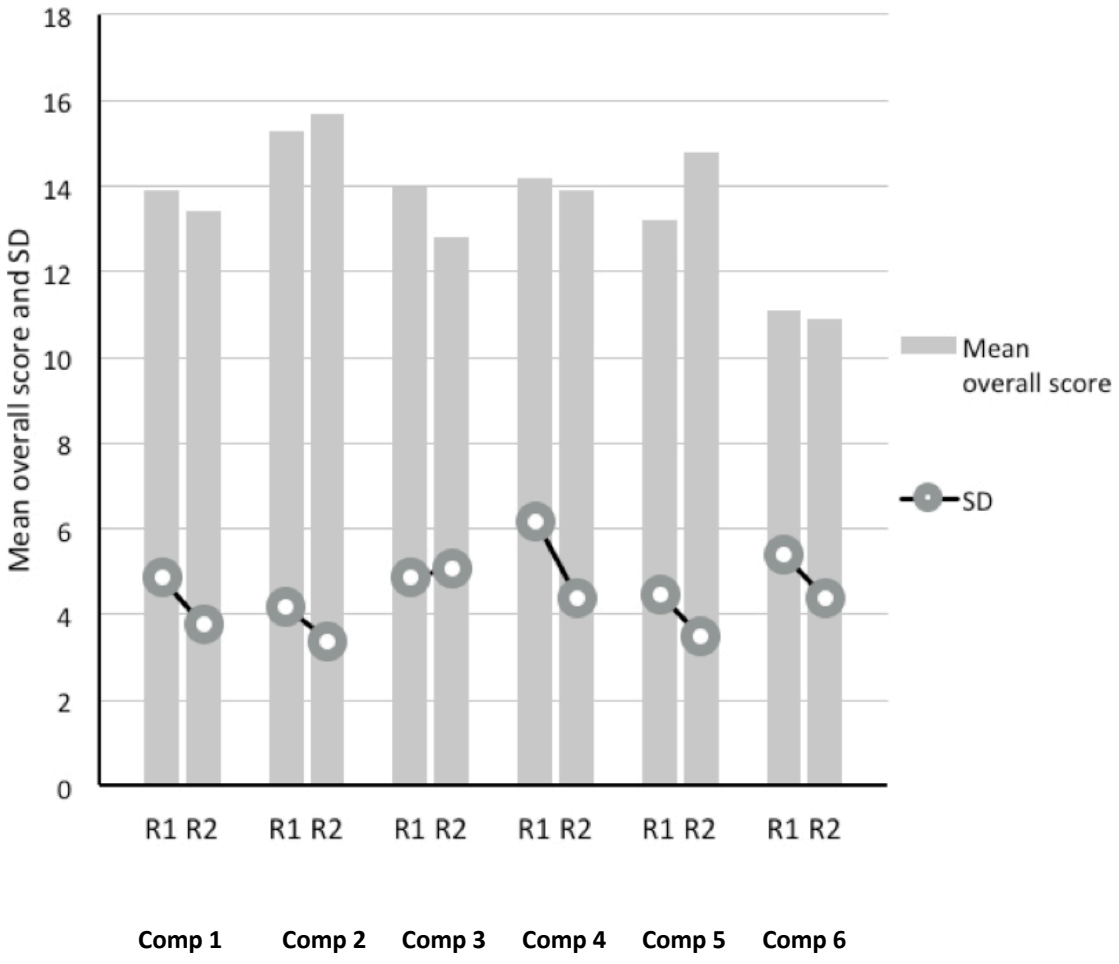
Competency 5. One panelist questioned the nature of 'evidence-based tools' and posed the question of whether collective professional discussion could be considered 'evidence-based.' This panelist also raised doubt over demonstrability. One panelist agreed that sharing information with colleagues should be encouraged, though another pointed out that gaining the cooperation of others might be difficult.

Competency 6. One panelist posed the question: '*Is advocacy a collective effort?*' Another stated that EBHC is a personal responsibility and that it's hard to impose one's own standard on colleagues. One panelist felt that promoting EBHC within the practice is not often afforded priority given other competing demands.

4.5.3. Comparison of ratings for Round 1 and Round 2

Calculation of mean overall scores for each competency provided a comparison of the utility of each competency over the two rounds. Comparison of standard deviations gave an indication of whether consensus was emerging over the two rounds (Figure 4.5). Mean overall scores (across all domains combined) were similar for each competency in Rounds 1 and 2. In each round, competency 1 was most favoured, and competency 6 the least. The spread of scores (expressed as standard deviation) decreased from Round 1 to Round 2 for all but one competency (competency 3), suggesting a degree of movement towards

Figure 4.5 Mean overall score* and standard deviation (SD) for each competency, in Round 1 (R1) and Round 2 (R2)



* To calculate the mean overall score for each competency, the ratings from each panelist for importance, achievability and demonstrability were added together and the total expressed as an integer. These totals were summed for all panelists and divided by the number of panelists.

consensus. Box plots allowed comparison of performance of between Round 1 and Round 2 (Figures 4.6 to 4.11). For Competency 1, median ratings, and the spread of ratings (indicated by the interquartile range) reduced for all domains in Round 2. For competency 2, median ratings for importance and achievability both increased in Round 2; the median

Figure 4.6 Median rating, interquartile range, maximum and minimum for each domain in Round 1 and Round 2: Competency 1

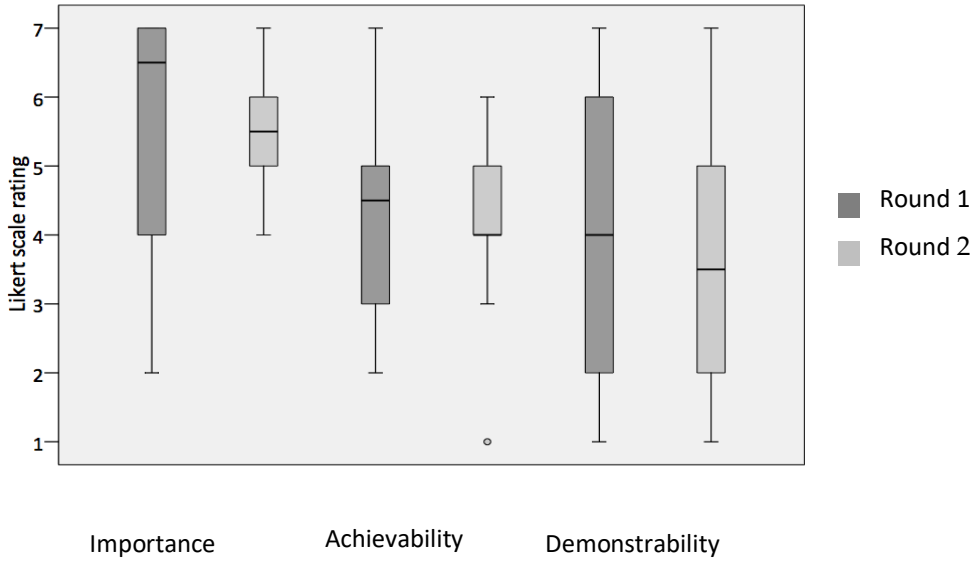


Figure 4.7 Median rating, interquartile range, maximum and minimum for each domain in Round 1 and Round 2: Competency 2

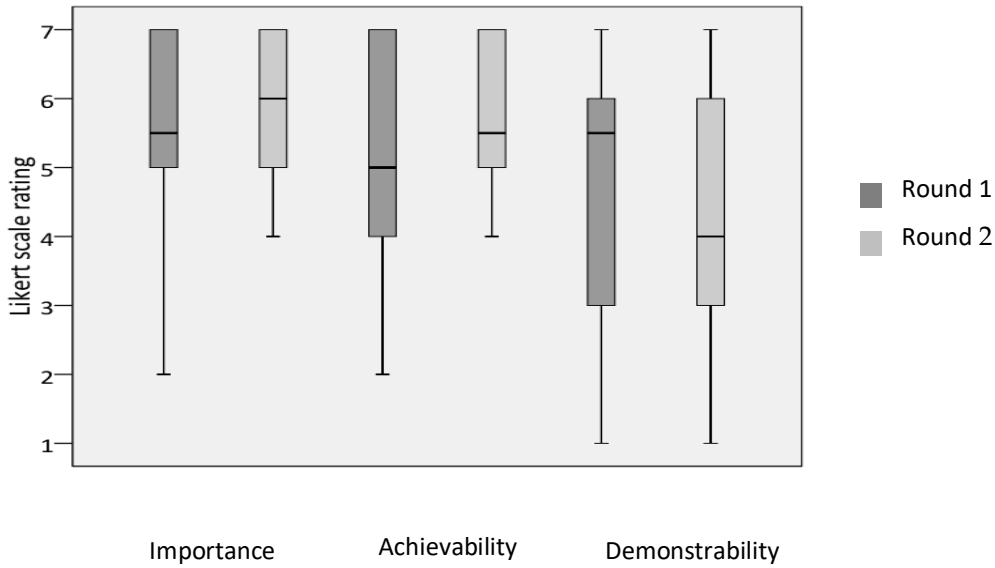


Figure 4.8 Median rating, interquartile range, maximum and minimum for each domain in Round 1 and Round 2: Competency 3

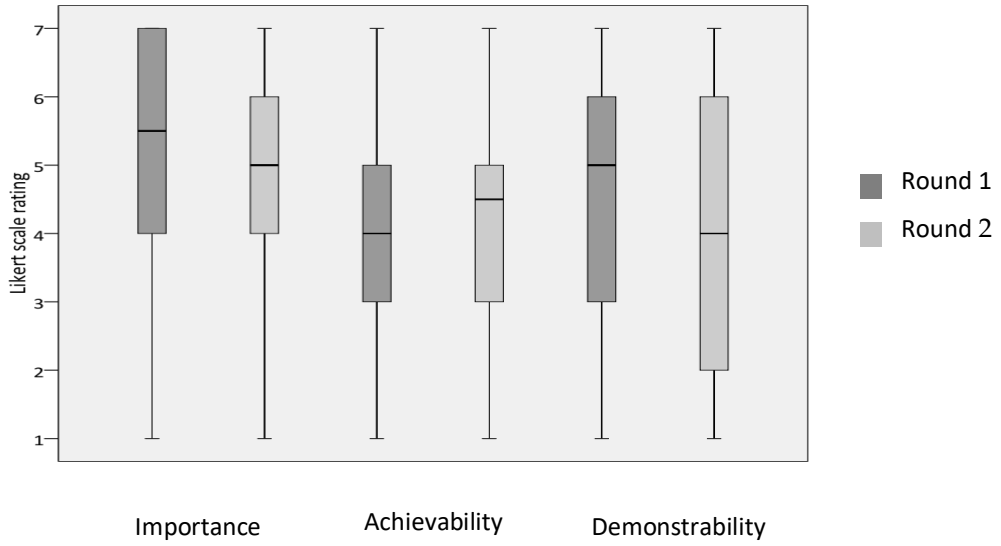


Figure 4.9 Median rating, interquartile range, maximum and minimum for each domain in Round 1 and Round 2: Competency 4

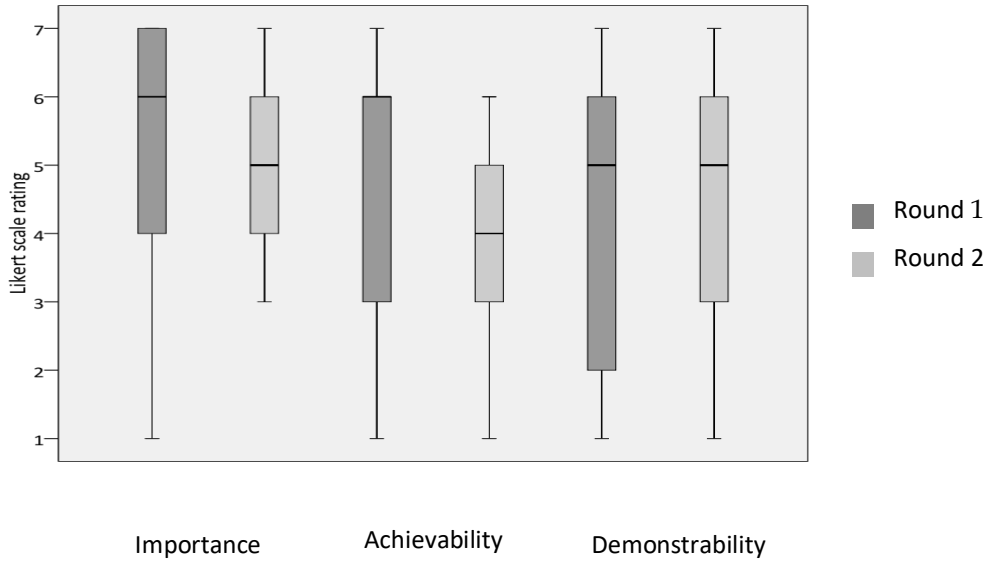


Figure 4.10 Median rating, interquartile range, maximum and minimum for each domain in Round 1 and Round 2: Competency 5

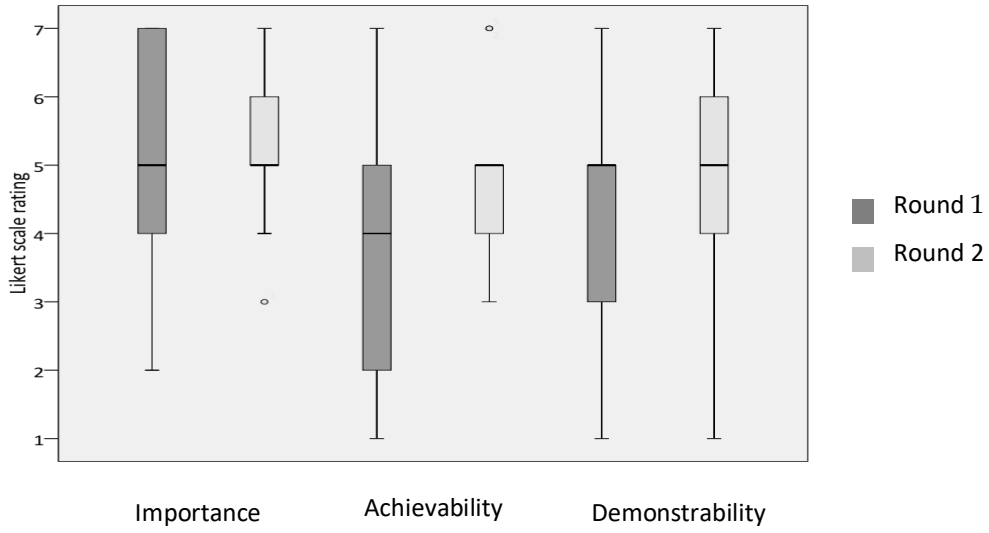
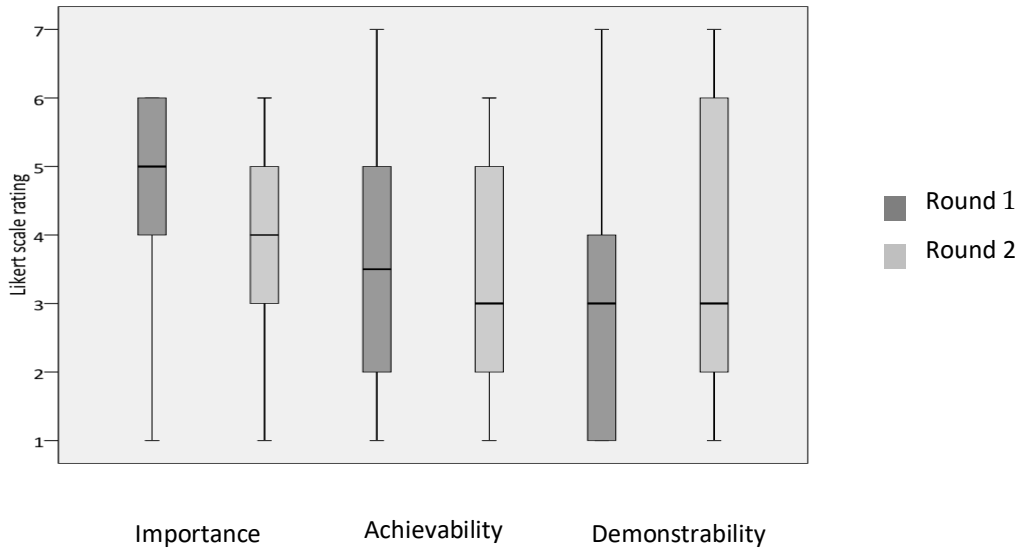


Figure 4.11 Median rating, interquartile range, maximum and minimum for each domain in Round 1 and Round 2: Competency 6



rating for demonstrability declined. Competency 3 was rated lower in Round 2 for importance and demonstrability, and competency 4 was rated lower in Round 2 for importance and achievability. The median ratings for competency 5 increased in Round 2 for achievability and demonstrability, and competency 6 showed a decrease in median ratings for importance and achievability.

4.5.4. Refinement of Q2 competencies by the decision committee

The wording of each competency was refined once again by the decision committee, after discussion of the findings from both rounds. As in the previous meeting, the anonymity of expert panelists' free-text comments was upheld throughout discussion to avoid potential bias. Two general suggestions were made by the decision committee. It was proposed that a glossary would be useful to explain to users the meaning of terms such as 'best available evidence.' The committee agreed that illustrative clinical vignettes for each competency would help users understand their meaning and enhance their demonstrability.

Competency 1. The committee agreed that a revised version of Competency 1 was suitably brief and demonstrable, allowing sufficient flexibility. The agreed version was: '*A competent GP takes steps to optimise communication of risk and benefit with individual patients, using the best available evidence communication tools and decision aids.'*

Competency 2. The committee agreed that the Q2 version of this competency was better than the proposed revision. As the competency was the most favoured by the expert panel in both rounds, the Q2 version was retained, unaltered: '*A competent GP demonstrates an*

ability to reflect on their decisions and reasoning, in terms of evidence, experience, empathy and environment.'

Competency 3. The committee discussed the lower scores for demonstrability in Round 2, and concern about demonstrability expressed in free-text comments. A proposed introduction of the phrase '*able to demonstrate steps taken…*' was approved as it would permit movement *towards* demonstration rather than full demonstration of the competency. A proposed specification that only 'important' new information need be evaluated was rejected after agreement that all new information should be evaluated to some degree. The agreed version was: *'A competent GP is able to demonstrate steps taken to structure their work such that they have some time to evaluate new information using an evidence-based approach.'*

Competency 4. The committee discussed the lower scores for achievability in Round 2 and concluded that this might have been because the expert panelists did not realise that there are many ways of identifying high quality evidence. These would include not only systematic reviews and synopses of evidence, but also GP update courses. It was agreed to retain the Q2 version: *'A competent GP demonstrates an ability to identify high quality evidence to address gaps in knowledge'* and to illustrate what is meant by 'high quality evidence' by providing an accompanying vignette.

Competency 5. Confusion was noted among the expert panel about the meaning of 'evidence-based tools.' The committee also noted that this phrase made Competency 5 similar to Competency 4. It was removed from the agreed revision: '*A competent GP shares gaps in clinical knowledge with colleagues and uses evidence to collectively improve practice.'*

Competency 6. It was noted that importance and achievability reduced from Round 1 to Round 2. A discussion took place about whether that might have been because the wording of the competency sounded evangelical about EBHC. A proposed revision focused on identifying organisational barriers to EBHC within a practice. It was agreed, however, that it was important to allow demonstration of the competency at both an individual and organisational level. The agreed revision was: '*A competent GP identifies and addresses barriers to EBHC within their practice.'*

4.5.5. Emergent themes from qualitative analysis

Coding carried out on two occasions yielded the same result. Seven themes emerged from the analysis of qualitative data:

1. Decisions are influenced by information drawn from a complex array of sources.

2. There are social, cognitive, informational and organisational barriers to the notion of ideal Evidence-Based Health care.

3. Evidence-Based Health care involves tailoring decisions to the needs and perspective of the individual patient.

4. A sense of pragmatism must underpin the approach to seeking and critically appraising evidence, and to the development of competence in EBHC, given the constraints implicit in general practice.

5. Evidence-Based Health care requires commitment.

6. Reflection is a continuous background process and should be objective, and recognise the GP's own needs.

7. Evidence-Based Health care is hard to demonstrate using currently available appraisal tools.

None of the quantitative findings contradicted the themes that emerged from qualitative analysis. In some cases, their credibility was strengthened by the quantitative findings. Such instances are discussed in the following section.

4.6 Discussion

A consensus emerged that competency 2 was favourable regarding importance and achievability; findings were inconclusive, however, regarding demonstrability in an appraisal. Competency 6 was of questionable importance but considered neither

achievable nor demonstrable in an appraisal. It was left unchanged by the decision committee after Round 1, but the expert panel consolidated their criticism in Round 2. Findings for the remaining competencies were inconclusive, having consolidated equivocal ratings over the two rounds across all domains.

One of the strongest themes to emerge was that *EBHC involves tailoring decisions to the needs and perspective of the individual patient.* Further credibility was given to the theme by the strong performance of Competency 2, which requires an empathic integration of the individual patient's perspective with other factors in decision-making.

Another strong theme was that *there are social, cognitive, informational and organisational barriers to EBHC.* It is hard to impose one's own standards on colleagues, and competing demands can mean no priority is given to the promotion of EBHC within the practice. The credibility of this theme was supported by the poor performance of Competency 6, which required advocacy and leadership among colleagues in identifying and addressing barriers to EBHC within the practice.

A further theme to emerge was one of pragmatism: *a sense of pragmatism must underpin the approach to seeking and critically appraising evidence, and to the development of competence in EBHC, given the constraints implicit in general practice.* It was notable that competency 4, which spoke clearly in Round 1 to the theme of pragmatism in the use of secondary (pre-appraised) evidence, received the second highest rating in that round, but declined in ratings (particularly for achievability) in Round 2 when it no longer specified use

of secondary evidence. In contrast to this pragmatism, however, there is still a place for effortful discipline, expressed in the theme that *EBHC requires commitment*.

The cognitive processes of decision-making were central to two emerging themes:

- *Decisions are influenced by information drawn from a complex array of sources.*

- *Reflection is a continuous background process and should be objective, and recognise the GP's own needs.*

The first of these two themes challenges the traditional EBHC notion of knowledge. Traditionally, knowledge is defined in EBHC as the best evidence from patient-centred biomedical and epidemiological research.[26] This theme broadened the sources of knowledge for decision-making. Implicit in the theme is the published work of one of the panelists, who has proposed an alternative framework for decision-making in generalist care called 'interpretive medicine.'[27] This is defined as '*the critical, thoughtful, professional use of an appropriate range of knowledge in the dynamic, shared exploration and interpretation of individual illness experience, in order to support the creative capacity of individuals in maintaining their daily lives.*'[27] This version of knowledge embraces co-construction from the illness narratives of all parties involved in a consultation. The breadth of knowledge sources also reflects the work of Gabbay, who proposed that GPs base their decisions on 'mindlines' - internalised tacit practice guidelines, derived from knowledge drawn from their own reading, training and practical experience, and from social

interaction among practice colleagues, specialists, pharmaceutical company representatives and patients.[25]

The second of these two themes embodied three interpretations of reflection: (1) reflection as a continuous background process; (2) reflection as objective; and (3) reflection as an activity that recognises the GP's own needs. Each of these interpretations can be found in other definitions of reflection. Continuity and objectivity are both implicit in Dewey's definition of reflection as '***active, persistent*** *and* ***careful consideration*** *of any belief or supposed form of knowledge* ***in the light of the grounds that support it*** *and the further conclusion to which it tends.*'[28] Objectivity is also inherent in Mezirow's definition of reflection: *'a deliberate act: to* ***develop a critique of the presuppositions*** upon which our beliefs have been built').[29] The third concept embraced by the theme is that reflection should recognise the GP's own needs. This is not a particular focus of either Dewey or Mezirow. Nor is it particularly highlighted by Schön's work on reflective practice, which I discussed in Chapter 2 in light of its strong influence in medical education.[30] This aspect of the theme is closer to Boud's interpretation of reflection, which addresses the role of personal experience and emotion: '*…learners need to describe their experience, to work through the attitudes and emotions which might colour their understanding, and to order and make sense of new ideas and information which they have retained.'*

There is one specific form of reflection, however, that has played a prominent role in medical education in recent years,[31] and which embraces all three components of the theme (continuity, objectivity and attendance to the needs of the practitioner): the

practice that is called 'mindfulness.' Mindfulness has been defined as '*the process of developing an open and unbroken awareness of present-moment cognitive-effective and sensory experience*.'[32] Continuity is evident in Epstein's description of how mindful practitioners '*engage in moment-to-moment self-monitoring*.'[33] Objectivity is implicit in Kabat Zinn's description of the non-judgmental quality of mindfulness, and of the concept of 'beginner's mind,' which describes a receptivity to one's own experiences without recourse to premature conclusions.[34] Attendance to the needs of the practitioner is also central to mindfulness. The purpose of mindfulness is to become more aware of one's own mental processes, including one's emotional state.[33] Indeed, it is thought that mindfulness can improve self-awareness, thereby making practitioners more attentive to stress, enabling them to understand their relationship with its origins, and more able to reduce its effects.[35]

Remaining themes describe a degree of *commitment as a requirement for Evidence-Based Health care*, and *difficulty demonstrating competency using currently available appraisal tools*. The combination of these two themes would appear to provide a disincentive to EBHC – why make an effort if it is unlikely to be recognised?

What emerges overall, is a version of EBHC which shares the focus on the individual patient that is implicit in traditional definitions,[36] but which is more explicitly pragmatic, acknowledging real-world limitations. It recognises a wider array of influences in the decision-making process and is underpinned by a more continuous and objective reflective process, that addresses the GP's own needs.

4.6.1. Limitations

Because of the limited availability of experts for what was a time-consuming process, the size of the expert panel was at the lower end of that which is reported as acceptable.[3] A small panel could result in under- or over-representation of certain types of expertise. However, a thorough and purposive approach was taken to finding suitable candidates, based on criteria determined in advance. These criteria were themselves based on suitable experience in general practice, and one or other of either academic experience in EBHC, or full-time work as a GP. Among the academic GPs, panelists were purposively invited on the basis of their published research interests, deliberately aligned with the themes emerging from the first stage of the multi-source synthesis.

It might also be argued that a further potential limitation arises from my self-recruitment to the expert panel. I might have allowed my own assumptions, some not based on any evidence, to influence the findings,[12] and my background as a GP and teacher of EBHC could have prevented me from maintaining an objective distance from the research and participants.[12] However, the same could be said of any panelist. Like them, my inclusion was justified on the basis of my particular expertise. My familiarity with the language and culture of both general practice and EBHC allowed me to understand the context underpinning panelists' comments, and my thorough immersion in the data allowed me to offer the panel opinions that were grounded in evidence derived from the literature. For example, commenting on the explanation to patients of the risk and benefit of health interventions, I offered the following opinion based on the work of Ford and colleagues:[37]

'*I would regard this as the bedrock of EBHC. Consideration of risk and benefit may not be the principal factor in many decisions, but the GP should be able nevertheless, to communicate this fundamentally important information if appropriate during a consultation*.'

As discussed with departmental experts in the design stage of the study, an advantage of the Delphi method is that anonymity of responses confers protection against undue influence from any individual.[6] I ensured that the wording of my comments did not break that anonymity. It is unlikely therefore, that my own opinions exerted any *dominant* effect in the group communication between panelists. There was arguably a greater opportunity for undue influence to arise from my inclusion in the monitor team (here renamed 'decision committee') as it was not conducted anonymously. However, it is normal practice for the facilitator to be part of the monitor team and anonymity is not a feature.[5-7,9] Critical reflection on my involvement invokes once again the epistemological debate between quantitative and qualitative research paradigms, which I discussed in Chapter 2. In quantitative research, the approach to acquiring new knowledge demands that the researcher remains objectively separated from the subject matter.[38] In contrast, qualitative researchers embrace direct involvement in the research,[11] and it is accepted that qualitative research is usually influenced by the feelings, experiences and perspectives of the researcher.[12] As Holloway claimed among her 'commitments' implicit in qualitative research, the standardised procedures employed in quantitative research for reducing bias and ensuring reproducibility do not apply. Rather, the qualitative researcher must continually reflect critically and transparently on the decisions made as they proceed. I did

indeed reflect critically upon my interpretation of the discussions of the monitor team, checking back with the other members that I had correctly represented their opinions. In the analysis of data too, I reflected continuously and critically on whether I was accurately and inclusively representing the opinions of the other panelists. This can be judged by the reader. I have provided access to all the data in Appendices 9 and 10. Like any researcher engaged in qualitative work, I rest my assertion of credibility on the exercise of those values of reflexivity and transparency.

A further limitation was that there was little concordance of rankings between panelists, beyond that which would be expected by random chance, as indicated by a Kendall's W statistic of 0.132. Some reassurance can be taken however, from the reduction of variance for mean overall ratings between Round 1 and 2, for five out of six competencies, which suggests a degree of consensus.

Data were coded by a single investigator, and this might reduce the reliability of coding. Guest and colleagues describe this as a common problem faced by many researchers working alone.[39] They recommend that the researcher reviews some, or all of their coding some time after the first round of coding, as taking time away from the task allows a fresh perspective, which can mitigate the distorting effects that can result from immersion in the data. I followed this advice and found that the coding did not change over time. This consistency of coding was not surprising, given that the qualitative data were mainly arranged around very specific, well-defined competencies.

In view of the limitations I have described, the findings of this Delphi process on their own must be viewed with caution. The final competency framework to which they contribute will, however, be subjected to a validation step (Chapter 6).

The investigation also has strength, arising from full engagement without attrition, by a panel representing a wealth of expertise. Also, the anonymity implicit in the Delphi process ensured that no expert voice was dominant, and all panelists would have felt unfettered in their responses. Indeed, an abundance of valuable qualitative data were generated from what were often extremely frank free-text comments. Referring once again to the advice I received in my Transfer of Status viva (see section 4.2), the expert opinion gleaned in this study certainly provided an expert 'map' with which to explore the 'jungle' of competency development.

4.7 Conclusions

This Delphi process generated a set of seven themes representing a consensus on the meaning of EBP competence among general practitioners. They share with traditional definitions[36] a focus on the individual patient, but have shifted towards a more pragmatic use of secondary sources of evidence, and a more continuous reflective process, deriving objectivity from awareness of the GP's own needs. They also recognise a wider array of influences in the decision-making process. This shift of emphasis may offer greater achievability in real-world practice. Less progress has been made regarding demonstrability using current appraisal tools. This will be a focus, however, of the later stages of the project.

In the next stage of the thesis, the seven themes will be synthesised with those derived from the qualitative-quantitative synthesis (Stage 1 of the multi-source synthesis) towards a final competency framework.

4.8 Summary

The conclusions of this chapter can be summarised as follows:

- A Delphi process generated seven consensus themes describing the meaning of EBHC competence among general practitioners.

- The themes represent a more pragmatic version of EBHC competence that explicitly supports use of secondary sources of evidence, regards reflection as a more continuous, sympathetic and objective process, and recognises a wider array of influences in the decision-making process.

- In the next stage of the thesis, the themes will be synthesised with those derived from the first stage of the multi-source synthesis, towards a final competency framework.

4.9 References

1. Galbraith K, Ward A, Heneghan C. A real-world approach to Evidence-Based Medicine in general practice: a competency framework derived from a systematic review and Delphi process. *BMC medical education.* 2017;17(1):78.
2. Adler A, Ziglio E, eds. *Gazing into the oracle: the Delphi Method and its application to social policy and public health.* London: Jessica Kingsley Publishers Ltd; 1998.

3. Keeney S, Hasson F, McKenna H. *The Delphi technique in nursing and health research.* Chichester, UK: Wiley - Blackwell; 2011.
4. Haynes RB, Sackett DL, Gray JM, Cook DJ, Guyatt GH. Transferring evidence from research into practice: 1. The role of clinical care research evidence in clinical decisions. *ACP J Club.* 1996;125(3):A14-16.
5. Linstone HA, Turoff M. *The delphi method.* Addison-Wesley Reading, MA; 1975.
6. Rowe G, Wright G, Bolger F. Delphi: a reevaluation of research and theory. *Technological forecasting and social change.* 1991;39(3):235-251.
7. Webler T, Levine D, Rakel H, Renn O. A novel approach to reducing uncertainty: the group Delphi. *Technological forecasting and social change.* 1991;39:253-263.
8. Hasson F, Keeney S, McKenna H. Research guidelines for the Delphi survey technique. *J Adv Nurs.* 2000;32(4):1008-1015.
9. Pluddemann A, Heneghan C, Thompson M, et al. Prioritisation criteria for the selection of new diagnostic technologies for evaluation. *BMC Health Serv Res.* 2010;10:109.
10. Patton MQ. Qualitative evaluation and research methods . Thousands Oaks. CA: Sage Publication; 2002.
11. Golafshani N. Understanding reliability and validity in qualitative research. *The qualitative report.* 2003;8(4):597-606.
12. Holloway I, Biley FC. Being a qualitative researcher. *Qualitative health research.* 2011;21(7):968-975.
13. Trevena LJ, Irwig L, Isaacs A, Barratt A. GPs want tailored, user friendly evidence summaries--a cross sectional study in New South Wales. *Australian Family Physician.* 2007;36(12):1065-1069.
14. Barghouti F, Halaseh L, Said T, Mousa AH, Dabdoub A. Evidence-based medicine among Jordanian family physicians: awareness, attitude, and knowledge. *Canadian Family Physician.* 2009;55(7):e6-13.
15. Callen JL, Fennell K, McIntosh JH. Attitudes to, and use of, evidence-based medicine in two Sydney divisions of general practice. *Australian Journal of Primary Health.* 2006;12(1):40-46.
16. McColl A, Smith H, White P, Field J. General practitioner's perceptions of the route to evidence based medicine: a questionnaire survey. *BMJ.* 1998;316(7128):361-365.
17. Taylor J, Wilkinson D, Blue IA, Dollard JT. Evidence-based rural general practice: barriers and solutions in South Australia. *Rural Remote Health.* 2002;2(1):116.
18. Young JM, Ward JE. Evidence-based medicine in general practice: beliefs and barriers among Australian GPs. *Journal of Evaluation in Clinical Practice.* 2001;7(2):201-210.
19. Upton D, Upton P. Knowledge and use of evidence-based practice of GPs and hospital doctors. *Journal of Evaluation in Clinical Practice.* 2006;12(3):376-384.
20. Ziebland S, McPherson A. Making sense of qualitative data analysis: an introduction with illustrations from DIPEx (personal experiences of health and illness). *Medical education.* 2006;40(5):405-414.
21. Gough D, Oliver S, Thomas J, eds. *An introduction to systematic reviews.* 1st ed. London: SAGE Publications Ltd; 2012.

22. Reeve J. Protecting generalism: moving on from evidence-based medicine? *British Journal of General Practice.* 2010;60(576):521-523.
23. Morris ME, Martin C, McGinley JL, et al. Protocol for a home-based integrated physical therapy program to reduce falls and improve mobility in people with Parkinson's disease. *BMC Neurology.* 2012;12 (no pagination)(54).
24. Gu Y, Chen J, Lu Y, Pan S. Integrative Frequency Power of EEG Correlates with Progression of Mild Cognitive Impairment to Dementia in Parkinson's Disease. *Clinical EEG & Neuroscience: Official Journal of the EEG & Clinical Neuroscience Society (ENCS).* 2016;47(2):113-117.
25. Gabbay J, le May A. Evidence based guidelines or collectively constructed "mindlines?" Ethnographic study of knowledge management in primary care. *BMJ.* 2004;329(7473):1013.
26. Evidence-based health care: a new approach to teaching the practice of health care. Evidence-Based Medicine Working Group. *J Dent Educ.* 1994;58(8):648-653.
27. Reeve J. Protecting generalism: moving on from evidence-based medicine? *British Journal of General Practice.* 2010;60(576):521-523.
28. Dewey J. *How we think.* Courier Corporation; 1997.
29. Mezirow J. How critical reflection triggers transformative learning. *Fostering critical reflection in adulthood.* 1990;1:20.
30. Mann K, Gordon J, MacLeod A. Reflection and reflective practice in health professions education: a systematic review. *Advances in health sciences education.* 2009;14(4):595-621.
31. Dobkin PL, Hutchinson TA. Teaching mindfulness in medical school: where are we now and where are we going? *Med Educ.* 2013;47(8):768-779.
32. Shonin E, Van Gordon W, Griffiths MD. Meditation as medication: are attitudes changing? *Br J Gen Pract.* 2013;63(617):654-654.
33. Epstein RM. Mindful practice. *JAMA.* 1999;282(9):833-839.
34. Kabat-Zinn J. Mindfulness-based interventions in context: past, present, and future. *Clinical psychology: Science and practice.* 2003;10(2):144-156.
35. Krasner MS, Epstein RM, Beckman H, et al. Association of an educational program in mindful communication with burnout, empathy, and attitudes among primary care physicians. *Jama.* 2009;302(12):1284-1293.
36. Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. *BMJ.* 1996;312(7023):71-72.
37. Ford S, Schofield T, Hope T. What are the ingredients for a successful evidence-based patient choice consultation?: A qualitative study. *Social Science & Medicine.* 2003;56(3):589-602.
38. McCusker K, Gunaydin S. Research using qualitative, quantitative or mixed methods and choice based on the research. *Perfusion.* 2015;30(7):537-542.
39. Guest G, MacQueen KM, Namey EE. *Applied thematic analysis.* sage; 2011.

CHAPTER FIVE

Multi-source synthesis Stage 3: *generation of a final competency framework by synthesis of primary and secondary data*

5. Multi-source synthesis Stage 3: *generation of a final competency framework by synthesis of primary and secondary data*

Note: The work presented in this chapter has been published in a peer-review journal.[1]

5.1 Abstract

Background. Stage 1 of a multi-source synthesis (Chapter 3) generated a set of themes representing important factors that should be considered in the construction of a competency framework, derived from the research literature. Stage 2 (Chapter 4) generated a second set of themes representing the meaning of EBHC in general practice, derived from a primary study that sought consensus among discipline experts. This chapter describes Stage 3, in which both sets of themes were synthesised, generating a final real-world EBHC competency framework for general practice, which acknowledges the barriers to EBHC that GPs encounter.

Methods. The third and final stage of a multi-source synthesis of primary and secondary research data. Themes derived from a synthesis of qualitative and quantitative data from the research literature were grouped with qualitative themes generated by a Delphi process where they shared a common meaning. The connections were used to develop an analytical map. Themes were iteratively regrouped until they were all embraced by overarching themes, which represented the final competency framework.

Results. A simple EBHC competency framework was created for real-world general practice. The competencies were (1) mindfulness - in one's approach towards EBHC itself, and to the influences on decision-making; (2) pragmatism – in one's approach to finding and evaluating evidence; and (3) knowledge of the patient – as the most useful resource in effective communication of evidence. A clinical scenario is presented, to illustrate how a GP might demonstrate these competencies in their routine daily work.

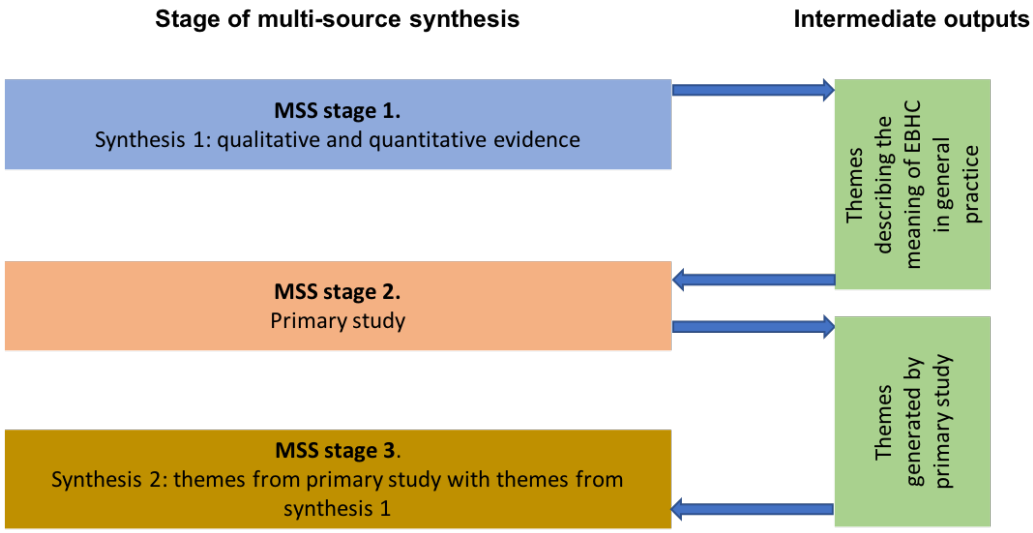
Conclusion. A simple real-world EBHC competency framework was developed, which acknowledges the constraints encountered in modern general practice. Validation of the framework is required, both as an educational resource and as a guide to EBHC in practice.

5.2 Introduction

In Chapter 3, a *preliminary* real-world EBHC competency framework was constructed from a synthesis of qualitative and quantitative data from the literature (multi-source synthesis Stage 1). Compared to the traditional model of EBHC,[2] it shifted in emphasis towards a more collaborative, reflective approach. It included advocacy for EBHC at the practice level and focused on demonstrable outcomes that matter in everyday practice. In Chapter 4 (multi-source synthesis Stage 2), the preliminary framework served as a theoretical 'straw model' for refinement by a panel of experts in a Delphi process. New themes were generated, representing an expert consensus on the meaning of EBHC competence in general practice. They shared with traditional definitions[3] a focus on the individual patient, but emphasised a version of reflection that was more continuous, and more objectively

aware of the GP's own needs and influences. They also stressed a more pragmatic approach to finding and using evidence, which relied upon secondary pre-appraised sources, and recognised a wider array of influences in the decision-making process. Two characteristics of the preliminary model did not arise among the themes from the Delphi process: a more collaborative approach to EBHC; and a role for the GP in advocacy for EBHC at the practice level. This chapter will describe how in the final stage of the multi-source synthesis (Stage 3), the themes derived from the Delphi process in Stage 2 were synthesised with the themes from Stage 1 (Figure 5.1) using a method that ensured all the data from both sources were considered. The result was a final real-world EBHC competency framework for general practice.

Figure 5.1 The structure and process of the multi-source synthesis



Themes generated by synthesis 1 guide the design of MSS stage 2 (primary study).
Themes generated by MSS stage 2 are synthesised with the themes from synthesis 1.

Multi-source synthesis is a systematic method for taking the findings of a synthesis of qualitative and quantitative data from the literature (so-called 'secondary' data), exploring the findings further in a new ('primary') study, and synthesising the primary and secondary data as a fully integrated whole.[4] The method – as described by Pedersen – also includes triangulation with data derived from non-scientific literature found in the literature search of the initial qualitative-quantitative synthesis. My search did not return any such non-scientific (so-called 'grey') literature, so this step was not required.

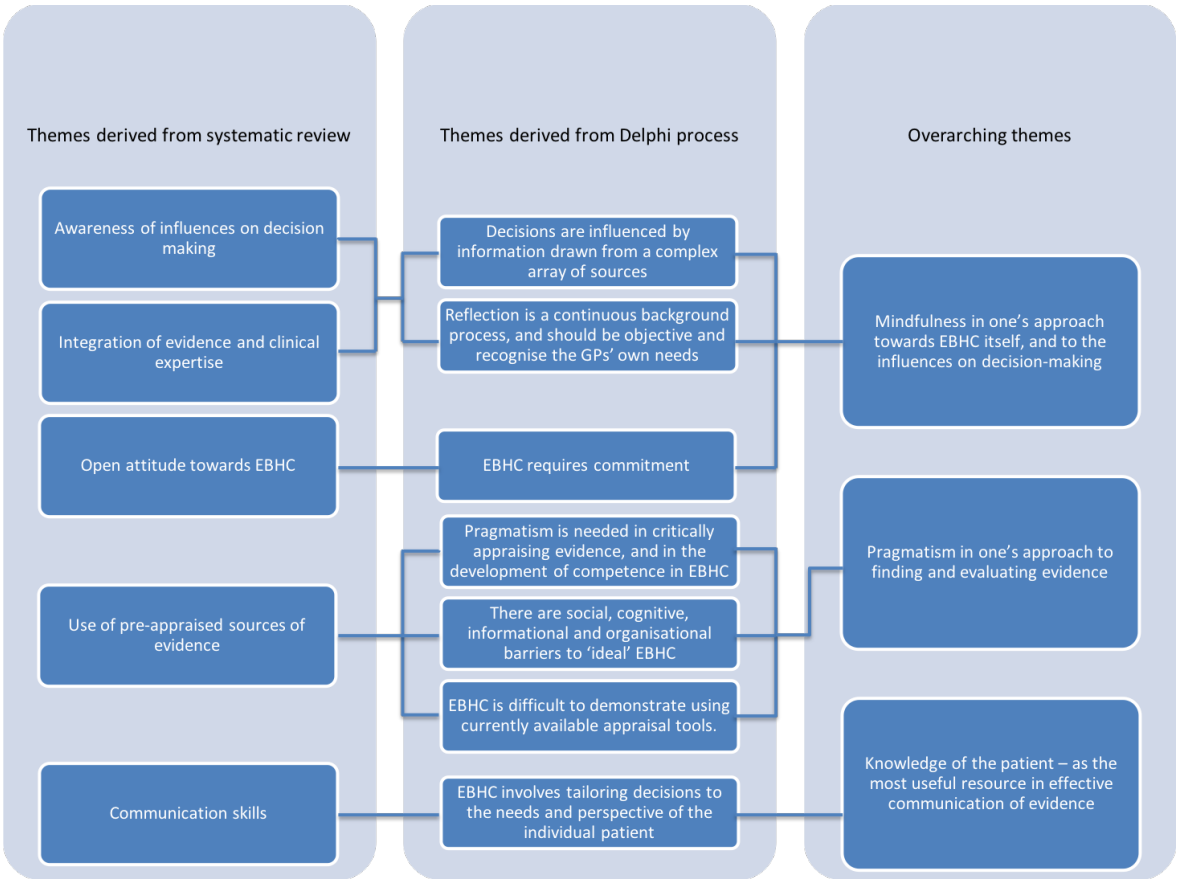
Multi-source synthesis has proven adaptable, having been used to explore the psychosocial needs of chronic fatigue syndrome sufferers, and the health seeking behaviours and other contributing factors to delays in breast cancer detection.[5] It suited the task I faced of synthesising primary and secondary data. A further advantage of multi-source synthesis is that it can be used to confirm whether the findings from the literature apply in a particular context – in this case, real-world general practice. The findings may, therefore, be more pertinent and 'actionable' in real life than those based only on a review of the literature.[4] The step-by-step approach was clearly laid out in Pedersen's methodological paper, so I was confident I could apply it to synthesise my data into a meaningful final competency framework.

5.3 Methods

The first task was to refresh my knowledge of the data contributing to each set of themes. For those derived from Stage 1 (Chapter 3), summaries of contributory data were re-explored. For those generated in Stage 2 (Chapter 4) by expert consensus in a Delphi

process, I revisited the original free-text responses and associated quantitative data. Having refreshed my understanding of the meaning underpinning each theme, I grouped them where they shared a common meaning. These connections were used to draw up an Analytical Map (Figure 5.2). I grouped and regrouped themes until they were all embraced by three overarching themes. The three themes represented the final competency framework. The last stage of a multi-source synthesis is triangulation with grey literature generated from the systematic review. In my systematic review, however, no relevant grey literature was found among the data, so this step was not required.

Figure 5.2. Connections between themes: an analytic map



5.4 Results

The three overarching themes, describing a final competency framework were:

1. Mindfulness in one's approach towards EBHC itself, and to the influences on decision-making.

2. Pragmatism in one's approach to finding and evaluating evidence.

3. Knowledge of the patient, as the most useful resource in effective communication of evidence.

5.5 Discussion

In this third and final stage of the multi-source synthesis, themes from stages 1 and 2 were synthesised. The synthesis of both sets of data resulted in a simple real-world EBHC competency framework: (1) mindfulness in one's approach towards EBHC, and the influences on decision-making; (2) pragmatism in one's approach to finding and evaluating evidence; and (3) application of one's knowledge of the patient in communication of evidence. I have described each competency in more detail below.

5.5.1. Mindfulness in one's approach towards EBHC, and the influences on decision-making

Mindfulness has been defined very simply as 'not being lost on automatic pilot.'[6] It is an awareness of what is happening in the present moment, rather than being caught up in one's experience.[6] Shankman gives a simple explanation:

'You can be mindful of anything. You can be aware of your thoughts and moods, what is happening in your body and what is going on around you. When you know your emotions, rather than becoming entangled in them, you are able to make wise choices in how to respond to situations. You gain a balanced perspective that allows for greater freedom in meeting the flow of life's ups and downs.'[6]

Mindfulness originated as a fundamental component of Buddhist practice.[7] It can be cultivated through meditation.[8] It is thought, however, that everyone can be mindful, and that it does not require any particular religious or cultural belief system.[7] As a form of therapy, it has been demonstrated in RCT to reduce and prevent burnout, promote positive attitudes among health professionals, strengthen patient-provider relationships, and enhance well-being among practitioners.[9] It has generated considerable interest in medical education, with many medical and dental schools offering courses.[10] I was first exposed to the concept of mindfulness while working as a lecturer at the University of Southampton School of Medicine, where in recent years it has become part of the curriculum.[11] Shonin gives a more technical definition of mindfulness as:

'the process of developing an open and unbroken awareness of present-moment cognitive-effective and sensory experience.'[12]

Kabat-Zinn gives a list of attitudes and behaviours that help develop mindfulness in everyday life.[8] These are helpful in describing the concept:

1. *Non-judging: being an impartial witness to your own experiences without premature conclusions;*

2. *Patience: letting things unfold in their own time;*

3. *Beginner's mind: being receptive to new possibilities and not getting stuck in a rut of your own expertise;*

4. *Trust: developing an essential trust in yourself and your feelings;*

5. *Not striving: paying attention to how you are right now however that is;*

6. *Accepting: seeing things as they actually are in the present;*

7. *Letting go: letting go is a way of letting things be, of accepting things as they are.*

A number of themes from the qualitative-quantitative synthesis and the Delphi process were reminiscent of mindfulness. One such theme was that *'reflection is a continuous background process and should be objective, and recognise the GP's own needs'* (Figure 5.2). In Chapter 4, I described how mindfulness embraced continuity, objectivity and attendance to the GPs' own needs in reflection more explicitly than the theories of reflection proposed by Dewey,[13] Boud,[14] Mezirow[15] and Schön.[16] 'Continuity' refers to a readiness to reflect at any point during one's work, rather than reserving it as an occasional pursuit. Shonin gives the following advice to GPs on the continuous nature of mindfulness:

'Maintaining a regular practice of mindfulness does not have to encroach into busy work schedules. In fact, rather than 'taking time out', mindfulness practice really begins when a person gets up from their meditation cushion (or chair) and continues with work and daily tasks. So the practice of mindfulness is less about finding the time to practise, and more about simply remembering to engage a mindful attention-set during whatever activity one happens to be engaged in.'[12]

'Objectivity' referred to a recognition of bias in making decisions, from any source, including one's own beliefs and perceptions. This quality resonates with the non-judgmental nature of mindfulness. Kabat-Zinn refers to it as *'a sense of open-hearted, friendly presence and interest.'*[8] Luchterhand suggests that *'to provide excellent patient-centred care, clinicians…must be fully present, flexible, and recognise their own patterns and beliefs,'* a capacity that she maintains can be cultivated through mindfulness.[17]

Attention to one's own needs is central to mindfulness, as its very purpose is to become more aware of one's own mental processes, including one's emotional state.[18] A before-and-after study of 70 primary care physicians by Krasner and colleagues evaluated the effects of a course in mindfulness meditation.[19] It found that participants improved in their sense of wellbeing and mood, and became more empathic towards their patients.

Three other themes addressed the complexity of decision-making, and a need to be aware of all the factors that influence decisions (Figure 5.2): (1) *decisions are influenced by information drawn from a complex array of sources;* (2) *the requirement to be aware of the influences on decision-making;* and (3) *the need to integrate evidence and clinical expertise*. All three themes reflect an all-encompassing quality of mindfulness, which Shankman describes as *'being open to, including and incorporating all the things we experience.'*[6]

Another two themes that echoed mindfulness were that *a GP's attitude towards EBHC should be open*, and that *EBHC requires commitment*. Again, these themes resonate with the non-judgmental nature of mindfulness and the need for commitment to its practice and cultivation in 'any and every moment.'[8]

I am not the first to propose mindfulness as an approach to EBHC. Epstein proposed mindfulness as a link between relationship-centred care and Evidence-Based Medicine.[18] His argument that *'all data, regardless of their completeness or accuracy, are interpreted by the clinician to make sense of them and apply them to clinical practice'*[18] reflects my findings. He maintains that mindful practice allows space for unconscious incompetence to

rise to the surface and to be identified.[18] Sibinga, though not referring to EBHC directly, proposed mindfulness as a way of preventing diagnostic errors that arise through failures in perception, failed heuristics, and other cognitive biases.[20] Examples are 'fundamental attribution error' (blaming the illness on the patient) and 'representativeness restraint' (a focus on the most typical or representative presentations of diagnoses which may lead to the premature or incorrect rejection of less typical presentations). Nor am I the first to propose the application of mindfulness to general practice. Shonin regards mindfulness as a way of cultivating competent general practice. He provides practical tips for GPs to cultivate mindfulness, including regular reminders from a wrist-watch or computer, or the use of the mnemonic 'SOS,' which reminds one to *'Stop, Observe the breath, Step back and watch the mind.'*[12] Epstein believes mindfulness is often practiced by good clinicians, but that they often find it difficult to find words to describe it.[21]

There is evidence from systematic reviews that mindfulness training has professional and health benefits, including the prevention of job burnout[22] and improved self-awareness and compassion among health care workers.[23] It reduced stress, increased physical and spiritual well-being, increased productivity, and helped confidence in decision making while recognising when help was needed. Mindfulness meditation has been shown on serial magnetic imaging of the brain to increase the volume of grey matter in the left hippocampus, the posterior cingulate cortex, the temporoparietal junction, and the cerebellum.[24] These brain regions are involved in learning and memory processes, emotion regulation, self-referential processing, and perspective taking. There is an association

between such increases in grey matter volume and corresponding functional improvements.[25,26]

In the context of this competency framework, I regard mindfulness as a non-judgemental, global awareness of the physical and mental processes at play in the present moment. It means maintaining an open attitude towards EBHC, aware of its strengths and limitations. It also refers to an awareness of the various subjective notions, biases and entrenched beliefs – among all parties - that might influence decisions. It embraces their influence as an inevitable part of the cognitive process of EBHC and asks only that they are acknowledged. It means being sympathetic towards one's self, recognising the constraints imposed by the working environment, and the factors influencing the patient's perspective.

Thus far, I have described the origin and meaning of mindfulness; how it embraced themes from Stages 1 and 2 of the multi-source synthesis; its earlier promotion as a link between relationship-centred care and EBHC; and how I interpret it in the context of this real-world competency framework. Now I will pose the question: '*What is the relationship between mindfulness and reflective practice?*' This is an important consideration because reflective practice is a prominent and enduring theory in medical education and has been regarded an essential attribute of competent health care professionals.[27]

Epstein regards mindful medical practice as a *logical extension* of reflective practice.'[18] Both regard the theoretical 'espoused' knowledge acquired in professional preparation as insufficient in itself to manage complex problems in the real world.[16,18] In his treatise on

reflective practice, Schön highlighted the need to supplement this espoused knowledge with 'knowing-in-action' – spontaneous, skilful performance in practice, based on tacit knowledge.[16] Epstein gives an example of knowing-in-action from his medical training, when he observed a vascular surgeon repair a leaking blood vessel.[28] The surgeon seamlessly switched from a relaxed disposition, as though in autopilot, to a more deliberately choreographed action as he detected the problem and worked competently and rapidly to stem the flow of blood. He sees in this state of mind a focus and attention to the present moment indicative of mindfulness. He develops the concept of knowing-in-action further however, maintaining that a mindful practitioner can *detect the difference* between well-founded tacit knowledge-in-action and self-deception. In Schön's model of reflective practice, reflection occurs when the practitioner is met with a 'surprise' – a moment of realisation that neither espoused knowledge nor knowledge-in-action is adequate to deal with a given problem. The practitioner responds with '*reflection-in-action*,' an automatic real-time reflection carried out as she or he manages the problem. Epstein again extends the model further, noting that '*surprises don't just happen*.' He maintains that the mindful practitioner is alert to the possibility of missing those moments, of ignoring or denying the obvious, or allowing their emotions, biases and premature assumptions to lead to poor decisions.

Both reflective practice and mindfulness are concerned with a broad array of factors that the practitioner must weigh up in their reflections, including new information, espoused knowledge, knowledge-in-action, consideration of the patient's perceptions, values and circumstances, and the social context of the problem.[29] Mindfulness broadens the range of

attention however, to *anything* that might influence the practitioner's decisions. This could be thoughts, moods, emotions, bodily sensations and whatever is happening around you.[6] I return to Epstein's explanation that '*all data*, *regardless of their completeness or accuracy, are interpreted by the clinician to make sense of them and apply them to clinical practice'*[18]

There are aspects of reflective practice, however, that are not shared by mindfulness. In contrast to the subconscious, automatic nature of Schön's reflection-in-action, mindfulness is a consciously cultivated ability to be attentive to the present, deliberately looking for the unexpected as well as the familiar.[21] An aspect of mindful practice that I have been unable to find in accounts of reflective practice is its non-judgmental approach to reflection. 'Non-judgemental' refers to the ability to avoid jumping to conclusions. Judgmental thoughts are generated continually, applying both to oneself and to others.[20] Mindfulness includes an awareness of these thoughts, and recognition that they distract from experiencing the present. [20] Epstein describes a moment of non-judgmental curiosity when he was annoyed with a patient who wouldn't take his advice as her family physician.[28] He realised that it was not, in fact, the patient who was making him annoyed; rather, it was his own mind that was '*creating this sense of annoyance because I desired something (a docile, agreeable patient) that was not in the offing*.' I contend that reflective practice might well achieve the same insight. However, the model does not provide guidance on *how* to reflect effectively, *how* to open oneself to achieve insight. In contrast, mindfulness embodies a number of philosophical perspectives – and its implicit non-judgmental approach is a good example – that if practiced, can lead to more valuable reflection.

I agree with Epstein that mindfulness is a logical extension of reflective practice. From my exploration of their similar and contrasting qualities, I conclude that on one level, mindfulness is a particular form of reflective practice. On another level however, it may facilitate a more effective form of reflective practice, one that is wilfully integrated with routine care, more objective, and provides a finer focus on the myriad factors that can affect decisions.

5.5.2. Pragmatism in one's approach to finding and evaluating evidence

The competency '*Pragmatism in one's approach to finding and evaluating evidence'* encapsulated four themes (Figure 5.2). Two addressed the approach to finding and evaluating evidence: (1) '*a preference for the use of pre-appraised sources of evidence,'* and (2) that '*pragmatism is needed in critically appraising evidence, and in the development of competence in EBHC.'* A third theme referred to '*practical difficulty demonstrating EBHC competence using currently available appraisal tools.'* All of these themes originated from a set of conditions expressed by the fourth theme – that '*there are social, cognitive, informational and organisational barriers to the notion of 'ideal' EBHC as articulated in the traditional model.'*

The competency recognises that it is impractical during routine general practice work for GPs to engage in two steps of the traditional EBHC model:[2]

- Systematic retrieval of best evidence available.
- Critical appraisal of evidence for validity, clinical relevance, and applicability.

It is more feasible that a GP faced with clinical uncertainty will turn to a trusted source of pre-appraised, secondary evidence. There are now some excellent examples of meta search engines, which search many databases at once. One example is the Turning Research Into Practice (TRIP) database.[30] It is widely used in the United Kingdom and internationally.[31] It has a simple, user-friendly search interface. It can quickly locate evidence, ordered by either quality (the default setting), date or relevance. Filters allow pre-appraised ('secondary') sources of evidence to be selected: systematic reviews, evidence synopses, international clinical practice guidelines and regulatory guidelines. Another example of a modern meta search engine is Clinical Knowledge Summaries, provided by the National Institute for Health and Care Excellence in the UK.[32] This provides up-to-date summaries of evidence and guidance for over 330 clinical problems that present commonly in general practice. Both resources meet the requirements of GPs. Successful information seeking depends on the convenience of access, reliability, quality, speed and applicability of resources.[33] Colleagues and textbooks have been identified as GPs' most frequently used sources of clinical information.[34,35] Yet there may well have been an increase over time in the use of online sources. An extensive survey among GPs in Denmark in 2014 found medical websites were the most frequently used sources of information, used weekly by 91%.[36] Earlier studies had yielded a wide spread of results. A survey of Canadian family physicians in 2013 found that only 37% used their favourite Internet website to make clinical decisions, and 49% used it to update their general medical knowledge.[37] A survey among GPs in New Zealand in 2001 found only 49% used the Internet to look for clinical information,[38] and a survey of GPs in France in 2009 found 85% used the Internet to find clinical information.[39] Access to online resources may vary between

countries. An online survey in 2007 among clinicians of various specialities found those in the US and Canada were more likely to use electronic resources to find clinical information than those based in the UK.[40] Physicians often preferred to use resources developed in their own country. The characteristics of GPs have also been found to influence their use of online resources. The survey of GPs in Denmark found that those aged over 44 were less likely to seek information from colleagues, guidelines and websites, but more inclined to seek information from medical journals.[36] It also found male GPs placed less value on clinical websites than their female counterparts.

In summary, it is reasonable to assume that GPs will continue to use online sources of evidence and that this use will increase. The design of future online resources should acknowledge that GP characteristics might influence usage. This competency requires that GPs assume a realistic 'just-in-time' approach to finding useful, valid evidence amidst the turmoil of a typical working day. Accepting that it is not feasible to conduct systematic searches and critical appraisals within or between consultations, it means becoming familiar with, and adept at using trusted online sources of pre-appraised evidence.

5.5.3 Knowledge of the patient - as the most useful resource in effective communication of evidence

The competency '*Knowledge of the patient - as the most useful resource in effective communication of evidence*' encompassed two themes: (1) '*a requirement for communication skills'* and (2) that '*EBHC involves tailoring decisions to the needs and perspective of the individual patient*.' Communication skills in EBHC, as demonstrated in

the qualitative-quantitative synthesis, depended on respect for the patient, honesty, and the ability to engender patient trust, and build a partnership.[41] The related theme, of tailoring decisions to the individual patient, was one of the strongest themes to have emerged from both the qualitative-quantitative synthesis and the Delphi process. Some expert panelists expressed the view that the traditional model of EBHC underplays the concept of individualised medicine. It also emerged in the Delphi process that attention to the individual patient's perspective is an important factor in making decisions. It may not be surprising that panelists took this view, as the doctor-patient relationship is a central plank of general practice philosophy. The WONCA definition of general practice states that

'It has a unique consultation process, which establishes a relationship over time, through effective communication between doctor and patient.'[42]

There is evidence that continuity of care from a single GP is beneficial. A systematic review has demonstrated an association between patient satisfaction and decreased health care use, including hospitalisation and emergency visits.[43] A further study showed that elderly patients who saw the same GP a greater proportion of the time experienced fewer hospital admissions than other patients.[44]

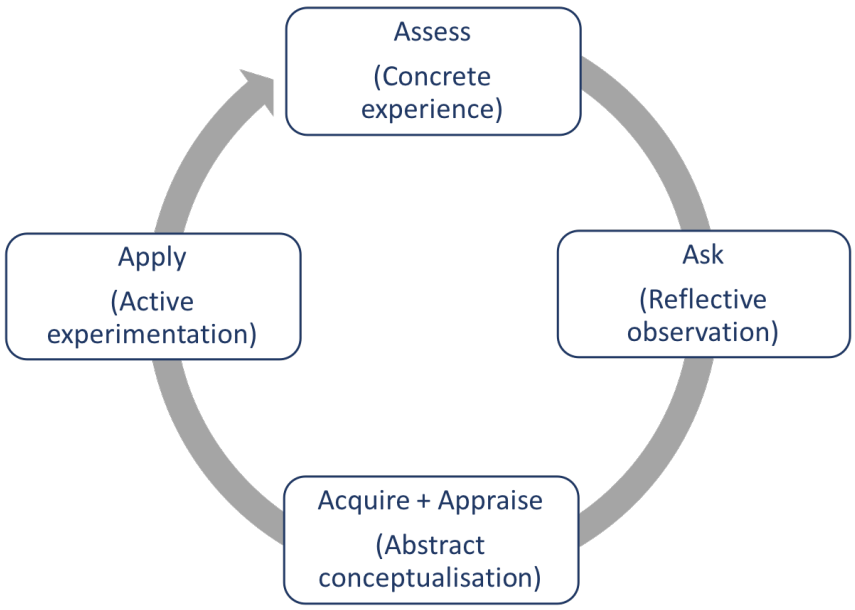
In summary, this competency resonates with the philosophy of care underpinning the doctor-patient relationship in general practice and which has been shown to be beneficial, both to patients and to the economics of health care provision. It refers to the particular ability of the general practitioner to 'read' their patients – to know instinctively when it is appropriate to communicate evidence, and when it is better saved for another opportunity.

This knowledge of the patient is enhanced by the cultivation of a stable, therapeutic doctor-patient relationship.

5.5.4. The real-world EBHC competency framework as an example of experiential learning

In Chapter 2, I proposed that a particular model of adult learning – experiential learning - is implicit in the five-step model of EBHC practice described by the EBM Working Group at McMaster,[45] and in the Sicily Statement.[2] I depicted the five steps as an iterative cyclical process as a clinician encounters new clinical problems and uncertainties.[46] I then illustrated how it maps onto Kolb's experiential learning cycle (Fig 5.3).

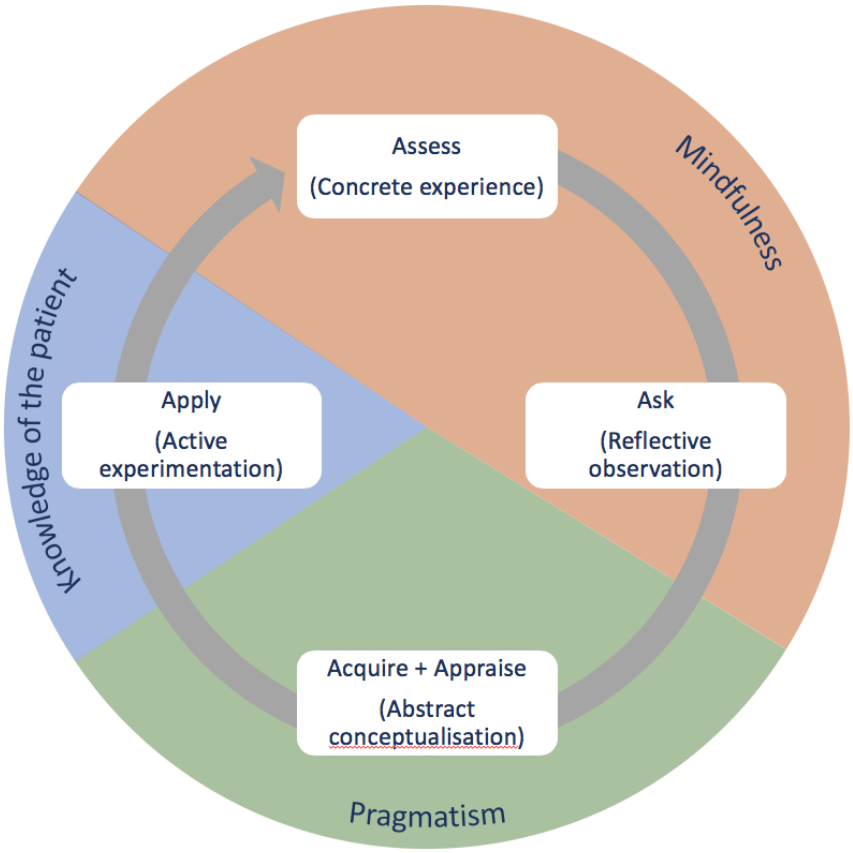
Figure 5.3 Framing the EBHC process as experiential learning



To briefly reprise the process in terms of experiential learning: the clinician assesses the clinical situation in response to the experience of a knowledge gap; they then reflect on this experience of uncertainty and ask a clinical question; the subsequent acquisition of evidence, and its critical appraisal are analytical activities based on abstract theoretical constructs; and the final stage – application of the evidence – represents an experimental implementation of what has been learned. If the problem has not been satisfactorily addressed, the cycle will continue in light of this new information. I described how the experiential learning model provides not only a theory of how we learn, but also a useful template for designing a learning activity or curriculum.[47] Learning that encompasses all four elements of the experiential cycle appeals to all learning styles and is thought to constitute particularly deep learning.[48]

Having derived a new, real-world EBHC competency framework, I explored whether it too could be mapped to the experiential learning cycle. My hypothesis was that the new competency framework itself represents an example of experiential learning. If so, there might be implications for its appeal across different learning styles, how it might be taught, and its effectiveness as a tool for changing GP behaviour towards better decision-making. Indeed, it corresponds well to the elements of experiential learning. Mindfulness (the attribute at the heart of the first competency) is predicated upon active observation of oneself, the patient and the problem, and non-judgmental reflection upon anything that might be influencing decisions.[6] This corresponds to reflective observation in response to a concrete experience (Figure 5.4). The pragmatic approach to finding and evaluating evidence (competency 2) will still, despite its focus on using trusted sources of pre-

Figure 5.4 Traditional and real-world EBHC frameworks as experiential learning



appraised evidence, require a level of abstract conceptualisation on the part of the practitioner. Trustworthiness of such pre-appraised evidence must still be judged, and this demands a sound understanding of the theory underpinning methodological rigour in systematic evidence searching and critical appraisal. Knowledge of the patient as the most useful resource in effective communication of evidence (competency 3) allows the experimentation implicit in evidence application to take place on a firmer footing. There may be a higher chance of successful experimentation if the GP applies their knowledge of the patient in communicating about evidence.

Both the new competency framework, and the traditional five-step model of EBHC therefore map to the experiential learning cycle. This similarity on a pedagogical level might lead one to question whether the new competency framework is simply a renaming of the traditional five step model. There are, however, crucial differences. Mindful practice shares with the traditional model a sensing of discomfort originating in clinical uncertainty that leads to reflective questioning. The critical distinction, however, is that the real-world competency involves assessing much more than clinical uncertainty, including for example bias, prejudice, error, fatigue, dislike of the patient or any other real-world factor that might impinge upon decisions. A further difference is that the real-world competency promotes reflection upon those factors in an open, non-judgmental way that leaves space for discovery. In its pragmatic approach to finding and evaluating evidence, the real-world framework differs from the traditional model in its explicit acceptance that it is not feasible to conduct systematic searches and critical appraisals within or between consultations. And recognition of the GP's knowledge of the individual patient as the most useful resource in effective communication of evidence moves beyond the traditional interest in the perspectives, values and life circumstances of the patient. It acknowledges the fact that a GP is uniquely placed to reflexively finesse their communication of evidence as they 'read' their patient and predict their responses on the basis of a therapeutic relationship built over time.

5.5.4. Comparison with other EBHC competency frameworks and curricula

There are similarities between the real-world competency framework and the other EBHC competency frameworks and curricula I reviewed in Chapter 2. Mindfulness and knowledge

of the patient as a resource for evidence communication are both echoed in several instances (Table 5.1). All the frameworks and curricula have noticeably moved away from

Table 5.1. Examples of convergence between the real-world competency framework, and other frameworks/curricula

Real-world competency	[a]Other frameworks/curricula
Mindfulness in one's approach towards EBHC itself, and to the influences on decision-making.	Be aware that beliefs and values, in doctor and patient, influence the interpretation of research results in support of potentially divergent views' (RACGP).
	Be aware of your own knowledge, limitations, biases and values that influence the way one practices medicine (RACGP).
	Be aware of external influences on your own practice (e.g. pharmaceutical companies, media) and be confident in dealing appropriately with these influences (RACGP).
	Ensure you understand the evidence or experience underpinning your own understanding, and be clear when you are stating an opinion based on experience rather than evidence (RCGP).
	Acquire the research and academic skills required of a GP that aid decision-making, which include a non-judgemental evidence-based approach to problem solving and recognising how individual bias may affect your interpretation (RCGP).
	Take into account psycho-social factors, learning disabilities, the vulnerability of patients, and cultural backgrounds when taking an evidence-based approach and apply the findings on both an individual and a population level (RCGP).
Knowledge of the patient - as the most useful resource in effective communication of evidence.	Communicate the evidence for management, diagnosis or screening to patients in a manner that is both understandable to the patient, and is patient centred (RACGP).
	Being aware of how you impart information about evidence so that patients can best understand relevant evidence and be helped in making a decision (RCGP).

[a]RACGP: Royal Australian College of General Practitioners, curriculum for Australian general practice 2016;[49] RCGP: Royal College of General Practitioners curriculum (UK)[50]

the stepwise, sequential nature of the traditional model, perhaps recognising the difficulty of integrating such a process with routine work. There are, however, fundamental

differences. The other frameworks cleave more closely to the competencies of the traditional EBHC model. My findings did not support this approach. There is consistent evidence of poor EBHC uptake in general practice.[51-56] Direct observation of GPs has revealed a lack of engagement in the traditional five steps of EBHC.[57] Even self-reported EBHC activity, which might be susceptible to socially desirable responding (SDR), is disappointingly sparse. In a survey of 302 UK GPs, 39% claimed to identify gaps in knowledge frequently; 28% claimed to track down evidence often; and only 8% to appraise literature critically.[58] Notably, the requirements for search and appraisal skills were the only themes to have lacked credibility in the qualitative-quantitative synthesis. The findings challenged the assumption that these activities can be incorporated into the working day. Some qualification of this approach is required, however: some knowledge of search and appraisal is necessary to make judgements about the quality of pre-appraised evidence. It can be anticipated that an occasional clinical question will require searching and critical appraisal of primary research. But it is not feasible to expect GPs to search MEDLINE, and conduct sound critical appraisals of primary research during routine work.

The real-world approach proposed here offers two advantages over the traditional model of EBHC: simplicity and flexibility. A simpler, more streamlined framework of only three competencies might be easier to integrate into routine work. It is more flexible in that it allows some room for manoeuvre in the imperfect, real world. It assumes that EBHC depends on GPs and individual patients making the best possible decisions in the prevailing circumstances. A clinical scenario is described below to illustrate how a GP might demonstrate the real-world competencies in practice.

5.5.5. Clinical scenario illustrating the demonstration of real-world competence in practice

Fiona's last patient on Friday afternoon is Reg, a 70-year-old retired army officer. He's well turned out, having put on a tie to see the doctor. He tells Fiona he hasn't been sleeping in the last six weeks since his wife died. Fiona's colleague had prescribed a sleeping tablet, and that had helped. He moves on quickly in response to Fiona's enquiries about his mood and says all he needs is some more of those sleeping tablets. Fiona recalls a complaint made by Reg some years ago when she suggested a referral for cognitive behavioural therapy (CBT) for a bout of anxiety. She's about to type 'Temazepam 10mg' when she remembers insomnia had been discussed at a Practice Based Small Group Learning (PBSGL) session she attended a few weeks ago. Fiona considers whether she might have been a little rash with her decision to prescribe. Perhaps it was because it's Friday afternoon and she's tired – or maybe because she didn't want to upset Reg again (**mindfulness**). *She asks Reg if he would mind waiting for a second while she looks for some useful information on the computer. She opens the TRIP database[30]she had used in the PBSGL meeting* (**pragmatism**)**.** *She types 'insomnia' in the search box and opens the first item listed, which is an evidence-based synopsis from BMJ Clinical Evidence.*[59] *Casting her eyes quickly down the page, she reads that 'the evidence for the effectiveness of CBT for insomnia is convincing, whereas the evidence for exercise programmes and timed exposure to bright light is less clear.' She reasons that a suggestion of exercise might, however, be more acceptable to Reg than a course of CBT or bereavement counselling* (**knowledge of the patient**)*. She prints off an*

information sheet on insomnia from www.patient.co.uk and uses a hypnogram to explain sleep cycles. She also explains how sleeping tablets only work at the start of sleep, and that they can soon produce dependence. She explores the various options with Reg, broaching CBT very tentatively (**knowledge of the patient**). *She's not surprised when he seems more inclined to try a programme of exercise, and she manages to secure his agreement to try that, and report back in a week. After Reg leaves, she wonders whether 20 minutes was a bit long for such a consultation* (**mindfulness**). *She decides to print off a batch of information sheets and a hard copy of the evidence synopsis to keep in her desk drawer.*

5.5.6. Strengths

The synthesis of primary and secondary data has allowed the triangulation of a large bank of data from qualitative and quantitative research literature, with the opinions of experts in both general practice and EBHC. An advantage of multi-source synthesis is that it can be used to confirm whether the findings from the literature apply in a specific context – in this case, real-world general practice. The findings may, therefore, be more pertinent and 'actionable' in real life than those based only on a review of the literature.

5.5.7. Limitations

The first step was to reacquaint myself with the data contributing to the themes generated by the qualitative-quantitative synthesis and Delphi process. Some considerable time had elapsed since I completed these components of the thesis. Fortunately, detailed notes had been kept. It is still possible however, that my interpretation of the results of my earlier analyses had changed subtly over time. I attempted to mitigate this possibility by thorough

reading of primary data in addition to the themes that had emerged. All qualitative data analysis generates empirical insights, which necessarily have a subjective basis.[60] This applies to the generation of themes in this final synthesis. It is possible that bias has contaminated my interpretations. Ideally, my findings would have been compared with those of a second, independent investigator conducting the analysis in parallel. Unfortunately, in the context of a doctoral thesis without funding, it was not possible to recruit a second investigator. There was no triangulation of data with grey literature. This step was obviated, however, by the lack of relevant grey literature yielded by Step 1 of the multi-source synthesis, despite searching a number of sources, such as dissertations, theses and conference proceedings.

Cognisant of the limitations of this step of my work, I decided it should be followed by a validation step, to determine whether the themes it generated could be demonstrated within the content of actual performance appraisal documents. This will be described in the next chapter.

5.6 Conclusion

Synthesis of secondary (literature-derived) and primary data in the final stage of a multi-source synthesis resulted in a simple final real-world competency framework for EBHC among GPs:

1. Mindfulness - in one's approach towards EBHC itself, and to the influences on decision-making. It refers to a non-judgemental, global awareness of the physical and mental

processes at play in the present moment. It means maintaining an open attitude towards EBHC, aware of its strengths and limitations. It also refers to an awareness of the various subjective notions, biases and entrenched beliefs – among all parties - that might influence decisions. It embraces their influence as an inevitable part of the cognitive process of EBHC and demands only that they are acknowledged.

2. Pragmatism – in one's approach to finding and evaluating evidence. It requires that GPs assume a realistic 'just-in-time' approach to finding useful, valid evidence amidst the turmoil of a typical working day. Accepting that it is not feasible to conduct systematic searches and critical appraisals within or between consultations, it means becoming familiar with, and adept at using trusted online sources of pre-appraised evidence.

3. Knowledge of the patient – as the most useful resource in effective communication of evidence. It refers to the particular ability of the general practitioner to 'read' their patients – to know instinctively when it is appropriate to communicate evidence, and when it is best saved for another opportunity. This is enhanced by the cultivation of a solid, therapeutic doctor-patient relationship. A clinical scenario illustrated how a GP might demonstrate these competencies in their routine daily work.

Mindfulness has previously been proposed as a link between EBHC and relationship-centred care,[18] as a remedy for cognitive biases in diagnostic decisions and as a way of cultivating good general practice.[12] From a learning perspective, it has been cited as a logical extension of reflective practice. I contend that mindfulness is a particular form of

reflective practice, that may facilitate its integration with routine care, with greater objectivity, and finer focus on the many factors that can affect decisions. Pragmatism in finding and evaluating evidence accepts that it is not feasible to conduct systematic searches and critical appraisals within or between consultations. Recognition of the GP's knowledge of the individual patient as the most useful resource in effective communication of evidence moves beyond the traditional interest in the perspectives, values and life circumstances of the patient, and employs a GP's unique ability to 'read' their patient through the establishment of a therapeutic relationship over time. I propose that the real-world framework follows the principles of experiential learning, and as such, may result in deep learning that suits all learning styles.[47,48] The real-world competency framework has similarities with other established competency frameworks and curricula in general practice training. However, the more streamlined real-world framework might be easier to integrate into routine work, and it allows some room for manoeuvre in the imperfect, real world. It assumes that EBHC depends on GPs and individual patients making the best possible decisions in the prevailing circumstances.

This final stage of the multi-source synthesis was limited by the necessarily subjective nature of analysis, conducted in this case for practical reasons, by a single investigator. A validation step was therefore required. This will be addressed in the following chapter.

5.7 Summary

The conclusions of this chapter can be summarised as follows:

- A real-world EBHC competency framework for GPs has been synthesised from themes emerging in the literature, and from consensus expert opinion.

- It has been designed for use as an educational tool, for application in existing performance appraisals, and as a strategy for actual EBHC practice. It can facilitate reflective practice and as an example of experiential learning, may result in deep learning that suits all learning styles.

- It requires validation. This will be addressed in the following chapter.

5.8 References

1. Galbraith K, Ward A, Heneghan C. A real-world approach to Evidence-Based Medicine in general practice: a competency framework derived from a systematic review and Delphi process. *BMC medical education.* 2017;17(1):78.
2. Dawes M, Summerskill W, Glasziou P, et al. Sicily statement on evidence-based practice. *BMC Med Educ.* 2005;5(1):1.
3. Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. *BMJ.* 1996;312(7023):71-72.
4. Pedersen VH, Dagenais P, Lehoux P. Multi-source synthesis of data to inform health policy. *Int J Technol Assess Health Care.* 2011;27(3):238-246.
5. Akuoko CP, Armah E, Sarpong T, Quansah DY, Amankwaa I, Boateng D. Barriers to early presentation and diagnosis of breast cancer among African women living in sub-Saharan Africa. *PLoS One.* 2017;12(2):e0171024.
6. Shankman R. *The Art and Skill of Buddhist Meditation.* Oakland CA: New Harbinger Publications Inc.; 2015.
7. Ludwig DS, Kabat-Zinn J. Mindfulness in medicine. *Jama.* 2008;300(11):1350-1352.
8. Kabat-Zinn J. Mindfulness-based interventions in context: past, present, and future. *Clinical psychology: Science and practice.* 2003;10(2):144-156.
9. Asuero AM, Queralto JM, Pujol-Ribera E, Berenguera A, Rodriguez-Blanco T, Epstein RM. Effectiveness of a mindfulness education program in primary health care professionals: a pragmatic controlled trial. *J Contin Educ Health Prof.* 2014;34(1):4-12.

10. Dobkin PL, Hutchinson TA. Teaching mindfulness in medical school: where are we now and where are we going? *Med Educ.* 2013;47(8):768-779.
11. Werneck AL, Rosso AL, Vincent MB. The use of an antagonist 5-HT2a/c for depression and motor function in Parkinson' disease. *Arquivos de Neuro-Psiquiatria.* 2009;67(2B):407-412.
12. Shonin E, Van Gordon W, Griffiths MD. Practical tips for using mindfulness in general practice. *Br J Gen Pract.* 2014;64(624):368-369.
13. Dewey J. *How we think.* Courier Corporation; 1997.
14. Boud D, Keogh R, Walker D. Reflection: Turning learning into experience. *Kongan Page, London.* 1985.
15. Mezirow J. How critical reflection triggers transformative learning. *Fostering critical reflection in adulthood.* 1990;1:20.
16. Schon DA. *The reflective practitioner: how professionals think in action.* London: Maraca Temple Smith; 1983.
17. Luchterhand C, Rakel D, Haq C, et al. Creating a Culture of Mindfulness in Medicine. *Wmj.* 2015;114(3):105-109.
18. Epstein RM. Mindful practice. *JAMA.* 1999;282(9):833-839.
19. Krasner MS, Epstein RM, Beckman H, et al. Association of an educational program in mindful communication with burnout, empathy, and attitudes among primary care physicians. *Jama.* 2009;302(12):1284-1293.
20. Sibinga EM, Wu AW. Clinician mindfulness and patient safety. *JAMA.* 2010;304(22):2532-2533.
21. Epstein RM. Mindful practice in action (I): Technical competence, evidence-based medicine, and relationship-centered care. *Families, Systems, & Health.* 2003;21(1):1.
22. Luken M, Sammons A. Systematic review of mindfulness practice for reducing job burnout. *American Journal of Occupational Therapy.* 2016;70(2).
23. Morgan P, Simpson J, Smith A. Health care workers' experiences of mindfulness training: a qualitative review. *Mindfulness.* 2015;6(4):744-758.
24. Hölzel BK, Carmody J, Vangel M, et al. Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research: Neuroimaging.* 2011;191(1):36-43.
25. Mechelli A, Crinion J, Noppeney U, et al. Structural pasticity in the bilingual brain: proficiency in a second language and age at acquisition affect grey-matter density. *Nature.* 2004;431(757):393.
26. Milad MR, Quinn BT, Pitman RK, Orr SP, Fischl B, Rauch SL. Thickness of ventromedial prefrontal cortex in humans is correlated with extinction memory. *Proceedings of the National Academy of Sciences of the United States of America.* 2005;102(30):10706-10711.
27. Mann K, Gordon J, MacLeod A. Reflection and reflective practice in health professions education: a systematic review. *Advances in health sciences education.* 2009;14(4):595-621.
28. Epstein R. *Attending: Medicine, Mindfulness, and Humanity.* New York: Scribner; 2017.

29. Shapiro J, Talbot Y. Applying the concept of the reflective practitioner to understanding and teaching family medicine. *Family medicine.* 1991;23(6):450-456.
30. Morris ME, Martin C, McGinley JL, et al. Protocol for a home-based integrated physical therapy program to reduce falls and improve mobility in people with Parkinson's disease. *BMC Neurology.* 2012;12 (no pagination)(54).
31. Meats E, Brassey J, Heneghan C, Glasziou P. Using the Turning Research Into Practice (TRIP) database: how do clinicians really search? *Journal of the Medical Library Association.* 2007;95(2):156.
32. Gu Y, Chen J, Lu Y, Pan S. Integrative Frequency Power of EEG Correlates with Progression of Mild Cognitive Impairment to Dementia in Parkinson's Disease. *Clinical EEG & Neuroscience: Official Journal of the EEG & Clinical Neuroscience Society (ENCS).* 2016;47(2):113-117.
33. Dawes M, Sampson U. Knowledge management in clinical practice: a systematic review of information seeking behavior in physicians. *International journal of medical informatics.* 2003;71(1):9-15.
34. Coumou HC, Meijman FJ. How do primary care physicians seek answers to clinical questions? A literature review. *Journal of the Medical Library Association.* 2006;94(1):55.
35. González-González AI, Dawes M, Sánchez-Mateos J, et al. Information needs and information-seeking behavior of primary care physicians. *The Annals of Family Medicine.* 2007;5(4):345-352.
36. Le JV, Pedersen LB, Riisgaard H, et al. Variation in general practitioners' information-seeking behaviour–a cross-sectional study on the influence of gender, age and practice form. *Scandinavian journal of primary health care.* 2016;34(4):327-335.
37. Kosteniuk JG, Morgan DG, D'arcy CK. Use and perceptions of information among family physicians: sources considered accessible, relevant, and reliable. *Journal of the Medical Library Association: JMLA.* 2013;101(1):32.
38. Cullen RJ. In search of evidence: family practitioners' use of the Internet for clinical information. *Journal of the Medical Library Association.* 2002;90(4):370-379.
39. Bernard E, Arnould M, Saint-Lary O, Duhot D, Hebbrecht G. Internet use for information seeking in clinical practice: a cross-sectional survey among French general practitioners. *International journal of medical informatics.* 2012;81(7):493-499.
40. Davies KS. Physicians and their use of information: a survey comparison between the United States, Canada, and the United Kingdom. *Journal of the Medical Library Association: JMLA.* 2011;99(1):88.
41. Ford S, Schofield T, Hope T. What are the ingredients for a successful evidence-based patient choice consultation?: A qualitative study. *Social Science & Medicine.* 2003;56(3):589-602.
42. *The European Definition of General Practice/Family Medicine.* London: WONCA Europe;2005.
43. Van Walraven C, Oake N, Jennings A, Forster AJ. The association between continuity of care and outcomes: a systematic and critical review. *Journal of evaluation in clinical practice.* 2010;16(5):947-956.

44. Barker I, Steventon A, Deeny SR. Association between continuity of care in general practice and hospital admissions for ambulatory care sensitive conditions: cross sectional study of routinely collected, person level data. *bmj.* 2017;356:j84.
45. EBM Working Group. Evidence-based medicine. A new approach to teaching the practice of medicine. *JAMA.* 1992;268(17):2420-2425.
46. Leung GM. Evidence-based practice revisited. *Asia Pacific Journal of Public Health.* 2001;13(2):116-121.
47. Armstrong E, Parsa-Parsi R. How can physicians' learning styles drive educational planning? *Academic Medicine.* 2005;80(7):680-684.
48. Kolb DA. Experiential learning: Experience as the source of learning and development. 1984.
49. Curriculum for Australian General Practice 2016. http://www.racgp.org.au/education/curriculum/ Accessed 08.04.2017, 2017.
50. Royal College of General Practitioners curriculum. http://www.rcgp.org.uk/GP-training-and-exams/GP-curriculum-overview.aspx Accessed 06.05.2016.
51. Chan GC, Teng CL. Primary care doctors' perceptions towards evidence-based medicine in Melaka State: a questionnaire study. *Medical Journal of Malaysia.* 2005;60(2):130-133.
52. McColl A, Smith H, White P, Field J. General practitioner's perceptions of the route to evidence based medicine: a questionnaire survey. *BMJ.* 1998;316(7128):361-365.
53. Freeman AC, Sweeney K. Why general practitioners do not implement evidence: qualitative study. *BMJ.* 2001;323(7321):1100-1102.
54. López MCS, de Torres MM, Sánchez JAS, Puche JFM, Ontoso EA. ¿ Qué pensamos los médicos de familia sobre la medicina basada en la evidencia? Un estudio con grupos focales. *Atención primaria.* 2010;42(10):507-513.
55. Young JM, Ward JE. Evidence-based medicine in general practice: beliefs and barriers among Australian GPs. *Journal of Evaluation in Clinical Practice.* 2001;7(2):201-210.
56. Willis TA, West R, Rushforth B, et al. Variations in achievement of evidence-based, high-impact quality indicators in general practice: An observational study. *PloS one.* 2017;12(7):e0177949.
57. Gabbay J, le May A. Evidence based guidelines or collectively constructed "mindlines?" Ethnographic study of knowledge management in primary care. *BMJ.* 2004;329(7473):1013.
58. Upton D, Upton P. Knowledge and use of evidence-based practice of GPs and hospital doctors. *Journal of Evaluation in Clinical Practice.* 2006;12(3):376-384.
59. Clinical Evidence. www.clinicalevidence.bmj.com Accessed 07.08.2017.
60. Giacomini MK, Cook DJ. Users' guides to the medical literature: XXIII. Qualitative research in health care A. Are the results of the study valid? Evidence-Based Medicine Working Group. *JAMA.* 2000;284(3):357-362.

CHAPTER SIX

Validation of the final competency framework by content analysis of GP performance appraisals

6. Validation of the final competency framework by content analysis of GP performance appraisals

6.1 Abstract

Background. Previous chapters described the development of a real-world general practice EBHC competency framework. The aims of the work set out in this chapter were threefold: (1) to test the validity of the competency framework as an educational resource for use in performance appraisal and routine practice; (2) if there was evidence of competence, to construct a set of descriptors for each competency, signifying emerging and full competence; and (3) to collate a set of illustrative vignettes to assist GPs who might wish to use the framework in their own appraisal.

Methods. I conducted a content analysis on a sample of anonymised GP appraisal documents. The content analysis followed prescribed steps: (1) creating and defining categories; (2) pretesting category definitions and rules; (3) assessing reliability and validity; (4) revising the coding rules where necessary; (5) pretesting the revised coding rules where necessary; (6) coding all the data; and (7) reassessing reliability and validity. Where there were sufficient data, I carried out an adapted word frequency analysis based on coded text. I sought the demonstration of competencies in real-world practice as validation of the framework. Appraisal data were used to generate descriptors of emerging and full competence, and to provide illustrative vignettes.

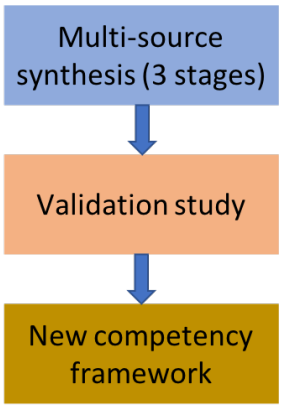
Results. I analysed 17 performance appraisal documents. Demonstration of all three competencies confirmed the content validity of the real-world framework. An adapted word frequency analysis on the factors perceived by GPs to influence decisions highlighted the importance of gaps in knowledge, resilience, bias and practice organisation, though this finding should be treated with caution. Emerging, and full competence were defined. I collected vignettes of real-world practice to guide GPs in the demonstration of each competency.

Conclusion. The real-world EBHC competency framework is a valid instrument for guiding the demonstration of competence in performance appraisal and routine general practice. GPs and appraisers may refer to definitions of emerging, and full competence. GPs may also find illustrative vignettes useful.

6.2 Introduction

The preceding chapter described the third and final stage in the construction of a real-world EBHC competency framework for general practice by multi-source synthesis. It comprised three competencies, which can be expressed in abbreviated form as mindfulness, pragmatism and knowledge of the patient. The work described in this chapter took advantage of annual performance appraisal documents as a rich source of real-world data, and used them to validate the framework, define emerging and full competence, and provide illustrative vignettes for GPs (Figure 6.1).

Figure 6.1 Overall plan of the thesis. This chapter describes the validation study



Annual appraisals provide an intimate insight into the work of the general practitioner.[1] Honest self-reflection is encouraged. Candid descriptions are included, of instances when the GP failed to maintain the desired standard of care. They describe GPs' efforts to achieve and sustain competence across a wide range of professional functions. I aimed to use these authentic data to confirm the content validity of the competency framework. In the context of a competency framework, content validity refers to whether it defines the behaviour of the competent GP and an important aspect of the role.[2] I hypothesised that evidence of competency demonstration within the appraisal documents would confirm content validity. I anticipated that the data would yield relevant and achievable behavioural descriptors for each competency and examples of how to demonstrate them in appraisal and routine practice.

Annual performance appraisal documents were not the only source of data I considered using. At one stage, it appeared that the project was in peril as data were not forthcoming from a local Appraisal Service. Having already helped me obtain consent from GPs to use their appraisals, the Appraisal Service was later forced to withdraw because of time and

workload issues. I sought other sources of data as a backup option. I received an initial positive response from another educational Deanery processing GP appraisals. I also successfully applied to use an archive of video-recorded GP consultations and transcripts, collected by researchers from the Centre for Academic Primary Care at the University of Bristol.[3] Access entailed a data-handling fee. While applying for funding, I received word from the original Appraisal Service that they would indeed be able to send me the appraisal documents as originally planned. In the end, I settled on this course of action.

Having decided on my source of data, I explored possible methodological approaches. My choice was driven by the type of data I planned to use, and the aim of my research. The data from appraisal documents was textual. A number of methods have been used to analyse texts.[4] Examples are:

- Coding of the text, as demonstrated in the synthesis of qualitative and quantitative data (Chapter 3), which could generate theories about the competencies demonstrated;

- Discourse analysis, which could analyse how the language used in appraisals constructs social reality around competence; and

- Semiotics, which could explore how meaning is generated around competence through signs ('signs' in this context meaning '*anything that conveys meaning by standing for something else*'[4]).

The problem with all of these methods however, was that they are all *analytic*. They all seek latent meaning within the data, and from those meanings, they generate new theories about the topic. In contrast, my aim was *descriptive* rather than analytic. I had no interest in seeking latent meaning within the appraisals or generating new theories; rather, my interest lay in seeking manifest and compelling evidence of the stipulated competencies. One method was perfectly suited to my task: content analysis. Content analysis is *'a research method that provides a systematic and objective means to make valid inferences from verbal, visual, or written data in order to describe and quantify specific phenomena.'*[5] Often, a 'concept-driven' coding frame is established in advance of analysing the text, based on existing theory or prior research. It is advised that the various categories within the coding frame should be mutually exclusive to avoid ambiguity.[6] This method suited my own research. My aim of looking for instances of competence demonstrated within the appraisals made the competency framework itself the perfect basis for a coding frame. Next, I considered what mutually-exclusive subcategories would be appropriate. I decided to divide instances of each competency into examples where it was 'emerging,' and examples where it was 'fully developed.' Before committing myself completely to content analysis, however, I sought reassurance from the literature that it had been deployed in similar research to my own. Indeed, I found a review of significant event analyses (a component of GP appraisal) using content analysis to explore their implications for quality of care.[7] The investigators developed a coding frame from existing classifications of errors, adverse and potentially harmful events.[7] This was a concept-driven coding frame similar to the one I envisaged. There were other advantages to content analysis. Although it involves some summarising of the data, the lack of reliance on inductive interpretation and theory

generation on the part of the investigator lends appropriate objectivity to a validation step. The process of categorising data without inductive interpretation lends itself to analysis of a large volume of textual data without losing sight of what is relevant. This was a practical consideration in the planning stage as I did not know how many GPs would agree to submit their appraisal to the study. I concluded that content analysis would be a suitable method for validating the new competency framework.

6.3 Methods

6.3.1. Recruitment and consent

I searched the literature for further examples of research using general practice performance appraisals as a source of data. I wanted to know how the GPs were recruited, and whether their appraisals were anonymised. I found a thematic analysis of appraisal documents, authored by the Associate Dean at Wessex Appraisal and Revalidation, published in 2013.[8] It explored the impact of introducing appraisal and revalidation among GPs on the Channel Island of Jersey, using data from anonymised appraisal documents. I wrote to the lead author, asking if the Wessex Deanery Appraisal Service might be able to help me access anonymised performance appraisals. I provided a detailed proposal. The Appraisal Service agreed to invite GPs to participate by consenting to an analysis of their most recent appraisal. The appraisal service sent the invitation (Appendix 11) by email to all the GP appraisees, numbering around 2200. I requested a second invitation be sent to boost recruitment. Unfortunately, this was not possible because of time and workload limitations within the appraisal service. The sampling frame comprised both part-time and

full-time GPs, and those working in different clinical settings. All had completed their speciality training in general practice. GPs in training undergo a different appraisal process with a designated educational body and were therefore not included. As the study was qualitative and not hypothesis-driven, a formal sample size calculation was not required. I sent willing participants an information sheet (Appendix 12) and consent form (Appendix 13) in the post. They returned signed consent forms to the Appraisal Service.

6.3.2. Data collection, anonymisation and handling

As the data for the content analysis were of a sensitive nature, some preparation was needed to ensure the preservation of anonymity. I completed an online training course in Good Clinical Practice, offered by the Clinical Trials & Research Governance team at the University of Oxford.[9] The course comprises five modules: (1) Protocol and Associated Document, (2) Applications, Agreements and Approval, (3) Trial Master Files, (4) Conducting the Trial and (5) Safety Reporting. Though focused on trials, the principles apply to all research involving people or their data. It is accredited by the Royal College of Physicians, London. To allow me to manipulate sensitive data in a secure online environment, I applied for the use of a High Compliance Storage System. Compared with a standard storage system, the High Compliance System offers the following advantages:

- Enhanced access controls, through tighter policies for registration of users, password change and strength, and restriction to computers on the Medical Sciences Division IT network.

- More comprehensive system monitoring for login attempts, intrusion, and rights assignment changes.

- Tighter restrictions at the firewall, with no access to the Internet.

- No access to external removable media including USB memory sticks, CDs, DVDs.

The user must work at a desktop connected to the Medical Sciences Division network, and which runs on the High Compliance server. All programmes run only on the server, and all the data remain on the server too.

I discussed data encryption with the Appraisal Service administration staff, and sent a link by email, for a video explaining how to send encrypted emails using the free software '7-zip.'[10] The appraisal documents from consenting GPs were delivered to me by email using 7-zip, as compressed, encrypted files. I opened them on the High Compliance System. Data were extracted from relevant sections of the appraisal documents (see below) and anonymised. To anonymise the data, I extracted any that were relevant into a data extraction spreadsheet (MS Excel) without any identifiers. I replaced names of individuals, their job titles and other designations, place names, and the names of educational institutions and courses with the letters 'X' (for a person) or 'Z' (for a place or other identifier). Some appraisal documents had attached files, the data from which were too many to copy into cells within the spreadsheet. I extracted their data to a series of anonymised extraction files in MS Word. I imported all the *anonymised* data extraction files

into 'NVivo 10' qualitative analysis support software on my personal laptop. No sensitive identifiable data were copied from the High Compliance System. The following components of the anonymised appraisals[11] were suitable for analysis:

- Continuing professional development activity. This is a record of both formal and informal learning, undertaken since the previous appraisal. Examples are courses, online modules, case reviews and background reading. The GP is required to comment on how the learning activities supported their various professional roles, and to reflect on how they demonstrated fulfilment of criteria for Good Medical Practice set by the General Medical Council (GMC).[12] The criteria cover four domains of practice: (1) knowledge, skills and performance; (2) safety and quality; (3) communication, partnership and teamwork; and (4) maintaining trust.

- Quality improvement activity. This is a record of activities undertaken to evaluate the quality of the GP's work. Examples include clinical audit and case reviews. The GP is required to describe how they conducted the activities, what actions they took as a result, and to reflect on how they demonstrated fulfilment of GMC criteria for Good Medical Practice.

- Significant events. The GMC defines these as any unintended or unexpected event, which could - or did - lead to harm of one or more patients.[13] The GP reflects upon and draws useful learning from the event. If the GP was not involved in any significant

events, they consider any of which they are aware, and from which they may glean useful learning.

- Achievements, challenges and aspirations. Completion of this section is not mandatory.

- Personal development plan (PDP). This is an itemised list of personal objectives, usually for the following year. The GP stipulates when they expect to achieve each goal, and how this will be recognised. The PDP is agreed by discussion between the GP and their appraiser at the end of each appraisal.

- Review of the previous year's personal development plan. In this section, the appraised GP describes progress towards achieving the actions and goals set in their last appraisal.

- Summary of appraisal. This is an account of the discussion between the GP and their appraiser and is agreed between both parties.

Some material within these sections was supplied as attached files. The remaining sections of the appraisal were considered unlikely to address the objective of the evaluation and were excluded from analysis.

6.3.3. Ethics

As the work appeared to fulfil the characteristics of a service evaluation, I was advised that formal ethics approval might not be required. I wrote to the Clinical Trials and Research

Governance (CTRG) team within Research Services at the University of Oxford. I enclosed a copy of the research proposal and pointed out that it fulfilled criteria for a service evaluation:

- The work would provide an evaluation of current EBHC competence within a sample of UK general practice.

- There would be no reference to an existing standard.

- It would involve the examination of only existing data.

- There would be no actual intervention by the investigator, as GPs had already submitted their appraisals.

- No randomisation was involved.

- It involved only a current 'intervention' (appraisal), which was already a mandatory requirement for GPs.

CTRG confirmed that my work fulfilled the criteria for a service evaluation. They had one query regarding the generalisability of results. I confirmed that the findings would not be generalisable beyond the sample of appraisals of GPs using the Wessex Deanery Appraisal and Revalidation Service. It was agreed that my work appeared to be a service evaluation

and therefore would not need review by a research ethics committee. I passed this confirmation to the Appraisal Service. They were then willing to proceed.

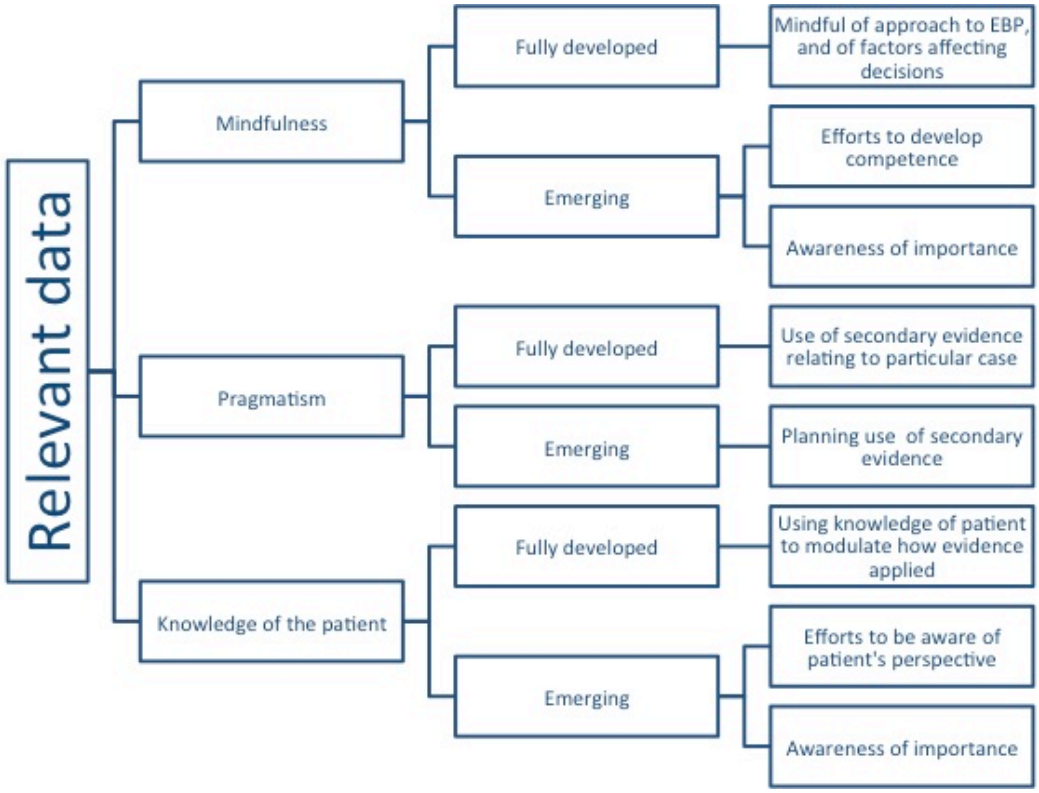
6.3.4. Analysis

The content analysis followed the steps described by Downe-Wamboldt:[5] (1) selecting the unit of analysis; (2) creating and defining categories; (3) pretesting category definitions and rules; (4) assessing reliability and validity; (5) revising the coding rules where necessary; (6) pretesting the revised coding rules where necessary; (7) coding all the data; and (8) reassessing reliability and validity. The unit of analysis (step 1) was an individual GP's most recent completed annual performance appraisal document, together with any relevant attached files. I based categories (step 2) on the competency framework (Figure 6.2). This was appropriate given the primary aim of determining whether the competencies were demonstrated within the appraisal documents. The coding frame was further subdivided to allow differentiation of 'emerging' from 'full' competence. This was to enable me to address the other aims of the exercise: to generate behavioural descriptors of emerging and full competence, and illustrative vignettes from examples of real-world practice. Code definitions were as follows:

Mindfulness:

- Fully developed: the GP demonstrates mindfulness towards their approach to EBHC, and towards factors that affect their decisions.

Figure 6.2 Coding frame



- Emerging: the GP demonstrates efforts to develop competence, or awareness of the importance of factors affecting decisions.

Pragmatism:

- Fully developed: the GP uses secondary (pre-appraised) evidence to assist decision-making in an individual case.

- Emerging: the GP demonstrates plans to use secondary evidence to assist decision-making.

Knowledge of the patient:

- Fully developed: the GP demonstrates how knowledge of the individual patient modulates their approach to applying evidence.

- Emerging: the GP demonstrates efforts to be aware of, or awareness of the importance of, the individual patient's perspective.

The analysis was conducted using 'NVivo 10' qualitative analysis support software. I piloted coding on a random sample of three appraisal documents to determine whether my coding frame was clear and unambiguous and whether it needed further refinement. I repeated the process to assess reliability. Testing the validity of the coding frame would have involved seeking the view of a panel of experts. I felt as the coding frame was the result of my own research, such an exercise would have gained little. Furthermore, the validity of the resulting competency framework would be tested in the next stage of the study. I decided, therefore, to forego this step. I found the coding rules did not require further testing or alteration. I then completed the coding process. I grouped data within each category where they shared meaning. The resulting sub-categories guided the construction of descriptors for the full and emerging development of each competency.

One particular sub-category contained a large amount of data (*mindful of approach to EBHC, and of factors affecting decisions*). This presented the opportunity to conduct an additional unplanned word frequency analysis, generating a pictorial representation of the relative frequency at which words occurred in the text (word cloud). The size of each word

depicted in a word cloud reflects its frequency. The technique can provide a brief overview of textual data preliminary analysis of text, highlighting phenomena that may not have been anticipated, and thus providing possible directions for more careful analyses.[14] It can visually communicate the words or topics that correlate with an outcome of interest.[15] Its use as a validation tool has also been recognised.[14] The frequency of words with particular meaning may or may not reflect the findings of other analyses of the same data. Caution must be exercised, however. Word frequency analyses have been criticised on a number of grounds. Simple numerical word counts fail to convey anything about the context in which the word was used, and the significance of a word is lost.[14] For example, a GP might refer to 'stress.' The word might have been used to convey serious anxiety, or alternatively, to convey mild discomfort at running behind schedule. Also, derivations of words, mis-spellings and words with shared meaning are not counted together.[16] For example, several GPs all expressing a similar point about difficulty interpreting meta-analyses might use 'metaanalysis,' 'meta-analyses' or 'metanalysis.' The frequency of each variant may not reflect the frequency with which the particular point is expressed. I attempted to mitigate these problems by adapting the technique. Instead of counting the words in the original text, I summarised each piece of coded text in a single descriptive word. For example, 'loss of resilience' (which occurred three times in the text), 'stress' (which occurred four times) and 'good and bad days in terms of mood' (one instance) were all assigned the summary word 'resilience.' This preserved the meaning and context of each piece of coded text as both aspects were known to me. Alternative word derivations and mis-spellings were also accounted for. The result was a total of eight counts of 'resilience,' each instance sharing

the same meaning and context. I supplied a glossary to explain the meaning of each summary word (Appendix 14).

I constructed behavioural descriptors for each developmental level from cases described among the appraisal documents. As these examples were adapted to fit their descriptive purpose, they were assessed for face validity by two experienced GPs and adjusted accordingly. Finally, I identified where in the standard appraisal document each developmental level could be demonstrated.

6.4 Results

6.4.1. Recruitment numbers and sample characteristics

I received initial consent by email from 21 GPs. Three did not return a signed consent form, and one withdrew consent. 17 GPs provided written consent for analysis of their most recent appraisal document, and I included their anonymised data in the study. The characteristics of those GPs are shown in Table 6.1. There was a roughly symmetrical gender balance among them. All had more than ten years of experience since qualification, and most of them had more than 20 years. None had any specific postgraduate qualification in EBHC, such as a Masters or doctorate. Most worked part-time.

6.4.2. Reliability of coding

Coding was straightforward, as the coding frame comprised mutually exclusive, clearly defined categories based on the research question. Repeated codings were identical, and

Table 6.1. Characteristics of sample (N=17)

		N (proportion of sample)
Gender	Male	8 (47%)
	Female	9 (53%)
Years since qualification	<10	0
	10-20	3
	>20	13
	Not recorded	1
Postgraduate Qualifications	MRCGP	14
	DRCOG	12
	DCH	4
	Evidence-Based Health Care	0
Work pattern	Full-time	5
	Part-time	10
	Locum	2

calculation of reliability was therefore unnecessary. The simple coding frame also obviated the requirement to seek saturation of data, as no further categories were generated inductively.

6.4.3. Evidence of competence within appraisals

6.4.3.1. Mindfulness in one's approach towards EBHC itself, and to the influences on decision-making.

Five GPs demonstrated *the full* development of this competency in their appraisal, described by three categories (Table 6.2):

1. Application of mindfulness training in practice: one GP gave an account of how he had learned actual mindfulness meditation techniques for use in stressful situations. He reported having found himself responding differently to challenging situations. I concluded that this was likely to apply to decision-making given that the latter is a core aspect of a GP's work.

2. Awareness of knowledge gaps during clinical work: two GPs described using PUNs and DENs (Patients' Unmet Needs and Doctors' Educational Needs). This is an educational strategy proposed by Eve, which attempts to identify learning and practice development needs.[17] The GP is encouraged to ask '*Was I equipped to meet the patient's needs?*' and '*Could I have done better?*' Another GP described reflecting on her consultations and looking things up afterwards.

3. Non-judgemental self-awareness: one GP described an objective, open response to instances of poor performance. This entailed honesty with himself, his friends, partners and colleagues, and allowed him to learn from poor decisions.

Table 6.2. Examples of full and emerging competence from text of appraisal documents

Mindfulness in one's approach towards EBHC itself, and to the influences on decision-making
Fully developed
Application of mindfulness training in practice: 'I have learned mindfulness meditation techniques that are helpful in managing stressful situations, and I find myself responding differently in challenging situations.'
Awareness of knowledge gaps during clinical work: 'Some of my greatest teachers have been my patients, and I often make notes of DENs, prompted by patients, to guide my learning…'
Non-judgemental self-awareness: 'I try to be honest to (sic) myself, my friends and partners and my colleagues. Where I haven't done as well as I might, I try to be open with people about it and learn from it.'
Emerging
Planning for own illness relapse: 'If I were in any doubt at all that my health might put my patients at risk, I would not work, and (would) contact my GP and psychiatrist immediately.'
Effort to be mindful of limited cognitive capacity: 'Think of brainpower as a bucket with a fixed capacity…The bucket is filled with other thoughts, e.g. when stressed, hungry, excited about external issues. It is important to think about how to empty the 'bucket' to create capacity to think…I will reflect on the 'bucket' before I start any surgery and every hour or so, in order to focus on the task in hand.'
Effort to be mindful of stress: 'Develop access to Mindfulness Plus state (positive reappraisal) and learn to grow when under stress.'
Effort to develop self-awareness: 'Self-awareness – understanding what aspects of ourselves are having an impact.'
Effort to understand patient: 'Use mindfulness – increases listening skills and ability to listen to patients.'
Awareness of influence of self: 'Maintenance of breadth of clinical knowledge, reflecting recent evidence-based changes.'
Awareness of influence of patients: 'I knew I should treat him like any other patient, but felt slightly uncomfortable doing so…highlights the problem of having doctors as patients, particularly if you know them quite well.'
Awareness of GP-patient dyad: 'RCGP workshop – this covered…building trust, communication etc. Would like to apply this approach in an away day session…'
Awareness of influence of the presenting problem: 'The most delayed patients were discussed in detail, looking at the most likely reasons for the delays (difficult diagnoses, non-specific symptoms).'
Awareness of the influence of work environment: 'Her first appointment was late in the afternoon, on the last working day before Christmas, and I think this changed the nature of the consultation from the outset.'

Continued

Pragmatism in one's approach to finding and evaluating evidence
Fully developed
Use of secondary evidence while consulting: 'NB Hot Topics…electronic version to put on all devices…Has KISS (Keep It Simple Summaries) to use in consultations with links to original sources and patient resources.'
Emerging
Planning use of secondary evidence: 'My general practice work requires that I remain up-to-date across the whole spectrum of medical problems that I might encounter, so a Hot Topics course attendance is planned…'
Knowledge of the patient as the most useful resource in effective communication of evidence
Fully developed
Judgement of when EBHC is appropriate: 'My main concern from the outset was the prescribing of benzodiazepines, but I think I felt the need to get her 'on side' at the first consultation, without scaring her off and to encourage her to return for follow-up.'
Integrating patient's perspective in decisions: 'I have always demonstrated to patients that I have the clinical knowledge that I must impart to them in a clear, understandable way, and then must support them in helping make decisions from their perspective.'
Emerging
Efforts to include patient's perspective: 'I do my utmost to show respect…Including considering their own health beliefs and cultural background…'
Awareness of importance of the Dr-patient relationship: 'I enjoy seeing the same patients because I feel relationships between doctors and patients develop over time.'
Awareness of tension between EBHC and patient perspective: 'I see a patient wanting this, but the guidelines and my professional judgement say this…'
Awareness of the importance of the patient perspective: 'Each of us should take one patient contact a day, and reflect on whether it would be what we would have wanted for ourselves.'

Three GPs demonstrated *emerging* competence, described by ten categories. Five categories described efforts to develop mindfulness in clinical practice (Table 6.2):

1. Planning for their own illness relapse: one GP who had a history of mental illness made efforts to encourage mindfulness of any relapse, by formulating a plan of action.

2. Effort to be mindful of limited cognitive capacity: one GP had learned a ‘bucket' analogy which described the limited capability of the mind to deal with competing influences, the ‘bucket' sometimes having no space left for effective decision-making. She resolved to reflect on this periodically throughout her working day.

3. Effort to be mindful of stress: one GP planned to use mindfulness techniques to respond positively to pressure.

4. Effort to develop self-awareness: one GP described an intention to meet challenging consultations with curiosity and self-awareness, to pre-empt poor decisions, and to be aware of their defence mechanisms.

5. Effort to understand the patient: one GP planned to use mindfulness to listen more carefully to patients.

Five further categories described an awareness of the factors impacting on decisions (Table 6.2). Several GPs contributed data to each category:

1. Awareness of the influence of factors relating to oneself: this included elements of personal organisation, illness, awareness of one's limitations, and working style. It also included administrative burdens, consultation skills, and some ‘human frailties', such as cognitive bias, knowledge gaps, perfectionism, and difficulty saying ‘no'.

2. Awareness of the influence of factors relating to patients: this category encompassed patient expectations, various personality traits, learning difficulty, cultural diversity, and the patient who also happens to be a doctor.

3. Awareness of the influence of factors relating to the GP-patient dyad: this category comprised issues of trust, rapport, poor communication, and 'bargaining', in which the GP and the patient both make conditional compromises.

4. Awareness of the influence of the presenting problem: problems of particular complexity, or those of a sensitive nature, can impact on decisions.

5. Awareness of the influence of the work environment: this broad category encompassed factors relating to the workplace within the surgery (such as organisational processes and availability of equipment), demands placed on the GP's work by professional governance and standards, and the accuracy of available diagnostic tests.

There were sufficient data to carry out a word frequency analysis on the factors perceived by GPs to influence decisions. This generated the word cloud shown in Figure 6.2. It illustrated the importance attached to addressing knowledge gaps. References also occurred frequently to 'resilience'. This has been defined in the context of clinical practice as '*a dynamic, evolving process of positive attitudes and effective strategies, employed in response to life stressors.'*[18] There was also a frequent appreciation of 'bias' as a factor in making decisions. Several forms of bias were described:

Figure 6.3 Factors that GPs perceive to influence decisions: frequency of single-word representations (most frequently occurring words are larger)*



*See Appendix 14 for a glossary of terms

- Posterior probability error: this occurs when a physician's estimate of the likelihood of disease is unduly influenced by what has come before for a particular patient.[19]

- Ascertainment bias: this occurs when prior expectation affects a physician's thinking.[19]

- Unpacking principle: a doctor might miss important diagnoses through a failure to elicit all relevant information.[19]

- Availability: the disposition to judge things as being more likely, or frequently occurring if they readily come to mind.[19]

- Anchoring: the tendency to perceptually lock onto salient features in the patient's initial presentation too early in the diagnostic process, and failing to adjust this initial impression in the light of later information.[19]

- Premature closure: the tendency to close the decision-making process too soon, accepting a diagnosis before it has been fully verified.[19]

- Expectation bias: expectation that an opinion is trustworthy because of seniority or experience.[19]

GPs frequently referred to 'organisation' as an influence on decisions. This referred to the organisational processes within the surgery (which could result, for example, in interruptions, excessive workload or a particular mix of cases), availability of equipment, the suitability of the clinical environment for efficient work, and the effect of information technology on the consultation. I have provided a full glossary of words from Figure 6.2 in Appendix 14. It explains how each word relates to perceived factors that influence decisions.

6.4.3.2. Pragmatism in one's approach to finding and evaluating evidence.

Seven GPs demonstrated *full* development of this competency in their appraisal, described by a single category (Table 6.2): use of secondary (pre-appraised) evidence while consulting. The sources of evidence included a variety of clinical practice guidelines and management 'pathways,' Map of Medicine,[20] the NB Medical Education Hot Topics GP update course,[21] GP Notebook,[22] and NICE Clinical Knowledge Summaries.[23] Seven GPs demonstrated *emerging* competence, described by the single category 'planning to use secondary (pre-appraised) evidence.'

6.4.3.3. Knowledge of the patient as the most useful resource in the effective communication of evidence.

Two GPs demonstrated *full* competence, described by two categories: (1) judgement of when EBHC is appropriate; and (2) integrating the patient's perspective in making decisions. Five GPs demonstrated *emerging* competence, described by four categories: (1) efforts to include the patient's perspective in making decisions; (2) awareness of the importance to EBHC, of the doctor-patient relationship; (3) awareness that there is sometimes a tension between the patient's perspective on management, and application of the best available evidence; and (4) awareness of the importance of the patient's perspective.

6.4.3.4. Descriptors for each competency

The categories describing each competency were collapsed to form one single descriptor for full competence, and one for emerging competence:

Competency 1. Mindfulness in one's approach towards EBHC itself, and to the influences on decision-making:

Full competence: The GP is objectively, and non-judgementally aware of the factors affecting their decisions.

Emerging competence: The GP is aware of the breadth of factors that may influence their decisions, and makes efforts to facilitate an awareness of them while consulting.

Competency 2. Pragmatism in one's approach to finding and evaluating evidence:

Full competence: The GP is adept at using trustworthy sources of secondary, pre-appraised evidence to address gaps in their knowledge that arise during consultations.

Emerging competence: The GP makes efforts to find, and become acquainted with trustworthy sources of secondary, pre-appraised evidence, and to ensure they have access to them during consultations.

Competency 3. Knowledge of the patient as the most useful resource in communicating evidence:

Full competence: The GP uses their knowledge of the individual patient to judge when current best evidence should be applied, and integrates an assessment of the patient's capacity and perspectives in making shared decisions.

Emerging competence: The GP is aware that knowledge of the individual patient, and an appreciation of their capacity and perspectives are essential to the successful application of evidence.

Real-world examples of each competency, both emerging and fully developed, are given in Table 6.3, with an indication of where a GP might demonstrate them in the appraisal document. The examples were adapted from actual appraisal content.

Table 6.3. Description of competencies, real-world examples, and demonstration in appraisal document

Competence	Descriptor	Examples in real-world practice	Section(s) of appraisal suitable for demonstration*
Mindfulness			
Full	The GP is objectively, and non-judgementally aware of the factors affecting their decisions.	A nervous young dad asks the GP how much paracetamol he should give his feverish 3-year-old to reduce distress. The GP is aware of evidence that paracetamol is not indicated, but is also aware that a feeling of antipathy towards EBHC as 'cookbook medicine,' inadequate in itself to manage individual patients, may influence her decision. She decides to 'park' that feeling for now, and makes a note to reflect later on its possible origins.	QIA, SE, PDP
Emerging	The GP is aware of the breadth of factors that may influence their decisions, and makes efforts to facilitate an awareness of them while consulting.	A GP is aware that he is currently subject to a number of life stresses, including house purchase, and a recent bereavement. He resolves to allow an extra 15 minutes before each session, to allow his mind to empty itself of all these other issues.	QIA, SE, PDP, CPD
Pragmatism			
Full	The GP is adept at using trustworthy sources of secondary, pre-appraised evidence to address gaps in their knowledge that arise during consultations.	A GP is unsure which symptomatic treatment to offer a seventy-year-old with stable angina and hypertension. He asks the patient to excuse him a moment while he consults a KISS (Keep It Simple Summary) sheet he has downloaded from the NB Medical Education 'Hot Topics' website. He advises the patient that in terms of best available evidence, a rate-limiting calcium channel blocker would be most appropriate for his condition.	QIA, SE, PDP
Emerging	The GP makes efforts to find, and become acquainted with trustworthy sources of secondary, pre-appraised evidence, and to ensure they have access to them during consultations.	A GP plans to retire from a partnership and to continue practice as a locum. She downloads local pathways from her Clinical Commissioning Group website and puts them in a folder to take with her as she moves between surgeries.	QIA, SE, PDP, CPD

Continued

Knowledge of the patient			
Full	The GP uses their knowledge of the individual patient to judge when current best evidence should be applied and integrates an assessment of the patient's capacity and perspectives in making shared decisions.	An elderly patient requests a sleeping tablet, having suffered recent bereavement. The GP recalls a complaint by the patient some months ago when she had suggested referral for cognitive behavioural therapy (CBT) during a bout of anxiety. He may react adversely to the suggestion of CBT for insomnia. She explains the disadvantages of using medication and suggests a programme of exercise. The patient agrees to this. The GP cautiously ventures that another strategy that has been shown to be effective is CBT. As the patient immediately shakes his head, the GP suggests they stick with the exercise programme.	QIA, SE, PDP
Emerging	The GP is aware that knowledge of the individual patient, and an appreciation of their capacity and perspectives are essential to the successful application of evidence.	A GP feels he could improve his ability to negotiate evidence-based management plans with patients, by learning more about how to cultivate a therapeutic doctor-patient relationship. He registers for a course on advanced consultation skills.	QIA, SE, PDP, CPD

* QIA: Quality Improvement Activity; SE: Significant Events; PDP: Personal Development Plan; CPD: Continuing Professional Development

6.5 Discussion

The finding of this content analysis was that each component of the proposed real-world competency framework was evident within a sample of GP performance appraisals. This supports the case for content validity. On the basis of appraisal content, behavioural descriptors were generated to clarify the attributes that represent emerging and full competency development. Recommendations were made for the most appropriate sections of the appraisal document for demonstration of each competency. The findings suggest the competency framework is achievable in real-world general practice, and can

be demonstrated using standard appraisal tools. The word frequency analysis suggested that GPs perceive gaps in their knowledge as a major factor influencing decisions. This may represent a healthy attitude towards continued learning, or may just reflect the statutory requirement to log a certain amount of continuing professional development activity. Encouragingly, there was evidence of an appreciation of a wide array of influences on routine work. 'Resilience' was a prominent term, referring to a dynamic, evolving process of positive attitudes and effective strategies that we employ in response to life stressors.[18] GPs also recognised various forms of cognitive bias and aspects of practice organisation for their influence on decision-making. Findings from the word frequency analysis are not conclusive however, in the absence of further empirical study. It was interesting that 'experience' did not appear in the word cloud. This was because the concept was captured by the word 'instinct' (Appendix 14). This might indicate that GPs' experience affects their decisions at a more subconscious level.

Notably, several GPs had attended formal mindfulness training, reflecting its current popularity. As noted in the previous chapter, it has generated considerable interest in medical education, with many medical and dental schools offering courses.[24]

For 25 years, a traditional framework has dominated the EBHC literature, based on five key steps.[25] This traditional framework was consolidated by a simple electronic consensus in the Sicily Statement of 2005, and was never formally validated.[25] Chapter 2 described a number of barriers to this traditional model, and a prevailing attitude of disenfranchisement among GPs. The real-world competency framework proposed in this

thesis differs from the traditional five-step model in a number of fundamental ways. Firstly, it has been tailor-made for general practice, making it more relevant, achievable and demonstrable. Secondly, it places fewer demands on the clinician in terms of ability to search for primary research evidence, and to conduct critical appraisals of evidence within the course of their clinical work, both of which have proven difficult in general practice.[26] It places greater demands on the clinician, however, regarding awareness of factors affecting decisions. In addressing these factors, a wider purview is required, coupled with an objective honesty derived from non-judgemental self-compassion. Chapter 5 compared the proposed real-world competency framework with other general practice curricula and competency frameworks. This broader, more objective appreciation of factors affecting decisions is echoed in the curriculum published by the Royal Australian College of General Practitioners (RACGP). Examples are: '*Be aware of your own knowledge, limitations, biases and values that influence the way one practices medicine,'* and *'Be aware of external influences on your own practice (e.g. pharmaceutical companies, media) and be confident in dealing appropriately with these influences.'*[27] Finally, in the application of evidence in practice, the real-world framework extends the notion of 'patient perspective' to encompass a more vital and dynamic influence: the relationship between doctor and patient, regarded by many as the cornerstone of general practice.[28] No longer is it sufficient to consider the patient's unique values, perspective and capacity. The real-world competency framework requires *knowledge* of the patient, to the extent that the GP can anticipate the most appropriate strategy for applying evidence. This approach may result in an acknowledgement that it would be better postponed, or not applied at all. Again, this alternative view is echoed within the curriculum of the Royal College of General

Practitioners (RCGP) in the UK: '*Being aware of how you impart information about evidence so that patients can best understand relevant evidence and be helped in making a decision.'*[29]

The standard GP performance appraisal document provided an excellent proxy for certain components of real-world general practice. Its design, based on an ethos of transparency and honest reflection, ensured a high-fidelity account of significant events, personal observations on actual episodes of care, and reflections on learning. It provided therefore, an ideal tool for testing the validity of the real-world competency framework. There were, however, limitations to the study. These are discussed in the following section.

6.5.1. Limitations

One limitation of this content analysis was potential selection bias in the recruitment of GPs willing to share their appraisal. These GPs may have felt comfortable to do so because of a perception that their appraisal was of high quality. Generalisability to other regions, in which GPs might be subject to differing working conditions, was limited. Few data were available on which to judge the representativeness of the sample in terms of the wider population of GPs. A larger sample of GPs, selected at random from several geographical areas would have contributed to a more robust study, but this was not feasible given the practical constraints under which I was working. For this reason, only one reviewer coded the data. This might impair the reliability of findings, and the study would have been stronger if a second independent investigator had coded data, blinded to the decisions made by the first. The threat to reliability was mitigated, however, by repeat coding after

a number of days, and the finding that the coding did not change over this time. This consistency was not surprising, given that a simple, highly specific coding frame was constructed *a priori*, in which the categories were mutually exclusive. The sample of appraisal documents was small. It is likely, however, that a larger sample would have simply consolidated the finding that the competencies were indeed demonstrated within the appraisals. The word frequency analysis was unplanned, and therefore potentially susceptible to shaping of the findings according to preconceived ideas on my part. However, its conduct was not prompted by a particular finding, but merely the volume of data available for one sub-category. It also relied upon the interpretations of a single investigator and could only reflect factors of which the GPs were aware. The findings must therefore be treated with caution as potentially hypothesis-generating rather than hypothesis-testing.

6.6 Conclusion

Content validity of the proposed real-world competency framework was demonstrated within a small sample of GP performance appraisal documents. The content analysis also enabled the construction of definitions for emerging and full competency, examples of how the competencies may be demonstrated in real-world practice, and where in the standard appraisal document they may be demonstrated. These additional details will improve the utility of the competency framework as a tool for learning EBHC in general practice. The study was susceptible to selection bias and limited generalisability. Further study will be needed. This will be discussed in the next chapter, along with potential applications.

6.7 Summary

The conclusions of this chapter can be summarised as follows:

- The real-world EBHC competency framework proposed for GPs has content validity as a tool for guiding the development of competence, both incorporated into the standard appraisal process and within routine practice.

- The study was limited by selection bias and limited generalisability, and further study will be needed to corroborate the findings of this study.

- Behavioural descriptors have been developed for each competency, allowing differentiation of emerging and full competence.

- A guide has been offered, proposing where each competency can be demonstrated within the standard appraisal document.

6.8 References

1. Conlon M. Appraisal: the catalyst of personal development. *BMJ: British Medical Journal.* 2003:389-391.
2. Klein AL. Validity and Reliability for Competency-Based Systems: Reducing Litigation Risks. *Compensation & Benefits Review.* 1996;28(4):31-37.
3. One in a Million: Primary Care Consultations Archive. http://bristol.ac.uk/primaryhealthcare/researchthemes/one-in-a-million/ Accessed 24.08.2017.
4. Schreier M. *Qualitative Content Analysis in Practice.* SAGE; 2012.
5. Downe-Wamboldt B. Content analysis: method, applications, and issues. *Health care for women international.* 1992;13(3):313-321.
6. Krippendorff K. *Content analysis: An introduction to its methodology.* Sage; 2012.

7. McKay J, Bradley N, Lough M, Bowie P. A review of significant events analysed in general practice: implications for the quality and safety of patient care. *BMC family practice.* 2009;10(1):61.
8. Caesar S, Locke R, Scallan S. Medical appraisal and revalidation: can it improve patient care? *Education for Primary Care.* 2013;24:398-400.
9. Clinical Trials & Research Governance team, The University of Oxford. Good Clinical Practice (GCP) Online Course. http://gcp.admin.ox.ac.uk/ Accessed 12.08.2017.
10. 7-zip. http://www.7-zip.org Accessed 24.08.2017.
11. NHS England. Medical Appraisal Guide. A guide to medical appraisal for revalidation in England. https://www.england.nhs.uk/medical-revalidation/appraisers/med-app-guide/ Accessed 12.11.2018.
12. Petrova M, Dale J, Fulford BK. Values-based practice in primary care: easing the tensions between individual values, ethical principles and best evidence. *British Journal of General Practice.* 2006;56(530):703-709.
13. General Medical Council. Guidance on supporting information for appraisal and revalidation. https://www.gmc-uk.org/registration-and-licensing/managing-your-registration/revalidation/guidance-on-supporting-information-for-appraisal-and-revalidation Accessed 15.11.2018.
14. McNaught C, Lam P. Using Wordle as a supplementary research tool. *The qualitative report.* 2010;15(3):630-643.
15. Schwartz HA, Ungar LH. Data-driven content analysis of social media: a systematic overview of automated methods. *The ANNALS of the American Academy of Political and Social Science.* 2015;659(1):78-94.
16. Turner D. Quirkos Blog. Using word clouds in qualitative research. https://www.quirkos.com/blog/post/word-clouds-and-word-frequency-analysis-in-qualitative-data Accessed 24.12.2017.
17. Stanton F, Grant J. Approaches to experiential learning, course delivery and validation in medicine. A background document. *Medical Education.* 1999;33(4):282-297.
18. Jensen PM, Trollope-Kumar K, Waters H, Everson J. Building physician resilience. *Can Fam Physician.* 2008;54(5):722-729.
19. Croskerry P. The importance of cognitive errors in diagnosis and strategies to minimize them. *Academic medicine.* 2003;78(8):775-780.
20. Brown CK. Values-based care. *British Journal of General Practice.* 2007;57(536):243.
21. McCord G, Smucker WD, Selius BA, et al. Answering questions at the point of care: do residents practice EBM or manage information sources? *Academic Medicine.* 2007;82(3):298-303.
22. de Lusignan S. An educational intervention, involving feedback of routinely collected computer data, to improve cardiovascular disease management in UK primary care. *Methods of Information in Medicine.* 2007;46(1):57-62.
23. Magrabi F, Westbrook JI, Coiera EW. What factors are associated with the integration of evidence retrieval technology into routine general practice settings? *International Journal of Medical Informatics.* 2007;76(10):701-709.

24. Dobkin PL, Hutchinson TA. Teaching mindfulness in medical school: where are we now and where are we going? *Med Educ.* 2013;47(8):768-779.
25. Dawes M, Summerskill W, Glasziou P, et al. Sicily statement on evidence-based practice. *BMC Med Educ.* 2005;5(1):1.
26. Zwolsman S, te Pas E, Hooft L, Wieringa-de Waard M, van Dijk N. Barriers to GPs' use of evidence-based medicine: a systematic review. *Br J Gen Pract.* 2012;62(600):e511-521.
27. The RACGP Curriculum for Australian General Practice 2011. 2011; http://curriculum.racgp.org.au Accessed 27 July 2015.
28. Kearley KE, Freeman GK, Heath A. An exploration of the value of the personal doctor-patient relationship in general practice. *Br J Gen Pract.* 2001;51(470):712-718.
29. Royal College of General Practitioners curriculum. http://www.rcgp.org.uk/GP-training-and-exams/GP-curriculum-overview.aspx Accessed 06.05.2016.

CHAPTER SEVEN

Conclusions

7. Conclusions

7.1 Summary of research findings

The findings of this thesis were as follows:

- A qualitative-quantitative synthesis (Stage 1 of a multi-source synthesis) generated two outputs: (1) five credible themes describing the meaning of EBHC competence in general practice; and (2) a 'straw model' competency framework for refinement by a panel of experts.

- A Delphi process among a panel of experts in general practice and EBHC (Stage 2 of a multi-source synthesis) refined the 'straw model' and generated seven further themes describing the meaning of EBHC competence in general practice.

- Stage 3 of a multi-source synthesis integrated the themes derived from the qualitative-quantitative synthesis and the Delphi process, resulting in a simple EBHC competency framework for real-world general practice. The competencies were (1) mindfulness - in one's approach towards EBHC itself, and to the influences on decision-making; (2) pragmatism – in one's approach to finding and evaluating evidence; and (3) knowledge of the patient – as the most useful resource in effective communication of evidence.

- A content analysis of a sample of 17 GP annual performance appraisal documents demonstrated content validity of the new competency framework as a tool for guiding the development of EBHC competence, both in the appraisal process and within routine

practice. Behavioural descriptors were developed for each competency, allowing differentiation of emerging and full competence. I illustrated each competency with a clinical vignette adapted from appraisal content. I also provided a guide proposing where each competency can be demonstrated within the standard appraisal document.

7.2 The stepwise refinement of a new competency framework: a summary of the process

The new competency framework developed in this thesis was the result of a process of refinement. It started with a qualitative-quantitative synthesis of the literature about EBHC competence among GPs (Stage 1 of a multi-source synthesis). The findings were based on 38 studies, gathering data from over 3500 GPs in total. To my knowledge, this was the most comprehensive investigation to date, of EBHC competence in general practice. At this early stage of the thesis, the picture of EBHC that emerged already differed from the traditional five-step model that has dominated for the last 25 years.[1] The most significant finding was that steps two and three of the traditional model – systematic retrieval of the best evidence available, and critical appraisal for validity, clinical relevance and applicability – were found to lack credibility. There was a focus on EBHC as a collaborative activity among GP colleagues. It was appropriate for GPs to save precious time by seeking pre-appraised summaries of evidence. There was a new role for the GP, as an advocate for EBHC within their practice. Decision-making involved reflection on a broader set of influences: evidence (availability, quality and applicability); experience (the GP's own accumulated on-the-job knowledge); empathy (appropriate consideration of the individual patient's perspective,

capacity and circumstances); and environment (the influence of external factors such as time pressure or access to resources).

The Delphi process (Stage 2 of the multi-source synthesis) took this literature-derived version of general practice EBHC and refined it using the perspectives of a panel of experts in general practice and EBHC. I presented to the group of experts the themes generated in the qualitative-quantitative synthesis, and a ‘straw model' competency framework derived from those themes. They were asked to focus on three particular factors: importance regarding delivery of the best possible care, achievability in the general practice setting, and demonstrability using existing appraisal tools. The themes resulting from the Delphi process reinforced the importance attached to the individual patient. They also supported a shift towards the more pragmatic use of pre-appraised evidence. Reflection had evolved into a more continuous background process rather than occurring in discrete episodes. It also required objectivity and an awareness of the GP’s own needs. There was recognition that the decision-making process draws on a more complex array of knowledge sources than previously thought. There was no support for the notions of EBHC as a collaborative activity, or of an advocacy role for the GP.

To make sure the data from the literature and the Delphi study were all taken into account, the themes arising from both sources were integrated in the third and final stage of a multi-source synthesis. What emerged was a simple framework comprising only three competencies.

The first was *mindfulness in one's approach towards EBHC itself, and to the influences on decision-making*. I defined mindfulness in this context as '*a non-judgemental, global awareness of the physical and mental processes at play in the present moment.'* It involves keeping an open mind towards EBHC as a discipline, aware of its strengths and limitations. It entails an awareness of the subjective views, biases and entrenched beliefs – among all parties - influencing decisions. Rather than try (often in vain) to suppress these influences, mindfulness embraces them as an inevitable part of the cognitive process of EBHC and only asks that they are acknowledged and weighed up. By maintaining such a detached awareness, the GP can make a rational decision whether to act on such influences or put them aside. There is an element of self-compassion, recognising the constraints imposed by the working environment.

The second competency was *pragmatism in one's approach to finding and evaluating evidence.* This pragmatism requires a realistic 'just-in-time' approach to finding useful, valid evidence during busy routine work. Accepting that it is not feasible to conduct systematic searches and critical appraisals within or between consultations, it means becoming familiar with, and adept at using trusted online sources of pre-appraised evidence.

The final competency was *knowledge of the patient as the most useful resource in effective communication of evidence*. This competency reflects the philosophy of care underpinning the doctor-patient relationship in general practice. It refers to the particular ability of the general practitioner to 'read' their patients – to know instinctively when it is appropriate to communicate evidence, and when it is better to save it for another opportunity. The GP

can enhance their knowledge of the patient by cultivating a stable, therapeutic doctor-patient relationship.

There are some similarities between this new competency framework and the other EBHC competency frameworks and curricula investigated. For example, there is a suggestion of mindfulness in the RCGP stipulation that GPs must '*Be aware that beliefs and values, in doctor and patient, influence the interpretation of research results in support of potentially divergent views*.'[2] Knowledge of the patient is also echoed in the RCGP curriculum: '*Communicate the evidence for management, diagnosis or screening to patients in a manner that is both understandable to the patient, and is patient centred*.'[2] All the frameworks and curricula reviewed in Chapter 2 have - like the new framework - shifted perspective away from the stepwise, sequential nature of the traditional model, perhaps recognising the difficulty of integrating such a process with routine work.[2-5] However, compared to the new framework, these other competency frameworks and curricula adhere more strictly to the competencies of the traditional EBHC model overall, particularly regarding evidence retrieval and critical appraisal. I designed the simpler framework for ease of integration with the appraisal process, and with routine care.

Like the traditional five-step model of EBHC, I found the new competency framework closely resembles Kolb's model of experiential learning.[6] It may, therefore, share its properties of suiting all learning styles and promoting deep learning.[7] This might result in better evidence-based decision-making, and could be the subject of further research.

The standard GP performance appraisal document provided a useful window to real-world general practice. Based on principles of transparency and honest reflection, it provided a high-fidelity account of significant events, personal observations on actual episodes of care, and reflections on learning. It was, therefore, an ideal tool for testing the content validity of the real-world competency framework. Even in such a small sample of appraisals (17 in total), GPs demonstrated each competency. It is likely that they would have also been demonstrated in a larger sample.

From appraisal content, behavioural descriptors were constructed to clarify the attributes that represent emerging and full competency development. The purpose of the descriptors was to help GPs gain a deeper understanding of competency development. The content of appraisals also provided some clinical vignettes that were used to illustrate emerging and full competence in practice. I made recommendations for the most appropriate sections of the appraisal document in which a GP could demonstrate each competency. I concluded that the competency framework is achievable in real-world general practice, and could be demonstrated using standard appraisal tools.

The content analysis showed that some GPs were already using mindfulness techniques, or intending to undergo training. Mindfulness has already become popular,[8] so more GPs may be willing to incorporate it into routine practice. The analysis also demonstrated that ‘pragmatism in the GP’s approach to finding and evaluating evidence,' and ‘knowledge of the patient as a useful tool for effective communication about evidence' are already well-

established phenomena. Again, this bodes well for the uptake of the competency framework.

7.3 Limitations

There were a number of limitations across the four component studies of the thesis. They are summarised in Table 7.1. One particular limitation arose repeatedly: data extraction/coding, and analysis by a single investigator. This potentially reduced the reliability of these processes. It would have been preferable in each case, to have had at least one additional independent investigator to carry out the same tasks, each one blind to the decisions of the others. Unfortunately, my DPhil was without funding and I was unable to secure the services of volunteer investigators. Reciprocal work among fellow doctoral students might have been a solution, but geographical distance and other logistic constraints made this unworkable. My solution was to repeat the coding of data on two separate occasions and compare the resulting themes. Coding proved reliable by this method, because I used very simple, highly intuitively coding frames which avoided ambiguity.

Another recurrent limitation, in both the Delphi process and the content analysis, was small numbers, of panelists and appraisal documents, respectively. Again, these limitations stemmed from logistic constraints. The Delphi study represented a significant commitment of time and effort on the part of panelists. I did achieve, however, what is regarded as the minimum acceptable number. It was fortunate that I found evidence of the new competencies in such a small sample of 17 documents. Had I not, I would have been left to

Table 7.1. Limitations to each component study of the thesis

Study (chapter)	Limitations
Qualitative-quantitative synthesis (Chapter 3)	Exclusion of articles addressing individual steps of the traditional EBHC competency framework
	Exclusion of educational interventions
	Exclusion of studies not in English
	Single reviewer extracting and analysing data
	Quality of included studies limited
	Lack of a validated framework for assessment of quality of observational studies
Delphi process (Chapter 4)	Small panel of experts
	Self-recruitment of lead investigator to expert panel and monitor team
	Low concordance of rankings in Round 2
	Coding and analysis by a single investigator
Synthesis of primary and secondary data (Chapter 5)	Qualitative-quantitative synthesis data reinterpreted after a period of time had elapsed
	Coding and analysis by a single investigator
Content analysis (Chapter 6)	Small number of appraisal documents
	Potential selection bias
	Limited generalisability
	Coding and analysis by a single investigator

ponder whether such a null finding might have been due to lack of validity, or just failure to garner sufficient data. Having found evidence of competency demonstration, however, it is likely that a larger sample of appraisals would have yielded further evidence of competency demonstration. Such additional data would have been useful, but would not have contributed to the question of content validity, which I contend was answered adequately.

It could also be argued that my self-recruitment to the expert panel and monitor team in the Delphi process could have introduced bias. However, as I discussed in Chapter 4, my familiarity with the language and culture of general practice and EBHC provided a deep understanding of the context underpinning fellow panelists' comments, and my immersion in the data allowed me to offer opinions that were well-grounded in the literature. Anonymity afforded protection from undue influence from any individual, including myself.[9] It is the norm in a Delphi process that the facilitator (usually the principal investigator) is a member of the monitor team (here renamed 'decision committee').[9-12] I have also made the point that in the qualitative paradigm, direct researcher involvement is more accepted than in quantitative research; and as insurance against bias, separation from the participants is trumped in importance by reflexivity and transparency. I adhered to these requirements, reflecting critically upon my interpretation of the discussions of the monitor team, and checking back with the other members that I had correctly represented their opinions, as described in Chapter 4. In the analysis of data, I reflected continuously and critically on the accuracy and inclusivity of my interpretation of panellists' opinions.

Once again, the reader is invited to read the unabridged comments in Appendices 9 and 10, and to judge for themselves the credibility of my interpretations.

The limitations would be likely mitigated to some degree by the fact that four integrated, stepwise studies contributed to the final competency framework. For example: it is conceivable that exclusion of educational interventions in the qualitative-quantitative synthesis might have resulted in the absence of important data. But the findings of the synthesis were then subjected to expert opinion in the next phase of the investigation (the Delphi process). Experts were asked to add any important issues they felt had been missed. The validity of the final competency framework was tested in the content analysis of appraisals. There were, therefore, a number of 'checkpoints' against the onward propagation of bias throughout the thesis.

7.4 Potential applications of the new competency framework

This section outlines the potential applications of the new competency framework within the appraisal process and in routine general practice. Consideration is given to the feasibility of its application in general practice, and to future research that could develop the work of the thesis further.

7.4.1. Application within the performance appraisal process

It is envisaged that the new competency framework could be used voluntarily by GPs in their annual performance appraisal to demonstrate that they are improving their competence in EBHC. It has been designed specifically for application in the standard

appraisal document. The framework is simple, comprising only three competencies. This may make it more manageable for busy GPs. It has been designed to acknowledge the barriers that GPs experience to EBHC. The Delphi process in particular focused on utility, by asking the panel of experts to comment specifically on the importance, applicability and demonstrability of competencies. It has proven valid as an appraisal tool, in that the competencies were all evident among even a small sample of actual appraisals. It is accompanied by explicit behavioural descriptors denoting partial and complete competency development. There is also a guide to the appropriate section of the standard appraisal document in which each competency could be most easily used as a learning tool. It may also help appraisers, who recognise that a GP has learning gaps pertaining to EBHC. An appraiser could propose that a GP include demonstration of emerging or full competence, as appropriate, within their Personal Development Plan.

7.4.2. Application within routine practice

It is also envisaged that the new competency framework could guide the integration of EBHC with routine general practice. This is likely to be feasible given that the sample of appraisals showed its demonstration in actual examples of routine practice. One might wonder, however, how a GP could cultivate mindfulness in everyday practice. Epstein proposes four habits that can be taught:[13]

1. *Attentive observation* of oneself, the patient, and the problem. This means looking for the unanticipated in addition to the mundane. It is an awareness of one's own 'filtering of perceptions,' which in turn allows evaluation and adjustment to bias.

2. *Critical curiosity* about the world as it is, rather than as one would prefer it to be. This involves a willingness to acknowledge one's own limitations, and 'inviting doubt.'

3. *Beginner's mind* is an ability to view the world afresh, without being influenced by preconceptions. This tolerance of doubt and uncertainty requires an ability to manage anxiety effectively.

4. *Presence* implies an insight into what one knows to be true. It also refers to 'undistracted attention on the task and the person,' and compassion derived from real insight into a patient's predicament rather than merely from sympathy alone.

Shonin regards daily meditation sessions of five to fifteen minutes an essential part of mindfulness training.[14] He suggests observation of one's own breath can be employed as an anchor to '*tie one's mind to the present moment and regulate thought rumination*.' Other strategies (described in Chapter 5) are to use a mindfulness reminder such as occasional chimes from a wrist-watch or computer, or the use of the acronym 'SOS:' 'Stop, Observe the breath and Step back and watch the mind.' He advises that mindfulness is '*less about finding time to practice, and more about simply remembering to engage a mindful attention-set during whatever activity one happens to be engaged in*.'[14] As demonstrated in the content analysis (Chapter 6), a number of GPs were already using mindfulness techniques, or intending to undergo training. Mindfulness has already become popular,[8] so more GPs may be willing to incorporate it into routine practice.

'Pragmatism in the GP's approach to finding and evaluating evidence,' and 'knowledge of the patient as a useful tool in effective communication about evidence' are both already well-established phenomena. This was evident from the content analysis of appraisals. Pragmatic use of evidence could be enhanced, however, by routinely opening a link on the computer desktop to a trusted online evidence-based resource at the start of each session. This might increase the chance of using it during routine work. For both of these competencies, it is hoped that recognising them as aspects of EBHC will reduce the sense of disenfranchisement with the discipline that was evident in the qualitative-quantitative synthesis.

7.4.3. Achieving uptake of the new competency framework

Energetic promotion of the competency framework will be needed if it is to achieve widespread usage. The first step has already been taken, with publication of the content of chapters three to five as a single manuscript in a peer-reviewed medical education journal.[15] At the time of writing, it has already generated significant interest. This is indicated by a current Altmetric score of 32 (93rd percentile for outputs of the same age and source). The score indicates the amount of attention the article has received. Calculated using an algorithm, it represents a weighted count of the amount of attention it has received on a variety of platforms online, such as Twitter, blogs and news outlets.[16] Weighting reflects the relative reach of each source. The Altmetric score was boosted by the posting of a blog about the article on the website of the Centre for Evidence-Based Medicine.[17] Another avenue of promotion will be to contact the Royal College of General Practitioners, and request consideration for including the framework within the next

revision of the curriculum. An editorial in the College journal would also help raise awareness. There are other widely circulated publications that could be approached, such as Pulse, which provides news, clinical and educational resources and job vacancies, both online and in print.[18] It was evident from the content analysis of appraisals that the NB Hot Topics course[19] is extremely popular. A request could be made to include the competency framework in the volume of updated evidence that is handed out to course attendees. The ultimate fillip for widespread uptake of the new competency framework however, would be incorporation as a fixture within the standard appraisal tools. This would require lobbying of the General Medical Council and Health Education England. The likelihood of success would depend on the quality of further research to evaluate the framework, and the amount of further publicity achieved.

7.5 Implications for future research

Use of the new competency framework could be viewed as an educational intervention. I have hypothesised that given its resonance with Kolb's model of experiential learning,[6] it may be an effective tool for changing practice for the better. A robust test of effectiveness would be to subject the intervention to a randomised controlled trial. There would be little point in embarking on such research, however, without first developing a suitable instrument to provide a valid measure of effect. Interventions based on the traditional five-step model of EBHC are often assessed using the Fresno Test.[20] Its psychometric properties have been tested, proving it to be a valid instrument for measuring outcomes.[20] An equivalent test could be developed and validated for measuring outcomes resulting from use of the new competency framework. Ideally the instrument would have the capacity to

measure clinically meaningful outcomes, such as changes in GP decision-making, in line with up-to-date evidence-based recommendations. A randomised, controlled trial can then be envisaged, in which GPs attending the popular Hot Topics course could be randomly allocated to receive either additional training in the new EBHC competencies, or no additional training. Clinical outcomes could be selected from among the recommendations given in the Hot Topics course,[19] and measured using a validated instrument as discussed above. Such research would address the effectiveness the new competency framework as an educational tool. It would not, however, shed light on how precisely it might exert its effect, for whom among GPs, and in what precise circumstances. This set of questions could be addressed by qualitative research methods, such as focus groups and semi-structured interviews analysed thematically. The most credible qualitative findings however, would be derived from ethnographic study, in which the researcher is embedded in the real-life work routines of GPs under direct observation. The application of such methods has a precedent in the work of Gabbay, who observed how GPs in two practices derived individual and collective health care decisions.[21] Similar methods could be applied to determine whether the competency framework has the capacity to change GP behaviour, and to glean a deeper understanding of its operation in practice.

The work conducted in this thesis represents the initial steps in the development of a new real-world EBHC competency framework for general practice. It has effectively started a conversation, as evidenced by the initial response to publication.[15] It is, to my knowledge, the first empirically derived alternative to the traditional five-step model of EBHC, which, as I have demonstrated in the qualitative-quantitative synthesis and Delphi study, is not

working well in general practice. I propose that this merits further research, along the lines I have outlined.

7.6 Summary

- The new competency framework was designed specifically for use within the performance appraisal process, as a tool for both GPs and their appraisers. Effective uptake will require energetic promotion. This has started with publication in a peer-reviewed medical education journal and an online blog. Further strategies could include advocacy within the RCGP, editorials in academic journals and other publications targeting GPs, and a request to publicise the framework in Hot Topics course resources.

- The new framework is also intended as a guide to EBHC in routine practice. This is likely to be feasible given the popularity of mindfulness training among GPs, the existing preference for pre-appraised, secondary sources of evidence, and the importance already attached in general practice to knowledge of the individual patient. Its congruity with experiential learning may enhance its effectiveness as a tool for behaviour change among GPs towards better decision-making. Strategies have been proposed for enhancing the development of mindfulness, and pragmatism in the use of evidence. It is important for acceptance of EBHC in general practice that competences already developed are defined as indicative of EBHC.

- Further research is needed to build on the work presented in this thesis. The next step could be the development of a validated instrument to measure educational outcomes resulting from training in the new competency framework. This would make future randomised controlled trials possible. Qualitative research, ideally involving direct observation of GPs at work, would shed further light on how it might be effective, for whom, and under what precise circumstances.

- The work presented here has started a conversation online about the future development of EBHC in the general practice setting. This is important given the current level of disenfranchisement among GPs, as demonstrated in the qualitative-quantitative synthesis and Delphi study.

7.7 Conclusion

A new EBHC competency framework has been constructed specifically for general practice. Its development was prompted by direct observation as a practising GP that the traditional competency framework is hard to integrate into real-world practice. Exploration of the literature confirmed this view. The new EBHC competency framework is designed to accommodate the constraints experienced in general practice, particularly lack of time.[15] I constructed it by integrating data from a qualitative-quantitative synthesis from the literature and consensus among a panel of experts. I validated it by content analysis of actual performance appraisal documents. It has been designed for GPs and their appraisers to use in the annual performance appraisal process. It is simple so that it can be employed by GPs in routine practice as a guide to developing competence in EBHC. It has congruity

with Kolb's model of experiential learning. Its utility has been enhanced by the provision of behavioural descriptors denoting stages of competency development, and clinical vignettes adapted from real scenarios described in GP appraisal documents. A clear path has been laid out for its promotion, and for future research. I hope the new competency framework will promote uptake of EBHC in general practice, and help GPs to recognise where EBHC competence already exists.

7.9 References

1. Dawes M, Summerskill W, Glasziou P, et al. Sicily statement on evidence-based practice. *BMC Med Educ.* 2005;5(1):1.
2. Weightman J. *Competencies in Action.* London: Institute of Personnel and Development; 1998.
3. ACGME Program Requirements for Graduate Medical Education in Family Medicine. 2015; http://www.acgme.org/acgmeweb/ Accessed 27 July 2015.
4. The RACGP Curriculum for Australian General Practice 2011. 2011; http://curriculum.racgp.org.au Accessed 27 July 2015.
5. Defining competence for the purposes of certification by the College of Family Physicians of Canada: The evaluation objectives in family medicine. Report of the Working Group on the Certification Process. 2010; http://www.cfpc.ca/EvaluationObjectives/ Accessed 27 July 2015.
6. Kolb DA. Experiential learning: Experience as the source of learning and development. 1984.
7. Armstrong E, Parsa-Parsi R. How can physicians' learning styles drive educational planning? *Academic Medicine.* 2005;80(7):680-684.
8. Shonin E, Van Gordon W, Griffiths MD. Meditation as medication: are attitudes changing? *Br J Gen Pract.* 2013;63(617):654-654.
9. Rowe G, Wright G, Bolger F. Delphi: a reevaluation of research and theory. *Technological forecasting and social change.* 1991;39(3):235-251.
10. Linstone HA, Turoff M. *The delphi method.* Addison-Wesley Reading, MA; 1975.
11. Webler T, Levine D, Rakel H, Renn O. A novel approach to reducing uncertainty: the group Delphi. *Technological forecasting and social change.* 1991;39:253-263.
12. Pluddemann A, Heneghan C, Thompson M, et al. Prioritisation criteria for the selection of new diagnostic technologies for evaluation. *BMC Health Serv Res.* 2010;10:109.

13. Epstein RM. Mindful practice in action (I): Technical competence, evidence-based medicine, and relationship-centered care. *Families, Systems, & Health.* 2003;21(1):1.
14. Shonin E, Van Gordon W, Griffiths MD. Practical tips for using mindfulness in general practice. *Br J Gen Pract.* 2014;64(624):368-369.
15. Galbraith K, Ward A, Heneghan C. A real-world approach to Evidence-Based Medicine in general practice: a competency framework derived from a systematic review and Delphi process. *BMC medical education.* 2017;17(1):78.
16. Altmetric. www.altmetric.com Accessed 21.08.2017.
17. Galbraith K. Keeping it real: evidence-based competence among GPs. 2017. http://www.cebm.net/keeping-real-evidence-based-competence-among-gps/. Accessed 21.07.2017.
18. PULSE. http://www.pulsetoday.co.uk Accessed 21.08.2017.
19. NB Medical Education. Hot Topics GP Update Courses. http://www.nbmedical.com/hot-topics-gp-update-courses Accessed 21.08.2017.
20. Ramos KD, Schafer S, Tracz SM. Validation of the Fresno test of competence in evidence based medicine. *BMJ: British Medical Journal.* 2003;326(7384):319-321.
21. Gabbay J, le May A. Evidence based guidelines or collectively constructed "mindlines?" Ethnographic study of knowledge management in primary care. *BMJ.* 2004;329(7473):1013.

Appendices

Appendix 1. Existing research about integration of EBHC and general practice: search strategy (Chapter 2)

Date of search: 05.05.2017

Ovid MEDLINE: (revised 13.07.2018) 418 hits

1. exp General Practice/
2. *Evidence-Based Medicine/
3. *Evidence-Based Practice/
4. 2 AND 3
5. 1 AND 4
6. limit 5 to (english language and yr="1992-Current")

Education Resources Information Centre (ERIC): 118 hits

1. General Practice (Abstract)
2. Evidence-Based Medicine (Abstract)
3. Evidence-Based Practice (Abstract)
4. 2 OR 3
5. 1 AND 4

Cochrane Library: 45 hits

1. MeSH descriptor: [General Practice] explode all trees
2. MeSH descriptor: [Evidence-Based Practice] explode all treees
3. 1 AND 2

Appendix 2. Qualitative-quantitative synthesis: search strategy (Chapter 3)

Date of search: 22.08.2011

Search Question: What factors should be considered in constructing a real-world competency model for evidence-based general practice?

Databases searched:	**Year range:**	**No records retrieved:**
Australian Education Index (Dialog)	1979 - present	4
British Education Index (Dialog)	1975 - present	3
Embase (OvidSP)	1974 - present	1529
ERIC (Dialog)	1966 - present	23
HMIC Health Management Information Consortium	1979 - present	279
Medline (OvidSP)	1950 - present	1752
PsycINFO (OvidSP)	1967 - present	324
Science Citation Index (WoK)	1945 - present	1651
Social Science Citation Index (WoK)	1956 - present	Included above
Cochrane Central Register	1904 - present	212
Total no records retrieved:	**No duplicates removed:**	**Final total:**
5777	**2358**	**3419**

Limits:

English language

Date range – 1991-present

Medline:

1. general practitioners/ or physicians, family/ or physicians, primary care/
2. (primary adj2 physician?).ti,ab.
3. (general adj2 practitioner?).ti,ab.
4. (family adj2 practitioner?).ti,ab.
5. (family adj2 physician?).ti,ab.
6. (family adj2 specialist?).ti,ab.
7. (family adj2 doctor?).ti,ab.
8. 1 or 2 or 3 or 4 or 5 or 6 or 7
9. evidence-based practice/ or exp evidence-based medicine/
10. evidence based.ti,ab.
11. (ebm or ebp or ebhc).ti,ab.
12. clinical epidemiology.ti,ab.
13. Guideline Adherence/
14. ((guideline* or protocol* or guidance or standard*) adj3 (adhere* or complian* or comply or uptake or implement* or utili?ation or usage or apply or applied or application or adopt*)).ti,ab.
15. ((evidence or research) adj3 (uptake or implement* or utili?ation or usage or apply or applied or application or adopt*)).ti,ab.
16. (prediction adj (rule* or guide* or score*)).ti,ab.
17. (diagnos* adj (rule* or guide* or score*)).ti,ab.
18. algorithms/
19. Decision Theory/
20. Decision Trees/
21. exp Decision Making, Computer-Assisted/
22. Decision Support Systems, Clinical/
23. decision support techniques/
24. (decision adj (rule? or support or analy* or aid*)).ti,ab.
25. 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24
26. Decision Making/

27. (decision* adj2 making).ti,ab.

28. 26 or 27

29. 8 and 25 and 28

30. limit 29 to (english language and yr="1991 -Current")

31. professional competence/ or clinical competence/

32. Health Knowledge, Attitudes, Practice/

33. "attitude of health personnel"/ or attitude to computers/

34. Information Seeking Behavior/

35. Judgment/

36. Aptitude/

37. (judgement or judgment).ti,ab.

38. aptitude?.ti,ab.

39. attitude?.ti,ab.

40. attribute?.ti,ab.

41. skill?.ti,ab.

42. knowledge.ti,ab.

43. behavio?r*.ti,ab.

44. (proficiency or proficiencies).ti,ab.

45. competenc*.ti,ab.

46. (ability or abilities).ti,ab.

47. characteristic?.ti,ab.

48. 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47

49. 8 and 25 and 48

50. limit 49 to (english language and yr="1991 -Current")

51. 30 or 50

Embase:

1. general practitioner/

2. (primary adj2 physician?).ti,ab.

3. (general adj2 practitioner?).ti,ab.

4. (family adj2 practitioner?).ti,ab.

5. (family adj2 physician?).ti,ab.

6. (family adj2 specialist?).ti,ab.

7. (family adj2 doctor?).ti,ab.

8. 1 or 2 or 3 or 4 or 5 or 6 or 7

9. *evidence based practice/ or *evidence based medicine/

10. evidence based.ti,ab.

11. (ebm or ebp or ebhc).ti,ab.

12. clinical epidemiology.ti,ab.

13. ((guideline* or protocol* or guidance or standard*) adj3 (adhere* or complian* or comply or uptake or implement* or utili?ation or usage or apply or applied or application or adopt*)).ti,ab.

14. ((evidence or research) adj3 (uptake or implement* or utili?ation or usage or apply or applied or application or adopt*)).ti,ab.

15. (prediction adj (rule* or guide* or score*)).ti,ab.

16. (diagnos* adj (rule* or guide* or score*)).ti,ab.

17. *algorithm/

18. decision theory/

19. *"decision tree"/

20. *computer assisted diagnosis/

21. decision support system/

22. (decision adj (rule? or support or analy* or aid*)).ti,ab.

23. 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22

24. decision making/

25. (decision* adj2 making).ti,ab.

26. 24 or 25

27. 8 and 23 and 26

28. limit 27 to (english language and yr="1991 -Current")

29. *competence/ or clinical competence/ or professional competence/

30. health personnel attitude/ or physician attitude/

31. attitude to computers/

32. *knowledge/ or professional knowledge/

33. aptitude/

34. (judgement or judgment).ti,ab.

35. aptitude?.ti,ab.

36. attitude?.ti,ab.

37. attribute?.ti,ab.

38. skill?.ti,ab.

39. knowledge.ti,ab.

40. behavio?r*.ti,ab.

41. (proficiency or proficiencies).ti,ab.

42. competenc*.ti,ab.

43. (ability or abilities).ti,ab.

44. characteristic?.ti,ab.

HMIC Health Management and Information Consortium:

1. general practitioners/ or family practitioners/

2. (primary adj2 physician?).ti,ab.

3. (general adj2 practitioner?).ti,ab.

4. (family adj2 practitioner?).ti,ab.

5. (family adj2 physician?).ti,ab.

6. (family adj2 specialist?).ti,ab.

7. (family adj2 doctor?).ti,ab.

8. 1 or 2 or 3 or 4 or 5 or 6 or 7

9. evidence based medicine/ or evidence based practice/

10. evidence based.ti,ab.

11. (ebm or ebp or ebhc).ti,ab.

12. clinical epidemiology.ti,ab.

13. ((guideline* or protocol* or guidance or standard*) adj3 (adhere* or complian* or comply or uptake or implement* or utili?ation or usage or apply or applied or application or adopt*)).ti,ab.

14. ((evidence or research) adj3 (uptake or implement* or utili?ation or usage or apply or applied or application or adopt*)).ti,ab.
15. (prediction adj (rule* or guide* or score*)).ti,ab.
16. (diagnos* adj (rule* or guide* or score*)).ti,ab.
17. decision theory/
18. (decision adj (rule? or support or analy* or aid*)).ti,ab.
19. 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18
20. exp decision making/
21. (decision* adj2 making).ti,ab.
22. judgement/
23. abilities/ or aptitude/ or exp competences/ or skills/
24. attitudes/ or staff attitudes/
25. (judgement or judgment).ti,ab.
26. aptitude?.ti,ab.
27. attitude?.ti,ab.
28. attribute?.ti,ab.
29. skill?.ti,ab.
30. knowledge.ti,ab.
31. behavio?r*.ti,ab.
32. (proficiency or proficiencies).ti,ab.
33. competenc*.ti,ab.
34. (ability or abilities).ti,ab.
35. characteristic?.ti,ab.
36. 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35
37. 8 and 19 and 36
38. limit 37 to yr="1991 -Current"

ERIC, British Education Index, Australian Education Index

1. ERIC (general NEXT physician$).TI,AB.

2. ERIC (general NEXT practitioner$).TI,AB.

3. ERIC (family NEXT physician$).TI,AB.

4. ERIC (family NEXT practitioner$).TI,AB.

5. ERIC (family NEXT doctor$).TI,AB.

6. ERIC (family NEXT specialist$).TI,AB.

7. ERIC (primary NEXT physician$).TI,AB.

8. ERIC 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR

9. ERIC (evidence ADJ based).TI,AB.

10. ERIC (ebm OR ebp OR ebhc).TI,AB.

11. ERIC (clinical ADJ epidemiology).TI,AB.

12. ERIC ((guideline$ OR protocol$ OR guidance OR standard$) NEXT (adhere$ OR complian$ OR comply OR uptake OR implement$ OR utili$ OR usage OR apply OR applied OR application OR adopt$)).TI,AB.

13. ERIC ((evidence OR research) NEXT (uptake OR implement$ OR utili$ OR usage OR apply OR applied OR application OR adopt$)).TI,AB.

14. ERIC (prediction ADJ rule$ OR prediction ADJ guide$ OR prediction ADJ scor* OR diagnosis ADJ scor$ OR diagnostic ADJ scor$ OR diagnosis ADJ rule$ OR diagnostic ADJ rule$ OR diagnosis ADJ guide$ OR diagnostic ADJ guide$).TI,AB.

15. ERIC (decision ADJ theory OR decision ADJ rule* OR decision ADJ support$ OR decision ADJ analy$ OR decision ADJ aid OR decision ADJ aids).TI,AB.

16. ERIC 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15

17. ERIC 8 AND 16

Cochrane Central Register:

1. MeSH descriptor General Practitioners explode all trees
2. MeSH descriptor Physicians, Primary Care explode all trees
3. MeSH descriptor Physicians, Family explode all trees
4. (primary near2 physician*):ti,ab,kw
5. (general near2 practitioner*):ti,ab,kw
6. (family near2 practitioner*):ti,ab,kw

7. (family near2 physician*):ti,ab,kw
8. (family near2 specialist*):ti,ab,kw
9. (family near2 doctor*):ti,ab,kw
10. MeSH descriptor Evidence-Based Practice explode all trees
11. (ebm or ebp or ebhc or "evidence based"):ti,ab,kw
12. MeSH descriptor Guideline Adherence explode all trees
13. ((guideline* or protocol* or guidance or standard*) near3 (adhere* or complian* or comply or uptake or implement* or utili*ation or usage or apply or applied or application or adopt*)):ti,ab,kw
14. (evidence or research) near3 (uptake or implement* or utili*ation or usage or apply or applied or application or adopt*):ti,ab,kw
15. (prediction rule* or prediction guide* or prediction score*):ti,ab,kw
16. (diagnos* next (rule* or guide* or score*)):ti,ab,kw
17. MeSH descriptor Algorithms explode all trees
18. MeSH descriptor Decision Theory explode all trees
19. MeSH descriptor Decision Making, Computer-Assisted explode all trees
20. MeSH descriptor Decision Support Systems, Clinical explode all trees
21. MeSH descriptor Decision Support Techniques, this term only
22. (#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9)
23. (#10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21)
24. (#22 AND #23)
25. MeSH descriptor Decision Making, this term only
26. (decision making):ti,ab,kw
27. (#25 OR #26)
28. (#24 AND #27)
29. MeSH descriptor Professional Competence explode all trees
30. MeSH descriptor Health Knowledge, Attitudes, Practice explode all trees
31. MeSH descriptor Attitude of Health Personnel explode all trees
32. MeSH descriptor Attitude to Computers explode all trees
33. MeSH descriptor Information Seeking Behavior explode all trees
34. MeSH descriptor Judgment explode all trees

35. MeSH descriptor Aptitude explode all trees
36. (judgement or judgment):ti,ab,kw
37. (aptitude*):ti,ab,kw
38. (attitude*):ti,ab,kw
39. (attribute*):ti,ab,kw
40. (skill*):ti,ab,kw
41. (knowledge*):ti,ab,kw
42. (behaviour* or behavior*):ti,ab,kw
43. (proficiency or proficiencies):ti,ab,kw
44. (competence*):ti,ab,kw

PsycINFO:

1. general practitioners/ or family physicians/
2. (primary adj2 physician?).ti,ab.
3. (general adj2 practitioner?).ti,ab.
4. (family adj2 practitioner?).ti,ab.
5. (family adj2 physician?).ti,ab.
6. (family adj2 specialist?).ti,ab.
7. (family adj2 doctor?).ti,ab.
8. 1 or 2 or 3 or 4 or 5 or 6 or 7
9. evidence based practice/
10. evidence based.ti,ab.
11. (ebm or ebp or ebhc).ti,ab.
12. clinical epidemiology.ti,ab.
13. ((guideline* or protocol* or guidance or standard*) adj3 (adhere* or complian* or comply or uptake or implement* or utili?ation or usage or apply or applied or application or adopt*)).ti,ab.
14. ((evidence or research) adj3 (uptake or implement* or utili?ation or usage or apply or applied or application or adopt*)).ti,ab.
15. (prediction adj (rule* or guide* or score*)).ti,ab.

16. (diagnos* adj (rule* or guide* or score*)).ti,ab.

17. algorithms/

18. decision theory/

19. decision support systems/

20. (decision adj (rule? or support or analy* or aid*)).ti,ab.

21. 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20

22. decision making/

23. (decision* adj2 making).ti,ab.

24. 22 or 23

25. 8 and 21 and 24

26. limit 25 to (english language and yr="1991 -Current")

27. competence/ or professional competence/

28. health personnel attitudes/

29. Computer Attitudes/

30. judgment/ or "clinical judgment (not diagnosis)"/

31. ability/

32. "Knowledge (General)"/

33. (judgement or judgment).ti,ab.

34. aptitude?.ti,ab.

35. attitude?.ti,ab.

36. attribute?.ti,ab.

37. skill?.ti,ab.

38. knowledge.ti,ab.

39. behavio?r*.ti,ab.

40. (proficiency or proficiencies).ti,ab.

41. competenc*.ti,ab.

42. (ability or abilities).ti,ab.

43. characteristic?.ti,ab.

44. 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43

Social Science and Science Citation index:

8 #6 AND #2 AND #1

Refined by: Languages=(ENGLISH)

Databases=SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan=1991-2011

Lemmatization=Off

7 #6 AND #2 AND #1

Databases=SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan=1991-2011

Lemmatization=Off

6 Topic=("decision making" OR "making decision*")

Databases=SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan=1991-2011

Lemmatization=Off

5 #3 AND #2 AND #1

Refined by: Languages=(ENGLISH)

Databases=SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan=1991-2011

Lemmatization=Off

4 #3 AND #2 AND #1

Databases=SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan=1991-2011

Lemmatization=Off

3 Topic=(attitude* OR skill* OR ability OR abilities OR aptitude OR attribute* OR judgment OR judgement OR competenc* OR proficiency OR proficiencies OR behavior OR behaviour OR charecteristic*)

Databases=SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan=1991-2011

Lemmatization=Off

2 Topic=("evidence based" OR "evidence-based" OR EBM OR EBP OR EBHC) OR Topic=("clinical epidemiology") OR Topic=(((guideline* or protocol* or guidance or

standard*) SAME (adhere* or complian* or comply or uptake or implement* or utili?ation or usage or apply or applied or application or adopt*))) OR Topic=(((evidence or research) SAME (uptake or implement* or utili?ation or usage or apply or applied or application or adopt*))) OR Topic=("prediction rule*" OR "diagnostic rule*" OR "prediction guide*" OR "diagnostic guide*" OR "prediction score*" OR "diagnostic score*") OR Topic=("decision theor*" OR "decision tree*" OR "decision support system*" OR "decision rule*" OR "decision analy*" OR "decision aid" OR "decision aids")
Databases=SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan=1991-2011
Lemmatization=Off

# 1 Topic=("general practitioner*" OR "family practitioner*" OR "family doctor*" OR "family physician*" OR "family specialist*" OR "primary physician*" OR "primary care physician*")
Databases=SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan=1991-2011
Lemmatization=Off

Appendix 3. Quality of included studies (Chapter 3)

	Quantitative methods							Qualitative methods					
Author/year	Specific objective/ hypothesis	Appropriate eligibility/ selection criteria	Important outcomes included	Instrument design/ quality described	Response rate	Exploration of failure to participate	Clear presentation of results	Clear objective	Selection of participants	Methods to generate data	Data collection	Analysis of data	Clear presentation of results
Barghouti F, 2009	+	+	+	+	+	+	+						
Callen J, 2006	+	+	+	+	–	–	+						
Hannan A, 1998	+	–	+	–	–	–	+						
Kahveci R, 2009	+	+	+	+	–	–	+						
McColl A, 1998	+	+	+	+	+	+	+						
McKenna H, 2004	+	+	+	+	+	–	+						
Robinson G, 2000	+	+	+	–	+	–	+						
Salisbury S, 1998	+	+	–	–	+	+	+						
Samuel O, 1997	–	+	–	–	–	–	–						
Siriwardena A,	+	+	+	+	–	–	+						
Taylor J, 2002	+	+	+	–	+	–	–						
Tracy C, 2003	+	+	+	+	–	+	+						
Trevena L, 2007	+	+	+	–	+	–	–						
Upton D, 2006	+	+	+	–	+	–	+						
Adams J, 2000								+	+	+	–	–	+
Armstrong D,								–	+	+	–	–	+
Calderón C, 2011								+	±	+	+	–	+
Ely J , 2002								+	+	+	+	±	+
Ford S, 2002								+	–	+	+	±	+
Ford S, 2003								+	+	+	±	–	+
Freeman A, 2001								+	+	+	±	–	+
Gabbay J, 2004								+	+	+	+	±	+
Hall L, 1999								+	+	+	±	–	+
Hannes K , 2005								+	+	+	+	+	+
Lipman T, 2004								+	+	+	+	±	+
Lorenz K, 2005								+	+	+	±	–	+
Mayer J, 1999								+	+	+	+	±	+
Mears R, 2000								+	+	±	–	–	+
Putnam W, 2002								+	+	+	+	±	+

Continued

Author/year	Quantitative methods							Qualitative methods					
	Specific objective/ hypothesis	Appropriate eligibility/ selection criteria	Important outcomes included	Instrument design/ quality described	Response rate	Exploration of failure to participate	Clear presentation of results	Clear objective	Selection of participants	Methods to generate data	Data collection	Analysis of data	Clear presentation of results
Short D, 2003								+	+	+	±	–	+
Skoglund I, 2007								–	+	±	±	–	+
Summerskill W,								+	+	+	+	–	+
Tomlin Z, 1999								+	+	+	+	–	+
Tracy C, 2003								+	+	+	+	+	+
Wood F, 1995								+	+	+	+	–	–
Patterson J, 1999	+	+	+	+	+	–	+	+	+	+	±	–	+
Rohrbacher R,	+	+	+	–	–	–	–	–	+	–	–	–	–
Young J, 2001	+	+	+	+	+	n/a	+	+	+	+	–	–	–

Opinion of the reviewer regarding quality: + fulfilled criterion; ± equivocal; – did not fulfill criterion; n/a not applicable as response rate 100%

Appendix 4. Studies contributing to each theme judged to be credible in the synthesis of qualitative and quantitative data

	Adams J, 2000	Armstrong D, 2002	Calderón C, 2011	Ely J, 2002	Ford S, 2002	Ford S, 2003	Freeman A, 2001	Gabbay J, 2004	Hall L, 1999	Hannes K, 2005	Lipman T, 2004	Lorenz K, 2005	Mayer J, 1999	Mears R, 2000	Patterson J, 1999	Putnam W, 2002	Rohrbacher R, 2009	Short D, 2003	Skoglund I, 2007	Summerskill W, 2002	Tomlin Z, 1999	Tracy C, 2003	Wood F, 1995	Young J, 2001
Attitude towards EBHC	✓		✓	✓	✓		✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓		✓
Major influences on decision-making				✓				✓	✓			✓	✓	✓						✓	✓			
Use of pre-appraised sources of evidence						✓		✓	✓	✓	✓				✓		✓		✓			✓	✓	✓
Integration of evidence with clinical expertise, and the needs of the individual patient	✓	✓	✓		✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		
Communication skills		✓	✓			✓				✓														

Note: shaded columns indicate the contribution of data from studies considered to have a high risk of bias.

Appendix 5. Characteristics of included studies (Chapter 3)

Cross-sectional surveys (n=14)

	Design	Subjects	No. GPs invited who fit inclusion criteria*	GP response rate	Competency-related outcomes explored
Barghouti F, 2009 Jordan	Self-administered questionnaire	Family physicians	200	70%	EBP knowledge, understanding, attitudes and awareness; perceived barriers to EBP.
Callen J, 2006 Australia	Self-administered questionnaire	GP members of a Division of Medical Practice	434	31%	EBP attitudes, awareness, understanding and implementation; perceived barriers to EBP.
Hannan A, 1998 UK	Self-administered questionnaire	GPs, surgeons and school teachers	17	47%	Use of research compared between professional groups.
Kahveci R, 2009 Turkey	Self-administered questionnaire and interview-based questionnaire	GPs, family medicine trainees and family medicine specialists	770	31%	EBP knowledge, attitudes and opinions on future practice; EBP training; perceived barriers to implementation.
McColl A, 1998 UK	Self-administered questionnaire	GPs	450	67%	Attitude to EBP; ability to access and interpret evidence; perceived barriers to EBP; opinions regarding best method of moving from opinion based to evidence based medicine.
McKenna H, 2004 UK	Self-administered questionnaire	GPs and community nurses	356	57%	Perceived barriers to EBP.
Robinson G, 2000 UK	Self-administered questionnaire	GPs	295	84%	Attitudes regarding the importance of primary care research; interest in and use of research; interest in, and experience of doing research.
Salisbury S, 1998 UK	Self-administered questionnaire	GPs	184	98%	Relationship between GP characteristics and implementation of evidence-based prescribing initiatives.
Samuel O, 1997 UK	Self-administered questionnaire	GPs and GP trainers	1739	28%	Rates of EBP activities in the prior 2 weeks, and of desire for training in use of Medline; opinions regarding EBP.

Continued

	Design	Subjects	No. GPs invited who fit inclusion criteria*	GP response rate	Competency-related outcomes explored
Siriwardena A, 2007 UK	Self-administered questionnaire and written knowledge test	GPs and secondary care physicians	NR	NR	EBP knowledge and attitudes.
Taylor J, 2002 Australia	Interview-based questionnaire	Rural and remote-practicing GPs	104	86%	EBP attitudes and self-reported implementation; perceived barriers to EBP and opinions regarding potential solutions.
Tracy C, 2003 Canada	Self-administered questionnaire	Family physicians (members of Canadian College of Family Physicians)	1037	42%	Relationships between physician attitudes toward EBM, contextual factors, and decision-making; factors that contribute to clinical decisions that contradict best evidence.
Trevena L, 2007 Australia	Open-ended, telephone survey	GPs	155	69%	Information sources for clinical decisions; barriers to EBP; suggested strategies to improve decision-making; preferences regarding patient involvement.
Upton D, 2006 UK	Self-administered questionnaire	GPs and hospital doctors	500	60%	Self-rated EBP knowledge and skills; self-reported application of EBP; perceived barriers to EBP. Comparisons of outcomes between GPs and hospital doctors.

*General or family practitioners, trained or in training, and working in the community. § Response rate as defined in Last J.M.(Ed). A Dictionary of Epidemiology. 4th ed. USA: Oxford University Press; 2001. NR Not reported

Qualitative studies (n=21)

	Design	Participants	No. GP participants	Competency-related outcomes explored
Adams J, 2000 UK	In-depth interview	GPs practicing complimentary and alternative medicine (CAM)	25	EBP perceptions; relationship with CAM.
Armstrong D, 2002 UK	Semi-structured interview	GPs from four health authorities	80	Management of depressed patients; reaction to the availability of new drugs.
Calderón C, 2011 Spain	Focus groups	Family practitioners working in 47 public health centres	67	EBP perceptions in primary care context.
Ely J, 2002 US	Participant observation	Academic generalist doctors, family doctors and medical librarians	23	Obstacles encountered while searching for evidence based answers to doctors' questions.
Ford S, 2002 UK	Semi-structured interview	GPs, hospital doctors, practice nurses, academics and lay people	11	Barriers to implementation of the 'evidence-based patient choice' consultation.
Ford S, 2003 UK	Semi-structured interview	GPs, hospital doctors, practice nurses, academics and lay public	11	Elements and skills required for a successful 'evidence-based patient choice' consultation.
Freeman A, 2001 UK	Balint-style groups	GPs	19	Perceived barriers to EBP.
Gabbay J, 2004 UK	Semi-structured interview, non-participant observation and analysis of documents/materials	GPs, nurses, phlebotomist, and associated medical staff in one practice providing initial data; transferability of theoretical model checked with general practitioners in a second practice	NR	Use of evidence in individual and collective healthcare decisions; social and organisational processes by which evidence, information, and knowledge become knowledge in practice.

Continued

	Design	Participants	No. GP participants	Competency-related outcomes explored
Hall L, 1999 UK	Focus groups	GPs, consultants and hospital nurses	18	Attitudes to clinical effectiveness and behaviour change in the context of professional and social relationships within the current organisation of the National Health Service.
Hannes K, 2005 Belgium	Focus groups	GPs (mix of academics, recruits from local GP peer groups, and a course in EBP)	31	Perceived barriers to EBP; strategies to overcome barriers.
Lipman T, 2004 UK	Semi-structured interview	GPs active in research network or EBP workshops	11	Factors influencing decision-making regarding anticoagulation for atrial fibrillation.
Lorenz K, 2005 US	Focus groups	Primary care providers (paediatricians, family practitioners, general internists and physician managers)	NR	Factors prompting search for evidence; search strategies and sources; comparison of clinician and physician manager approaches.
Mayer J, 1999 Australia	Focus groups	GPs	27	Attitude to EBP; factors affecting consideration and use of evidence from a selection of guidelines within consultations.
Mears R, 2000 UK	Semi-structured interview	GPs, based in research-based general practice or involved in continuing medical education	5	Factors influencing decision making.
Putnam W, 2002 Canada	Focus groups	Family physicians	50	Perspectives on use of evidence, and its influence on practice in the context of managing patients with cardiovascular disease.
Short D, 2003 UK	Semi-structured interview	GPs	15	Factors that lead GPs not to prescribe aspirin in stroke patients, contrary to recommendations in guidelines.
Skoglund I, 2007 Sweden	Focus groups	GPs	16	Thoughts about EBP and prescribing.
Summerskill W, 2002 UK	Focus groups and semi-structured interviews	GPs	14	Factors influencing use of secondary prevention in management of patients with coronary heart disease.

Continued

	Design	Participants	No. GP participants	Competency-related outcomes explored
Tomlin Z, 1999 UK	Semi-structured interview	GPs	24	Definitions of effective health care; reasons for not practising effectively according to respondents' own criteria; sources of information used to answer clinical questions; reasons for making changes in clinical practice.
Tracy C, 2003 Canada	Semi-structured interview	Family physicians	15	EBP attitudes and experience; influence of patients' preferences on decision-making; role of intuition in family practice.
Wood F, 1995 UK	In-depth, structured and semi-structured interviews, non-participant observation and workshop	GPs and other practice staff in two studies (Trent and Anglia/Oxford), reported together	62	Information-related behaviour of GPs; reasons for information needs; satisfaction with information seeking; sources of information; communication of information; effects of national health service reforms on information needs; opinions on future needs, and appropriate strategies; guidelines for best information practice.

NR not reported.

Mixed methods studies (n=3)

	Design	Participants	No. GPs invited who fit inclusion criteria*	Survey response rate (%) *	No. Participants in qualitative study	Competency-related outcomes explored
Patterson J, 1999 UK	Mixed methods (Self-administered questionnaire and in-depth interview)	GPs	44	82%	14	Attitudes to EBP; comparison of attitudes in the context of patient care consultations, and in purchasing; change in attitudes over time; perceived barriers to EBP.
Rohrbacher R, 2009 Germany	Mixed methods (interviews, semi-structured questionnaire)	GPs, specialist physicians and patients	NR	NR	104	Reasons underpinning treatment selection for five selected medical conditions; attitude to EBP; patient satisfaction.
Young J, 2001 Australia	Mixed methods (semi-structured interviews and SAQ)	GPs	60	100%	50	Current use of information technology; views about EBP; self-reported understanding of EBP terms; perceived barriers to EBP; preferred EBP resources; perceptions regarding EBP, barriers, EBP-supportive strategies and preferred sources of information when faced with clinical uncertainty.

NR not reported. *Response rate as defined in Last J.M.(Ed). A Dictionary of Epidemiology. 4th ed. USA: Oxford University Press; 2001

Appendix 6. Information for Delphi panelists (Chapter 4)

Construction of a pragmatic competency model for Evidence-Based General Practice using the Delphi process

Thank you for participating as an expert panelist in this Delphi process. Below are some questions and answers to clarify the nature and purpose of the exercise, and what you, as an expert panelist, are required to do. If you have any further questions, please contact me by email: Kevin.Galbraith@Kellogg.ox.ac.uk.

What is the Delphi process?

The Delphi process is a method of achieving convergence of opinion solicited from experts in the particular field.[1] It takes the form of a series of rounds. In each round, expert panelists complete a questionnaire. The researcher collates and edits the responses, and feeds a summary back to the group. Panelists may then reassess their initial judgements in light of the range of opinions. The number of rounds varies. Anonymity of responses is maintained throughout.

Will this consume a lot of my time?

Though people work differently, you will not be required to spend more than half an hour on each questionnaire. There are only two questionnaires, separated in time by about 4-6 weeks. Each will have been piloted to make sure it can be completed in good time.

What is this study about?

This study is part of a PhD thesis, the aim of which is to make a new set of competencies for Evidence-Based Practice (EBP), that GPs, despite being busy people, could feasibly demonstrate using existing annual performance appraisal tools. I am interested in this because GPs have expressed a view that EBP, as it has been traditionally presented, fails to take into account the complexities and demands of primary care.[2]

How will this study help GPs?

This will be the first set of EBP competencies to take into account the constraints and competing demands experienced by GPs. GPs who wish to make their work more evidence-based will be able to incorporate the competencies into a familiar appraisal process.

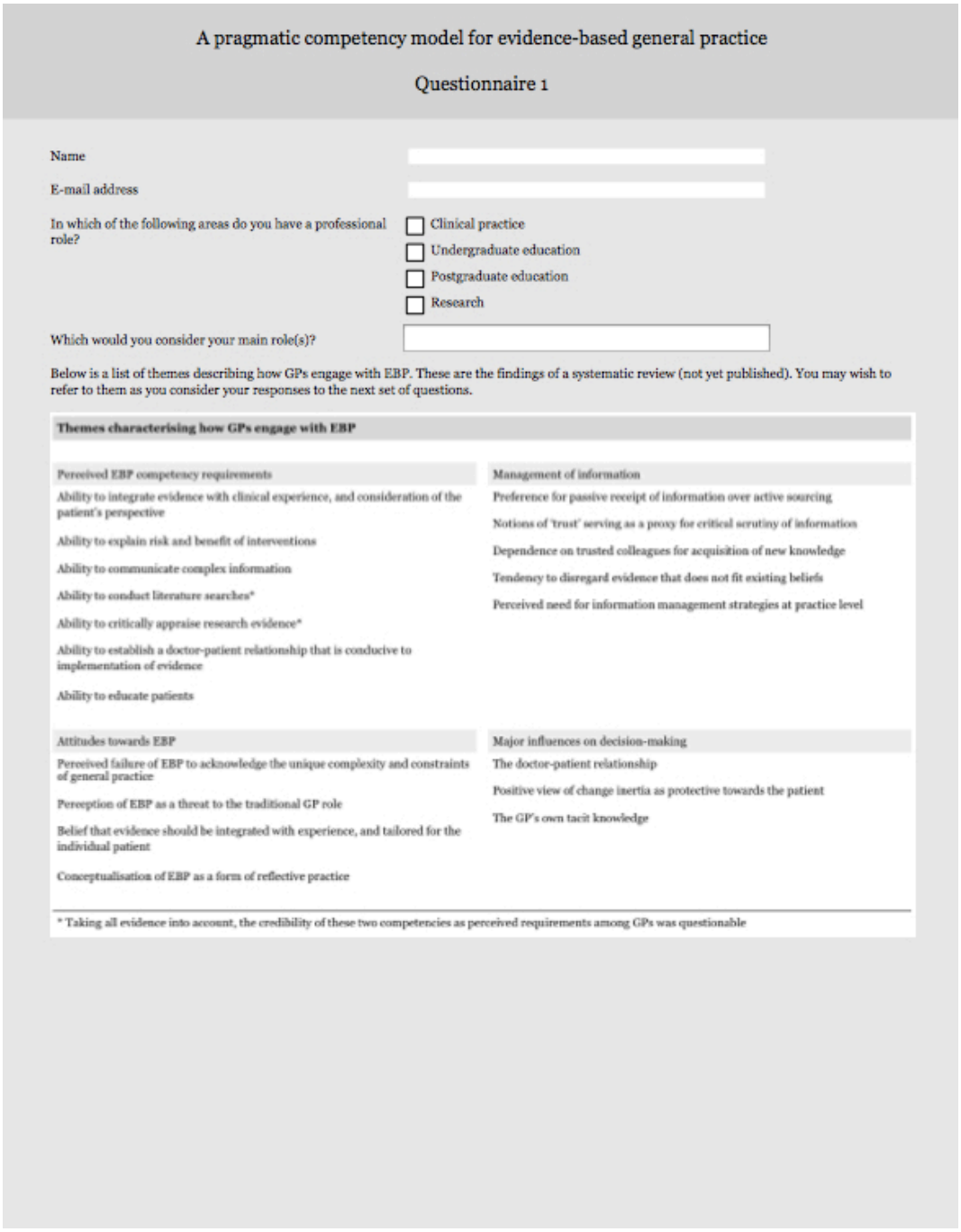
Will participation help me in any way?

An exploration of the nature and application of EBP in primary care will inevitably involve a degree of personal reflection on your own practice as a clinician. As such, participation could make a valuable contribution to your own appraisal. For those whose role is mainly clinical, the value may also lie in engaging with research. It is hoped that the exercise will

also prove intellectually gratifying, as you help to push forward the discussion on how EBP can evolve.

What am I required to do?

1. Open the attached pdf file that accompanies this document. It is named "Delphi Questionnaire 1." It should look like this, with boxes for you to fill in and tick:



A pragmatic competency model for evidence-based general practice

Questionnaire 1

Name

E-mail address

In which of the following areas do you have a professional role?

- ☐ Clinical practice
- ☐ Undergraduate education
- ☐ Postgraduate education
- ☐ Research

Which would you consider your main role(s)?

Below is a list of themes describing how GPs engage with EBP. These are the findings of a systematic review (not yet published). You may wish to refer to them as you consider your responses to the next set of questions.

Themes characterising how GPs engage with EBP

Perceived EBP competency requirements

- Ability to integrate evidence with clinical experience, and consideration of the patient's perspective
- Ability to explain risk and benefit of interventions
- Ability to communicate complex information
- Ability to conduct literature searches*
- Ability to critically appraise research evidence*
- Ability to establish a doctor-patient relationship that is conducive to implementation of evidence
- Ability to educate patients

Management of information

- Preference for passive receipt of information over active sourcing
- Notions of 'trust' serving as a proxy for critical scrutiny of information
- Dependence on trusted colleagues for acquisition of new knowledge
- Tendency to disregard evidence that does not fit existing beliefs
- Perceived need for information management strategies at practice level

Attitudes towards EBP

- Perceived failure of EBP to acknowledge the unique complexity and constraints of general practice
- Perception of EBP as a threat to the traditional GP role
- Belief that evidence should be integrated with experience, and tailored for the individual patient
- Conceptualisation of EBP as a form of reflective practice

Major influences on decision-making

- The doctor-patient relationship
- Positive view of change inertia as protective towards the patient
- The GP's own tacit knowledge

* Taking all evidence into account, the credibility of these two competencies as perceived requirements among GPs was questionable

If you try to open it using a smart phone or tablet, you may need a particular 'app' to see the fill-in boxes, so it is recommended that you use a desktop or laptop computer. If you run into any difficulty, please email me: Kevin.Galbraith@Kellogg.ox.ac.uk.

2. Fill in the questionnaire, saving your work periodically as you go.

3. Save the completed form, and email it to: Kevin.Galbraith@Kellogg.ox.ac.uk.

4. Look out for the second (and final) questionnaire, which will be emailed to you in 4-6 weeks.

Thank you once again for your invaluable help.

Kevin Galbraith

Appendix 7. Delphi process Round 1 Questionnaire (Chapter 4)

A pragmatic competency model for evidence-based general practice

Questionnaire 1

Name

E-mail address

In which of the following areas do you have a professional role?

- ☐ Clinical practice
- ☐ Undergraduate education
- ☐ Postgraduate education
- ☐ Research

Which would you consider your main role(s)?

Below is a list of themes describing how GPs engage with Evidence-Based Practice (EBP). These are the findings of a systematic review (not yet published). You may wish to refer to them as you consider your responses to the next set of questions.

Themes characterising how GPs engage with EBP

Perceived EBP competency requirements	Management of information
Ability to integrate evidence with clinical experience, and consideration of the patient's perspective	Preference for passive receipt of information over active sourcing
Ability to explain risk and benefit of interventions	Notions of 'trust' serving as a proxy for critical scrutiny of information
Ability to communicate complex information	Dependence on trusted colleagues for acquisition of new knowledge
Ability to conduct literature searches*	Tendency to disregard evidence that does not fit existing beliefs
Ability to critically appraise research evidence*	Perceived need for information management strategies at practice level
Ability to establish a doctor-patient relationship that is conducive to implementation of evidence	
Ability to educate patients	

Attitudes towards EBP	Major influences on decision-making
Perceived failure of EBP to acknowledge the unique complexity and constraints of general practice	The doctor-patient relationship
Perception of EBP as a threat to the traditional GP role	Positive view of change inertia as protective towards the patient
Belief that evidence should be integrated with experience, and tailored for the individual patient	The GP's own tacit knowledge
Conceptualisation of EBP as a form of reflective practice	

* Taking all evidence into account, the credibility of these two competencies as perceived requirements among GPs was questionable

Below is a set of 6 *proposed* competencies. Consider them a starting point for eliciting your own opinions on what a set of pragmatic EBP competencies for GPs should look like. They have been proposed on the basis of the themes shown above, and attempt to focus on the real-life tasks of GPs. Please rate each for importance, achievability and demonstrability. If you would like to add any comments to clarify your opinion, or to suggest alternative wording, please write these in the space provided.

Competency 1.

The EBP competent GP reflects on instances in which risk and benefit were difficult to explain to a patient, and develops a concise, clear explanation for future use.

	1 Not important at all	2	3	4	5	6	7 Very important
How important is this competency in terms of delivering the best possible care?	○	○	○	○	○	○	○

	1 Completely unachievable	2	3	4	5	6	7 Fully achievable
How achievable is this competency in the general practice setting?	○	○	○	○	○	○	○

	1 Not demonstrable at all	2	3	4	5	6	7 Fully demonstrable
Can the competency be demonstrated using existing appraisal tools?	○	○	○	○	○	○	○

Any comments you would like to make?

Competency 2.

The EBP competent GP demonstrates an ability to identify decisions they found challenging, and to reflect upon their reasoning in terms of '4Es' - Evidence (availability, quality and applicability), Experience (their own accumulated on-the-job knowledge), Empathy (appropriate consideration of the patient's perspective, capacity and circumstances) and Environment (the influence of external factors such as time pressure or access to resources).

	1 Not important at all	2	3	4	5	6	7 Very important
How important is this competency in terms of delivering the best possible care?	○	○	○	○	○	○	○

	1 Completely unachievable	2	3	4	5	6	7 Fully achievable
How achievable is this competency in the general practice setting?	○	○	○	○	○	○	○

	1 Not demonstrable at all	2	3	4	5	6	7 Fully demonstrable
Can the competency be demonstrated using existing appraisal tools?	○	○	○	○	○	○	○

Any comments you would like to make?

Competency 3.

The EBP competent GP demonstrates a commitment to checking newly acquired knowledge from colleagues, media, pharmaceutical companies and other sources against the best available evidence, using secondary sources such as guidelines, evidence-based summaries and systematic reviews.

	1 Not important at all	2	3	4	5	6	7 Very important
How important is this competency in terms of delivering the best possible care?	○	○	○	○	○	○	○

	1 Completely unachievable	2	3	4	5	6	7 Fully achievable
How achievable is this competency in the general practice setting?	○	○	○	○	○	○	○

	1 Not demonstrable at all	2	3	4	5	6	7 Fully demonstrable
Can the competency be demonstrated using existing appraisal tools?	○	○	○	○	○	○	○

Any comments you would like to make?

Competency 4.

The EBP competent GP demonstrates a commitment to efficiently addressing clinical uncertainty, using secondary sources of evidence, and the best available information technology.

	1 Not important at all	2	3	4	5	6	7 Very important
How important is this competency in terms of delivering the best possible care?	○	○	○	○	○	○	○

	1 Completely unachievable	2	3	4	5	6	7 Fully achievable
How achievable is this competency in the general practice setting?	○	○	○	○	○	○	○

	1 Not demonstrable at all	2	3	4	5	6	7 Fully demonstrable
Can the competency be demonstrated using existing appraisal tools?	○	○	○	○	○	○	○

Any comments you would like to make?

Competency 5.

The EBP competent GP works with colleagues to share the tasks of identifying and prioritising clinical questions, finding, appraising and presenting evidence, and refreshing knowledge of EBP concepts and resources.

	1 Not important at all	2	3	4	5	6	7 Very important
How important is this competency in terms of delivering the best possible care?	○	○	○	○	○	○	○

	1 Completely unachievable	2	3	4	5	6	7 Fully achievable
How achievable is this competency in the general practice setting?	○	○	○	○	○	○	○

	1 Not demonstrable at all	2	3	4	5	6	7 Fully demonstrable
Can the competency be demonstrated using existing appraisal tools?	○	○	○	○	○	○	○

Any comments you would like to make?

Competency 6.

The EBP competent GP demonstrates advocacy and leadership in identifying and addressing barriers to EBP within their practice.

	1 Not important at all	2	3	4	5	6	7 Very Important
How important is this competency in terms of delivering the best possible care?	○	○	○	○	○	○	○

	1 Completely unachievable	2	3	4	5	6	7 Fully achievable
How achievable is this competency in the general practice setting?	○	○	○	○	○	○	○

	1 Not demonstrable at all	2	3	4	5	6	7 Fully demonstrable
Can the competency be demonstrated using existing appraisal tools?	○	○	○	○	○	○	○

Any comments you would like to make?

Please add any further comments you would like to make, or any competencies you think should have been included.

Please save your responses and email the completed form to Kevin.Galbraith@Kellogg.ox.ac.uk

Thank you very much for your help.

Appendix 8. Delphi process Round 2 Questionnaire (Chapter 4)

A pragmatic competency model for evidence-based general practice

Questionnaire 2

Introduction

Thank you once again for participating in this Delphi process, the aim of which is to construct a set of competencies, that a busy GP could make part of their annual appraisal should they wish to develop the Evidence-Based Practice (EBP) part of their skill-set. This questionnaire is the final one in the process.

A reminder of what happened in Round 1

You will recall that in Round 1, you were asked to rate a number of proposed competencies for three characteristics: (1) their importance in terms of delivering the best possible care; (2) their achievability in the general practice setting; and (3) their demonstrability using existing appraisal tools. The proposed competencies were based on an extensive review of the knowledge, skills, attitudes and behaviour of GPs in the context of EBP. Some of you also provided additional comments.

How your responses were analysed

The ratings allocated to each competency were collated. The free-text comments were analysed for areas of agreement and disagreement, and organised into themes. All the data were presented to a panel of senior academics in the Department of Primary Care Health Sciences at the University of Oxford. With their help, the competencies were revised after careful consideration of your Round 1 responses.

How Round 2 is structured

In this second (and final) phase of the process, you will be presented with the revised competencies. Just as in Round 1, you will be asked to rate each for importance, achievability and demonstrability, and to provide any comments you would like to make. Then you will be asked to rank order them in terms of importance, achievability and demonstrability.

Revised Competency 1

A competent GP reflects on instances in which risk and benefit were difficult to explain to a patient, identifies any limitations in their communication skills in this context, and takes clearly defined steps to develop these skills, using the best available evidence.

	1 Not important at all	2	3	4	5	6	7 Very important
How important is this competency in terms of delivering the best possible care?	○	○	○	○	○	○	○

	1 Completely unachievable	2	3	4	5	6	7 Fully achievable
How achievable is this competency in the general practice setting?	○	○	○	○	○	○	○

	1 Not demonstrable at all	2	3	4	5	6	7 Fully demonstrable
Can the competency be demonstrated using existing appraisal tools?	○	○	○	○	○	○	○

Any comments you would like to make?

Revised Competency 2

A competent GP demonstrates an ability to reflect on their decisions and reasoning, in terms of evidence, experience, empathy and environment.

	1 Not important at all	2	3	4	5	6	7 Very important
How important is this competency in terms of delivering the best possible care?	○	○	○	○	○	○	○

	1 Completely unachievable	2	3	4	5	6	7 Fully achievable
How achievable is this competency in the general practice setting?	○	○	○	○	○	○	○

	1 Not demonstrable at all	2	3	4	5	6	7 Fully demonstrable
Can the competency be demonstrated using existing appraisal tools?	○	○	○	○	○	○	○

Any comments you would like to make?

Revised Competency 3

A competent GP values an evidence-based approach and can demonstrate that they have structured their work to allow time for the evaluation of newly-acquired information.

	1 Not important at all	2	3	4	5	6	7 Very important
How important is this competency in terms of delivering the best possible care?	○	○	○	○	○	○	○

	1 Completely unachievable	2	3	4	5	6	7 Fully achievable
How achievable is this competency in the general practice setting?	○	○	○	○	○	○	○

	1 Not demonstrable at all	2	3	4	5	6	7 Fully demonstrable
Can the competency be demonstrated using existing appraisal tools?	○	○	○	○	○	○	○

Any comments you would like to make?

Revised Competency 4

A competent GP demonstrates an ability to identify high quality evidence to address gaps in clinical knowledge.

	1 Not important at all	2	3	4	5	6	7 Very important
How important is this competency in terms of delivering the best possible care?	○	○	○	○	○	○	○

	1 Completely unachievable	2	3	4	5	6	7 Fully achievable
How achievable is this competency in the general practice setting?	○	○	○	○	○	○	○

	1 Not demonstrable at all	2	3	4	5	6	7 Fully demonstrable
Can the competency be demonstrated using existing appraisal tools?	○	○	○	○	○	○	○

Any comments you would like to make?

Revised Competency 5

A competent GP shares gaps in clinical knowledge with colleagues and uses evidence-based tools to collectively improve practice.

	1 Not important at all	2	3	4	5	6	7 Very important
How important is this competency in terms of delivering the best possible care?	○	○	○	○	○	○	○

	1 Completely unachievable	2	3	4	5	6	7 Fully achievable
How achievable is this competency in the general practice setting?	○	○	○	○	○	○	○

	1 Not demonstrable at all	2	3	4	5	6	7 Fully demonstrable
Can the competency be demonstrated using existing appraisal tools?	○	○	○	○	○	○	○

Any comments you would like to make?

Revised Competency 6

A competent GP demonstrates advocacy and leadership in identifying and addressing barriers to EBP within their practice.

	1 Not important at all	2	3	4	5	6	7 Very important
How important is this competency in terms of delivering the best possible care?	○	○	○	○	○	○	○

	1 Completely unachievable	2	3	4	5	6	7 Fully achievable
How achievable is this competency in the general practice setting?	○	○	○	○	○	○	○

	1 Not demonstrable at all	2	3	4	5	6	7 Fully demonstrable
Can the competency be demonstrated using existing appraisal tools?	○	○	○	○	○	○	○

Any comments you would like to make?

We would like to ascertain how the revised competencies compare with each other for importance, achievability and demonstrability.

For each of these three characteristics, place the competencies in order of 'most -' to 'least -'. This should be done by allocating each competency a number between 1 (least important or achievable or demonstrable) and 6 (most important or achievable or demonstrable). Allocate a different number between 1 and 6 for each competency.

Importance in terms of delivering best possible care

Revised Competency 1	**Rank**
A competent GP reflects on instances in which risk and benefit were difficult to explain to a patient, identifies any limitations in their communication skills in this context, and takes clearly defined steps to develop these skills, using the best available evidence.	
Revised Competency 2	
A competent GP demonstrates an ability to reflect on their decisions and reasoning, in terms of evidence, experience, empathy and environment.	
Revised Competency 3	
A competent GP values an evidence-based approach and can demonstrate that they have structured their work to allow time for the evaluation of newly-acquired information.	
Revised Competency 4	
A competent GP demonstrates an ability to identify high quality evidence to address gaps in clinical knowledge.	
Revised Competency 5	
A competent GP shares gaps in clinical knowledge with colleagues and uses evidence-based tools to collectively improve practice.	
Revised Competency 6	
A competent GP demonstrates advocacy and leadership in identifying and addressing barriers to EBP within their practice.	

Achievability in the general practice setting

Revised Competency 1	Rank
A competent GP reflects on instances in which risk and benefit were difficult to explain to a patient, identifies any limitations in their communication skills in this context, and takes clearly defined steps to develop these skills, using the best available evidence.	
Revised Competency 2	
A competent GP demonstrates an ability to reflect on their decisions and reasoning, in terms of evidence, experience, empathy and environment.	
Revised Competency 3	
A competent GP values an evidence-based approach and can demonstrate that they have structured their work to allow time for the evaluation of newly-acquired information.	
Revised Competency 4	
A competent GP demonstrates an ability to identify high quality evidence to address gaps in clinical knowledge.	
Revised Competency 5	
A competent GP shares gaps in clinical knowledge with colleagues and uses evidence-based tools to collectively improve practice.	
Revised Competency 6	
A competent GP demonstrates advocacy and leadership in identifying and addressing barriers to EBP within their practice.	

Demonstrability using existing appraisal tools

Revised Competency 1	Rank
A competent GP reflects on instances in which risk and benefit were difficult to explain to a patient, identifies any limitations in their communication skills in this context, and takes clearly defined steps to develop these skills, using the best available evidence.	
Revised Competency 2	
A competent GP demonstrates an ability to reflect on their decisions and reasoning, in terms of evidence, experience, empathy and environment.	
Revised Competency 3	
A competent GP values an evidence-based approach and can demonstrate that they have structured their work to allow time for the evaluation of newly-acquired information.	
Revised Competency 4	
A competent GP demonstrates an ability to identify high quality evidence to address gaps in clinical knowledge.	
Revised Competency 5	
A competent GP shares gaps in clinical knowledge with colleagues and uses evidence-based tools to collectively improve practice.	
Revised Competency 6	
A competent GP demonstrates advocacy and leadership in identifying and addressing barriers to EBP within their practice.	

Please add any further comments you would like to make, or any competencies you think should have been included.

Please indicate whether you would like your name, position and academic institution/practice to be included in a list of expert participants if this work is published. (Note: depending on the responses of the group as a whole, a decision will be made whether to include a list or not).

- ☐ Yes, I would like my details to be included
- ☐ No, I would not like my details to be included
- ☐ I don't mind one way or the other

Please save your responses and email the completed form to Kevin.Galbraith@Kellogg.ox.ac.uk

Thank you very much for your help.

Appendix 9. Delphi process: free-text comments from Round 1 (Chapter 4)

Competency 1

The EBP competent GP reflects on instances in which risk and benefit were difficult to explain to a patient, and develops a concise, clear explanation for future use.

- very hard to capture in reality for appraisal

- I think this would be fairly straightforward to demonstrate for appraisal. However, as an activity I am not sure it happens other than rarely except perhaps at the start of one's career. There have been instances when I recall similar activities as part of generally disseminated guidance eg hrt and breast cancer risk. I have a variety of tools to use to discuss risk/ benefit and EBM evidence would inform the specifics of the discussion, but I do not have the time to look at every scenario in this way.

- Importance: I would regard this as the bedrock of EBP. Consideration of risk and benefit may not be the principal factor in many decisions, but the GP should be able nevertheless, to communicate this fundamentally important information if appropriate during a consultation. Achievability: the situation is likely to occur often, providing plenty of opportunities for reflection. The obligatory nature of the appraisal process would help overcome inertia, but protected time may be required, with measures taken to make sure it is not used for other work. Demonstrability: a simple written account could be submitted. It would likely be clear to an appraiser whether any real attempt had been made to compose an improved explanation for future use.

- Time constraints main issue. The appraisal toolkit does little to encourage EBM competent practice although with some imagination you can demonstrate it

- I don't know what appraisal tools are currently used in GP. GP's should be competent in discussing the "balance" of risks and benefits for common GP scenarios e.g. antibiotics for otitis media. But should not be expected to develop skills in explaining rarer 'specialist scenarios' off the bat in a consultation e.g. interferon for MS. But GP's should be capable of challenging specialist advice based on the balance of risks and benefits e.g. testosterone for male fatigue

- Explanations regarding risk/benefits need to be tailored to the individual needs of each patient. "playing the record" can sometimes be appropriate but patients need an explanation they can understand in the setting of individual circumstances. They may be starting from different sets of health beliefs and have several other confounding medical issues that may mean an individual solution is needed in that individual rather than a standard fit solution.

- current appraisal tool required evidence of engagement on reflection only

- "develop a concise, clear explanation for future use" Not sure this is right/possible? Having spent some time thinking about what I could do to support my own 'difficult' conversations with patients in the 'grey areas' of practice, my main reflection is perhaps that there is no one explanation? When a conversation goes well and I think 'I must remember that for next time', next time is always different. John Gabbay's work describes how GPs use collective experience and knowledge to generate 'mindlines'...rules of thumb? But they are still guidance, not 'clear explanations'. So I support the principle of learning from experience...integrating experience with other forms of knowledge (including 'scientific evidence') to generate frameworks. But wonder if they are frameworks...ideas to draw on in interpreting the next situation. Not 'balck

and white' outputs. And also wonder whether it is best as a collective process, not singly (as per Gabbay's work). This sort of collective reflective practice is increasingly difficult in usual daily practice due to pressures of time/confusion over GP roles...fragmentation of services etc. It can perhaps come up in case study reflections in existing appraisal, but it will often be crowded out by other things

Competency 2

The EBP competent GP demonstrates an ability to identify decisions they found challenging, and to reflect upon their reasoning in terms of '4Es' - Evidence (availability, quality and applicability), Experience (their own accumulated on-the-job knowledge), Empathy (appropriate consideration of the patient's perspective, capacity and circumstances) and Environment (the influence of external factors such as time pressure or access to resources).

- See comments at the end about what is EGP competent and what is a GP. Reflecting on the use of multiple sources of knowledge in interpreting/constructing individually tailored decisions/knowledge is - I agree -a core competency, certainly of expert generalist practice. Whether I would use the 4 E's...possibly need to think about. I would like to see it like more clearly with the idea of knowledge construction (so the criteria I use include data collection, interpretation/analysis, generation of knowledge, generalisability, utility. The 4E's perhaps offer a more GP /clinicain friendly version> but I would need to think longer about whether they a) capture everything b) support critical refection on the process of knowledge generation

- This is something we all do, often as a shared experience with colleagues. Significant event analysis I guess formalises this to a degree.

- The competency, as written, doesn't capture 4 things: (1) 'Difficult' decisions may not be the highest priority for reflection - decisions which seem easy may be more prone to incorrect assumptions. (2) Rapid assumptions make an important contribution to decisions - when a patient presents, an almost instantaneous appraisal is made of the salient features, and these are integrated with existing 'illness scripts.' Both are subject to assumptions. (3) The relative contribution of evidence, experience, empathy and environment to the decision may be important. (4) An 'ability' to reflect doesn't place any requirement on the GP to exercise this ability and to establish it in the longer term. Attempting to capture these 4 issues, an alternative wording might be: 'The EBP competent GP demonstrates a commitment to reflecting on decisions that transpired to be suboptimal, assessing the contribution of non-evidence-based assumptions, tacit experience, consideration of the patient's situation and perspective, and the work environment.' This is a complex reflective exercise, perhaps not easy to achieve within a busy schedule.

- this could be demonstrated for appraisal purposes by writing up of difficult cases

- Is there too much emphasis on reflective learning????

- easier to capture because self report is possible

Competency 3

The EBP competent GP demonstrates a commitment to checking newly acquired knowledge from colleagues, media, pharmaceutical companies and other sources against the best available evidence, using secondary sources such as guidelines, evidence-based summaries and systematic reviews.

- most GPs, especially newer trainees seem unaware of biases and influences on 'evidence' and have no healthily sceptical views

- time constraints are the main barrier to this

- Achievability: this may require properly protected time, but could be achieved efficiently if already online, and familiar with a search database such as the TRIP database, which is simple to use, and allows selection of pre-appraised secondary sources of evidence.

- This occurs in a parallel universe where GPs have time for reflection and opportunity to take "time out" from clinical work. Just not do-able for ordinary mortals!

- reflects a more traditional view of EBP as currently practiced? Why are these the gold standard/reference sources? Need a broader view of appropriate and available knowledge supporting interpretive [practice

Competency 4

The EBP competent GP demonstrates a commitment to efficiently addressing clinical uncertainty, using secondary sources of evidence, and the best available information technology.

- I can't answer this one. It is 2 (3?) elements. Secondary sources of evidence, IT (and efficiency). There is clearly an assumption here about good practice (what is the right sort of evidence).

- Uncertainty is part of clinical practice. The evidence itself is often uncertain even in highly defined areas which are "easy" to study. The evidence base is not fit for purpose in reducing uncertainty in a given individual. In fact that is not what most studies are for - large amounts of the data base are derived from commercial activity, other large tracts are suppressed to prevent commercial harm. Very little is directed at defining the best solution for an individual in a multivariate clinical environment. Clinical research produces best results in groups where individual variance is minimised - the exact antithesis of the clinical situation.

- I personally use NHS CKS as it is evidence based and cites secondary sources of evidence

- Achievability: some properly protected time may be required.

Competency 5

The EBP competent GP works with colleagues to share the tasks of identifying and prioritising clinical questions, finding, appraising and presenting evidence, and refreshing knowledge of EBP concepts and resources.

- can self report on questions identified

- Achievability: this would depend on the 'change culture' within the practice, the relationship dynamics between GP colleagues, and work patterns. But many practices have managed to run journal clubs, so a similar activity like this is feasible in some practices.

- Again time is the main issue. That said a competent GP in EBM will make time to disseminate this with other. Even a journal club can provide some of these skills

- The hell we do. Again, we are going to radically reduce patient contact to achieve aspirational stuff like this.

- willingness of colleague to participate can be very variable

- traditional ebp again...guidelines do this bit. See John Gabbay - working with colleagues is about building the 'beyond guideline'/protocol/scientific evidence knowledge?

Competency 6

The EBP competent GP demonstrates advocacy and leadership in identifying and addressing barriers to EBP within their practice.

- What is EBP - how are you defining it? EBM was the educational process to support identifying and critically appraising evidence. The EBM manuels missed out the application to patients. John Gabbays work demonstrates that GPs do something different than use guidelines. How do mindlines fit with EBP as defined for this purpose. If you dont define EBP with that in mind then it will never work. Appraisal is not the tool by which to change practice? Leadership and advcocacy for beyond protocol/technical care is hugely important if we are to get back to a person-centred rather than command and control model of health care. But I am not sure this is what you are asking?

- I feel that there is a lot of negative, preconceived ideas of EBP currently

- The evidence is that evidence based practice is a can of shit. No-one can decide what it actually says and everyone interprets it in the way they want to give the answer they want. Lots of useless things are measured, while lots of useful things can't be measured. Modern research tools are so poor that data has to be subjected to statistical manipulation in "meta-analysis" etc before it makes any sense and successive papers examining the same question contradict each other, so an aggregate answer is the best we can do.

- I rarely see any attempts to meet this criteria

- Achievability: the competency itself is fully achievable, though a successful outcome may be hard to achieve depending on the 'change culture' and relationship dynamics within the practice.

- Practice as in others within the partnership or group rather than one's own practice, I presume

- very difficult to expect all individuals to achieve this

General comments

- 'Demonstration of commitment' would require some tangible strategy towards sustainability of the competency to be evident in the appraisal

- I think a lot of GP's (like hospital specialists) take the path of least resistance in relation to 'prescribing' based on evidence. They wish to be liked and to be seen as a 'nice doctor' who gives the patient what they want (or does what specialist requests). There is a general reluctance among GP's to take a wider perspective than the individual patient who sits before them. My thoughts [question #1] are influenced by two recent (very affable) discussions with clinical colleagues, both within the last fortnight: (1) with a neurologist who described how his colleagues will readily assent to a patients request for interferon even though they themselves (the individual neurologists) doubt that it will be of any benefit; and that the 'single clinician' who adopts a different approach is the cultural outlier. (2) with an experienced GP who had agreed to give regular testosterone injections (instigated by a 'respectable' hospital specialist) to a middle aged man with fatigue. the GP did not think it posed much of a threat to the individual patient and so on balance was giving it; did not wish to challenge the specialist on their advice and would almost never think of refusing to implement specific prescribing advice from a specialist on the grounds of the lack of supporting evidence [had in fact never done this]; did not think that GP's as a 'professional group' might do considerable harm over time to such middle aged men with fatigue (and although prepared to admit that their prescribing practice in relation to HRT had changed significantly in the past, they could no see any parallel with the approach they were adopting towards testosterone).

- The whole process of over analysis is making the task of tending to patients virtually impossible. You end up wondering why you are wondering why you are wondering. It doesn't make you a better Dr., in fact it makes you worse because it gives credence to a process which betrays patient care and is used to control care for commercial and political purposes. Until EBM is cleaned up morally and made fit for purpose it must not be allowed to govern outcomes in the consulting room.

- I am struggling to respond as I am not sure:-

  how you are defining Evidence Based Practice (the 'correct' use of 'best evidence'?...what is 'correct' and what is 'best'? Are we talking about the use of 'best evidence' as guideline agreed unless unsafe to do so...a perhaps more technical view of EBP. Or are you talking about a 'higher level' if EBP. interpretive practice that integrates and interprets multiple sources of knowledge from a defined perspective in order to generate an individually tailored account of what is wrong/needs doing. An account (new knowledge) which can...and should...be critically evaluated by reference to the whole process by which knowledge is produced (My declared bias being that the latter is my work on interpretive practice. But perhaps also look at John Gabbay's work on mindlines...which probably fits somewhere between these two. Is EBP a homogeneous form of practice? Or are there different versions? A continuum?

  how you are understanding General Practice. Is General Practice a homogeneous profession and would we expect to see all GPs using EBP in the same way? Again, my declared bias....we have suggested there are at least 3 types of GPs/ways of working in Gen Practice...the GP w Special INterest, the Navigator and the expert Generalist. All of whom may use evidence for practice in different ways...be at different points along the continuum.

  - is EB Practice a set of competencies (Evidence Based Medicine is perhaps definable as comptencies...butis the application...the practice...so linear/straightforward?) or something more complex...a complex intervention with constant and variable components, for example. And with the added complexity of multiple roles within Gen Practice, would you want to capture just the core./shared competencies? Or allow for different GPs to have (show strnegth in) different areas?

Appendix 10. Delphi process: free-text comments from Round 2 (Chapter 4)

Revised Competency 1

A competent GP reflects on instances in which risk and benefit were difficult to explain to a patient, identifies any limitations in their communication skills in this context, and takes clearly defined steps to develop these skills, using the best available clinical evidence.

- Potentially valuable but difficult to show

- The phrase "best available clinical evidence" needs clarifying/expanding. GPs use many sorts of evidence/knowledge in interpreting risk and benefit. If you keep this definition narrow (ie medical clinical knowledge - epidemiology and trials), it is probably easier to achieve/demonstrare...but for me it isnt best evidence informed practice

- I think the wording could be improved further - it is unclear whether the competency focuses only on the development of communication skill, or both communication skill, and finding/selecting the best available evidence. 'Using the best available clinical evidence' appears tagged on the end of the competency as a caveat. Both skills are necessary for this to be an EBP competency, and both should therefore be included. The competency derives 'real-world pragmatism' from the fact that it demands not necessarily achievement of ideal risk communication, but attempted movement towards that ideal. I think this approach should be retained. It would be nice to encourage the use of infographics and other decision aids. A

possible revision would be: 'A competent GP takes steps to optimise communication of risk and benefit, using the best available evidence communication tools and decision aids.'

- I would reflect on my explanation to patient and try to improve my skill for future consultations,But each patient might require different method of explanation.

- It would be lovely to have unambiguous clinical evidence of sufficient quality to clearly guide decision making - allas, this is not generally the case for even the simplest of decisions and every patient is different, handles information differently and is receptive to different messages and nuances at different times and for different reasons. Perception of risk and pre-existing health beliefs all contribute far more to a patient's decision than crude data, even if this weren't so frequently contradictory. Unfortunately there is no time to sit around reflecting and creative writing around this.

Revised Competency 2

A competent GP demonstrates an ability to reflect on their decisions and reasoning, in terms of evidence, experience, empathy and environment.

- Difficult with current appraisal models

- Reflection is often assumed to be something we do after the event? Generalist should be using all these sources of knowledge in making a decision - not just in reflection after. Reflection is something they do all the time (I marked as 6 because we do it less at times when

stressed/pushed or in acute emergency situations when there is a clear pathway of action). Can write up case studies to demonstrate but I wonder sometimes if the appraisers get it

- The current GP appraisal tools could be improved to include this information

- This is an essential medical quality to all practitioners in all disciplines. It's something virtually all doctors do every day with each other. It's the basis of medical referral, report writing, evidence giving etc. unfortunately there is no time to sit around reflecting and doing creative writing around this.

Revised Competency 3

A competent GP values an evidence-based approach and can demonstrate that they have structured their work to allow time for the evaluation of newly-acquired information.

- "evaluation" is a very broad term. How does this differ from 'keeping up to date'? Evaluation can be bother at level of 'quality of knowledge' and 'utility' for this pateint? But I suspect this is the sort of competency - if clearly described in the full descriptor - that traditional appraisal supports. Will we be rquired to demonstrate we can critically appraise a paper or some such..

- time limits likely restrain this. Should GPs all be actively encouraged to have some planned elective time to develop these skills as routine part of their job plan?

- Full demonstrability would depend on whether evidence were provided in the appraisal of valid output from such protected time. I don't know whether current appraisal tools are structured to demand such evidence.

- We structure our work around patients, not demonstrating that we are intelectualising.

Revised Competency 4 A competent GP demonstrates an ability to identify high quality evidence to address gaps in clinical knowledge.

- Desirable but not essential; but feasible in appraisal

- So long as definition of high quality kept broad...then the capacity for a doctor - whoever that is - to be able to find knowledge to fill gaps is clearly crucial. Its not what you know but how you use it...depends on being able to find the knowledge to use. Of course the probelm comes in GPs not having time to do this often...hence the justification for guidelines etc. Maybe we need to free up generalist time to do more of this?

- GPs should be able to get access to the best available evidence, through secondary and tertiary sources. A very EBP competent GP would be able to access and appraise primary sources as well.

- There is no possibility at all of a GP familiarising themselves with even a fraction of the evidence which pertains to practice. Reading time neccessarily has to be taken up with review style pieces on major topics.

Revised Competency 5

A competent GP shares gaps in clinical knowledge with colleagues and uses evidence-based tools to collectively improve practice.

- likewise desirable but not essential; but feasible in appraisal

- Evidence based tools? I might query what this is. John Gabbays work on mindlines demonstrates that GPs use collective professional discussion...do you regard this as evdience based? It can be achieved - is part of daily practice - but caution in making it a 'quota'...a 'keyt performance indicator'. Can be demonstrated through use of case studies...narrative examples in existing appriasal process

- Sharing information amongst colleagues should be actively encouraged. There is scope for this in appraisal tools through demonstrating impact. In this case impact is through dissemination.

- Perhaps 'evidence-based tools' requires clarification. Does it mean evidence-based synopses, critical appraisal frameworks, or protocols?

- This depends on cooperation of others which is not always easy

Revised Competency 6 A competent GP demonstrates advocacy and leadership in identifying and addressing barriers to EBP within their practice.

- hard to show in practice

- I think the mindlines discussion is more relevant here? That might include what you are referring to as advoacy and leadership here but is a more collective engagement model? I suppose it could be demonstrated - again a case example. But I am not sure that I have fully understood this competency

- i dont think that this is often a priority for GPs who admittedly are already busy running a practice with other demands over and above patient care.

- It is difficult to impose ones own standard and wishes on colleagues.I believe it to be a personal responsibility to practice EBM.

- I don't trust myself.

General comments

- I haven't been able to rank demonstrability and achievability. Because this depends on whether you want me to think about the impact of constraints of current practice - where (cynic alert) I think it is easier to demonstrate quite limited range of practice because this is what the system favours. Or whether you want me to think about whether it is possible to do so if some of these constraints were removed. I also couldn't meaningfully separate many of them. So I stopped trying!

- I do not see the value of "ranking" in your questionnaire .

- These questions give the impression that the originators believe there is time in modern day general practice for reflection, shared experience, group interaction, creative and reflective writing an administrative oportunities to record such activity. There isn't...and its stuff like this that is helping to empty general practice at the moment.

Appendix 11. Content analysis of appraisals: invitation letter (Chapter 6)



Evidence-Based Medicine in general practice

Dear colleague,

I am evaluating the standard of Evidence-Based Medicine (EBM) in a sample of annual GP appraisals. But rather than apply a traditional definition of EBM – which has proven difficult to achieve in general practice, given time, workload and other pressures – I will apply a more flexible definition, which will acknowledge ways in which GPs might have adapted EBM to fit within those constraints. This will help make EBM training more suited for 'real-world' general practice. The evaluation also forms part of a doctoral thesis.

Would you be prepared to allow analysis of an *anonymised* version of your most recent annual appraisal document? **You will be able to include participation in this study among the CPD activities in your next appraisal.** This will fulfil your obligation under GMC guidance to '*be prepared to contribute to teaching and training doctors and students*' (Good Medical Practice, item 39).

If you are prepared to offer your most recent appraisal for analysis, simply reply to this email message, stating that you are willing to participate. You will be sent a consent form in the post, together with a participant information sheet. The latter will detail precisely how data will be handled, and how to seek further information.

Thank you for your time.

Yours sincerely

Dr Kevin Galbraith Kevin.Galbraith@Kellogg.ox.ac.uk

c/o University of Oxford Department for Continuing Education

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United Kingdom

Appendix 12. Content analysis of appraisals: participant information sheet (Chapter 6)



Evidence-Based Medicine in general practice

07/03/2016

Dear Colleague,

Thank you for expressing an interest in participating in an evaluation of Evidence-Based Medicine (EBM) in general practice, the aim of which is to ascertain the current standard, and to help tailor a suitable version of EBM for modern general practice. It is important that you should understand precisely what the evaluation is about, how it will be conducted, and your role as a participant. For clarity, information is provided below in the form of a series of questions and answers.

What is the title of this evaluation?

The title is as follows: *'What is the standard of Evidence-Based Health Care in a sample of annual GP appraisals? A service evaluation.*'

What is a 'service evaluation'?

A service evaluation is designed and conducted to define or judge current care. It addresses the question 'What standard does this service achieve?' using existing data, without reference to a standard, and without any intervention by the investigator(s).

Who is conducting the evaluation?

The evaluation is part of a doctoral thesis by myself, Dr Kevin Galbraith. I am attached to the Department of Continuing Education at the University of Oxford (www.conted.ox.ac.uk), though I spend more time in contact with the Department of Primary Care Health Sciences (www.phc.ox.ac.uk), as that is where my supervisors Professor Carl Heneghan and Dr Alison Ward work. As the study is part of my doctoral thesis, I am the sole researcher, although my supervisors will act in an advisory capacity. The Wessex Deanery Appraisal Service (www.wessexdeanery.nhs.uk) are committed to supporting appropriate research, and agreed therefore to advertise the service evaluation, and to send the appraisals offered by consenting GPs in encrypted form to me as the researcher.

What is the purpose of the evaluation?

The purpose is twofold:

1. To make an initial evaluation of the standard of EBM in general practice. But rather than adhere to a traditional definition of EBM, a more flexible definition will be applied, which acknowledges that GPs might have found their own novel solutions to the challenge of bringing EBM into their work. The findings will help determine whether a more extensive evaluation should be conducted in future, which could be extrapolated to the wider GP population. This will help plan future strategies for EBM training in general practice.

2. To explore *whether* – and if so, precisely *how* – GPs demonstrate EBM in their work. The findings will be triangulated with those from earlier work, to generate a new set of 'real-world' EBM competences, suited to the unique discipline of general practice. These will be presented for GPs to use, should they wish, as personal developmental objectives in their annual appraisal. Each competence will be accompanied by a series of explanatory vignettes from everyday practice, to assist GPs in identifying situations in which they can be developed. Appraisers may also find the new competence model useful. They will possess in their toolbox a resource that could be recommended to appraisees with whom they have identified EBM learning needs.

Why have I been asked to participate?

You have been asked to participate because you are a GP, because your appraisal contains the type of data of interest in this evaluation, and because you are served by the Wessex Deanery Appraisal Service, which has agreed to assist.

If I agree to participate, what will I have to do?

If you are happy to participate, please read the accompanying consent form carefully. If you are happy to proceed, complete and sign the consent form, and post it to the Wessex Deanery Appraisal Service in the enclosed stamped, addressed envelope. There is nothing else you will have to do.

Can I ask further questions before deciding whether to participate?

Yes. If you have any questions, please contact me by email:
Kevin.Galbraith@Kellogg.ox.ac.uk.

Can I withdraw at any time?

Consent may be withdrawn, and your appraisal removed from the study without any need for explanation, at any stage up to completion of the analysis.

Has the study received ethics committee approval?

I have followed guidance provided by the University of Oxford Central University Research Ethics Committee to determine whether this work requires approval by an ethics committee. In keeping with this guidance, the Clinical Trials and Research Governance Team has been consulted. The Team advised that the work resembles a service evaluation and will not therefore require review by a research ethics committee. I must still adhere however, to guidance issued by the University of Oxford Central University Research Ethics Committee, and I am subject to the University of Oxford Policy on the Management of Research Data and Records.

How will my personal data be handled?

- Recruitment will be conducted confidentially by the Wessex Deanery Appraisal Service.

- The appraisals will be sent by email to me as encrypted files. I will open the files on a computer on the Department premises. The anonymisation process will be conducted on that computer, on Departmental premises. Non-anonymised data will not be transferred or copied to any external device, and will remain behind the University firewall at all times.

- The University of Oxford is committed to the dissemination of its research for the benefit of society and the economy and, in support of this commitment, has established an online archive of research materials. This archive includes digital copies of student theses successfully submitted as part of a University of Oxford postgraduate degree programme. Holding the archive online gives easy access for researchers to the full text of freely available theses, thereby increasing the likely impact and use of that research. If you agree to participate in this project, the research will be written up as a thesis. On successful submission of the thesis, it will deposited both in print and online in the University archives, to facilitate its use in future research. The thesis will be published with access restricted to those who have approval to use the University archives. It is possible that the researcher will also wish to submit data from the evaluation for publication in a peer review journal. The thesis, and any other publication arising from this evaluation will use only anonymous appraisal data.

- The study will be written up as several chapters of a doctoral thesis. It will contain only anonymised data. If submission of the thesis is successful, it will be deposited both in print and online in the University archives, to facilitate its use in future research. The thesis will be published with access restricted to those who have approval to use the University archives. The anonymised data file may also be submitted to the archive so that other researchers can use it. The non-anonymised appraisal documents will be destroyed on completion of the service evaluation.

- As this work is a service evaluation it will not be submitted for publication in a peer-review journal. The findings may be referred to however, in publication of other components of the doctoral thesis submitted to peer-review journals. As data have been anonymised, it follows that findings would also be anonymous.

What benefit might I accrue from participation in this study?

There is no inducement, financial or otherwise, for you to participate. However, you should gain recognition for the invaluable help you are providing. It is suggested therefore, that you consider including your participation among the CPD activities listed in your next appraisal. Your participation is helping to develop the educational resources available to GPs, and as such, fulfils the Good Medical Practice guidance that you should '*be prepared to contribute to teaching and training doctors and students'* (item 39).

The set of tailored competences resulting from this research will be of practical educational value. They will be presented in a way that will help GPs incorporate them efficiently into their appraisal. Each competence will be accompanied by a set of clinical vignettes illustrating how it could be demonstrated in everyday clinical practice, and the particular requirements of Good Medical Practice that it will help you fulfil.

What, if any, are the risks?

As you would be involved only indirectly, the only risks associated with participation relate to the accidental disclosure of personal data. **This risk can be easily mitigated by participating only if you are sure your appraisal does not contain information you would regard as sensitive.** Before giving consent, you should be satisfied that all reasonable efforts are being made to ensure the proper protection of personal data.

What if there is a problem?

If you have a concern about any aspect of this project, please contact me by email at Kevin.Galbraith@Kellogg.ox.ac.uk. Alternatively, you may contact my supervisors Carl Heneghan (Carl.Heneghan@dphpc.ox.ac.uk) or Alison Ward (Alison.Ward@dphpc.ox.ac.uk). You should receive acknowledgement of your concern within 10 working days, with an indication of how it will be addressed. If you remain unhappy or wish to make a formal complaint, please contact the chair of the Research Ethics Committee at the University of Oxford (Chair, Medical Sciences Inter-Divisional Research Ethics Committee; Email: ethics@medsci.ox.ac.uk; Address: Research Services, University of Oxford, Wellington Square, Oxford OX1 2JD). The chair will seek to resolve the matter in a reasonably expeditious manner.

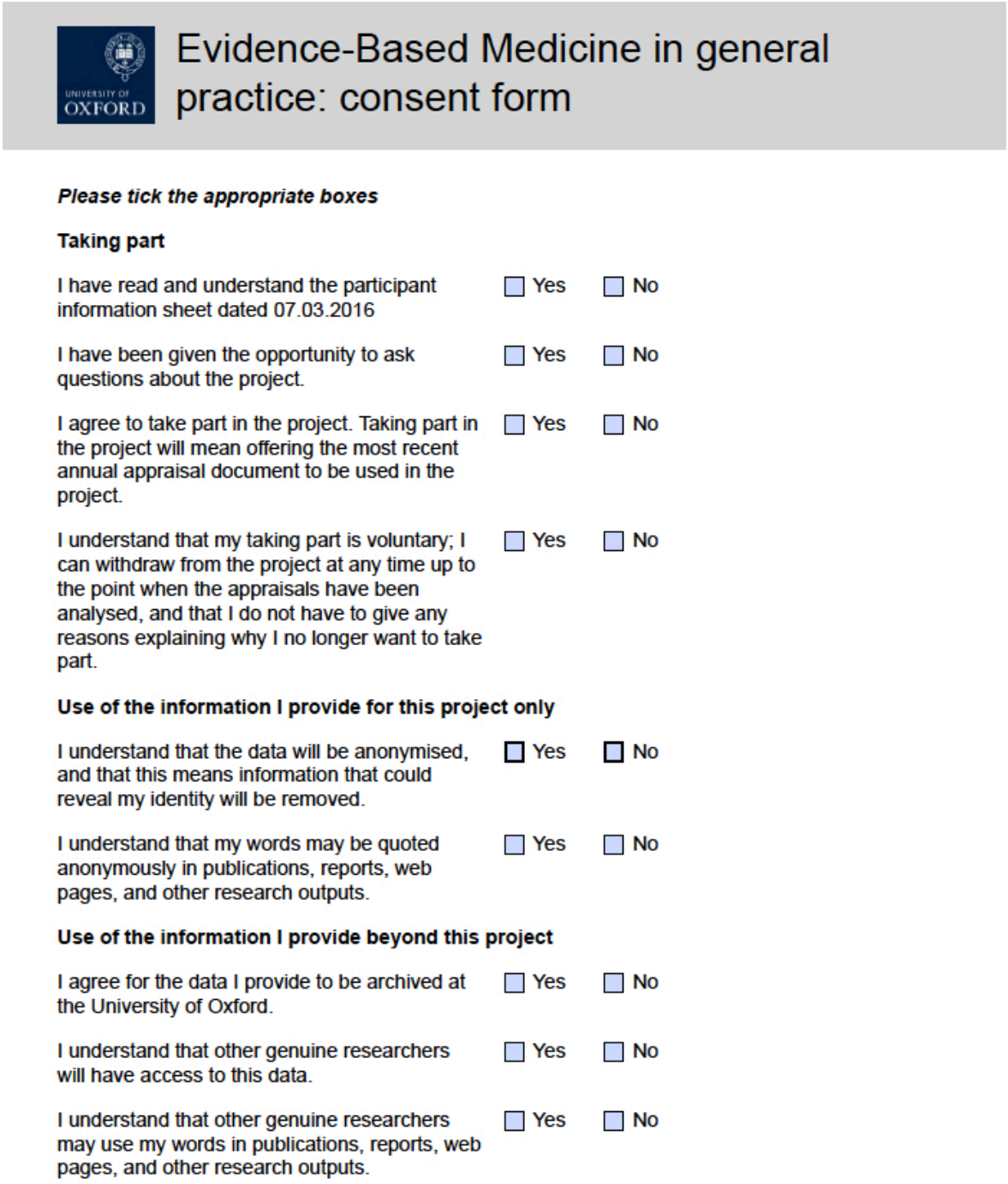
Thank you very much for helping with this evaluation.
Dr Kevin Galbraith

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Rewley House,
1 Wellington Square,
Oxford OX1 2JA,
United Kingdom

Kevin.Galbraith@Kellogg.ox.ac.uk

1. Hsu C-C, Sandford BA. The Delphi Technique: Making Sense Of Consensus. *Practical Assessment, Research & Evaluation.*12(10):2.
2. Calderon C, Sola I, Rotaeche R, et al. EBM in primary care: a qualitative multicenter study in Spain. *BMC Fam Pract.* 2011;12:84.

Appendix 13. Content analysis of appraisals: consent form (Chapter 6)



Evidence-Based Medicine in general practice: consent form

Please tick the appropriate boxes

Taking part

I have read and understand the participant information sheet dated 07.03.2016	☐ Yes	☐ No
I have been given the opportunity to ask questions about the project.	☐ Yes	☐ No
I agree to take part in the project. Taking part in the project will mean offering the most recent annual appraisal document to be used in the project.	☐ Yes	☐ No
I understand that my taking part is voluntary; I can withdraw from the project at any time up to the point when the appraisals have been analysed, and that I do not have to give any reasons explaining why I no longer want to take part.	☐ Yes	☐ No

Use of the information I provide for this project only

I understand that the data will be anonymised, and that this means information that could reveal my identity will be removed.	☐ Yes	☐ No
I understand that my words may be quoted anonymously in publications, reports, web pages, and other research outputs.	☐ Yes	☐ No

Use of the information I provide beyond this project

I agree for the data I provide to be archived at the University of Oxford.	☐ Yes	☐ No
I understand that other genuine researchers will have access to this data.	☐ Yes	☐ No
I understand that other genuine researchers may use my words in publications, reports, web pages, and other research outputs.	☐ Yes	☐ No

So we can use the information you provide legally

I agree to assign the copyright I hold in any materials related to this project to Dr Kevin Galbraith. ☐ Yes ☐ No

Name of participant:

Date:

Signature:

Please place the completed form in the stamped, addressed envelope provided, and post to Gill Watson, Programme Manager, Wessex Appraisal Service, Health Education England, Southern House, Otterbourne, Winchester, Hampshire SO21 2RU.

Please direct any queries to the principal investigator:

Dr Kevin Galbraith
c/o University of Oxford Department for Continuing Education
Rewley House,
1 Wellington Square,
Oxford OX1 2JA,
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Kevin.Galbraith@Kellogg.ox.ac.uk

Appendix 14. Glossary of terms associated with factors influencing decisions (chapter 6)

Shown here is a selection of terms that appear in the word cloud in Figure 6.2. This glossary clarifies their meaning in the context in which they occurred in appraisal documents.

Administration: stress derived from having to perform administrative tasks in addition to clinical work.

Bargaining: trade-offs negotiated between GP and patient, as a factor in making decisions.

Bias: cognitive bias, as a factor affecting decisions.

Blame: a tendency among some patients to blame the GP for their illness.

Capacity: refers to a finite cognitive capacity within the GP, the limits of which determine how much information can be processed at a given time.

Communication: refers to the effectiveness of communication between GP and patient.

Complexity: refers to the complexity of clinical problems, such as multimorbidity.

Culture: aspects of culture that affect the patient's approach and response to illness.

Defensiveness: a tendency to deny personal failing.

Delegation: *difficulty* delegating tasks, as an added stressor.

Disability: functional impairment within a patient, as a factor affecting decisions.

Efficiency: ability to prioritise tasks and complete them successfully.

Emails: electronic messaging as a distraction, and therefore a source of stress during work.

Expectations: refers to patients' expectations as a factor in decision-making.

Governance: refers to professional governance functions as an added stressor in daily work.

Inaccuracy: refers to inaccuracy of diagnostic tests.

Instinct: tacit experience or 'gut-feeling' as an influence in making decisions.

Knowledge: gaps in knowledge as a factor affecting decisions.

Limitations: refers to an appreciation of one's own limitations.

Motivation: refers to motivation to continue practicing medicine.

Numbness: adaptation to stress within the GP, resulting in a lack of emotional response.

Organisation: refers to organisational processes, and environmental stressors in the workplace.

Overmedicalisation: perceived excessive labelling of normal problems as illness.

Patient-centredness: GP behaviour in terms of prioritising the perspectives, needs and capacity of the individual patient.

Pedantry: tendency to preach to patients about their health, resulting in a negative response.

Perfectionism: stress derived from an innate drive to perform tasks faultlessly.

Personality: personal traits within the GP, that affect the approach to decisions.

Prescribing: prescribing behaviour.

Record keeping: refers to time spent recording clinical information as a stressor, and omission of items from records as an obstruction to effective decision-making.

Referring: willingness to refer a patient to a specialist.

Resilience: capacity to adapt positively to stressors.

Roles: stress derived from having to juggle a number of work roles at once.

Self-awareness: refers to *lack* of self-awareness as a factor that affects decisions.

Timekeeping: refers to time pressure as a stressor, and poor time management as a failure of personal organisation.

Sensitivity: refers to sensitive problems experienced by patients, that they may have difficulty communicating to the GP.

Situation: refers to the context of the appointment – for example, the last appointment of the day, or the last before a public holiday.

Skills: consultation skills as a factor in making decisions.

Technology: refers to the effect of technology, such as IT, on the consultation process.

Trust: between GP and patient, as a factor in making decisions.

Vulnerability: susceptibility of the GP to psychological manipulation.

Workload: stress derived from the amount of work.