# “Workhorses”: Exploring How Internal Medicine Residents Learn Efficiency

Assessment Code A18088

Candidate Number 1074133

Department of Education, University of Oxford

MSc in Medical Education

September 2024

**Acknowledgements**

Firstly, I would like to thank my supervisor, Dr. [REDACTED] for his guidance throughout my master's degree. His timely feedback and willingness to schedule meetings on short notice when I was feeling stuck were instrumental in keeping my work on track, and his insight and encouragement have been crucial in shaping this dissertation.

My sincere thanks also go to Dr. RH, whose initial advice on how to navigate ethics approval in Canada and introducing me to the resident training committee were vital steps in this research process and saved me valuable time.

I am also thankful to my course mates for their moral support and friendship throughout. You made my master's experience feel quintessentially Oxford. Even when we couldn't be together in person, I always felt a renewed sense of motivation to keep writing after commiserating for a while on WhatsApp.

I am deeply grateful to the nine study participants who generously volunteered their time and insights. Without you, this research would not be possible.

Finally, I would like to thank my family. A special thank you to my husband B, who entertained our daughter for many weekends to allow me the time and space I needed to focus on my work. To my daughter L, who put up with my frequent trips to Oxford. To my unborn son, who patiently waited until after I submitted my dissertation to make his arrival. Finally, to my brother R, who is still in the throes of medical residency, you have been an inspiration to me.

## Abstract

**Introduction:** In high volume training programs like internal medicine, inefficiency is the primary reason that residents are sent for remediation. Remediation, aimed at correcting competency struggles, is costly and emotionally distressing for trainees. Despite its importance, the meaning of efficiency in medicine and how it is learned are not well understood. The purpose of this study was to explore efficiency in the context of internal medicine and to examine how residents learn to become efficient, with the goal of developing strategies to promote efficiency and reduce the need for remediation. My research questions were, "What constitutes efficiency in the context of internal medicine residency?" and "How do internal medicine residents learn to be efficient in clinical practice?"

**Methods:** A qualitative interpretivist approach was employed. First- and second-year internal medicine residents at a Canadian university participated in semi-structured individual interviews to explore their learning of efficiency. Data were analyzed using inductive reflexive thematic analysis.

**Findings:** Nine residents participated. Efficiency was a multifaceted skill involving a combination of clinical knowledge, mental organization, social skills, and an unwavering focus on maximizing patient safety and care. Efficiency also functioned as a cultural value that shaped residents' identities. Learning efficiency required residents to foster other-centeredness, focusing on actions that would help their team succeed in advancing patient care. Experience and effective feedback were essential for the development of efficiency.

**Conclusion:** Efficiency in medicine involves using specialized expertise to advance patient care at both an individual and collective level. Learning efficiency is a complex process involving personal growth and group experiences. Open communication is crucial for fostering efficiency. It is important to consider how efficiency is learned using a combination of cognitive, socio-cultural, and emergent frameworks to support residents and teams as they navigate increasing patient volumes. Incorporating these insights into training programs will enhance the development of efficiency among residents.

# Contents

## List of Tables



## Abbreviations and Acronyms

**BDC** Business Development Bank of Canada

**CanMEDS** Canadian Medical Education Directives for Specialists

**CaRMS** Canadian Resident Matching Service

**CAQDAS** Computer-Assisted Qualitative Data Analysis Software

**CTU** Clinical Teaching Unit

# Chapter 1: Introduction and Literature Review

## 1.1 Background

Efficiency, or the ability to set priorities, is acknowledged under the Canadian Medical Education Directives for Specialists (CanMEDS) framework as an essential skill required to be a competent physician (Frank et al., 2015). As the hospital system constantly becomes more fast-paced, the pressure on residents to become more efficient is an ever-growing problem (Szymczak & Bosk, 2012). Lack of efficiency is a major reason that some students, notably those in residency, fail to complete medical training (Warburton et al., 2017). Furthermore, the actual number of medical trainees who struggle with efficiency is likely under-recognized, as difficulties with efficiency are often mistaken for knowledge or professionalism deficits (Warburton et al., 2017). Medical residency is a training program that prepares medical school graduates for unsupervised practice of medicine in a specialty (Accreditation Council for Graduate Medical Education [ACGME], 2024, p. 8). During medical residency, newly graduated doctors are entrusted with the responsibility of providing essential service functions for the first time (Professional Association of Residents of Ontario, 2022, art. 1).

In specialty training programs with high patient volumes such as internal medicine, lack of efficiency is the most common reason junior doctors are sent for remediation (DeKosky et al., 2018; Warburton et al., 2017). Remediation is a formal program designed to support residents who are struggling to meet competency standards (Shearer et al., 2019). However, this process is costly for training programs (Guerrasio et al., 2014), may impact a trainee's future career opportunities (Dupras et

al., 2012) and often leads to significant emotional distress for the trainee (Krzyzaniak et al., 2021; Mills et al., 2021).

Despite this difficulty, there is a lack of knowledge about how doctors learn to become efficient in clinical practice. Therefore, research is needed to identify ways for residents to learn efficiency to improve resident well-being and to decrease costs for medical programs (Chou et al., 2019). Enhancing efficiency in our future doctors will also help the health care system operate more smoothly and improve patient care.

### 1.2 Personal Motivation

My interest in learning more about efficiency in medicine started during my own internal medicine residency. Striving to be efficient was at the forefront of my mind every day during my residency. My interest in the topic continued to grow as an attending physician, as I noticed that many residents were struggling more with deficits in efficiency compared to other domains such as medical knowledge. However, not much is known about how to help residents improve their efficiency. Understanding efficiency better in the context of residency is needed to support future generations of residents. This made it a natural choice for my dissertation topic.

### 1.3 Pathway to Internal Medicine in Canada

Efficiency is relevant across both Canadian and British medical contexts. However, understanding the differences in medical training structures between the United Kingdom and Canada is important because these variations can affect the stages at which competencies including efficiency are developed in trainees. Clarifying learners' responsibilities at each stage of training and explaining the

structure of the medical teaching teams in Canada will help readers to understand how expectations and environment influence the trainees' experience of efficiency. Summarized in Table 1 is a comparison of medical training in the United Kingdom and Canada.

**Table 1**

*Terms used for medical specialist education in the United Kingdom vs. Canada*

| | United Kingdom | Canada |
|---|---|---|
| Initial phase | Foundation doctor (2 years, required) | No true equivalent, closest approximation would be clerk (last 2 years of medical school, required) |
| Specialist training phase | Specialty registrar (4-6 years) | Resident (2-6 years) |
| Position after certification | Consultant | Attending physician |

In North America, prospective medical students must complete at least a 4-year baccalaureate degree prior to entering medical school. Medical school usually takes 4 years. The first 2 years are known as pre-clerkship, which consists mostly of coursework and limited contact with patients. The last 2 years consist of a period known as clerkship which is almost entirely clinical. During clerkship, medical students rotate from one specialty to another and are expected to actively participate in clinical duties. They routinely write patient orders which are then verified and co-signed by a resident or attending physician. Upon completing medical school, graduates receive a Doctor of Medicine (MD) degree.

Final-year medical school students apply to residency programs through a centralized matching system. In Canada, it is managed by the Canadian Resident Matching Service (CaRMS). One of the available residency programs is internal medicine. Internal medicine is a medical specialty focused on the prevention,

diagnosis, and treatment of diseases in adults. The specialty encompasses a wide range of conditions affecting the internal organs and systems of the adult body excluding surgical and obstetric conditions.

Internal medicine residents are known as junior residents in their first year of training. Junior residents are typically expected to manage their patient load independently, but meet once or twice a day with a senior resident and attending physician to discuss and modify their patient care plans. In the second year of training, internal medicine residents are typically designated as senior residents and become responsible for managing the junior residents and medical students under the guidance of an attending physician. In the third year of internal medicine, internal medicine residents apply again to CaRMS to be admitted into subspecialty training programs. Thus, residency can last for 4 (e.g. 4-year general internal medicine program) to 6 years total (e.g. cardiology) for internal medicine residents depending on the subspecialty chosen, after which time they become eligible for board certification and independent practice.

During their training, internal medicine residents engage in a variety of rotations including a mix of outpatient and inpatient clinical rotations, subspecialty and general medicine rotations. One common inpatient general medicine clinical rotation is called clinical teaching unit (CTU), which involves being part of a team that usually consists of one attending physician, one senior resident, two internal medicine junior residents, one resident from a different specialty program (e.g. family medicine or radiology), and two third-year medical students. These team members must work

together for one month to collectively care for a group of approximately 20-25 inpatients, requiring each team member to work efficiently.

### 1.4 Existing Research on the Definition and Measurement of Efficiency

Worker efficiency is challenging to define and measure beyond financially motivated definitions, where cost efficiency is an equation related to amount of labour per dollar spent (Andrews & Emvalomatis, 2024). Most of the research done on worker efficiency comes from business management literature (Witzel, 2002; Callender, 2008). However, despite the frequent usage of the term 'efficiency' in management discourse, the term is rarely defined explicitly, and it is often assumed to be understood despite the lack of a standardized definition. Even when attempts are made to define efficiency, the result is vague. For instance, management education pioneer Peter Drucker (1967) defined efficiency simply as 'doing things right'. Business and management professor Guy Callender (2008) acknowledges that "a precise definition of efficiency does not exist in the English language" and notes that even dictionary definitions of efficiency contradict each other (p. 23). He also writes that scientific attempts to apply efficiency to guide management practice "have failed to establish what might be defined as an optimal efficient state" (p. 23-24). He provisionally defines efficiency in the context of management as "the capacity of individuals, groups and organizations to achieve productive, competent outcomes in both micro and macro contexts" (p. 37), where the specific outcomes that need to be achieved depend on the profession or context in question.

The Business Development Bank of Canada (BDC), a national development bank owned by the Government of Canada mandated to help create and develop

Canadian businesses, highlights the need to coordinate resources appropriately to achieve efficiency. The BDC (2019) defines operational efficiency as "using resources like time, people, equipment, inventory and money in an optimized way to serve the business" (para. 3). Although this definition is still quite broad, it does offer some indication of what constitutes efficiency and the process through which efficiency is realized.

In addition to business management literature, attempts have also been made to define efficiency in a health care management context. In his manual for mid-level hospital and healthcare facility managers, Gil (2020) equates efficiency to productivity. He defines productivity as "the sum of quality times satisfaction times volume" (p. 20), where quality is the quality of health care being provided, satisfaction consists of both physician and patient well-being, and volume is the number of patients seen given a constant set of resources. Thus, the goal of efficiency in this context is to achieve "Pareto improvement", which is to increase volume without compromising quality or satisfaction through advances in technology, knowledge, and managerial skill (p. 2). For example, by implementing an operating room checklist at his hospital, Gil was able to increase the number of operations conducted per day at the hospital without a change in existing resources. Gil's work focuses mainly on how hospital managers can put into action new policies to improve the efficiency of hospitals at a systems level. However, his work does not address how non-managerial personnel optimize their efficiency within a relatively fixed hospital structure.

In management literature, worker efficiency is usually assessed using time and motion studies. Pioneered by the combined work of Frederick Winslow Taylor (1911)

and Frank and Lillian Gilbreth (1911), a time-and-motion study is a systematic analysis method used to break down work tasks into detailed steps, measure the time taken for each step, and identify opportunities for improving efficiency by eliminating unnecessary movements and standardizing processes (Witzel, 2002). Healthcare time-and-motion studies have been used effectively in nursing to increase the time that nurses spend in direct contact with patients, which has been shown to improve patient care outcomes (Hendrich et al., 2008; Lopetegui et al., 2014). However, in the context of medical residency, time-and-motion studies have not been so successful at identifying how to make residents more efficient. This may be because the role of the resident is not so well-defined. Residents spend 50.6% of their day at a computer and only 9.4% of time interacting with patients (Mamykina et al., 2016). This suggests that perhaps improvements could be made by investing in better electronic medical record technology. However, it remains unknown whether the residents are using their time valuably within the constraints of the current hospital resources, and what is the most valuable use of medical residents' time (Chaiyachati et al., 2019).

While patients might appreciate extended contact with their physicians, time spent speaking to patients may not always be what is essential for physicians to make life-or-death medical decisions for the patient. For example, Chand (2011) based his definition of efficiency on the hospital's motto of patient-centred care. As a result, he defined efficiency as what patients view as a valuable use of medical residents' time. He surveyed patients and discovered that patients value direct contact with their doctors above all else. Therefore, his solution to improve rounding efficiency at the hospital was to implement family-centred rounding, to maximize the time that junior

doctors were in direct contact with their patients. Family-centred rounding is a patient care approach where the medical team conducts their daily rounds at the bedside of the patient and their family members, encouraging active participation and discussion from the family. At the end of the study, Chand (2011) concluded that the residents were now more efficient because they were spending more time with their patients. Although this was true for Chand's definition of efficiency, efficiency is a dynamic concept. For example, if efficiency was instead defined as number of resident work hours per day, then perhaps spending more time with patients would have made no difference or even worsened efficiency.

In contrast to Chand, Mauksch et al. (2008) defined efficiency as *decreased* patient visit length without compromising patient-physician relationship, and explored ways to decrease time spent with patients while maintaining patient satisfaction. Similarly, ethnographers Szymczak and Bosk (2012) discovered that "residents try to avoid spending too much time with patients and families" so that they can maintain efficiency (p. 7). In fact, one resident from the study faced criticism from the program director for inefficiency because he was spending too much time with patients and their families and as a result was not completing his work on time. Consequently, in the context of medicine, efficiency cannot be defined solely based on how little or how much time is spent with each patient.

Much of what we know about efficiency in medical residency is based on the work of Szymczak and Bosk (2012), who conducted the only ethnography on this topic since a series of studies in the 1980s (Anspach, 1988; Arluke, 1980; Becker, 1961; Mizrahi, 1985). Their research is significant because instead of imposing their

own definition of efficiency, they used an inductive approach to explore how medical residents navigate the constraints of the hospital system to achieve efficiency. After careful observation and interviews, Szymczak and Bosk (2012) defined efficiency as "prioritization, the anticipation of problems, and taking action to accomplish tasks" (p. 351). However, beyond this definition, they also found that efficiency is more than just a skill; it is "the predominant value organizing the professional and occupational culture of residency" (p. 355). Although residents may not be explicitly aware of it, efficiency is the main skill they use to display competency and to critique themselves and others. Therefore, the work of Szymczak and Bosk (2012) highlights the central role of efficiency within residency culture.

Despite its importance, the definition of efficiency remains nebulous. Certain aspects of efficiency such as number of patients seen per unit time can be measured, but this over-simplifies what is meant by efficiency and limits the scope of our understanding of how efficiency is learned. This study will use the definition of efficiency constructed by Szymczak and Bosk (2012) as a starting point, but will also strive to independently investigate what constitutes efficiency within the context of the current study.

### 1.5 Existing Research on How Efficiency is Learned

Despite its importance, research on how efficiency is learned in medical training is sparse. Some insights can be drawn from human resource management and healthcare management literature. For instance, some early business research found that feedback improved the efficiency of factory workers, and that adding praise to the feedback further enhanced productivity (Wikoff et al., 1983). More recently, business

and healthcare management research has found that open communication within the team and a democratic leadership style allows for employees to make changes to the system that allow the team to operate more efficiently as a whole (Dwivedi et al., 2020; Gil, 2020). Thus, educational philosophy on how efficiency is learned in the management world has evolved over the decades, shifting from a behaviourist approach that relies on positive and negative reinforcement to a more collaborative and participatory model focused on team-based learning. I wished to explore both of these learning models further in my study.

In medicine, we lack comprehensive studies that focus on improving doctors' overall efficiency. However, there are a couple studies that have focused on improving how quickly doctors and residents perform specific tasks. For example, workshops have been designed to help residents and physicians generate notes using specific electronic medical record systems more quickly (Skelly et al., 2020). Another study looked at ways to shorten the time residents and physicians spent with patients without diminishing patient satisfaction (Mauksch et al., 2008). Both studies found that the intervention that saved the most time was agenda-setting, which is establishing goals for the patient encounter up-front to ensure a focused and efficient patient visit. For my study, I was interested in the role of task-specific improvements but also in understanding how residents integrate efficiency into their overall practice across different contexts to provide more comprehensive strategies that can be applied across various tasks.

Most of our understanding of how efficiency is learned in medicine comes from research on internal medicine residents undergoing remediation for efficiency

deficits. Traditionally, repetition of a clinical rotation has been the only recourse provided to students with efficiency deficits, even though research shows that this type of remediation tends to be ineffective (Chou et al., 2019). This is in contrast to remediation for knowledge deficits, which usually involves specific study recommendations or tutoring sessions (Yao, 2000). As a result, remediation programs for efficiency deficits have historically not been as effective as for knowledge deficits (Guerrasio et al., 2014).

Junior doctors rarely receive explicit instruction about efficiency, and little is known about how this skill is learned on the wards. It is often expected that trainees will learn efficiency through general experience, which unfortunately does not always occur (Warburton et al., 2017). DeKosky et al. (2018) presumed that "most residents [not requiring remediation] adopt [efficiency] by observing supervisors and peers" (p. 321). However, the claim that efficiency is learned through role modelling has not been verified or validated by research.

It was not until recently that Warburton et al. (2017, 2018, 2023) and DeKosky et al. (2018) worked together to use action research to design a specific remediation plan for internal medicine residents struggling with efficiency. The proposed intervention involves a combination of interviews, direct observation, coaching, feedback, self-reflection exercises, and didactic teaching. As part of this intervention, DeKosky et al. (2018) developed some remediation tools that make the admission, pre-rounding, and note composition processes more explicit for learners. The combined result of all these interventions was that none of the learners were put on academic probation or dismissed from the program, although one learner voluntarily

transferred to a program in another specialty. DeKosky et al. (2018) acknowledged that there was no comparison group to know if the improvements in resident performance were due to the interventions or the results of usual resident maturation during training; however, the interventions were rated positively by the participants. These learning tools could potentially also be useful even for trainees not undergoing remediation, although they have not been specifically investigated for residents currently in good standing with their program. While remediation efforts can be successful, they were resource intensive, requiring an average of 45 hours of faculty and administrative staff time per learner (Warburton et al., 2017).

Therefore, due to resource limitations, mere repetition of clinical rotations will likely continue to be the status quo at most institutions for residents with efficiency deficits. Strategies aimed at averting remediation are beneficial (Chou et al., 2019), but no such strategies exist in research literature to foster development of efficiency. This study seeks to fill this gap in knowledge by studying internal medicine residents that have learned efficiency and probe their thoughts on what learning strategies or tools might be useful.

### 1.6 Workplace Learning Theories

Due to my interest in how internal medicine residents become efficient in the workplace, I chose to investigate various workplace learning theories as sensitizing concepts for my study. However, due to the lack of available pre-existing research on how efficiency is learned, I decided that I could not make any early conclusions about which learning theory would apply the best to learning efficiency.

Workplace learning theories are commonly organized into three categories: (1) cognitive theories, (2) socio-cultural theories, and (3) emergent theories (Hager, 2011). In this section I will review all three categories and highlight a few specific theories that were of particular interest when considering efficiency.

### *Cognitive Theories of Workplace Learning*

Cognitive theories of workplace learning are primarily grounded in the acquisition metaphor of learning (Hager, 2011). Sfard's (1998) acquisition metaphor refers to learning as acquiring an object. The individual 'possesses' knowledge, and learning occurs in the individual's mind. Learning is independent of context. Arguably, no workplace learning theory strictly adheres to the acquisition of metaphor of learning. The name 'workplace learning' automatically implies that learning relies on being situated in or participating in the workplace. Despite this, Hager (2011) contends that cognitive theories align best with the acquisition metaphor because they emphasize the individual, mental aspects of workplace performance, with limited mention of the role of social interactions in learning.

An example of a cognitive theory of workplace learning would be Dreyfus and Dreyfus' (1986) model of skill acquisition. The model proposes that learners progress through five stages of skill development, from novice to expert, with novices relying on rules and guidelines, and experts operating with deep, intuitive understanding and pattern recognition. The Dreyfus model of learning was of interest to me for studying how internal medicine residents learn efficiency because efficiency is not formally taught, and the Dreyfus model emphasizes the development of skills informally through experiences where learning is not the main objective (Hager, 2011).

Although not tightly associated with workplace learning, some other cognitive theories that I explored prior to starting the study were the concept of self-regulated learning and Kolb's (1984) experiential learning framework. Self-regulated learning theory posits that learners actively monitor, regulate, and control their cognitive processes to achieve learning goals (Zimmerman, 2002). This learning theory piqued my interest because my personal experience with learning efficiency often involved self-motivated and goal-directed efforts. However, I also recognized the diversity in learning approaches and was eager to understand how others experience and achieve learning efficiency in varied ways.

Kolb's (1984) experiential learning theory appealed to me because it highlighted the concept that everyone has different learning style preferences. Kolb proposed that learning involves cycling through four key stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Although learners must progress through all four stages in order to learn, learners fall into four different learning styles depending on how they process and perceive information: converging (thinking and doing), diverging (feeling and watching), assimilating (thinking and watching), and accommodating (feeling and doing).

All of the learning theories discussed above involve learning taking place within an individuals' mind. Although the skills being learned are situated in the workplace, the cognitive theories focus mostly on the rational rather than the social aspects of workplace performance (Hager, 2011).

### *Socio-cultural Theories of Workplace Learning*

Conversely, socio-cultural theories, influenced by work in sociology and social anthropology, emphasize that learning is dependent on social, organizational, and cultural context. These theories are deeply rooted in the participation metaphor of learning, which views learning as "a process of becoming a member of a certain community" (Sfard, 1998, p. 6).

An example of a socio-cultural learning theory relevant to workplace learning is Lave and Wenger's (1991) communities of practice. This theory proposes that learning is a communal and participatory process where newcomers start as peripheral participants and gradually gain deeper expertise by observing and interacting with more experienced members. This theory was of interest to me for my project because of its focus on the concept of learners becoming members of a community and learning the cultural norms of a particular group. In their ethnography, Szymczak & Bosk (2012) discovered that efficiency is not just a cognitive skill but also an important cultural value. Therefore, it was important to look at learning theories that incorporated the concept of adopting a new culture.

### *Hybrid Cognitive and Socio-cultural Workplace Learning Theories*

Ultimately, Anna Sfard (1998) herself advocates that we need both the acquisition metaphor and the participation metaphor to explain the phenomenon of learning. One workplace learning model that attempts to use aspects of both cognitive theories and socio-cultural theories is Eraut's (2000) informal workplace learning model. In this model, Eraut and Hirsh (2010) argue that the Dreyfus (1986) skill model of progression continues to have merit despite its individualism. However,

Eraut (2000) also emphasizes the existence of social knowledge and the situated or context-dependent nature of workplace learning.

Eraut's theory is also of interest because he is the only workplace learning theorist that mentions speed and productivity, both of which are relevant to efficiency. He explains that procedures which might "have begun as explicit procedural knowledge […] become automised and increasingly tacit through repetition, with concomitant increases in speed and productivity" (p. 127) as learners progress from novice to expert. However, although he discusses the importance of social knowledge and social context elsewhere in his work, his discussion of speed and productivity are specifically discussed solely in the context of individual cognitive processes.

### *Emergent Learning Theories*

There is a new, third metaphor of learning that is starting to gain traction. This third metaphor does not yet have a name but has been referred to as "engagement, (re)construction, emergence, or becoming" and involves a temporal dimension to workplace learning (Hager, p. 27). These theories emphasize the unplanned nature of learning. In this framework of learning, it is impossible to know what exactly is being learned before it is learned. Individuals or teams might naturally develop new ways of working and learning without specific directives. This allows individuals and teams to adapt appropriately to constantly changing conditions and contexts. Examples of this type of theory are actor network theory, Engeström's expansive learning theory, and complexity theory.

Complexity theory, originating from the natural sciences, emphasizes self-organization, feedback, and adaptation within systems. Rather than focusing on top-

down control, complexity theory highlights that learning is "a joint voyage of exploration" between learners and teachers, "not simply of recycling given knowledge" (Morrison, 2008, p. 26). Learning evolves, and learning outcomes are unpredictable (Osberg & Biesta, 2007).

These emergent theories were of interest to my project because of the elusive nature of defining efficiency. Perhaps there are no specific objectives to find when it comes to efficiency because of the emergent learning nature of this skill.

### *Preliminary Conclusions Regarding Workplace Learning Theories*

Therefore, I looked at a range of workplace learning theories as sensitizing concepts prior to starting my study, but did not feel committed to a single theory prior to data collection and analysis. Due to lack of prior research on the subject, I was still unsure whether learning efficiency was mostly a cognitive process similar to in Dreyfus and Eraut's theories of learning, or whether it would be a mostly socio-cultural or even emergent learning process, or some combination of the three.

## 1.7 Research Aims

The purpose of this study is to understand how internal medical trainees learn efficiency in routine clinical settings in order to identify practical ways to promote efficiency in all junior doctors. With a deeper understanding of how efficiency is learned, ultimately strategies aimed at fostering the development of efficiency and averting remediation could be developed.

## 1.8 Research Questions

The first research question of this study is: "What constitutes efficiency in the context of internal medicine residency (i.e. what exactly is being learned)?" The

second research question of this study is: “How do internal medicine residents learn to be efficient in clinical practice?”

### 1.9 Study Significance

This study investigates a critical yet underexplored aspect of internal medicine residency training: how residents become efficient in their clinical practice. While existing literature has predominantly focused on remediation strategies for inefficient residents, there is a noticeable absence of proactive approaches to promote efficiency among residents at large. This research aims to fill this gap by eliciting insights directly from current residents on how they have learned efficiency during their training. By shifting the focus from remediation to proactive learning strategies, this study seeks to uncover practical recommendations that can be integrated into internal medicine residency programs to enhance efficiency as a core competency. The findings are expected to contribute significantly to resident education by not only improving patient care outcomes but also by promoting resident well-being and job satisfaction through better workload management and reduced burnout. Moreover, the study's implications extend beyond internal medicine, potentially influencing residency training practices across various specialties, thereby addressing a critical need in medical education.

In addition to addressing a practical knowledge gap, this study also confronts a significant theoretical gap. Despite the importance of efficiency in clinical practice, there is no existing research on how this skill is learned through the lens of learning theories. By applying learning theories to the study of efficiency in medicine, we can deepen our understanding of the cognitive, sociocultural, and emergent learning

processes involved. Ultimately, bridging this theoretical gap will enhance our ability to design and implement effective training programs that foster efficiency to benefit both residents and the broader medical community.

## 1.10 Overview of the Dissertation

In Chapter 2, “Methodology”, I describe the research paradigms, data collection methods and analytic technique used to answer my research questions.

In Chapter 3, “Results”, I present and interpret my research findings.

In Chapter 4, “Discussion”, I compare my results to previous literature and explore the implications of my findings. I also provide practical recommendations to promote efficiency based on my results and propose directions for future research.

In Chapter 5, “Conclusion”, I summarize my objectives, my findings, and their implications.

# Chapter 2: Methodology

## 2.1 Research Methodology

Rather than first choosing a research method and then attempting to generate a research question to fit a particular methodology, this study adopted White's (2017) question-led approach to research. Pring (2015), Oancea (2015), and White (2017) caution against being overly prescriptive or rigid when adopting paradigms, philosophical assumptions, and methodologies, and encourage using one's research question to guide practical choices in research.

My research questions deal with the meaning of efficiency in medical training and how internal medicine residents learn efficiency in clinical training. What constitutes efficiency and whether efficiency has been adequately learned are both subjective matters. For instance, we know exactly how residents spend their day from time-and-motion studies, but we still cannot make a judgment on whether the current time allocations are the optimally efficient use of time (Chaiyachati et al., 2019). Even if we knew the optimal time allocation for one given context, this would probably be different from hospital to hospital or even from person to person. Therefore, to answer my research question, I required a qualitative, interpretivist paradigm. As opposed to positivism, which deals with the systematic study of what is factual and open to observation, interpretivism deals with understanding people's intentions and interpretations of their actions (Pring, 2015). Efficiency is a quality that cannot be easily quantified or observed, making it more amenable to interpretivist research. Callender (2008) asserts that studying efficiency qualitatively is a forced choice

because of the diversity and complexity of the topic of efficiency precludes the use of quantitative research.

My underlying philosophical assumptions align with the interpretivist framework needed to answer my research question. My epistemological stance is that knowledge of learning efficiency is constructed by the combined perspectives of the researcher and participants. My axiological stance is that research is value-laden, and that subjectivity should be embraced so that researchers can reveal insights about efficiency that go beyond what can be quantified (Creswell & Poth, 2016). My methodological stance is that my research requires inductive logic, the topic must be studied within its context, and I make use of an emerging design.

Because my research question required an interpretivist approach, my data collection process involved semi-structured interviews and I employed reflexive thematic analysis. Using reflexive thematic analysis allowed for an inductive analysis with theoretical flexibility to identify patterns across data.

## 2.2 **Reflexivity**

Interpretivist research is reflexive, meaning that researchers critically reflect on their biases, assumptions, and interpretations. They must be aware of the experiences that influence their judgments and interpretations. I recognize that as a researcher, my values and previous experiences play a significant role in the construction of knowledge. I bring an insider perspective as a former internal medicine resident and a current attending physician on internal medicine CTU. I also have a strong interest in medical education. Due to my experiences and interests, one of my values is learner-centeredness. I carry the assumption that the perspectives of learners must be

understood and incorporated into training programs to improve learning experiences. To maintain reflexivity throughout the study, I wrote analytic memos to reflect on my research and to document my reactions throughout the research process (Appendix A).

### 2.3 Methodological Strengths and Limitations

Interpretivist research is inductive, subjective, context-dependent, and allows for flexibility in research methods. It also allows for thick description or rich understanding of a study group. These qualities make it well-suited to answer my research questions. However, these same strengths of interpretive research could also be seen as limitations.

Interpretivist research is subjective so it relies on the perspective of the researcher to interpret the findings. This can make the research difficult to replicate or cause others who are more accustomed to a positivist paradigm to question its validity. The research often focuses on in-depth study of small sample sizes in a specific context, all of which can limit the generalizability of the findings. Despite these limitations, interpretivist research is ideal for exploring complex social realities that cannot be illustrated through more positivist methodologies.

### 2.4 Participant Selection and Recruitment

Participants were recruited using purposive sampling (Braun & Clarke, 2013). First- and second-year internal medicine residents at a single Canadian university (henceforth referred to as University X) were invited to participate in the study. This specific sample group was selected because first- and second-year internal medicine residents are early in their training and are likely experiencing a time of rapid growth in their efficiency skills. Furthermore, previous research on efficiency in medicine has

centred on this learning group (Szymczak & Bosk, 2012; Warburton et al., 2023), providing a valuable foundation to build upon.

The University X internal medicine program was specifically chosen as the research setting because it is a high-volume training program where efficiency was likely to be deeply relevant. The University X internal medicine program is one of the three largest internal medicine programs in Canada (Canadian Resident Matching System [CaRMS], 2023). Most of the teaching hospitals affiliated with University X are also quaternary care centres. Thus, the internal medicine residents provide service not only to the city's metropolitan area but also to the sickest patients from all over the province as well as neighbouring provinces and territories. University X's internal medicine program is also unique in that residents are not assigned to one base hospital for their entire training. Instead, they rotate from one hospital to another depending on the month. Therefore, they must become accustomed to working in a variety of clinical contexts with different electronic medical records and cultural practices. In first year, all the placements occur at one of three hospitals. By second year internal medicine, placements can occur at almost any hospital in the province. Therefore, studying internal medicine residents in the University X program was a unique opportunity to explore how efficiency is learned in a variety of different hospital settings.

It was estimated that the ideal study sample to achieve saturation would involve 8-10 study participants based on other interview-based studies of similar scope (Braun & Clarke, 2013). Participants were recruited via an email sent to first- and second-year internal medicine residents at University X by an administrator from the

University X Residency Training Committee (Appendix B). The participant information sheet was also sent electronically as part of the recruitment email (Appendix C). Participants were offered a $10.00 CAD Starbucks gift card funded by me to thank them for their contribution to the research study. Interested respondents were asked to email me at my secure Oxford email address for further instructions on how to participate.

**2.5 Data Collection**

Data were collected via semi-structured individual interviews with residents. Individual interviews allowed for a deeper exploration and discussion of what could be a highly personal and sensitive topic for interviewees. The interviews' semi-structured nature allowed me to discuss issues important to the participants that I had not anticipated and remain open-minded throughout the research process. An interview guide was created with questions organized into categories to make the interviews run more smoothly (Appendix D). The categories were ‘biographical questions’, ‘questions about the definition of efficiency’, ‘questions about efficiency as a value’, ‘questions about learning efficiency as an individual’, and ‘questions about learning efficiency as a team’. Some minor adjustments were made to the guide throughout the study to reflect issues that were commonly arising during the unstructured parts of previous interviews. I was the sole interviewer so that I could be fully immersed in the data and be able to compare the findings from one interview to the next.

Interested respondents were sent an electronic copy of the participant information sheet and consent form (Appendix E) to sign before the interview. Verbal

consent was also obtained at the beginning of each interview. Interviews were conducted online over Microsoft Teams. To build rapport with the interviewees, video was used during the interview instead of audio alone. Interviews lasted approximately 30-45 minutes. Recordings were obtained as video recordings directly from Microsoft Teams and automatically stored on the secure University of Oxford servers. A transcript from the video recordings was generated directly from the Microsoft Teams software and these transcripts were also automatically stored on secure University of Oxford servers. I then edited the transcripts for accuracy against the video recordings and de-identified the transcripts. The anonymized transcripts were then stored on the University of Oxford Nexus365 OneDrive for business along with all other project-related files. Consent forms, scratch notes, and de-identified interview transcripts will be kept on the University of Oxford secure servers for at least five years after publication after which supervisor Dr. [REDACTED] will delete them.

## 2.6 Data Analysis

Data were analyzed using Braun and Clarke's (2006) technique of reflexive thematic analysis and followed the six-step process of familiarization, coding, generating themes, reviewing themes, defining and naming themes, and then writing up.

### *Familiarization*

I personally copy-edited and anonymized each interview transcript that had been generated via Microsoft Teams, re-watching the video footage of each interview not only to ensure accuracy of the transcript but also to ensure that I was deeply familiar with the data.

### *Coding*

To help with the organization of data and the coding process, I uploaded the edited and anonymized transcripts to NVivo (Version 14; Lumivero, 2023), a computer-assisted qualitative data analysis software (CAQDAS) package. Coding was inductive. I used first-cycle coding methods developed by Saldaña (2021), making use of a substantial number of in-vivo codes which I would then nest into parent codes using my own wording (Appendix F). I also experimented with process coding, metaphor coding, and emotion coding to extract more meaning from the data. I also wrote analytic memos that I was able to link to my codes using the NVivo software. My first cycle of coding was in sequence from transcript P1 to P9. After the first cycle, I used the process recommended by Braun and Clarke (2021) and did I second cycle of coding starting from transcript P5 to P9 and then from P4 back to P1. The NVivo file was saved on the secure University of Oxford servers to protect the data.

### *Generating Themes*

To generate themes, I reviewed my codes and clustered the ones I felt were related to each other into larger categories, sometimes returning to the coding process temporarily if a new idea was emerging (Appendix G). I followed Braun and Clarke's (2021) recommendation not to focus solely on finding direct answers to research questions, but instead to explore patterns related to the research topic freely so as not to limit the flow of ideas.

### *Reviewing Themes*

Approximately seven candidate themes were generated (Appendix H). Upon review, it became clear that some of these themes overlapped and could be collapsed

into one another to create more robust themes. In other cases, as the analysis progressed, certain ideas were crystallized further, leading to the emergence of a new theme. This iterative process of refining and consolidating themes ultimately resulted in three well-defined themes for each research question.

## 2.7 **Ethical Considerations**

Ethics approval was obtained by the University of Oxford Education Departmental Research Ethics Committee on November 11, 2023 (approval number EDUC_C1A_23_286, Appendix I). The research was also approved by the Internal Medicine Residency Training Committee at University X (Appendix J). Permission to conduct the research was also obtained from the University X Behavioural Research Board, but a formal ethics application was waived as the research was not being conducted under the auspices of University X (Appendix K).

Participation was voluntary based on informed consent, and participants were free to withdraw from the study anytime until August 19, 2024. Participants were reassured that resident assessment would be in no way affected by participation in the study.

The identity of the participants was kept anonymous by assigning participants a unique participant identification number rather than the participant's name. Data from interviews was analysed based on anonymous interview transcripts. Strict confidentiality was maintained. Any quotations used for illustrative purposes did not contain any information that could identify the participant or a specific situation.

The research did not directly involve sensitive topics and presented minimal psychological risk to the participants. However, it was conceivable that the interview

might remind participants of some prior stressful work experiences, which might cause some mild emotional discomfort for participants. Participants were advised prior to providing consent to the interview that they might be reminded of some stressful experiences and that they could choose not to answer questions that made them feel uncomfortable or withdraw their participation from the interview at any time with no consequences.

# Chapter 3: Results

## 3.1 **Study Sample**

Ten respondents expressed interest in participating in the study. One respondent never replied to an email request to schedule an interview and was therefore excluded from the study, resulting in the final study sample size of 9 participants. Shown in Table 2, the participant group was balanced in terms of gender, with 4 males and 5 females out of a total of 9, and no participants identifying outside these categories. The age distribution was as follows: 7 out of 9 participants were aged 25-30 years old, and the remaining 2 participants were aged 30-35 years old. This age distribution was consistent with the participants' training level. There was a representative mix of Year 1 and Year 2 participants (3 vs. 6 out of 9 participants). There was a disproportionate number of East Asian residents in the study (5 out of 9 participants) compared to White participants (1 out of 9 participants), but this is not unexpected for a study conducted at University X, which is situated in the city with the largest East Asian representation outside of Asia and where greater than 25% of the city's population is East Asian (Statistics Canada, 2023). The ethnic composition of the internal medicine classes at University X are not documented but the proportion of East Asians in internal medicine likely either meets or exceeds 25%. Research shows that East Asians tend to be over-represented in medicine in Canada whereas Blacks and Aboriginals tend to be under-represented (Dhalla et al., 2002). Finally, there was a balanced mix of residents who had prior clinical experience at University X during medical school versus no prior training at University X prior to starting residency (4 vs. 5 out of 9 participants).

**Table 2**

*Demographic profile of study participants.*

| Participant number | Gender | Age | Year of Residency | Ethnicity | Medical School Training |
|---|---|---|---|---|---|
| 1 | Male | 25-30 | 2 | East Asian | Other |
| 2 | Female | 25-30 | 2 | South Asian | University X |
| 3 | Female | 25-30 | 2 | East Asian | Other |
| 4 | Male | 25-30 | 2 | White | Other |
| 5 | Female | 25-30 | 1 | West Asian | University X |
| 6 | Female | 30-35 | 2 | East Asian | Other |
| 7 | Female | 25-30 | 2 | East Asian | University X |
| 8 | Male | 25-30 | 1 | East Asian | University X |
| 9 | Male | 30-35 | 1 | Arab | Other |

### 3.2 Research Question 1: What is Efficiency?

The first research question was, "What constitutes efficiency in the context of internal medicine residency?" When participants were asked to define efficiency in their own words, most alluded to the individual and cognitive aspects of efficiency. Most described efficiency as being able to see an assigned number of patients within a given timeframe. For example, Participant 9 defined efficiency as "being able to see all your patients in a timely fashion and allocating to each case the amount of time needed". Although this definition captured a significant component of efficiency, there were some other aspects of efficiency that emerged from the interviews such as effective team management that were not encompassed by this definition. All the participants also mentioned that their main motivation to increase their efficiency was to provide better patient care or ensure patient safety, which they sometimes excluded from their verbatim definitions of efficiency. Ultimately, efficiency in the context of internal medicine residency was seen as taking deliberate actions to advance patient care within a specialized role. Efficiency encompassed both cognitive and social aspects, each critical to the overall functioning and effectiveness of medical practice.

Efficiency was also an important cultural value that residents used to assess each other's character.

### *Cognitive Aspects*

The cognitive aspects of efficiency involved using medical knowledge and mental organization to optimize patient care. This included the ability to quickly and accurately diagnose conditions, formulate treatment plans, and anticipate potential complications. Effective mental organization allowed residents to prioritize tasks, manage time effectively, and integrate new information rapidly. Participant 6 explained, "there's certain lists of things that you want to do [...] and then it's really my ability to go through these patients or these tasks systematically". These skills were essential for handling the complex and often unpredictable nature of internal medicine.

An efficient resident was characterized by their ability to quickly assess and prioritize the most critical aspects of patient care. The efficient resident was "able to distinguish sick versus not sick" (Participant 4). Efficient residents "[thought] about what questions are most relevant to [the] patient's condition". They prioritized the issues that "could really affect the patient in the next couple of days or next couple of hours" (Participant 9). They "recognize[d] that the small day-to-day issues that we know are in the back of our heads don't need to have so much time spent on them on a daily basis" (Participant 2).

In addition to prioritizing patients and their issues, residents became efficient by determining an organizational workflow that suited them best. Participant 1 stated that "doing one [patient] at a time, going back to the computer, writing a note, then

going in to see the next patient [is] a lot less efficient". Participant 1 preferred to see all his patients first and then write all the notes at the end. Participant 8 noted, "other people will just wait until they've seen everyone and write their notes after, but I find it hard for me to keep all the issues in my head" for so many patients. Therefore, he described seeing clusters of two or three patients at a time. He explained, "I'll prep two or three notes first [then] see the three patients back-to-back, [then] populate [my notes with] any changes." Thus, the exact optimal workflow varied from person to person, but most agreed that taking too many trips back and forth from the chart to the patient was inefficient. The optimal workflow also differed depending on the work site:

> A workflow that I've built that I think works got challenged because I went to [Hospital B] for my last CTU block where there's still paper charts and my entire flow was disrupted because I don't have my dual screens with [the hospital electronic medical record] on one side, [the provincial electronic medical record] on the other side typing away as I'm reading things. (Participant 5)

Therefore, one major aspect of efficiency was being able to adapt to new situations and quickly formulate new workflows that functioned well in a new work environment.

### *Social Aspects*

Efficiency also had significant social dimensions, including the management of patient encounters and interactions with other healthcare professionals, such as nurses and fellow physicians. Efficient residents demonstrated strong communication skills, ensuring clear and concise exchanges of information that facilitate timely and effective patient care. This included managing social interactions such as interruptions from nurses and inspiring confidence that you would address their concerns in priority sequence. For example, Participant 3 commented, "Knowing when to say, 'I'm so

sorry, my favourite nurse. Let's do this for now and then I'll address this later after I finish this task." Similarly, residents had to find ways to maintain therapeutic relationships with their patients without causing the care of other patients to suffer. Participant 7 noted that her main struggle with efficiency was managing the length of patient interactions. Although a good therapeutic relationship is important for patient wellbeing, residents had to learn how to interact with patients in such a way that the patients felt supported, but not spend so much time with one patient that there was not enough time to fulfil the care needs of all the patients.

Further, there was a professional aspect to efficiency, which involved a concern for the overall functioning of the care team. Being efficient was closely linked with being considered "nice" or "good" (Participant 3). Participant 8 emphasized the importance of working with "someone who I can rely on or I enjoy working with". Consequently, efficiency emerged as a significant professional and cultural value in residency. Beyond managing one's own workload, concern for the care team included delegating tasks effectively, providing pointers or assistance to more junior members of the team as needed, and ensuring that the team's collective efforts were focused on patient care objectives. Participant 6 described how she would "pull [students] aside to [...] show them [her] workflow [...] to get things going a little bit faster." Participant 7 regarded effective team guidance to be one of the most crucial traits of a successful medical resident. Overall, efficiency in residency was not only about individual performance but also about fostering a supportive team environment.

Another professional aspect of efficiency was maintaining team morale. Participant 2 noted that "it's not just one thing" that causes inefficiency, and "one of

the things [is] burnout". Thus, she mentioned that she is "trying to make the team more fun" to help sustain its efficiency. Participant 4 echoed this sentiment, stating, "When you have people that are upbeat and positive [...] it just makes things flow so much smoother and makes the wards so much lighter and more pleasant". Likewise, team efficiency itself can also boost team morale. Participant 3 said, "I feel like we all love it when we have an early day. Everyone cheers and goes, 'Wow, good job, team!' And you don't want to be the rate limiting step to that early day or that happy team morale." Therefore, a positive attitude can boost team efficiency, and in turn, high team efficiency can further elevate the team's spirit.

***Contextual Variability***

While the manifestation of efficiency could vary across different medical contexts, the overarching goal remained the same: to advance patient care within one's specialized skill set. For instance, assisting patients to the washroom or getting patients blankets was considered a kind gesture that could be done sometimes if time and ability allowed, but it was not an efficient use of specialized medical training. The same applied to different clinical rotations. On general medicine rotations, there was often a greater emphasis on detailed information gathering to provide comprehensive care. Conversely, in specialty medicine, information gathering tended to be more targeted, focusing on specific areas relevant to the specialty. For example, it would not be efficient for a resident on a gastroenterology rotation to be conducting neurological examinations when the question that gastroenterology had been specifically asked to deal with for the patient was an intestinal bleed. Thus, the aim was to enhance patient outcomes through purposeful actions. Different residents might find some contexts

easier than others. Participants 6 and 9 found subspecialty rotations more difficult. Participant 6 said, “I was doing a CTU level of detail of consults when really this is a consultation for cardiology, for example.” Similarly, Participant 9 said:

> With subspecialties, I’ve had a bit of trouble. It’s difficult to initially get into the framework of what they want to hear and what they don’t want to hear. As an internist, you kind of think at least most things are kind of relevant.

On the other hand, Participant 1 found it easier to be efficient in subspecialty medicine rotations compared to general medicine rotations because less detailed information gathering is required.

Similarly, patient load influenced how efficiency was practiced. A lighter patient load allowed for more time to delve into patient details, enabling a more thorough exploration of each case. Participant 1 said:

> If you’re having one patient, then sure, just take 2 hours, whatever, take as much time as you want to get the best assessment, [...] I won’t say that you’re being inefficient. You have the time, so why not use it?

However, even in such scenarios, prioritization of tasks based on the acuity of patient needs remained crucial. This ensured that the most urgent cases and patient issues received immediate attention while still maintaining a high standard of care for all patients.

Collectively, the results indicated that efficiency in internal medicine residency was characterized by a combination of cognitive and social competencies aimed at maximizing the use of one’s expertise to advance patient care. Through the application of medical knowledge, effective communication, and teamwork, the essence of efficiency lay in its ability to select interventions that would have the greatest impact on patient wellbeing.

### 3.3 Research Question 2: How is Efficiency Learned?

The second research question was, “How do internal medicine residents learn to be efficient in clinical practice?” Not all participants learned efficiency the same way; the process was somewhat heterogeneous. Some participants experienced efficiency learning more passively, while for others, it was a deliberate effort. For example, Participant 2 described the process as “more subconscious,” and Participant 4 noted, “I don’t think I ever set specific goals” for learning efficiency. In contrast, Participant 3 asserted, “I did try to be intentional about it”, and Participant 6 explicitly told her academic coach, “I want to be more efficient; this is my learning objective”. Despite these differences, three common themes emerged from the interviews with respect to how residents learn efficiency. First, learning efficiency requires the development of other-centeredness. Second, efficiency is gained through experience. Third, effective feedback accelerates the learning process. In this section, I will systematically present these three themes.

#### *Becoming Efficient Requires Development of Other-Centeredness*

As medical trainees progress from medical students to senior residents, there is a gradual transition from an individual mindset to a group mindset. An outward perspective allows for residents (1) to become aware of the value of efficiency and embrace it as part of their identity and (2) helps them become more efficient.

**Medical Student Role.** Medical students often begin their training with an inward focus. They are primarily concerned with their own learning and how they are perceived by others. This more self-centered perspective is common as they navigate the early stages of their medical education, seeking validation and reassurance. As a

result of trying to impress their attendings, they tend to spend time on gathering information and performing tasks that are less relevant to patient care and team workflow. Participant 1 observed, “The medical students are like: ‘I’m worried [...] if I don’t include all these things on my differential, the staff will be unhappy with me”. Participant 4 echoed this sentiment, stating “as a med student, you just kind of do it using the shotgun approach. You’re asking every question in the book, even if it’s unrelated to the presenting complaint”.

Medical students are often focused on a set of personal objectives related to career advancement and gaining knowledge. Here is Participant 3:

> My goal [as a medical student] was to perform the absolute best and to get a reference letter and to try to learn as much as I can, and that often means that I needed to get the most amount of information, even things that are slightly irrelevant. But for me [at that point in my training], the benefits of doing things better and slower outweighed the risks of being efficient and potentially missing something.

There is little to no cultural expectation for medical students to be efficient. Medical students are generally considered to be performing well if they do not create too much extra work for other members of the team. Generally, it is expected for more senior team members to help the medical students with their tasks. Participant 5 said, “If med students are still there [at the end of the day] I’m going to go help them out”. In fact, if a medical student is more efficient than more senior members of the care team, it can be a source of embarrassment. Participant 3 recalled:

> I remember distinctly I was doing weekend rounds once and it was just me and a med student for our team, and we ended up taking on equal numbers of patients. [...] And that student finished before me, and she offered to help me, which is very kind of her. [...] But it was really embarrassing for me because I was a junior resident at that point.

Therefore, expectations for performance and the relative value placed on efficiency changes as learners progress through their training.

**Junior Resident Role.** As learners transition to junior residency, roles shift. In this stage of training, residents are suddenly expected to be more independent and responsible. Participant 1 said, “I actually found the transition from medical student to junior [resident] was more difficult just because you have a lot more responsibility just shoved on you [...] and you’re kind of on your own.” Most participants noted that first year residency was the stage of greatest development in terms of efficiency. Participant 6 noted, “I think efficiency is always at the forefront of my mind, but it’s probably something I thought about more as a first-year resident as something that I needed to work to achieve”.

Junior residents have a clearer work identity compared to in medical school, and a heightened awareness of actions that directly improve patient care and contribute to the team's overall success. It was common for participants to refer to junior residents as the team’s “workhorses” during the interviews (Participant 3, Participant 4). The junior residency stage is marked by a growing sense of responsibility and a shift towards a more action-oriented approach that prioritizes the immediate needs of patients. Participant 3 stated:

> One day I decided to stop and step back and think, wait a second, you should be doing A, B, and C because you’re afraid of putting the patient in danger, [...] not because of whether you look good or not in front of your seniors and attending. I think adjusting that mindset and [...] focusing on what’s truly affecting patient safety, that really changed my perspective.

As a result of this shift in focus, junior residents are more efficient because their purpose and their actions are focused on the main priority of medicine, which is to provide excellent patient care.

In addition to feeling increased responsibility toward patients, the junior residency stage is marked by a shift towards feeling increased responsibility towards the care team. There is less focus on personal objectives and more focus on one's role within the team. Due to this shift in identity, residents develop an awareness of the social value of efficiency. Participant 3 noted:

> I began to realize that on a team you were like the workhorse and so efficiency is a necessity. It's no longer just a cherry on top on top of your clinical skills. [Efficiency is part of] your professionalism, it's become part of what makes you a good team member because you could be the limiting step to the team going home, right. And so that becomes part of your role on the team and who you are.

Participant 3 further highlighted the importance of efficiency as a cultural value that affects how individuals are perceived in a collaborative environment:

> And, you know, people associate having good days with being with good people. If they get to go home early on your block, then they think, 'Wow, she's so nice.' Even though you know personality-wise, I was like the same person this whole time, but people associate good experiences with good skills. And so, I began to realize efficiency was important because I wanted to be that happy team member that was associated with good experiences.

Interestingly, despite Participant 3's belief that she was "the same person this whole time", her recognition of efficiency as a professional value was a significant transformation. Her mindset shifted from inward-focused to outward-facing. By striving to be efficient, she conveyed her respect for her teammates' well-being and established her role as a key contributor to the team's overall success. Thus,

recognizing efficiency as a cultural value motivates trainees to further improve their efficiency. Becoming efficient also increases one's social standing within the team.

**Senior Resident Role.** Senior residents demonstrate a further evolved perspective. Their focus extends beyond their own efficiency to encompass the efficiency of the entire team. Participant 1 explained, "As a senior it's more looking at other people's efficiencies and seeing what you can do to help them, whereas as a junior, it's really focusing on being efficient yourself." This advanced stage of other-centeredness reflects a deepened understanding of a resident's role within the medical team, highlighting their ability to delegate, support, and optimize the collective workflow. In terms of language used by the participants, there was a lot more use of the word "we" rather than "I" when residents discussed their efficiency as a senior resident. For example, Participant 2 said, "If **we're** not meeting those targets, then it just doesn't feel great". Therefore, the success of senior residents is increasingly tied to the efficiency of the team as a whole, underscoring their responsibility to ensure that the group's overall performance is optimized.

### *Efficiency is Learned Through Experience*

**Cognitive Experiences.** All participants in the study stressed the importance of repetition in learning the cognitive aspects of efficiency. Repeated exposure to similar tasks and clinical scenarios allows residents to refine their skills and streamline their workflows. Through continuous practice, residents develop intuitive problem-solving abilities which contribute significantly to their efficiency. Most participants mentioned that they have mental or physical checklists that only develop after seeing something more than once. Participant 1 explained:

> I think the main thing for taking less time to actually do the work itself is mostly repetition. Just seeing things over and over, like if I see a certain case like heart failure, I've seen it so many times I kind of already have a system in my mind. [...] I know exactly what I want to check for already.

Similarly, Participant 5 said, "I just have a list of things that I need to check on a daily basis that's through I think just practice, like OK I need to check their creatinine."

**Social Experiences.** It can be difficult for residents to spend time with each other due to the busy workload. However, it is important for teammates to know each other well to maximize the team's efficiency. Participant 2 commented, "The first week is always chaotic and it's the least efficient week because we're getting used to all the different residents and their strengths." Social interactions on the team are also important to enable residents to learn efficiency from each other.

***Role Modelling.*** Residents often found themselves so busy with their workload that they did not have much time to interact with or observe other team members during their workday. Participant 5 stated, "I don't think I had much of a chance [to observe what others were doing]." Participant 1 explained, "If they're already struggling to handle their patient load, then how are they going to have time to also watch somebody else?" However, when residents took special measures to arrange shadowing experiences for themselves, they find it very useful. Participant 2 wanted to improve her efficiency in cardiology and so she made a special effort to "role model the [second-year residents] in terms of how they do their consults and how their workflow works" and felt that this helped her improve quickly. Participant 7 also requested help with improving her efficiency and as a result she was assigned to shadow a more experienced senior resident for a call shift. She found it useful to watch someone more experienced performing her work duties to learn how to triage

efficiently and manage patient interactions. Similarly, Participant 5 specifically asked to shadow her senior resident last block to see how they assess suitability for intensive care unit transfers before starting senior residency and also found it helpful. Therefore, taking time to watch and interact with more experienced team members is valuable for learning efficiency, but opportunities to do so are limited in the current Canadian residency environment.

***Blurring of the Lines Between Learner and Teacher.*** In the complex environment of medical residency, the traditional boundaries between learner and teacher often blur during social interactions, leading to a reciprocal learning process that benefits both junior and senior residents. The role of junior residents is to develop their efficiency, focusing on refining their clinical skills and time management. On the other hand, senior residents are tasked with not only maintaining their own efficiency but also improving the efficiency of the entire team. Through continuous dialogue, junior residents gain insights into more effective practices, while senior residents refine their leadership and team management skills. This dynamic interaction fosters an environment where both parties learn from each other, leading to the emergence of new strategies. For example, Participant 2 described a situation where, after discussing efficiency challenges with a junior resident who struggled with paper charts, they devised an innovative solution: the junior resident could dictate daily progress notes into a Word document. This approach improved the junior resident's efficiency and highlighted the importance of adapting team strategies to its members' needs. Additionally, this dialogue prompted the senior resident to consider ways to enhance the team's work environment, realizing the value of making the team experience more

enjoyable. Thus, the process of teaching and learning efficiency in residency is a collaborative effort, where both junior and senior residents contribute to as well as benefit from the exchange of ideas and practices.

**Life Experiences.** Life experiences outside of clinical training also play a significant role in developing efficiency. Interestingly, these valuable learning experiences were not necessarily related to previous work experiences. Participant 7 previously worked at a different job that required her to be efficient but felt that it did not translate to her being an efficient senior resident. Instead, the experiences outside of residency that translated well to medical training took place completely outside of work. Some life experiences assisted with some of the more cognitive aspects of efficiency. Participant 9 noted a similarity between grocery shopping and efficiency in medical residency. He said, "Say grocery shopping, I'm very efficient. I have a list. I know exactly where I'm going. There, there, there. I'm going to go out now." Other life experiences provided a broader perspective and a diverse skill set that enhanced residents' ability to navigate the social complexities of residency. Participant 8 said:

> Coming from a background of sports that's very important to me to make sure that teamwork carries through and that I'm keeping up my end of the bargain by working hard and trying to see all my patients such that it won't fall on my colleagues or peers.

Through experience with sports, Participant 8 already achieved much of the required personal development and 'other-centeredness' that is usually cultivated during medical school and junior residency. As a result, he was immediately able to understand the value of efficiency and apply it effectively to medical training.

### *Effective Feedback Accelerates Efficiency Learning*

Most participants noted that the right feedback can boost efficiency exponentially. However, many of these same participants also found it difficult to give feedback to learners that they thought were performing inefficiently. Receiving and providing feedback openly is essential to both individual and team efficiency.

**Barriers to Giving Feedback on Efficiency.** In exploring the theme that good feedback accelerates efficiency learning, it is essential to first address the barriers to giving good feedback on efficiency. Although all the study participants asserted that efficiency is "always something that's in your back mind" (Participant 4), they also admitted that "feedback is kind of difficult to come by" (Participant 8). The reluctance to provide constructive feedback, particularly on efficiency, stems from a fear of causing stress and discomfort among learners and an impression that it will hinder their learning in other domains. This hesitance can inadvertently hinder the team's efficiency, placing an additional burden on other team members who then need to carry more patients. The following participant quotes illustrate these challenges and the nuanced dynamics at play.

***Fear of Causing Stress and Discomfort.*** Participants frequently expressed a reluctance to provide feedback on efficiency due to a concern that it might overwhelm or de-motivate the learners. Participant 3 described a situation of hesitancy to rush medical students during their first consults, fearing it might negatively impact the students' learning experience. Participant 3 stated, "I didn't want to be like, 'Oh my God. Guys, I told you. No rush, but actually let's rush.' So I didn't want to say that, and it was really hard for me in that moment". Participant 2 noted that attending physicians

often advised, “Don’t take your work home, but the day is way more chaotic if I don’t do that”. This is despite most of the study participants mentioning that preparation the night before or morning before the start of the workday is one of their main strategies for maintaining efficiency. Therefore, senior team members often try to make the workload seem less burdensome than it truly is for junior learners. This is likely due to a combination of wishful thinking and guilt about the demands of a career in medicine. However, it would be more productive for senior members of the team to acknowledge the reality of the situation and provide words of encouragement and thanks for the efforts of the residents. This reluctance to provide honest feedback highlights the delicate balance between maintaining a supportive learning environment and promoting efficiency.

Similarly, Participant 4 recounted his experience with a resident who took longer to complete consults. To avoid placing the resident in an uncomfortable position, he chose to rely more heavily on the other junior residents and brainstormed alternative strategies to manage the workload without directly addressing the need for increased efficiency. Participant 4 shared, "I don't want to put people in an uncomfortable position, cause then [...] it affects their learning". This protective approach underscores the fear that direct feedback on efficiency might be detrimental to the learner’s development. However, not giving feedback about efficiency does not alleviate the pressure that residents feel. They often “feel guilty for not being efficient” (Participant 3) even when nothing is said to them, as they tend to be their “own worst critic” (Participant 2). Residents are aware that the need for efficiency is “not said, but there’s just this known expectation” (Participant 2). When attending physicians remain

silent about efficiency levels, they still inadvertently send non-verbal signals of impatience, such as “waiting by their cell phone” (Participant 1) or “yawning when we were reviewing” (Participant 3). This only heightens residents’ anxiety levels without offering constructive ways to improve.

***Over-Reliance on Repetition and Experience to Teach Efficiency.*** Part of the reluctance to provide feedback on efficiency stems from the impression that efficiency is a skill that only be learned individually through practice and repetition, and that trying to rush this learning process will be ineffective or somehow result in a learner not a being safe or thorough doctor. Participant 7 recalled repeatedly asking for feedback on how to improve her efficiency at the end of rotations and being provided with reassurance that she would just learn efficiency naturally with time. It was not until her senior resident year that attendings agreed with her concerns and became more interested in providing her with constructive suggestions. There is a prevailing assumption that “what comes ahead [of efficiency] is being thorough” (Participant 5). Learners who have issues with efficiency are told, “maybe your knowledge is not good” (Participant 1) rather than being told that they have issues with efficiency. Although adequate clinical knowledge and experience are indeed necessary for the development of efficiency, some residents still struggle with efficiency despite not having deficits in these domains. All participants agreed that “if you get the right feedback then that could be really helpful in developing efficiency” (Participant 1).

***Impact on Team Efficiency.*** While the intention behind withholding feedback is often to protect the learner’s experience, it can have unintended consequences for

the team. Participant 5 highlighted how when some learners took too long to present patient issues during rounds and no one intervened to provide feedback, it delayed the entire team:

> Sometimes I do feel like rounds as a whole can be inefficient[.] Sometimes when you know there is a list of twenty patients and there's still five things on your to-do list per patient and you're just kind of sitting there waiting for rounds to end, it does make your day inefficient.

Similarly, Participant 7 noted that some team members spent excessive time seeing a single patient, resulting in other members having to manage more patients. Despite recognizing their inefficiency and the impact on the team, she found it difficult to approach these team members and tell them that they needed to improve their efficiency. This acknowledgment points to the need for developing strategies to provide feedback on efficiency without compromising the supportive learning environment

Participant 3 also reflected on the importance of timely feedback, recognizing that early and straightforward feedback is often appreciated more than delayed feedback. She stated, "I think most learners [...] appreciate feedback early on more than being like, 'good job' early on and then at the end you're like, 'Oh, actually this was something you could have worked on.'" Ultimately, most participants reported positive outcomes as a result of giving feedback. Participant 3 found that "people were not as hurt in terms of feelings as I was afraid of." Participant 2 found that although it involved "awkward and tough conversations", suggestions to a junior resident about her efficiency "actually worked well". This proactive approach can mitigate the negative impact of delayed feedback and help learners adjust their practices sooner, benefiting both the individual and the team.

The fear of causing stress and discomfort to learners or seeing efficiency as a skill that can only be learned passively poses a significant barrier to providing feedback on efficiency. This reluctance can undermine team efficiency and increase the workload for other team members. Recognizing and addressing these barriers is crucial for fostering a culture where feedback on efficiency is viewed as an integral part of the learning process, ultimately enhancing both individual and team performance. By developing strategies to deliver constructive feedback in a supportive manner, educators can help learners improve their efficiency while maintaining a positive and effective learning environment.

**Characteristics of Effective Feedback.** In the context of internal medicine residency, helpful feedback is characterized by being non-judgmental, specific, and timely. Effective feedback should be honest yet respectful, avoiding insults or harsh judgments. For instance, feedback such as "you're not organized" or "you're too slow" (Participant 1) antagonizes the learner without providing constructive guidance. Instead, it is more productive to offer specific suggestions, such as advising learners to "prioritize main issues" (Participant 1) or encouraging them to "think about what questions are most relevant to this patient's condition" (Participant 3). Several senior residents mentioned that they will give specific feedback during rounds to help more junior residents “articulate [their] findings in a way so that we’re not spending 30-45 minutes talking about one patient” (Participant 6). Participant 6 also “[pulls the learners] aside to [...] show them [her] workflow and [ask them], ‘What is your workflow?’” She then makes suggestions such as, “Actually you can probably cut [that] to get things going a little bit faster”. Thus, “walking [learners] through the

[thinking] process" (Participant 2) is a common and effective way for senior residents to provide feedback without being judgmental. Junior residents found this type of feedback helpful towards learning efficiency. When asked to recall how she improved her efficiency, Participant 5 said, "We would do bedside rounds and my senior kind of talked through her way of reviewing patients". Participant 7 similarly recalled that following a more senior resident during a call shift while he explained his thought process was very helpful. Thus, this approach helps streamline learners' workflow and promotes improvement without labelling or discouraging the learners.

It is also important for feedback to be proactive and timely. Senior team members or attending physicians can usually predict when learners are going to run into difficulties with efficiency, and it can be helpful to "solve problems before they occur and before [learners] try to take extensive amounts of time trying to troubleshoot [issues] themselves" (Participant 3). For instance, Participant 6 described a scenario where they provided guidance to their peers by saying, "I'll be like, 'Hey, how are you doing? Well, we'll plan to review in like 30 minutes, and whatever you have up until then, that's great.' [...] So I kind of give them cues to get them along." Feedback and advice does not have to all be verbal, it can also present itself in the form of written materials. Participant 6 and Participant 9 both brought up the value of didactic teaching materials or written orientation materials. Participant 9 mentioned:

> Written material like PDF's [saying] we expect you guys to maybe focus on this, focus on that [are helpful]. So for cardiology, for example they did that for us. [...] I knew exactly what they wanted. I think cardiology was one of the smoothest in terms of me transitioning from CTU to a subspecialty. They have their own kind of system that all cardiologists use. So they're like this is your access and then when you get a consult or you're reviewing a patient, go through these clinic notes, go through the cardiac history. And so they are clearer on what they want from you.

Therefore, didactic or written orientation materials can be distributed at the start of rotations to pre-empt common efficiency struggles and save mentors from having to repeat themselves.

Specific and immediate directives also play a crucial role. Participant 9 found pointers such as “No, don’t focus on that, focus on this” during reviews of consultations to be the most helpful type of feedback to improve his efficiency. Additionally, a staff member demonstrated a practical technique by showing how to use a split screen provider view during a particularly busy week, emphasizing the importance of such an approach for efficiency. She stated, “This is how you’re going to get through the day, like you can’t be flipping through screens all the time” (Participant 5). This hands-on advice was noted as particularly beneficial during a demanding period.

### 3.4 Summary of Findings

Efficiency in the context of internal medicine residency involves focusing on actions most relevant to advancing patient care. This requires residents to acquire enough clinical knowledge to prioritize issues and enough experience to maintain an organized workflow. It also requires residents to have social, collaborative, and professional skills to work seamlessly within a care team. Efficiency is a cultural value that is highly prized for its positive effects on team dynamics.

Learning efficiency in medicine is a complex process involving both personal growth and group experiences. Awareness of one’s purpose and identity within the care team is important for unlocking the right mindset to understand the value of efficiency and to determine which actions will be most relevant to maintain efficiency.

Repetition is important to master the cognitive aspects of efficiency, whereas social interactions with peers and outside life experiences can help with the more managerial and collaborative aspects of efficiency. Both junior and senior team members improve their efficiency through open dialogue with each other. A culture of open communication and feedback enhances the learning of efficiency.

# Chapter 4: Discussion

## 4.1 Discussion about Defining Efficiency

My study builds on the definition of efficiency introduced by Szymczak and Bosk, who, until now, provided the only definition of efficiency in the context of medical residency. Szymczak and Bosk's (2012) definition emphasizes "prioritization, the anticipation of problems, and taking action to accomplish tasks" (p. 351), which aligns closely with my findings on the cognitive aspects of efficiency. Participant 1 explained:

> On those days where you have a lot of patients [...] you have to be mindful like, 'OK, who am I going to prioritize? Who is the sickest patient that needs the most of my attention earlier on today?

This notion of prioritization is further reflected in the common language used by residents, such as labelling patients as "sick versus not sick" (Participant 4) to signal urgency, a concept that also emerged in Szymczak and Bosk's (2012) study. The researchers explained:

> We came to learn that "sick" was a code word for "might crump any minute." A sick patient became an object of heightened attention and concern. "Sick" is a linguistic red flag that allows residents to anticipate and prioritize tasks in the face of limited time. (p. 352)

This shared terminology highlights the consistency of cognitive strategies employed by residents across both studies to achieve efficiency.

My study also corroborates Szymczak and Bosk's (2012) finding that efficiency is an important cultural value in medical residency, expanding on their observation that efficiency is the "primary emphasis in displaying competence" (p.355). My findings reveal that residents are not only pre-occupied with efficiency, as they "think about it a lot" (Participant 9), but also that achieving this competency

reshapes their identity and influences how others perceive them. Especially in the case of junior residents, efficiency becomes central to their identity as the "workhorse" of the team (Participants 3 and 4). Efficient residents are viewed as "good people" (Participant 3) and as people that others "enjoy working with" (Participant 8). Therefore, efficiency is not only used to judge a resident's competence, but is also required to become a well-liked and respected member of the care team.

Although Szymczak and Bosk (2012) highlight residents' pre-occupation with efficiency, they do not explicitly address residents' motivations for wanting to be efficient. My study showed that the main purpose of efficiency was to be able to provide optimal patient care:

> My most important drive [for efficiency] is patient care. [...] Service becomes busy and you worry about missing things, but at the same time, if you focus too much time on one patient, you might miss other sicker patients that need your attention. (Participant 9)

All the study participants mentioned that patient safety was a main source of worry for them and a primary motivator to maintain efficiency.

Szymczak and Bosk (2012) also did not discuss the context-dependent nature of efficiency, such as how different clinical settings influence its practice. This was because they only observed participants in an inpatient general internal medicine context. My study found that residents had to adopt different strategies depending on which clinical rotation they were on in order to stay efficient across different contexts.

Finally, Szymczak and Bosk (2012) do emphasize the need to manage available resources optimally and deal with system constraints to maintain efficiency, but they do not explicitly discuss the need for team management skills and the more

social aspects of efficiency. They mention challenges such as interruptions during handover but do not describe the skills required to overcome these issues.

In contrast, management-oriented definitions of efficiency do incorporate these aspects. The BDC (2019) defines efficiency as "using resources like time, people, equipment, inventory, and money in an optimized way to serve the business" (para. 3). This definition also highlights the importance of avoiding waste, which they describe as "any activity that adds cost without creating value for customers" (para. 8). To adapt this definition to a medical education context, serving the "business" would be reframed as serving patients, and “costs” would not refer to monetary costs but instead to lost time or gaps in patient care. The BDC definition, with its emphasis on serving a larger goal, resonates with my findings that residents are efficient primarily in order to serve patients better. The BDC definition also emphasizes the need for resource management including managing other people, which is a central aspect to my research findings. The BDC definition underscores that the goal of efficiency in medical residency is not just about performing individual tasks effectively but about optimizing all available resources such as managing the care team appropriately to enhance patient outcomes.

Of course, the BDC definition of efficiency lacks certain components found in Szymczak and Bosk's definition. While the BDC emphasizes resource optimization and waste reduction, it does not address the cognitive aspects of efficiency, such as prioritization and problem anticipation, which are central to Szymczak and Bosk's (2012) understanding of efficiency in medical residency. Additionally, the BDC definition focuses heavily on the business context, overlooking the professional and

cultural values that shape how efficiency is understood and enacted in the clinical setting.

Similarly, Gil's (2020) work focuses heavily on resource management but does not discuss some of the individual, cognitive aspects of efficiency. He assumes that the system can always be modified rather than specifically examining how physicians operate within systems constraints. However, there are many aspects of Gil's definition of efficiency that resonate with my study findings. Gil (2020) defined efficiency as "the sum of quality times satisfaction times volume" (p. 20), where satisfaction consisted of both physician and patient well-being. My study did not include patient interviews and therefore I could not directly assess whether patients noticed any difference in their care when assigned to a team that was operating efficiently versus one that was not. However, it was clear that resident satisfaction increased significantly when the team was functioning more efficiently. Participants mentioned that efficiency led to a "happy team morale" (Participant 3), a feeling of accomplishment that "everyone survived [and] OK, I think that actually went pretty well" (Participant 4), and increased resident well-being such as the ability to eat lunch (Participant 8) or get some sleep (Participant 5).

In terms of what it means to optimally serve patients, my definition focuses more on overall provision for patients rather than on individual patients' satisfaction. Although I do not doubt Chand's (2011) finding that patients value prolonged contact with their doctors, this must be balanced with the need to care for all patients within a reasonable timeframe with a given set of resources and manpower. Participants mentioned their efficiency suffered when they were unable to extricate themselves

from patient conversations because then they ran out of time to see all their patients (Participant 7, Participant 8). Therefore, my study findings aligned more with the findings of Mauksch et al. (2008) and Szymczak and Bosk (2012), who found that efficiency meant decreased patient visit length without compromising the patient-physician relationship.

My study's definition of efficiency in the context of internal medicine residency is directly derived from participant interviews, rather than being based on a preconceived framework. It integrates and expands upon existing definitions by emphasizing both cognitive and social aspects. This definition focuses on taking the most relevant actions to advance patient care, optimizing the use of time, people, and technology within one's specialized context. It also highlights the importance of efficiency as a cultural value in residency. While other definitions of efficiency emphasize elements like prioritization and task accomplishment, they often overlook the broader purpose and social dynamics that my participants identified as essential for overall team efficiency. Conversely, some definitions, particularly those from management perspectives, emphasize team management skills and resource optimization, but neglect the individual and cognitive aspects, such as prioritization and intuitive decision-making, which my participants identified as critical to clinical efficiency. Additionally, business-oriented definitions often leave out the role of efficiency as a key component of resident identity and as a cultural value within medical practice. My study bridges these gaps by offering a definition that incorporates both cognitive and social dimensions while highlighting the cultural

importance of efficiency that shapes how efficiency is understood and enacted in residency.

## 4.2 Discussion about Learning Efficiency

### *Learning Efficiency and Prior Research*

Based on my study, experience and repetition are central to learning the cognitive aspects of efficiency such as prioritization and mental organization. This finding suggests that the traditional remediation method of having learners repeat clinical rotations has some merit, particularly in enhancing skills like pattern recognition. However, this approach primarily addresses the cognitive aspect of efficiency and may not support learners struggling with other components such as managing patient interactions or leading a medical team. Additionally, repeating rotations can be burdensome, as it either prolongs the resident's training or limits the resident's exposure to elective rotations. To address these challenges, alternate measures should be prioritized to either prevent the need for remediation altogether or to reduce the amount of repetition required. Ensuring that learners manage a patient load appropriate to their training level is crucial to optimize their learning experiences. Over-sheltering learners by reducing their workload or delegating their work tasks to more efficient team members might diminish their learning, potentially requiring them to gain additional experience later and delaying their overall training.

Furthermore, based on my study findings, strategies such as providing regular, timely feedback and offering targeted advice can accelerate efficiency learning, guiding residents before they veer off course. Of the arsenal of interventions employed by Warburton et al. (2017) to remediate residents struggling with efficiency, my study

findings suggest that the most useful intervention would be interviews or open dialogue with residents to brainstorm mutual solutions to efficiency. When Participant 2 had a conversation with a learner about efficiency they were able to learn from each other and devise helpful strategies to improve the productivity of the team. Similarly, Dwivedi (2020) and Gil (2020) concluded that transformational leadership involving democratic, open communication within the team was the most effective way to improve efficiency. Proactive cues to "solve problems before they occur" (Participant 3) also helped learners improve their efficiency. For example, Gil (2020) started notifying physicians every week about the percentage of patients who had not yet had an inpatient consult done within 24 hours and the percentage of unseen consults dropped from 20 to 2% just from providing cues about expectations around timeframes. Likewise, Participant 6 gave her medical students "cues to get them along" and found that this helped improve their efficiency.

In addition, DeKosky et al. (2018) found that residents commonly struggled with admitting patients in a reasonable timeframe, pre-rounding systematically, and composing accurate daily progress note. As part of a remediation intervention, they devised mnemonics and codified workflows. These mnemonics could easily be distributed to residents at the start of clinical rotations, and based on my study findings, would likely help all residents with the cognitive aspects of efficiency. For example, Participant 9 mentioned that he would appreciate more written orientation materials to improve his workflow.

However, my research ultimately revealed that difficulties such as rounding systematically or composing accurate progress notes were often symptomatic of a

broader issue, which was an inability to prioritize patient issues and as a result, the inability to gather relevant information about the patient to advance patient care. When patient safety is the primary focus, actions become more streamlined toward this unified goal. Therefore, promoting other-centeredness in residents and recognizing efficiency as an important professional value are critical aspects of improving efficiency but were not addressed in DeKosky et al.'s (2018) study.

### *Learning Efficiency and Learning Theories*

Ultimately, no one learning theory entirely encapsulated how efficiency is learned in the context of medical residency. For my participants, there were aspects of cognitive, socio-cultural, and emergent learning theories that were all applicable to how efficiency is learned.

However, not all cognitive learning theories were relevant to my study. As noted by Participant 2, efficiency learning "was more subconscious", and therefore, self-regulated learning theory did not apply well to my study. Although some participants actively engaged in goal-setting, reflection, and asking explicitly for feedback on their efficiency, a substantial proportion of participants learned efficiency in a more passive manner. Therefore, theories such as self-regulated learning theory which require conscious effort on the part of the learners were less suited to my study.

Kolb's (1984) experiential learning theory was partially applicable to my study findings. While some learners clearly engaged in more reflective observation than others, this variation could be attributed to differences in individual learning styles. For instance, Participant 5 fit an assimilating learning style, as she found didactic lectures beneficial for improving her efficiency and sought out shadowing

opportunities prior to starting senior residency. In contrast, Participant 3 fit an accommodating learning style, as she learned primarily through trial-and-error and active experimentation. Kolb's model demonstrates that there are diverse pathways to learning efficiency, with certain methods proving more effective depending on an individual's learning preferences. However, some participants appeared neither to engage in active experimentation nor reflective observation, at least not consciously, emphasizing the implicit nature of learning efficiency. Furthermore, Kolb's model does not address how residents learn the social and professional aspects of efficiency, such as how learning efficiency shapes resident identity.

Of all the cognitive learning theories, the Dreyfus five-stage learning model (1986), which posits that learners progress from novice to expert through practice and experience, was the most applicable to learning efficiency in medical residency. According to the Dreyfus model, at the novice stage, learners focus on the basic facts and rules without much understanding of the broader goals of the procedures. This aligns with my finding that medical students use a "shotgun approach" to their work (Participant 4) and are not necessarily aware of how their work ties into the overall goals of the medical service. At the proficient level, learners see patterns quickly and rely more on intuition developed through experience to make decisions. Participant 8 explained, "I don't have to look up as many things anymore". The Dreyfus five-stage learning model emphasizes the need for repetition and experience to learn. My study also demonstrated the importance of practice and repetition in learning efficiency. Participant 4 commented, "I've just adopted strategies naturally as a result of seeing so many patients". Similarly, Participant 9 noticed that his attending physicians had "a

mental structure that they built over years of experience". These findings also echo Eraut's (2000) work, which also uses the Dreyfus five-stage learning model to explain the critical role of informal experiences in developing expertise and refining professional skills.

Therefore, it is important to acknowledge that there are some aspects of efficiency that must simply be learned individually with time and practice. Granting residents independence and space to develop their efficiency is essential. However, although there are merits to allowing learners to figure some things out on their own, there are dangers to confining the learning of efficiency to the Dreyfus model of learning. Concluding that efficiency can only be learned through experience (a perspective that Participant 7 encountered with most of her mentors) and that the only solution for struggling learners is to assign them more patients and hope that they eventually improve is not an effective teaching strategy. Therefore, it is potentially harmful to only consider efficiency learning through the lens of cognitive models of learning, and other types of learning theories need to be incorporated to maximize learning of efficiency.

Socio-cultural learning theory further enhances our understanding of how efficiency is learned. Although feedback is a feature in many learning theories including many cognitive theories (behaviourism, cognitivism, experiential learning), my study found that the type of feedback that was the most effective for learning efficiency was dialogical rather than providing strict positive and negative reinforcement, and therefore less in line with behaviourism and more in line with socio-cultural learning. Praise such as "you're efficient" (Participant 6) or criticisms

such as “you’re too slow” (Participant 1) were not considered to be helpful forms of feedback. Residents preferred open discussions about their workflow or way of approaching problems. Socio-cultural learning theory also helps to emphasize that inefficiency in the resident is often not a failure of the individual resident, but of the entire team. It is often difficult to distinguish between poor team management and poor individual performances of the junior residents. Residents need opportunities to observe how more experienced team members conduct their work and guidance to understand their role within the care team. When they are not provided with either of these, it is difficult to say if this is a deficiency in the individual or a fault in the group’s culture.

Furthermore, socio-cultural learning theory helps explain the role of efficiency as a cultural value in medicine. Mastering efficiency influences how residents perceive themselves and how they are perceived by others. This process of identity formation involves internalizing the cultural norms of the medical community, where becoming efficient is seen as a key marker of professionalism. As Participant 3 explained, efficiency “becomes part of your role on the team and who you are”. Consequently, learning efficiency is not merely about acquiring cognitive skills but about embracing the values of the medical culture, which is essential for becoming a fully integrated member of the professional community.

Emergent learning theory also enhances our understanding of how participants perceive the process of learning efficiency. Through discussion between learner and teacher, the lines between the two often blurred, with the learner giving the teacher insight on an issue that the teacher had never thought of before. For instance,

Participant 2 and a more junior learner came up with an entirely new method of charting to work around inefficiencies with the existing charting system. Participant 2 also concluded that she needed to make the team more fun to improve their efficiency based on her discussion with the junior learner. Similarly, Participant 5's attending changed the way rounds were conducted based on the escalation of patient workload and opinions of the junior residents to improve efficiency. Emergent theory helps us to understand the unpredictable nature of working in health care and how efficiency evolves over time.

To date, education theory has focused on the individual and cognitive aspects of learning efficiency. This study corroborates the importance of repetition and experiential learning in developing the cognitive components of efficiency. Without adequate clinical experience, residents cannot learn efficiency. However, beyond this, the study also demonstrates the need to consider how efficiency is learned through a socio-cultural and emergent lens. Efficiency is enhanced when there is an opportunity for learners to observe and to obtain feedback from other team members. Furthermore, open discussion between learners and mentors or coaches can lead to the discovery of entirely new techniques to improve efficiency. If we can change our mindset from seeing efficiency as solely an individual skill to seeing it as a team or system effort, we can improve the quality of social interactions and the success of both individual residents and the medical care team.

## 4.3 Implications of the Study

### *Conceptual and Theoretical Contributions*

To my knowledge, this is the first study of efficiency in medical residents to discuss how efficiency is learned in relation to a variety of learning theories. Ultimately, I have found that understanding efficiency in medical residency requires a combination of cognitive, socio-cultural, and emergent learning theories to capture the collaborative and dynamic nature of learning efficiency in a medical residency setting.

### *Practical Recommendations*

Below are some practical recommendations to increase the learning of efficiency in the context of medical residency based on my study findings:

**Role Modelling Opportunities.** Currently, internal medicine residents in Canada have limited opportunities to observe the workflow of more senior team members. Shadowing more experienced trainees at key transition points, such as when moving from medical student to junior resident or from junior to senior resident, could be a valuable learning experience to improve efficiency, even if it's just for one or two hours per year. It's crucial that these observations focus on the specific roles that the less experienced team members are expected to fill.

**Feedback and Open Communication.** There needs to be a cultural shift where both attending physicians and residents openly acknowledge the importance of efficiency and are not hesitant to provide feedback on this skill. A key aspect of being an effective and efficient senior resident involves managing the efficiency of junior team members. In my study, residents often had to actively seek feedback on

efficiency, but upon receiving feedback, found it to be helpful. Therefore, attending physicians and senior residents should be encouraged to provide feedback on efficiency. Proactively providing guidance in anticipation that learners will run into efficiency struggles is also helpful.

**Orientation Materials.** For example, some rotations provide learners with a template for consults and follow-up notes, ensuring clarity about what is considered relevant content.

**Social Skills Training.** Previous studies have designed workshops to maximize the efficiency of patient encounters (Mauksch et al., 2008; Skelly et al., 2020). These studies have found that agenda-setting with the patient is a useful strategy to improve both patient and physician satisfaction while also decreasing the overall time spent with the patient.

### 4.4 Limitations of the Study and Directions for Future Research

Common to interpretivist studies, the findings of this research are inherently context-specific and may not be universally applicable. However, the internal medicine residency program chosen for the study possesses several characteristics that enhance the generalizability of the results. The program's diversity in clinical experiences—spanning clinic and ward settings, individual and team-based medicine, general and subspecialty care—along with the variety of hospitals and the diverse medical school backgrounds of residents, offers a broader perspective on how residents adapt to different contexts. This diversity within the study population provided a comprehensive view, making the findings relevant to a variety of residency programs with different structures and experiences.

The reliance on participant recollection during interviews presents another limitation, as it may not fully capture all aspects of learning efficiency. Memory bias or selective recall could have influenced the data, potentially leading to the omission of important details or overemphasizing certain experiences. However, participants were deliberately selected from first- and second-year residency as they are currently in the process of learning efficiency, making their experiences more recent and likely to be fresh in their memory.

Finally, this study focused on the experiences of medical residents and did not include patient interviews. The primary research goal of this study was to explore how medical residents define efficiency and how they learn efficiency in their clinical practice. Given this focus, it was appropriate to centre the research on the residents with the objective of enhancing resident education. However, future studies could include patient interviews to highlight areas for efficiency improvement from the patients' perspectives, and also align the learning strategies of medical residents with the ultimate goal of delivering high quality patient care.

Given the limitations of relying on participant recollection, future studies could also benefit from more ethnographic approaches. Observing residents in real-time as they navigate their daily tasks could help uncover the tacit aspects of efficiency that might not be articulated in interviews. Ethnographic methods could provide a more nuanced understanding of how efficiency is learned and applied in various clinical settings.

Future research could also explore the effectiveness of some of the proposed recommendations based on the findings in this study. For instance, investigating the

impact of providing protected time for junior residents to observe senior team members during key transitions such as the start of junior residency or the transition from junior to senior residency could yield valuable insights about whether structured observation and guided walkthroughs of workflow processes by experienced residents can improve junior residents' efficiency.

Additionally, studies that focus more narrowly on specific findings of this research may be particularly illuminating. For example, further investigation into the outside experiences that enhance efficiency such as extracurricular activities or prior work experience could lead to new strategies for integrating these experiences into residency programs. By focusing on these specific aspects, future research could lead to targeted recommendations for improving efficiency in medical education.

This study offered valuable insights into the learning of efficiency during internal medicine residency and provides potential for further exploration. Building on the current study findings can refine and expand our understanding of how efficiency can be both effectively taught and learned in medical education.

# Chapter 5: Conclusion

In conclusion, my dissertation sought to address two key research questions regarding efficiency in medical residency. The first research question asked, “What constitutes efficiency in the context of internal medicine residency?” I found that efficiency in this context included both cognitive and social components and consisted of taking deliberate actions to advance patient care within one’s role on the care team. I also discovered that efficiency was more than just a competency; it was a cultural value that shaped residents’ professional identity and reputation within the medical team.

The second research question asked, “How do internal medicine residents learn to be efficient in clinical practice?” I found that individual, experiential learning was critical to learning efficiency but also that open dialogue and collaboration with peers was also crucial for efficient care team management.

This research study is pioneering in its exploration of how residents learn efficiency beyond formal remediation processes. Additionally, it provides a novel perspective by examining the learning of efficiency through the lens of various learning theories, offering a more comprehensive understanding of how these theories apply in a clinical context. An acquisition, participation, and emergent metaphor of learning can be applied to learning efficiency and should all be used in tandem. These findings contribute to the broader conversation on medical education and can inform future training programs on how to enhance clinical practice efficiency.

## References

Accreditation Council for Graduate Medical Education. (2024). *Glossary of terms*. https://www.acgme.org/globalassets/pdfs/ab_acgmeglossary.pdf

Andrews, A., & Emvalomatis, G. (2024). Efficiency measurement in healthcare: The foundations, variables, and models – A narrative literature review. *Economics*, *18*(1). https://doi.org/10.1515/econ-2022-0062

Anspach, R. R. (1988). Notes on the sociology of medical discourse: The language of case presentation. *Journal of Health and Social Behavior*, *29*(4), 357. https://doi.org/10.2307/2136869

Arluke, A. (1980). Roundsmanship: Inherent control on a medical teaching ward. *Social Science & Medicine*, *14*(4), 297–302. https://doi.org/10.1016/S0271-7123(80)90173-X

Becker, H. (1961). *Boys in white: Student culture in medical school*. Transaction.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2013). *Successful qualitative research: A practical guide for beginners*. SAGE.

Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. SAGE.

Business Development Bank of Canada. (2019). *What is operational efficiency?* BDC. https://www.bdc.ca/en/articles-tools/operations/operational-efficiency/3-critical-factors-operational-efficiency

Callender, G. (2008). *Efficiency and management*. Routledge.

https://doi.org/10.4324/9780203888957

Canadian Resident Matching System (CaRMS). (2023). *Internal medicine 2023 R-1 main residency match - first iteration: Quota overview by university*. CaRMS. https://www.carms.ca/match/r-1-main-residency-match/program-descriptions-archive-first-iteration/

Chaiyachati, K. H., Shea, J. A., Asch, D. A., Liu, M., Bellini, L. M., Dine, C. J., Sternberg, A. L., Gitelman, Y., Yeager, A. M., Asch, J. M., & Desai, S. V. (2019). Assessment of inpatient time allocation among first-year internal medicine residents using time-motion observations. *JAMA Internal Medicine, 179*(6), 760–767. https://doi.org/10.1001/jamainternmed.2019.0095

Chand, D. V. (2011). Observational study using the tools of Lean Six Sigma to improve the efficiency of the resident rounding process. *Journal of Graduate Medical Education, 3*(2), 144–150. https://doi.org/10.4300/JGME-D-10-00116.1

Chou, C. L., Kalet, A., Costa, M. J., Cleland, J., & Winston, K. (2019). Guidelines: The dos, don'ts and don't knows of remediation in medical education. *Perspectives on Medical Education, 8*(6), 322–338. https://doi.org/10.1007/S40037-019-00544-5

Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. SAGE.

DeKosky, A. S., Sedrak, M. S., Goren, E., Dine, C. J., & Warburton, K. M. (2018). Simple frameworks for daily work: Innovative strategies to coach residents struggling with time management, organization, and efficiency. *Journal of Graduate Medical Education*, *10*(3), 325–330. https://doi.org/10.4300/JGME-D-

17-00756.1

Dhalla, I. A., Kwong, J. C., Streiner, D. L., Baddour, R. E., Waddell, A. E., & Johnson, I. L. (2002). Characteristics of first-year students in Canadian medical schools. *Canadian Medical Association Journal*, *166*(8), 1029–1035.

Dreyfus, H. L., & Dreyfus, S. E. (1986). *Mind over machine: The power of human intuition and expertise in the era of the computer*. Free Press.

Drucker, P. F. (1967). *The effective executive*. Heinemann.

Dupras, D. M., Edson, R. S., Halvorsen, A. J., Hopkins, R. H., & McDonald, F. S. (2012). "Problem residents": Prevalence, problems and remediation in the era of core competencies. *The American Journal of Medicine*, *125*(4), 421–425. https://doi.org/10.1016/j.amjmed.2011.12.008

Dwivedi, P., Chaturvedi, V., & Vashist, J. K. (2020). Transformational leadership and employee efficiency: Knowledge sharing as mediator. *Benchmarking*, *27*(4), 1571–1590. https://doi.org/10.1108/BIJ-08-2019-0356

Eraut, M. (2000). Non-formal learning and tacit knowledge in professional work. *The British Journal of Educational Psychology*, *70(1)*, 113–136. https://doi.org/10.1348/000709900158001

Eraut, M., & Hirsh, W. (2010). *The significance of workplace learning for individuals, groups and organisations*. ESRC Centre on Skills, Knowledge and Organisational Performance (SKOPE).

Frank, J., Snell, L., & Sherbino, J. (2015). *CanMEDS 2015 physician competency framework.* Royal College of Physicians and Surgeons of Canada.

Gil, Z. (2020). *The healthcare efficiency revolution: A mid-level managers' manual*

*for professional development*. Springer. https://doi.org/10.1007/978-3-030-61232-0

Gilbreth, F. B. (1911). *Motion study: A method for increasing the efficiency of the workman*. D. Van Nostrand Company.

Guerrasio, J., Garrity, M. J., & Aagaard, E. M. (2014). Learner deficits and academic outcomes of medical students, residents, fellows, and attending physicians referred to a remediation program, 2006–2012. *Academic Medicine*, *89*(2), 352–358. https://doi.org/10.1097/ACM.0000000000000122

Hager, P. (2011). Theories of workplace learning. In M. Malloch, L. Cairns, K. Evans, & B. N. O'Connor (Eds.), *The SAGE handbook of workplace learning* (pp. 17–31). SAGE. https://doi.org/10.4135/9781446200940

Hendrich, A., Chow, M. P., Skierczynski, B. A., & Lu, Z. (2008). A 36-hospital time and motion study: How do medical-surgical nurses spend their time? *The Permanente Journal*, *12*(3), 25–34. https://doi.org/10.7812/tpp/08-021

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice-Hall.

Krzyzaniak, S. M., Kaplan, B., Lucas, D., Bradley, E., & Wolf, S. J. (2021). Unheard voices: A qualitative study of resident perspectives on remediation. *Journal of Graduate Medical Education*, *13*(4), 507–514. https://doi.org/10.4300/JGME-D-20-01481.1

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.

Lopetegui, M., Yen, P.-Y., Lai, A., Jeffries, J., Embi, P., & Payne, P. (2014). Time

motion studies in healthcare: What are we talking about? *Journal of Biomedical Informatics, 49,* 292–299. https://doi.org/10.1016/j.jbi.2014.02.017

Lumivero. (2023). *NVivo* (14.23.3). www.lumivero.com

Mamykina, L., Vawdrey, D. K., & Hripcsak, G. (2016). How do residents spend their shift time? A time and motion study with a particular focus on the use of computers. *Academic Medicine*, *91*(6), 827–832. https://doi.org/10.1097/ACM.0000000000001148

Mauksch, L. B., Dugdale, D. C., Dodson, S., & Epstein, R. (2008). Relationship, communication, and efficiency in the medical encounter: Creating a clinical model from a literature review. *Archives of Internal Medicine, 168*(13), 1387–1395. https://doi.org/10.1001/archinte.168.13.1387

Mills, L. M., Boscardin, C., Joyce, E. A., Cate, O., & O'Sullivan, P. S. (2021). Emotion in remediation: A scoping review of the medical education literature. *Medical Education, 55*(12), 1350–1362. https://doi.org/10.1111/medu.14605

Mizrahi, T. (1985). Getting rid of patients: Contradictions in the socialisation of internist to the doctor-patient relationship. *Sociology of Health and Illness*, *7*(2), 214–235. https://doi.org/10.1111/1467-9566.ep10949079

Morrison, K. (2008). Educational philosophy and the challenge of complexity theory. *Educational Philosophy and Theory*, *40*(1), 19–34. https://doi.org/10.1111/j.1469-5812.2007.00394.x

Oancea, A. (2015). The aims and claims of educational research. In M. Hand & R. Davies (Eds.), *Education, ethics and experience* (pp. 109–122). Routledge. https://doi.org/10.4324/9781315716466-10

Osberg, D., & Biesta, G. J. J. (2007). Beyond presence: Epistemological and pedagogical implications of "strong" emergence. *Interchange, 38*(1), 31–51. https://doi.org/10.1007/s10780-007-9014-3

Pring, R. (2015). *Philosophy of educational research*. Bloomsbury Academic. https://doi.org/10.5040/9781474228596

Professional Association of Residents of Ontario. (2022). *2020-2023 PARO-OTH agreement*. https://myparo.ca/your-contract/

Saldaña, J. (2021). *The coding manual for qualitative researchers* (4th ed.). SAGE.

Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher, 27*(2), 4. https://doi.org/10.2307/1176193

Shearer, C., Bosma, M., Bergin, F., Sargeant, J., & Warren, A. (2019). Remediation in Canadian medical residency programs: Established and emerging best practices. *Medical Teacher*, *41*(1), 28–35. https://doi.org/10.1080/0142159X.2018.1436164

Skelly, K., Shen, W., Wilbur, J., Thoma, K., Endres, J., Lynch, A., Gaglioti, A., & Rosenbaum, M. (2020). A curriculum for teaching clinical efficiency focusing on specific communication skills while maximizing the electronic health record. *MedEdPORTAL, 16,* 10989. https://doi.org/10.15766/mep_2374-8265.10989

Statistics Canada. (2023). *Census profile*. 2021 Census of Population. https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=E

Szymczak, J. E., & Bosk, C. L. (2012). Training for efficiency. *Journal of Health and Social Behavior*, *53*(3), 344–358. https://doi.org/10.1177/0022146512451130

Taylor, F. W. (1911). *The principles of scientific management*. Harper.

Warburton, K. M., Goren, E., & Dine, C. J. (2017). Comprehensive assessment of struggling learners referred to a graduate medical education remediation program. *Journal of Graduate Medical Education*, *9*(6), 763–767. https://doi.org/10.4300/JGME-D-17-00175.1

Warburton, K. M., Parsons, A. S., Yen, P., & Goren, E. (2023). Evaluation and remediation of organization, efficiency, and time management. In A. Kalet & C. L. Chou (Eds.), *Remediation in medical education: A mid-course correction* (2nd ed., pp. 125–134). Springer. https://doi.org/10.1007/978-3-031-32404-8_11

White, P. (2017). Research questions in education research: Their neglect, role and development. In D. Wyse, N. Selwyn, E. Smith, & L. E. Suter (Eds.), *The BERA/SAGE handbook of educational research* (pp. 180–202). SAGE.

Wikoff, M. B., Anderson, D. C., & Crowell, C. R. (1983). Behavior management in a factory setting: Increasing work efficiency. *Journal of Organizational Behavior Management*, *4*(1–2), 97–128. https://doi.org/10.1300/J075v04n01_04

Witzel, M. (2002). A short history of efficiency. *Business Strategy Review*, *13*(4), 38–47. https://doi.org/10.1111/1467-8616.00232

Yao, D. C. (2000). National survey of internal medicine residency program directors regarding problem residents. *JAMA*, *284*(9), 1099. https://doi.org/10.1001/jama.284.9.1099

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice*, *41*(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2

# Appendices

## Appendix A: Example of Reflection and Analytic Memo

Reflection after Interview #5
2024-02-07
The importance of teamwork as a driver for learning efficiency is becoming more apparent. People know that they are being efficient when they are assigned or "rewarded" with extra work, or have extra time to help other teammates with their work. You would think that being assigned extra work would be negative reinforcement and encourage people to go more slowly, but getting extra work is actually seen as a positive thing by residents, flattering and something to be proud of. This sentiment seems to be related to the idea of wanting to be a good team player and creating a light and happy work environment where the whole team can go home at a decent hour and everyone seems pleased and everyone has a positive impression of the efficacy of the team as a whole.
This is also my first junior resident (resident year 1) interview and it was interesting to hear that she recalls some specific incidents of senior residents and staff providing informal advice on how to operate efficiently (how to work the electronic medical record, what order to complete rounds in), which corroborates the comments of the senior residents (resident year 2s) mentioning that they give occasional tips to the med students and the juniors. Also interesting was that she didn't really remember getting advice from anyone unless I specifically asked her how she learned a specific trick.
Participant #5 also felt that more explicit or even didactic pointers or resources that could be found all in one place to enhance efficiency would be useful, echoing some of the sentiments of participant #1.
As a junior resident, participant #5 also does not have the benefit of hindsight at the moment and so her identity as a year 1 resident having to be the "workhorse of the team" seems less solidified than was mentioned by most of the year 2 residents. It was interesting that she thinks that she will have to be even more efficient as a year 2 resident, (which the year 2 residents did not think was the case now that they are in year 2, they all felt that year 1 was really when efficiency was paramount).
Recognizing that patient safety is the priority is another recurring theme. At some point, people realize that any work that doesn't affect patient safety is of less importance and can be omitted. People who have the mindset of "I'm just going to do what's important for patient safety" can streamline their work more effectively.
Overall some answers to some questions are emerging:

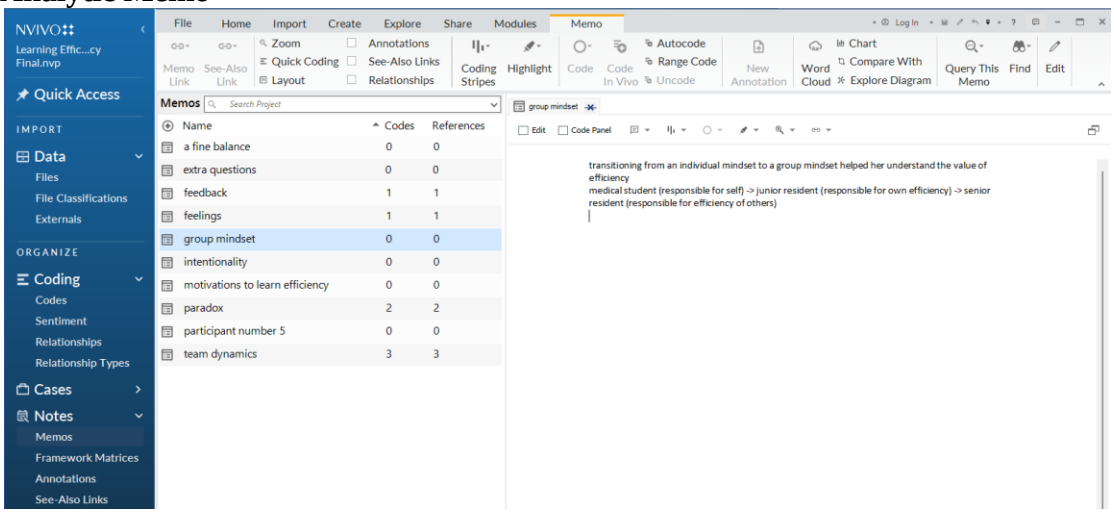
- How do people know that efficiency is important?
    - Part of being a good team member. Situated learning/communities of practice
    - Part of the identity of a junior resident. Supposed to be "the workhorse" of the team
- When do people learn efficiency?
    - Mostly during junior residency
- How do people learn efficiency?
    - "Experience", "trial and error"
    - Noticing that maybe they are not as fast as someone more junior than them (although they rarely notice what other more senior members are doing, so role modeling seems less important in that sense, more important when they feel embarrassed that the medical student is doing better than them)
    - Informal advice or comments in passing from more senior members of the team. This is different from feedback.
    - Improving their overall medical knowledge to better identify issues that concern patient safety
- How do people be efficient?
    - Prioritizing and focusing on tasks that are directly related to patient safety

- Preparing themselves the night or the morning before they start work, whether that is reviewing patient notes or charts, etc.

What do I want to ask more about at the next interview:

- What are some suggestions you have to improve how residents learn efficiency?
- More examples of informal discussions or ways people learned certain efficiency tricks

## Analytic Memo



## Appendix B: Recruitment Email

# EMAIL TITLE: **VOLUNTEERS NEEDED FOR STUDY ON HOW RESIDENTS LEARN EFFICIENCY**

BODY OF EMAIL:

**Using constructivist grounded theory to understand how medical residents learn efficiency**

Ethics Approval Reference: [EDUC_C1A_23_286]

Dear colleagues,

I am [REDACTED], an internal medicine and nephrology physician in Vancouver. I am also a master's student in Medical Education at the University of Oxford. I am conducting a study on how medical residents learn efficiency in clinical training. I am asking for your help.

We are looking for volunteers who are current medical residents at the University of [REDACTED] to help us understand how residents learn efficiency. You are invited to participate in a one-to-one interview conducted online on Microsoft Teams. The interview would take about 30 minutes of your time and would involve answering questions about your learning experiences and views of efficiency.

If you are interested and would like more information please contact [REDACTED] at the Department of Education, Oxford by January 19th, 2024. There is no obligation to take part. An information sheet and consent form is attached to this email for your reading.

Thank you!

[REDACTED]

# Appendix C: Participant Information Sheet

Principal investigator: [REDACTED]

Primary Researcher [REDACTED]

**Using constructivist grounded theory to understand how medical residents learn efficiency**

**PARTICIPANT INFORMATION SHEET**

Central University Research Ethics Committee Approval Reference: [EDUC_C1A_23_286]

**1. Introductory paragraph**

You are being invited to take part in a research project. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether you wish to take part.

**2. Why is this research being conducted?**

We want to better understand how residents learn efficiency, with the hopes that these insights could someday help us improve how efficiency is learned in residency programs.

**3. Why have I been invited to take part?**

As a current medical resident at the University of [REDACTED], you have been chosen to participate in our study because we are specifically interested in hearing your insights and perspectives on how you learn efficiency. Recruitment for the study is open-ended but we estimate that around 8-10 participants will be recruited to the study.

**4. Do I have to take part?**

No. It is up to you to decide whether to take part. You can withdraw yourself from the research, without giving a reason, and without negative consequences, by advising either [REDACTED] or [REDACTED] of this decision. If you withdraw your consent to participate after interview information has already been collected, we will destroy all research data collected from you within 10 days of receiving your notification to withdraw from the study. The deadline by which you can withdraw any information you have contributed to the research is August 19th, 2024 (one month before dissertation due date).

**5. What will happen to me if I take part in the research?**

One-to-one interviews will be conducted online via Microsoft Teams video meeting. A link to the video meeting will be sent to your email address prior to the scheduled interview. Participants will also be asked to sign a consent form and email the signed copy to [REDACTED] prior to the start of the interview. Interviews are expected to last approximately 30 minutes. We will be asking questions to better understand how you learn efficiency, which may include asking you to tell us about your learning experiences while on busy clinical rotations. With your consent, we would like to video record you so that we can have an accurate record of our conversation. After the interviews, Microsoft Teams software will be used to generate a transcript of your interview from the recordings. [REDACTED] will then edit the interview transcript to remove any identifying information

that you might have shared during the interview. Participants can ask to pause or stop the research activities at any time.

**6. What are the possible disadvantages and risks in taking part?**

There are minimal psychological, physical, confidentiality, or social risks to participating in this study. It is possible that the interview might remind you of a few stressful work situations, but this is expected to cause minimal distress. You can ask to pause or stop the interview at any time, or choose not to answer certain questions. Your assessment as a resident will in no way be affected by your participation in this study. Throughout the study, only the interviewer [REDACTED] will be able to link your identity to your interview responses, and she will not be documenting or sharing this knowledge with anyone else. Data from your interviews will be analyzed anonymously, and only [REDACTED] and [REDACTED] will have access to this anonymous data. Anonymized quotations may be used for illustrative purposes, and will not contain information that could identify you or a specific situation.

**7. Are there any benefits in taking part?**

There will be no direct or personal benefit to you from taking part in this research.

**8. Expenses and payments**

You will receive a $10.00 CAD Starbucks gift card as a gesture of appreciation for participating in the study if we have your permission to do so.

**9. What information will be collected and why is the collection of this information relevant for achieving the research objectives?**

I am interested in your experiences of learning efficiency and your views of efficiency. As part of the study, we may collect information about your work-related values. Although I will not directly be questioning you about your physical or mental health, if you choose to share information with me about this during the interview and it is relevant to how you learn efficiency, I might choose to include it in the analysis. Any data including any sensitive information you share will be made anonymous prior to analysis. No sensitive personal data relating to race, ethnic origin, sexual orientation, religious beliefs, union membership, genetics, sexual life, biometrics, or criminal activities will be collected. If this information is inadvertently disclosed by you during the interview it will be removed at the time that the interview transcripts are being de-identified. Video recordings of the interviews will be stored electronically on secure password-protected encrypted Oxford servers destroyed as soon as the interview transcripts are ready for use. Anonymized interview transcripts and field notes will be stored in a password-protected secure Oxford server and backed up on a password-protected encrypted USB drive. The backup contents will be deleted at the time of study publication, and the field notes and transcripts will be stored for 5 years after publication or public release of the research work on the secure Oxford servers after which [REDACTED] will destroy the data.

Only [REDACTED] and [REDACTED] will have access to all the research data.

Identifiable data (i.e. consent forms) will be stored in a locked filing cabinet in a secure office at St. Paul's Hospital and be stored for 5 years after publication or public release of the research work, then disposed of in confidential waste containers. In order to send you a Starbucks gift card, I would need to input your email on the Starbucks gifting website so that there is an email address to deposit the gift card.

Research data will be stored in both Vancouver and online on Oxford servers. Identifiable data will be removed whenever possible and any data transfer will be done securely and with a similar level of data protection as required under UK and Canadian law.

**10. Will the research be published? Could I be identified from any publications or other research outputs?**

The findings from the research will be written up in a dissertation, academic publications and conference presentations. A copy of my thesis/ dissertation will be deposited both in print and online in the Oxford University Research Archive where it will be publicly available to facilitate its use in future research. Participants will not be identifiable from the research outputs. We would like your permission to use direct quotations without identifying you in any research outputs.

**11. Data Protection**

The University of Oxford is the data controller with respect to your personal data, and as such will determine how your personal data is used in the research. The University will process your personal data for the purpose of the research outlined above. Research is a task that is performed in the public interest. Further information about your rights with respect to your personal data is available from the University's Information Compliance web site at https://compliance.admin.ox.ac.uk/individual-rights.

**12. Who has reviewed this research?**

This research has received ethics approval from a subcommittee of the University of Oxford Central University Research Ethics Committee. (Ethics reference: EDUC_C1A_23_286). It has also received ethics approval from the University of British Columbia Resident Training Committee.

**13. Who do I contact if I have a concern about the research or I wish to complain?**

If you have a concern about any aspect of this research, please contact [REDACTED] or [REDACTED], and we will do our best to answer your query. We will acknowledge your concern within 10 working days and give you an indication of how it will be dealt with. 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 who will seek to resolve the matter as soon as possible:

The Chair, Social Sciences & Humanities Interdivisional Research Ethics Committee;
Email: ethics@socsci.ox.ac.uk; Address: Research Services, University of Oxford, Boundary Brook House, Churchill Drive, Headington, Oxford OX3 7GB

**14. Further Information and Contact Details**

If you would like to discuss the research with someone beforehand (or if you have questions afterwards), please contact:

[REDACTED]
Department of Education
15 Nordham Gardens
Oxford, OX2 6PY
University email: [REDACTED]

## Appendix D: Interview Guide

**Biographical Questions**

1. Which clinical rotations have you done so far in residency? Which service have you found to be the busiest so far? How did you handle the workload?
2. How have you found the transition from medical student to resident so far? (Are the expectations the same or different? How did you figure out what the new expectations were?)

**Questions about the Definition of Efficiency**

3. In your own words, what does efficiency in the context of residency mean?
4. How do you think about efficiency?
5. How do you conceptualize efficiency?
6. In your opinion, are efficiency and effectiveness the same or different? If different, is one more important than the other?

**Questions about Efficiency as a Value**

7. Is efficiency important? Why or why not?
8. What would you say are the top three attributes of a successful internist? (E.g. efficiency, caring, common sense, medical knowledge). Is efficiency more important than medical knowledge?
9. How did you learn that efficiency was important?

**Questions about Learning Efficiency as an Individual**

10. Where did you learn efficiency?
11. How often do you think about your efficiency at work?
12. Did it require conscious effort to become efficient? If so, do you have specific goals in mind or outcomes you are trying to achieve when trying to improve your efficiency?
13. What strategies have you tried to use to improve your efficiency?
14. How did you learn these strategies to improve your efficiency?
15. How do you know whether your strategy to improve your efficiency is effective or not?
16. Does role modeling play a role in learning efficiency?
17. Do you find external feedback helpful when it comes to learning efficiency? Why or why not?
18. Informal discussions with the team
19. How do you think we could improve how we teach efficiency?

**Questions about Learning Efficiency as a Team**

20. How did you learn efficiency in the clinical community?
21. Can you share with me an example of a time where you or someone on your team was very efficient? How did you know they were being efficient? How do you think they learned how to do that? Is that the same way you learn efficiency?
22. Can you share with me an example of a time where you felt you or someone on your team was inefficient? How did you know they were inefficient? How did you handle that situation?
23. What emotions come to mind when you think about situations that have challenged your efficiency or the efficiency of your teammates, and how do you deal with these emotions?

Home vs work

Motivations

## Appendix E: Consent Form

Principal investigator: [REDACTED]

Primary Researcher [REDACTED]

UNIVERSITY OF OXFORD

**Consent to take part in "Using constructivist grounded theory to understand how medical residents learn efficiency"**

Central University Research Ethics Committee (CUREC) approval reference: EDUC_C1A_23_286

Purpose of Study: The purpose of this study is to understand how medical trainees learn efficiency during clinical training.

| | **Please initial each box if you agree with the statement** |
|---|---|
| I confirm that I have read and understand the information sheet version for the above research. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. | ☐ |
| I understand that my participation is voluntary and that I am free to withdraw at any point, without giving any reason, until August 19th, 2024 (one month before submission due date of dissertation). | ☐ |
| I understand who will have access to personal data provided, how the data will be stored and what will happen to the data at the end of the project. | ☐ |
| I understand that I will not be identifiable from any dissertations, publications or research presentations. | ☐ |
| I consent to being video recorded. | ☐ |
| I understand how video recordings will be used in research outputs. | ☐ |
| Use of quotations: Please indicate your preference (select *one* option):<br>a) I do not wish to be quoted. **or** | ☐ |
| b) I agree to the use of quotations in research outputs if I am not identifiable. | ☐ |
| I understand how to raise a concern or make a complaint. | ☐ |
| I agree to take part. | ☐ |

I hereby assign to the researcher all copyright in my contribution for use in all work stemming from this project and future projects. ☐

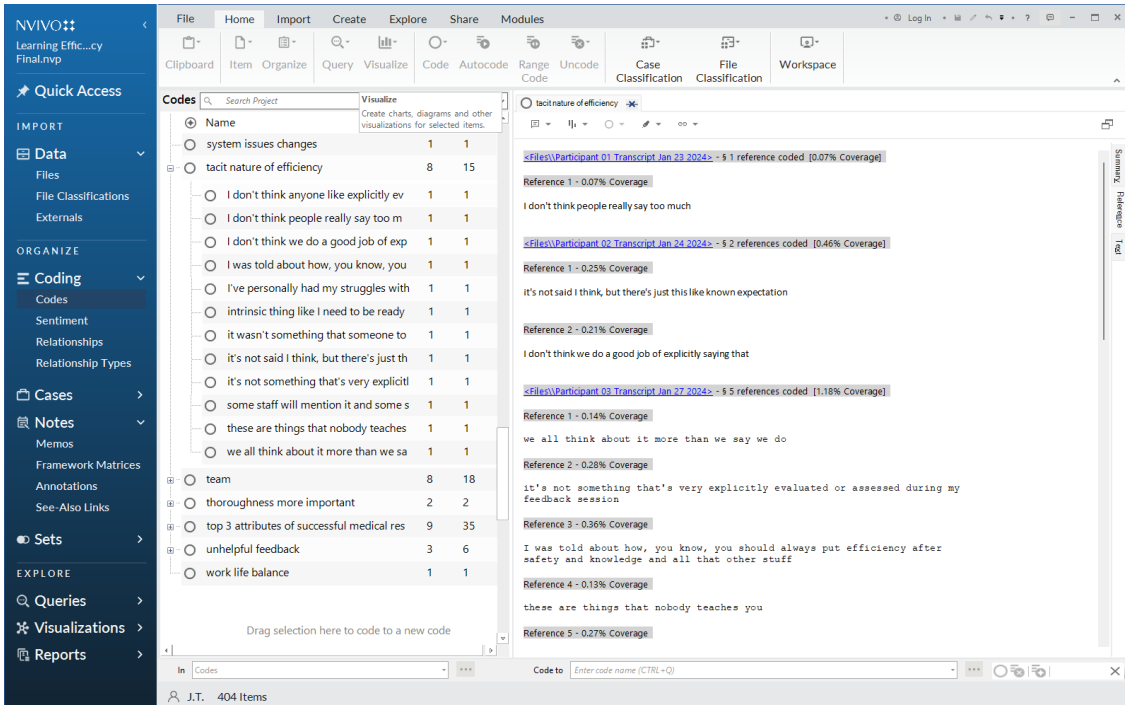
I would like to be sent a complimentary $10.00 CAD Starbucks gift card after the interview and consent to having my email address entered into the online Starbucks gifting form for this purpose. ☐

| _____ | dd / mm / yyyy | _____ |
|---|---|---|
| Name of participant | Date | Signature |

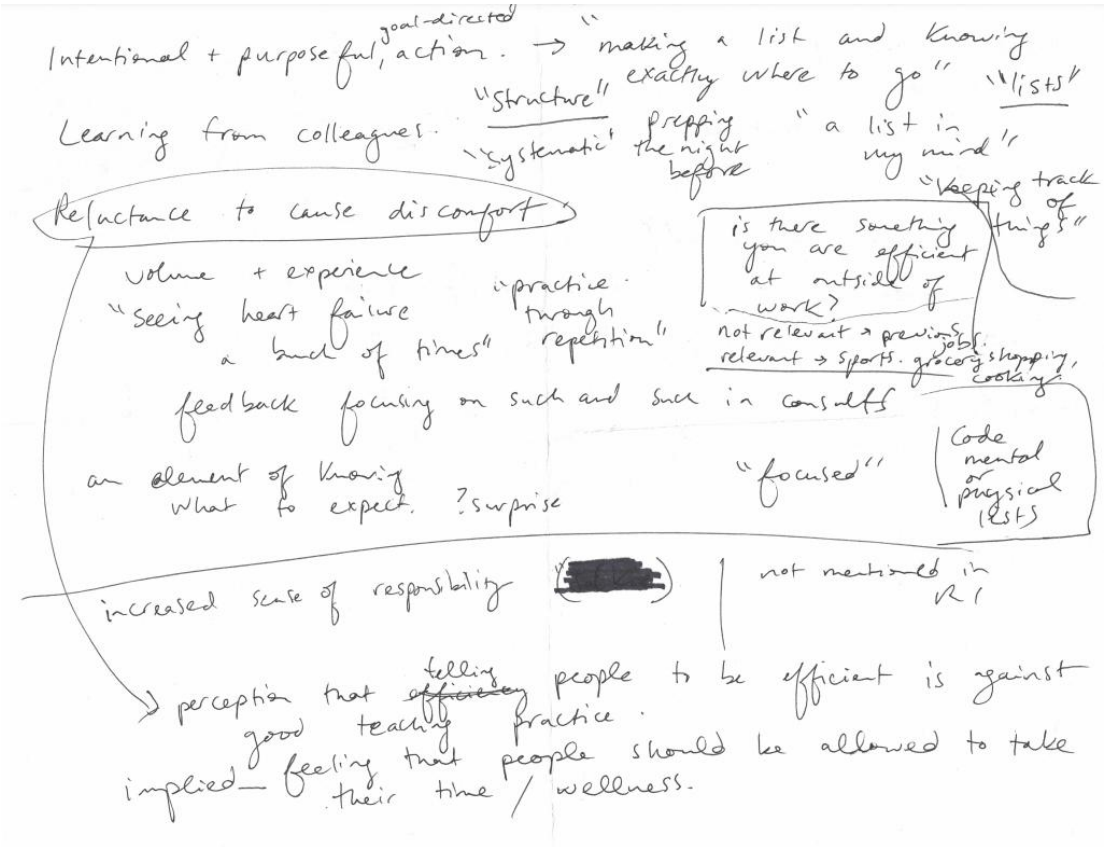
| _____ | dd / mm / yyyy | _____ |
|---|---|---|
| Name of person taking consent | Date[1] | Signature |

[1] To be signed and dated in the presence of the participant. Once this has been signed by both parties the participant should receive a copy of the signed and dated participant consent form. The original signed and dated consent form should be kept with the project's main documents, which must be kept in a secure location.

# Appendix F: Coding Example



## Appendix G: Theme Generation Example



**Appendix H: Candidate Themes**

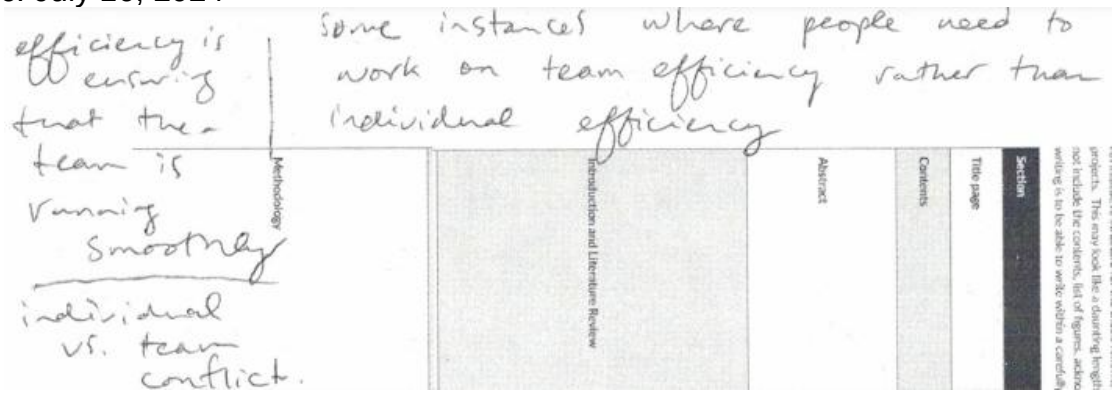
May 30, 2024
Efficiency consists of intentional and purposeful, goal-directed action to advance patient care

- Faster when you don't buy extra unnecessary groceries you don't need (e.g. gastroenterology consult vs. general medicine consult)
- Faster when you prepare a shopping list ahead of time (e.g. prepping list the night before)
- Faster when you already know the layout of the grocery store (e.g. how to navigate the EMR)

Culture: efficiency is an important part of resident identity but there is a perception that telling people they need to be more efficient is against good teaching practice/feeling that people should be allowed to take their time/focus on "wellness"/reluctance to cause discomfort: perhaps this is the case with all feedback
Responsibility/identity
Decreased self-centeredness, not "being in your own head", focusing on the team and focusing on patient care
Learning efficiency has conscious and unconscious components
Feedback can speed up the learning process
Some learners are more intentional about their approach than others

Developing efficiency

c. July 16, 2024



## Appendix I: Central University Research Ethics Committee Approval

**SOCIAL SCIENCES & HUMANITIES**
**INTERDIVISIONAL RESEARCH ETHICS COMMITTEE**
**DEPARTMENTAL RESEARCH ETHICS COMMITTEE**

Department of Education
15 Norham Gardens, Oxford OX2 6PY
student.curec@education.ox.ac.uk; staff.curec@education.ox.ac.uk
[redacted]


Department of Education, Social Sciences Division
University of Oxford

11 November 2023

Dear [redacted]

**Research ethics approval**

Research title: Using constructivist grounded theory to understand how medical residents learn efficiency

**Research ethics reference:** EDUC_C1A_23_286

The above application has been considered on behalf of the Education Departmental Research Ethics Committee (DREC) in accordance with the University's procedures for ethical approval of all research involving human participants.

I am pleased to confirm that, on the basis of the information provided to the DREC, ethics approval has now been granted for this study.

Please note the following:

**Personal data**: It is the responsibility of the PI to ensure that all personal data collected during the project is managed in accordance with the University's guidance and legal requirements.

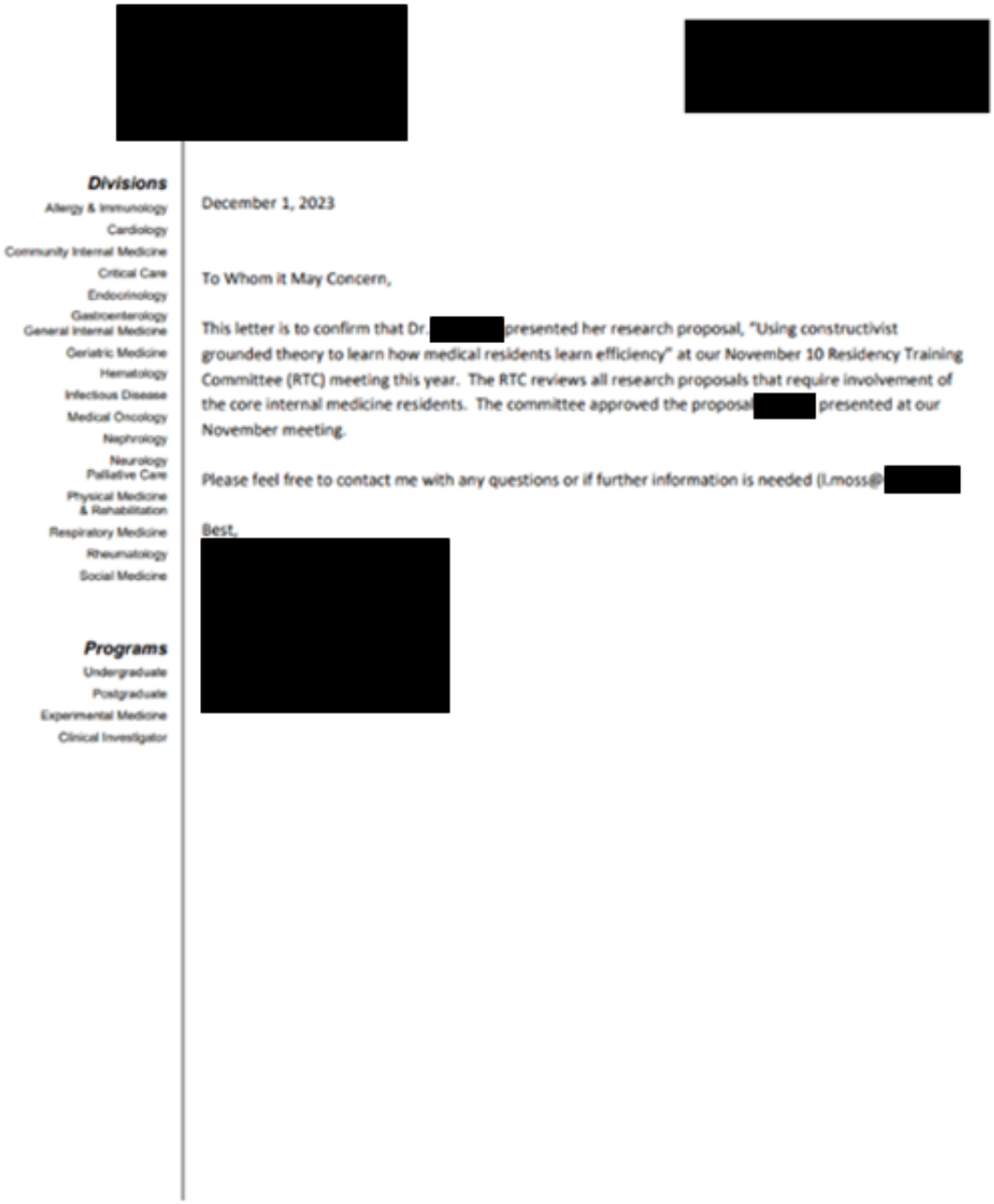
**In-person activities**: Any data collection involving in-person interactions with participants must have an up-to-date fieldwork risk assessment in place; further guidance is available from the Safety Office's website.

**Amendments**: Please notify the committee if you intend to make any amendments to the information in your ethics application as submitted at date of this approval, as all changes must receive ethical approval prior to implementation. The amendment form is available on the SSH IDREC webpage.

We welcome feedback on your experience of the ethical review process and suggestions for improvement. Please email any comments to staff.curec@education.ox.ac.uk / student.curec@education.ox.ac.uk or ethics@socsci.ox.ac.uk.

Yours sincerely
Aliya Khalid
DREC member

## Appendix J: University X Resident Training Committee Approval



[redacted]

[redacted]

**Divisions**
Allergy & Immunology
Cardiology
Community Internal Medicine
Critical Care
Endocrinology
Gastroenterology
General Internal Medicine
Geriatric Medicine
Hematology
Infectious Disease
Medical Oncology
Nephrology
Neurology
Palliative Care
Physical Medicine & Rehabilitation
Respiratory Medicine
Rheumatology
Social Medicine

**Programs**
Undergraduate
Postgraduate
Experimental Medicine
Clinical Investigator

December 1, 2023

To Whom it May Concern,

This letter is to confirm that Dr. [redacted] presented her research proposal, "Using constructivist grounded theory to learn how medical residents learn efficiency" at our November 10 Residency Training Committee (RTC) meeting this year. The RTC reviews all research proposals that require involvement of the core internal medicine residents. The committee approved the proposal [redacted] presented at our November meeting.

Please feel free to contact me with any questions or if further information is needed (l.moss@[redacted]

Best,

[redacted]

## Appendix K: University X Behavioural Research Board approval

8/15/24, 4:04 PM [redacted]

Re: Oxford Master's Project, Interviewing [redacted] Residents

[redacted]

Mon 1/8/2024 10:36 AM

[redacted]

Thank you Maria!

[redacted]

**From:** [redacted]
**Sent:** Monday, January 8, 2024 10:15 AM
**To:** [redacted]
**Subject:** FW: Oxford Master's Project, Interviewing [redacted] Residents

[redacted]

Yes, you are good to go now.

Thanks,
Maria

[redacted]
BREB Research Ethics Review Officer
[redacted]

**From:** [redacted]
**Sent:** Saturday, December 23, 2023 2:54 PM
**To:** [redacted]
**Subject:** Re: Oxford Master's Project, Interviewing [redacted] Residents

[CAUTION: Non[redacted]Email]
Sorry about that, I have removed it now and re-attached the document here.
Am I good to go now?

Thanks,

[redacted]

**From:** [redacted]
**Sent:** Monday, December 18, 2023 1:58 PM
[redacted]
**Subject:** RE: Oxford Master's Project, Interviewing [redacted] Residents

[redacted]

8/15/24, 4:04 PM [redacted]

Also, the information sheet should not include a statement that approval has been given by the [redacted] BREB, as this may indicate endorsement of the study.

Thanks,
Maria

[redacted]
BREB Research Ethics Review Officer
[redacted]

[redacted]
**Sent:** Sunday, December 3, 2023 11:45 PM
[redacted]

[**CAUTION**: Non[redacted] Email]
Dear Maria,

Please see attached for the full ethics application submitted to Oxford, the approval certificates, consent form, recruitment email, information sheet, interview script.
Once I have your approval I will ask Laura Moss to send the recruitment email to start the study.

Thank you!

Best regards,

[redacted]

**From:** [redacted]
**Sent:** Thursday, October 26, 2023 7:25 AM
[redacted]
**Subject:** RE: Oxford Master's Project, Interviewing [redacted] Residents

Hi [redacted]

Apologies for the delay in responding. As you are obtaining approval from Oxford, and this study is being conducted to inform your degree at Oxford and is not being conducted under the auspices of [redacted] we will not require a RISe application. Once you obtain approval from Oxford and the [redacted] Resident Training Committee, please send me your full ethics application submitted to Oxford, the approval certificates, and all supporting documents (e.g., consent form, recruitment material, interview script). I will then take a look to see if we require any additional information.

Hope this helps. Please let me know if you have further questions.