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## SPECIAL PAPER

# Physician associates and anaesthetic associates in UK: rapid systematic review of recent UK based research

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**ABSTRACT****OBJECTIVE**

To summarise research on the efficacy and safety of UK physician associates and anaesthetic associates in the context of an ongoing policy review.

**DESIGN**

Rapid systematic review.

**SEARCH STRATEGY**

Keyword and author search of three databases; citation tracking; search of previous systematic reviews.

**ELIGIBLE STUDIES**

Empirical research (any design) on physician associates/anaesthetic associates in UK healthcare published between 2015 and January 2025.

**MAIN OUTCOMES**

Any measure of clinical efficacy or safety.

**METHODS**

Eligible papers were grouped into categories and appraised using Critical Appraisal Skills Programme checklists. Two reviewers independently extracted data on study designs, samples, methods, and findings. Each paper was scored for trustworthiness, generalisability, and relevance; differences were resolved by discussion. Studies meeting a minimum inclusion standard were described and critiqued.

**RESULTS**

Of approximately 5000 titles, 52 papers were eligible (48 on physician associates, four on anaesthetic associates), of which 29 met the inclusion standard. The total number of physician associates studied was very small, especially in primary care; no studies reported direct assessment of anaesthetic associates. Only one study, of four physician associates, involved any assessment by a doctor of their clinical competence by direct observation. No studies examined safety incidents. Some studies suggested that physician associates could support the work of ward based teams and work in emergency departments when appropriately deployed and supervised in low risk clinical settings, but the number of individuals and settings studied was small, and those findings should be considered preliminary. Physician associates seemed to struggle in primary care, however, because the role was more autonomous, the case mix was more diverse, decisions were more uncertain, institutional support was more limited, and supervision arrangements were more challenging. Staff expressed concern about physician associates' and anaesthetic associates' competence to manage undifferentiated, clinically complex, or high dependency patients; order ionising radiation; or prescribe. Physician associates reported a range of experiences and

desired a clear role within the team. No evidence was found that physician associates add value in primary care or that anaesthetic associates add value in anaesthetics; some evidence suggested that they do not.

**CONCLUSIONS**

The UK literature on physician associates and anaesthetic associates is sparse and of variable quality, and some is outdated. In this context, the absence of evidence of safety incidents should not be misinterpreted as evidence that deployment of physician associates and anaesthetic associates is safe. Findings of apparent non-inferiority in non-randomised studies may obscure important unmeasured differences in quality of care. New research is urgently needed to explore staff concerns, examine safety incidents, and inform a national scope of practice for these relatively new and contested staff roles. The findings from this UK based study should be interpreted in the context of the wider international evidence base.

**STUDY REGISTRATION**

INPLASY202520039.

**Introduction**

In the UK, the term “physician associate” means a person with a first degree that is usually (although not always) in science and two years' additional training, who undertakes medically related work under the supervision of a senior doctor.<sup>1 2</sup> “Anaesthetic associate” is the corresponding role in anaesthetics. As in many other countries, the expansion of these roles is, at least in part, a response to a worsening workforce crisis (particularly, a shortage of doctors).<sup>3 4</sup> The safety and efficacy of physician associates and anaesthetic associates in the UK healthcare system is contested; it is the focus of a review commissioned in late 2024 by the Secretary of State for Health and Social Care, Wes Streeting, led by Gillian Leng and ongoing at the time of writing.<sup>5</sup>

The background to this controversy is complex and has been covered in a recent paper,<sup>1</sup> which identified six major concerns: safety of patients (with allegations of harms and, very rarely, deaths<sup>6</sup>); clinical effectiveness and scope of practice (which tasks and duties physician associates and anaesthetic associates are competent to undertake and what level of supervision they need for these is unclear; practice varies widely); transparency and consent (patients may not be told they are seeing a physician associate or anaesthetic associate); employment conditions (newly qualified physician associates and anaesthetic associates typically have fewer responsibilities, better

terms and conditions, and higher salaries than newly qualified doctors in training); consequences for medical training (some people have alleged that physician associates and anaesthetic associates reduce training opportunities for doctors); and the additional workload for doctors who supervise physician associates and anaesthetic associates (perceived by some to be demanding, under-acknowledged, and inadequately remunerated). A British Medical Association survey revealed UK doctors' concerns about accountability.<sup>7</sup> They thought that they were being asked to take responsibility for the decisions and actions of associates in stressful and understaffed contexts in which adequate supervision was impossible. Others have presented an alternative view, that a major increase in numbers of physician associates and anaesthetic associates may be necessary to tackle the dire workforce shortage in UK that has contributed to long waiting times to get seen in many specialties.<sup>8</sup>

This debate has been complicated by a lack of clarity about what problem physician associates and anaesthetic associates are intended to solve and, thus, the roles that they should undertake. Moreover, concerns about the scope of practice and safety of physician associates and anaesthetic associates in the UK have sometimes been expressed forcefully, prompting some authors to condemn the use of "venomous" and personalising language.<sup>9</sup>

This rapid systematic review aimed to inform this somewhat toxic debate by summarising the evidence base from empirical research

on what physician associates and anaesthetic associates do in the UK and how well and safely they do it. We had four research questions. What empirical research has been published on physician associates and anaesthetic associates in the UK since 2015, especially concerning safety and efficacy? To what extent is that body of research trustworthy, generalisable, and relevant to current UK policy decisions? What are the key findings? What are the research gaps and the priorities for future research?

## Methods

### Study design

This was a rapid systematic review informed by Cochrane guidance on rapid reviews.<sup>10</sup>

### Search strategy

Figure 1 shows the study flowchart. The work was undertaken rapidly in January and early February 2025 to meet the window for submissions to an ongoing policy review, the terms of reference of which we scrutinised to inform an outline protocol.<sup>5</sup> We searched selected electronic databases (PubMed, CINAHL, Cochrane Library) on 16 January 2025; we piloted different options to produce the final list of search terms: "physician assistant[s]," "physician associate[s]," "advance practice provider[s]," "medical associate profession[s]," "mid-level practitioners", or "anaesthetic assistant/associate[s]" in the title or abstract.

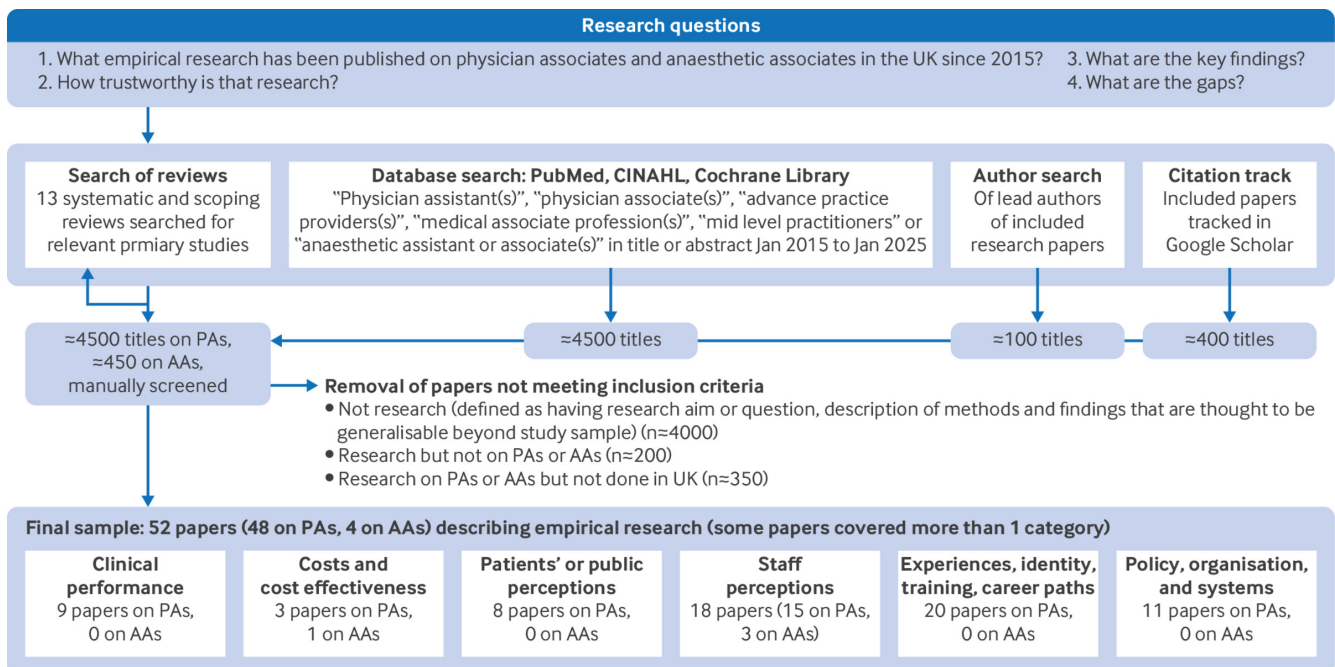


Fig 1 | Study flowchart. AA=anaesthetic associate; PA=physician associate

We repeated the key word search on 6 February 2025 (to capture papers published in January). We also searched the names of lead authors of all included primary studies in that second search. We manually searched the lists of included studies in systematic reviews identified in the search (n=13) for primary studies meeting our inclusion criteria. All primary studies meeting our inclusion criteria and the 13 previous systematic reviews were also tracked in Google Scholar.

The search was thus iterative and multifaceted, using multiple strategies that fed into one another. This approach has been shown to be both more effective and more efficient (that is, quicker) than using tightly predefined search strings alone.<sup>11</sup>

### Inclusion and exclusion criteria

Given this review's focus and time constraints, we restricted the search to articles published after 2015 (when an estimated 200 physician associates were working in UK), which described empirical research (defined as a primary study with a research aim or question,

a description of methods, and findings that are in some way generalisable beyond the study sample) in UK healthcare settings that involved some kind of evaluation of physician associates or anaesthetic associates. Although we applied no language restrictions to the title search, all studies identified were in English. Exclusion criteria were: not research, research but not about physician associates or anaesthetic associates, research on physician associates or anaesthetic associates but not in a UK healthcare setting, and published before 2015.

We chose the 2015 cut-off for four reasons. Firstly, a recent systematic review that looked at UK literature with no date cut-off suggested that very few empirical studies from the UK had been published before 2015, and the few that had been were preliminary scoping studies that were now superseded.<sup>12</sup> Secondly, the 2015 publication cut-off captured the first major studies on physician associates in the UK, which were undertaken in 2011-12. Thirdly, UK healthcare has changed significantly since 2014, with workforce shortages becoming substantially more pressing,<sup>4</sup> so studies undertaken before that date would have limited external validity to the present day UK. Finally, to meet the tight time limit for a key policy window, we had to trade timeliness against comprehensiveness.

### Critical appraisal, data extraction, and interpretation

The lead author (TG) arranged all papers meeting the inclusion criteria into broad topic categories, starting with the terms of reference of the Leng review (efficacy and safety of physician associates and anaesthetic associates). It was evident that the included studies were heterogeneous in design and many used mixed methods (combining various kinds of qualitative and quantitative data in multiple work packages). As such, critical appraisal for internal validity required a tailoring of existing tools. To construct a bespoke critical appraisal checklist, we selected relevant questions from Critical Appraisal Skills Programme checklists on research question, study design, context, methods, sampling, instruments or tools, outcome measures, data collection and analysis methods, confounding, follow-up, results, and conclusions.<sup>13</sup> These items were worded to allow flexible interpretation for different study designs and methods. For example, when assessing sample size, we used statistical power calculations for quantitative studies and Malterud's notion of information power for qualitative studies.<sup>14</sup> A copy of the critical appraisal sheet used is given in the supplementary material on bmj.com.

We summarised our assessment of each study by scoring it on three criteria. Firstly, whether it was trustworthy (that is, internally valid), on the basis of criteria such as size and representativeness of sample, reliability of instruments used, and approach to data analysis. Secondly, whether the study was generalisable (that is, externally valid)—whether the findings could reasonably be transferred beyond the population from which the sample was drawn. An example of poor generalisability would be a small, well conducted local study (for example, of one year group of physician associates in a single university) that was trustworthy in its own context but not generalisable to other settings (for example, physician associates trained in other universities). Thirdly, whether the findings were relevant to UK policy decisions in 2025 (for example, less relevant if the deployment arrangements studied would no longer be an option today, given key changes in policy, staffing, and front line pressures).

We scored each study as 0 (not at all), 1 (to some extent), or 2 (to a large extent) for each of the three criteria of trustworthiness, generalisability, and relevance. If a study covered more than one topic category (for example, clinical performance and cost), we scored it separately for each. We deemed studies scoring at least 1 on all three criteria to meet the inclusion standard for this review.

Taking each topic area in turn, we tabulated, critiqued, and compared the scope, methods, and findings from empirical studies. We summarised key findings, strengths and limitations of the existing literature, and notable gaps. As recommended by Cochrane rapid review guidance,<sup>10</sup> a second reviewer (MM) independently read and assessed all 52 papers in the final dataset and made his own data extraction and quality assessment before checking against the lead author's version. We calculated an inter-rater reliability score on the basis of whether each reviewer classified the study as meeting or not meeting the standard for inclusion (see bmj.com for details). We resolved differences by discussion.

An important aspect of this review was interpretation. As we have argued elsewhere, reviews of narrowly focused biomedical topics (for example, the efficacy of drug A in condition X) can be appropriately undertaken solely by applying the technical methodology of Cochrane-style review (which prioritises the extraction and statistical summation of particular items of quantitative data). However, when a topic area is complex and multifaceted and has been examined in different ways by different researchers, a key aspect of a scholarly review is making sense of this literature.<sup>15</sup> In this rapid review, we sought to achieve both a "systematic review" (summation of data to the extent that such data existed) and also a "narrative review" (that is, interpretive synthesis and commentary on what kinds of research different authors had done and what these studies could and could not contribute to the evidence base).

### Patient and public involvement

Two members of the public, one with several long term conditions and one the parent of a child with a condition, read a draft of this paper and provided comments.

## Results

### Description of dataset and inter-rater reliability

Of approximately 4500 titles on physician associates and 450 on anaesthetic associates, we identified 52 empirical papers (48 on physician associates and four on anaesthetic associates). Of these, 25 studies (written up in 29 papers) met the inclusion standard of a score of at least 1 on all three criteria of trustworthiness, generalisability, and relevance to current UK policy. These are tabulated in clear rows in the supplementary materials on bmj.com. Studies scoring 0 for at least one criterion are tabulated in the shaded rows, showing reasons for exclusion, on bmj.com. The inter-rater reliability for this exercise between the two reviewers was 92.6% (see details on bmj.com).

The papers covered six broad topic categories, summarised in [table 1](#). A more detailed version and additional detail on each topic category are provided in [table S1](#) on bmj.com. The search also identified 13 previous systematic reviews, all but two of which covered mostly non-UK studies (see [table S2](#) on bmj.com).<sup>12 43</sup> We consider the papers meeting the inclusion standard under each topic category below.

Table 1 | Topics covered in UK based research on physician associates (PAs) and anaesthetic associates (AAs)

Topic area	Examples of research questions	Typical study design	Summary of studies identified (for findings, see main text)
Clinical performance of PAs in UK	Are PAs effective and safe? How do they compare with other staff groups?	Range of quantitative (eg, analysis of aggregated electronic record data) and qualitative (eg, ethnography, interview, video) methods, often combined in mixed methods designs	9 papers describing 7 studies, of which 6 met minimum criteria for quality and relevance <sup>16,21</sup>
Costs and cost effectiveness of PAs and AAs in UK	Are PAs or AAs as cost effective as other staff groups?	Collection and comparison of data such as number of patients seen, duration of appointment, hours worked, and pay per hour	3 papers on PAs described attempts at economic analysis, but none achieved its planned objective in this regard <sup>17 19 22</sup> ; 2 had significant methodological flaws. One study on AAs used empirical data on salaries to model hypothetical scenario <sup>23</sup>
Patients' experience of, and public attitudes to, PAs in UK	What do the public think of PAs? Were patients satisfied with a clinical encounter?	Qualitative (interviews, focus groups) or predominantly quantitative (surveys)	7 papers identified, of which 3 (all qualitative) met minimum quality criteria <sup>24,26</sup> ; various surveys were judged to be methodologically flawed or non-generalisable
Staff perceptions of PAs and AAs in UK	What do other staff groups think of PAs and AAs?	Qualitative interviews, focus groups, or surveys	18 papers describing 17 studies identified, of which 10 met minimum quality and relevance criteria <sup>16 25 27 34</sup>
Training, professional identity development, and career paths of PAs in UK	What training do PAs undertake, and what learning methods are effective for them? What are the challenges to professional identity development in PAs? What do PAs think of their training and their service roles?	Qualitative interviews or surveys; document analysis (eg, of course curriculums); pre-post studies (eg, measuring knowledge or skills in student cohort); surveys (eg, of educators)	20 papers describing 18 studies, of which 5 papers (describing 4 studies) met minimum quality and relevance criteria <sup>29 30 35 37</sup>
Policy and systems studies of PAs in UK	When and why were PAs introduced in the UK? What are the system level challenges of introducing PAs?	Health policy and systems analyses using mixed methods (eg, analysis of policy documents, quantitative surveys of national provision and infrastructure, workforce modelling, and qualitative interviews with policy makers)	10 papers identified, of which 8 met minimum quality and relevance criteria <sup>21 38,42</sup>

### Clinical performance (efficacy and safety)

Published research on the clinical performance of physician associates in the UK (nine papers describing seven studies, of which the papers meeting our inclusion standard are described below) related to only three settings: hospital wards,<sup>16</sup> emergency departments,<sup>17</sup> and general practice.<sup>18–21</sup> We identified no randomised controlled trials directly comparing process or outcome for physician associates versus any other staff group, no studies examining safety incidents, and no studies of the safety of prescribing. We identified no studies directly assessing the efficacy or safety of anaesthetic associates.

All but two of the nine papers in this category were by the same research team (Drennan and colleagues). The work of this team, which is highly cited, seems to have been competently conducted but pertains to a surprisingly small number of physician associates (43 on hospital wards,<sup>16 22</sup> six in hospital emergency departments,<sup>17</sup> and seven in general practice<sup>18–20</sup>); the fieldwork for the primary care component was undertaken more than a decade ago (2011–12), before a substantial increase in NHS pressures, general practice workload, and skill mix.<sup>44–46</sup>

The highest scoring study in this category (Drennan et al, 2019<sup>16</sup>) was a mixed methods case study in medical and surgical wards, using ethnographic observation and a total of 176 interviews with managers, clinicians, and patients. It showed that in participating multidisciplinary teams, physician associates worked mainly on the wards during daytime weekday hours, providing continuity of knowledge about patients' progress, undertaking tasks (for example, clerking patients, writing discharge summaries), and communicating with patients and across staff groups. Staff described physician associates as contributing to efficiency by smoothing

patient flow and aiding communication between medical, nursing, and bed management teams. As one doctor in training put it, "They [PAs] are the lubricant [of the multidisciplinary team] as opposed to, you know, the actual engine" (page 60).<sup>22</sup> Physician associates' local, operational, and system knowledge (perhaps, "knowing the ropes") was sometimes greater than that of doctors in training who were new to that post, but much of this knowledge was specific to the particular setting. Staff reported that they thought that physician associates were safe (and in particular, safer than locums who did not have local system knowledge) and could recall no safety incidents relating to physician associates; some commented that physician associates were less suited to dealing with clinically complex or risky cases than were doctors in training. Importantly, although the data collection team (made up of nurses and social scientists) observed physician associates to document what tasks they were doing, for these researchers to judge how well they were doing them or to identify safety concerns was not part of the study design.

A non-randomised study in three emergency departments (Halter, 2020b<sup>17</sup>) analysed a very large number of consultations (n=2890) by a very small number of physician associates (n=6), and the level of missing data was very high (>50%).<sup>17</sup> Its primary outcome measure (reattendance at the same healthcare facility with the same complaint within seven days) was not designed to detect or examine safety critical decisions or the impact on other parts of the system (for example, attending a general practitioner or other urgent care facility). The authors showed that physician associates saw a different case mix than doctors (less complex patients; less severe and less urgent illnesses) and took significantly longer to see patients than did doctors. After adjustment for case mix, physician associates ordered significantly more radiographs (adjusted odds

ratio 2.7, 95% confidence interval 1.72 to 4.24) and gave more prescriptions, although this difference did not reach statistical significance (adjusted odds ratio 1.35, 0.08 to 23.5). However, as we argue on *bmj.com* (page 8), the study was underpowered to detect a clinically significant difference between the two staff groups in the primary outcome used (an adequately powered study would need more than five times the number of physician associate consultations). No safety incidents were logged, and a retrospective chart review by senior doctors identified similar levels of omissions and inadequacies in both groups.

Research on the clinical performance of physician associates in UK primary care is very sparse. Drennan and colleagues (2015) used a mixed methods design “to compare outcomes and costs of same-day requested consultations by PAs with those of GPs” (page e344).<sup>18</sup> The study was conducted in 2011-12 in 12 general practices in southern England. Six of these employed no physician associates; five employed one physician associate, and one employed two physician associates (that is, seven physician associates in total). All patients attending for same day or urgent appointments with participating physician associates (in practices with physician associates) or general practitioners (in practices without physician associates) in designated sessions over four weeks were eligible for inclusion. The primary outcome measure was re-consultation within 14 days for the same or a related problem. Secondary outcome measures were care processes as recorded in the record (diagnostic tests ordered, referrals made, prescriptions issued, general advice and medication management advice given), patients’ satisfaction, and length and cost of consultation.

These authors developed a tool for systematically estimating the clinical complexity, severity, and urgency of the presenting complaint and relevant sociodemographic factors (for example, age, deprivation), which is written up in a separate paper and explained on *bmj.com* (page 9).<sup>20</sup> After adjusting for case mix by using this tool, the authors found that re-consultation rates were higher with physician associates (24.6% v 18.6%) but this difference was not statistically significant (although, partly because they used different time periods for the sample size calculation and data collection, the study was underpowered to detect a clinically significant difference in these rates). Cost data from this study are discussed in the following subsection.

Drennan and colleagues’ 2015 study was designed primarily to test whether physician associates generate additional workload for general practices as measured by re-consultation rates, and the answer in that study seems to be no.<sup>18</sup> That conclusion should be interpreted in the light of the study’s significant limitations, most notably that no more than seven physician associates were studied; case mix differed significantly between the samples; and, because the design was not randomised, multiple unmeasured confounders cannot be excluded. The work was done in research practices in southern England in 2011-12, a time before the current workload crisis in general practice (hence, general practitioners’ capacity to supervise physician associates is likely to have been greater).<sup>44-46</sup> The study’s findings, which pertain only to same day appointments in general practice, have not been replicated.

De Lusignan and colleagues (2016) report a sub-study of 62 videoed consultations sampled from the above study (41 by five general practitioners and 21 by four physician associates).<sup>19</sup> After editing out of sections that would have revealed the staff group of the clinician, the recordings were analysed by experienced general practitioners using a modified version of a structured assessment tool (the Leicester Assessment Package<sup>47</sup>). Using this tool, “all consultations were assessed as safe; but general practitioners were

rated higher than PAs in all elements of consultation” (page 1).<sup>19</sup> Although some consultations in both samples were inadequate, most consultations by physician associates were, according to the scoring system, “satisfactory” but tended to “lack discrimination, organisation and good time management”; and one in six consultations by physician associates (compared with approximately one in 16 by general practitioners) had “inadequacies” (see *bmj.com*, page 9-10, for further detail). These findings pertain to a tiny sample of only four physician associates and have not been replicated.

The only other (and more recent) published research study on the performance of physician associates in UK primary care was a mixed methods evaluation of the impact of expanded skill mix including multiple clinical roles.<sup>21</sup> Although this was a large and rigorously conducted study, only three physician associates were included in the sample and findings from that group were limited. One general practice in this study had stopped deploying physician associates because they were seen as “needing a lot of support,” “highly protocol driven,” and “lacking in clinical experience,” as well as unable to prescribe or order imaging.<sup>21</sup>

Further details of studies in this section are given in table S3 and accompanying notes on *bmj.com*. The other categories below are less centrally relevant to the formal terms of reference of the Leng review, but we have included a brief summary of those topics because they are likely to have some bearing on policy.

### Costs and cost effectiveness of physician associates

No published research studies on costs or cost effectiveness of physician associates met our inclusion standard; one on anaesthetic associates did.<sup>23</sup> We found three studies on physician associates that attempted to ascertain costs,<sup>16-18</sup> and they all struggled. The Drennan 2019 study on hospital wards described above had planned a detailed economic evaluation (see their report to funder, page 19, for details<sup>22</sup>) but found that the costs and benefits of physician associates could not be disaggregated from those of the wider team.<sup>16</sup> The lack of hard economic data was not because of methodological flaws but because it was a key finding of the study that physician associates’ work was inextricably interwoven with the work of other team members. The same team’s study of physician associates in emergency departments suffered from inaccessibility of key data; it, too, produced no economic estimates but for a different reason.<sup>17</sup>

In Drennan and colleagues’ 2015 study in primary care (involving a maximum of seven physician associates),<sup>18</sup> the estimated cost per consultation for physician associates after adjustment for case mix (calculated by multiplying the average length of consultation by the average hourly rate of the clinician from national validated unit costs) was significantly lower than for general practitioners, even taking account of the longer consultation length (£28.06 v £34.80, a difference of 18%). However, whereas physician associates were encouraged to consult general practitioners in real time for advice, and they did so, this general practitioner time was not factored into the cost data (or even measured). Hence, this small study systematically overestimated the apparent cost effectiveness of physician associates and the degree to which general practitioners were “freed up.” As Nelson and colleagues comment (page e495), “If PAs saved some GP time, extra time was incurred supervising trainees, making overall net savings hard to gauge.”<sup>27</sup>

Drennan and colleagues (2015) could have done a sensitivity analysis to estimate the cost of supervision. Using their own figures, if each physician associate consultation took, on average, one minute of general practitioner time to supervise (including, for example, confirming a diagnosis and issuing a prescription, as well as

checking the physician associate's written records), the cost (including physician associate and general practitioner time) would rise to £31.14; this would be £34.20 for two minutes, £37.30 for three minutes, and so on. Other sections also raise the possibility of higher indirect costs with physician associates, such as investigations, prescriptions, and the unanticipated inefficiencies associated with expanding new staff roles in general practice.

In relation to cost effectiveness of anaesthetic associates, Hanmer and colleagues (2024) present an economic model comprising hypothetical scenarios of the relative costs of different supervisory models (for example, one doctor supervising two anaesthetic associates across two operating theatres). The paper, which argues that such supervisory arrangements would be cost saving only if anaesthetic associates were paid considerably less than they currently are, included real salary costs but no empirical data from actual deployments.<sup>23</sup>

Further details of studies in this section are given in table S4 and accompanying notes on [bmj.com](https://www.bmj.com).

### Patient and public attitudes to physician associates

Published research on the attitudes of patients and the public to physician associates was covered in eight papers, of which three met our inclusion standard.<sup>24-26</sup> In these, patient and public attitudes to physician associates varied but overtly negative attitudes were rare. Many study participants were unaware of the physician associate's role, and some patients thought a doctor was seeing them. Patients were mostly happy being seen by physician associates provided they were working within their competence and adequately supervised (but not otherwise). In one well conducted study, trust in the physician associate seemed to be derived from trust that the NHS and the supervising doctor would not employ someone unsuitable.<sup>24</sup> Patients wanted to be told that the person seeing them was a physician associate.

Further details of studies in this section are given in table S5 and accompanying notes on [bmj.com](https://www.bmj.com).

### Staff perceptions of physician associates and anaesthetic associates

Of 18 papers (reporting 17 studies) on the attitudes and experiences of other staff towards physician associates (14 studies) or anaesthetic associates (three studies), 10 met our inclusion standard. They comprised local qualitative or mixed methods studies (four in secondary care,<sup>16 28-30</sup> and three in primary care<sup>25 27 31</sup>) and three regional or national surveys.<sup>32-34</sup>

Many local studies had been done before physician associates had been introduced widely at the study site. Where physician associates or anaesthetic associates were working in multidisciplinary teams in longstanding arrangements, staff on those teams generally spoke positively about them, describing them as "an extra pair of hands"<sup>30</sup> and valuing the continuity they provided. However, this could reflect survivorship bias if other sites had started but then abandoned employment of physician associates. An exception to the broadly positive views was high risk or high dependency specialties (for example, intensive care, high risk patients in anaesthetics), where senior doctors thought that doctors in training were more appropriate than physician associates or anaesthetic associates for the work required.<sup>16 28 30</sup> Clinicians and managers recognised the need to tackle staff shortages and rising demand but expressed concern about how the physician associate role would be operationalised, especially in relation to their scope of practice, their level of competence (for example, physician associates' ability to handle medical complexity and the associated risks to patients'

safety), the level of supervision needed, and the operational limitations of non-prescribers working as substitutes for doctors.<sup>25 27 34</sup> Managers questioned the relative value of physician associates compared with other staff groups.<sup>34</sup>

A 2019 online survey of all UK general practice managers (17% response rate) found that many were employing or seeking to employ physician associates in their practice in the context of a policy that provided ring fenced funding for employing physician associates (and some other occupations) but not doctors.<sup>33</sup> However, only 14% thought they would do so if they paid for this staff group out of their own budget. A secondary analysis of data from the 7th National Audit of the Royal College of Anaesthetists (undertaken between 2020 and 2022; 10 009 responses) found that anaesthetic associates, who accounted for less than 1% of the anaesthetic workforce at the time, were mostly working under supervision with low risk cases; however, in a handful of instances, an anaesthetic associate was working alone, outside their locally agreed scope of practice, with higher risk patients.<sup>32</sup>

Further details of studies in this section are given in table S6 and accompanying notes on [bmj.com](https://www.bmj.com).

### Experiences, training, identity, and career paths of physician associates

Of the 20 papers in this category, only five (describing four in-depth qualitative studies)<sup>29 30 35-37</sup> met our inclusion standard; the remainder were mostly small, with evident biases, single site, or out of date. Physician associates seemed to have moderate job satisfaction but sometimes experienced other staff groups as being "negative" towards them.<sup>29 30</sup> In some settings, especially primary care, physician associates were unclear about their scope of practice, under-confident in performing the role expected of them, troubled by the amount they were expected to know, and stressed from having to explain their role to other staff continually.<sup>30</sup> Researchers suggested the need for staff to be educated about the physician associate role and for local physician associate "champions" (for example, senior doctors who backed the role) and appropriate role models (that is, other physician associates).<sup>29 35 36</sup> Career paths of physician associates seemed to be uncertain and characterised mostly by lateral moves (to another equivalent job) rather than vertical ones (to a more senior role).<sup>37</sup>

Further details of studies in this section are given in table S7 and accompanying notes on [bmj.com](https://www.bmj.com).

### Policy, organisation, and systems research on physician associates

This category included 11 papers (of which seven met our inclusion standard), including two from Drennan's team<sup>31 38</sup> and six from Spooner's team.<sup>21 39 40 48 49</sup> Drennan and colleagues' studies<sup>31 38</sup> showed that a strong push exists for new staff roles from national policy makers in England, driven by concerns about workforce planning, although a weakness of their analysis is the conflation of multiple different roles into a single category of "non-medical practitioners" (which includes existing clinical professions such as nurses and pharmacists, as well as a range of health occupations).<sup>38</sup> Drennan and colleagues also documented a conviction among some national policy makers that physician associates have already been shown to be effective, clinically safe, and able to "free up" other clinicians, but the same study also found evidence of resistance from professional bodies, which were less convinced than national policy makers of the value and safety of physician associates and their place in relation to other professional groups.<sup>31</sup>

The more recent body of work by Spooner and colleagues has shown that the introduction of physician associates in English general practice has occurred as part of a wider expansion of staff roles and has led to challenges in managing this skill mix (for example, how to allocate patients to the most appropriate staff member).<sup>21 49</sup> Large quantitative studies in English general practice by this team suggest that introducing a wider mix of staff, far from being associated with improved efficiency of care or better patient satisfaction, seems to be associated with the opposite.<sup>39 40 48</sup>

An international comparative study of physician associates' scope of practice across 25 countries confirmed that this title is associated with very different roles and levels of skill in different countries; this important study illustrates that people with the title "physician associate" cannot simply be imported from any country and deployed in UK.<sup>41</sup> A national level study of workforce policy in England from the Nuffield Trust (based on interviews and small surveys of staff groups and published in January 2025) found that physician associates are increasingly deployed in the NHS and that much debate and controversy exist about their roles and impact.<sup>4</sup> This recent study affirmed many of the findings of our review, including that public awareness of the physician associate role remains low, with patients often mistaking physician associates for doctors; that staff have mixed views and concerns about safety and would like a more precise scope of practice for physician associates; and that the anticipated cost savings have proved elusive because of the hidden costs of supervision and knock-on inefficiencies across the system.

We identified no papers describing policy, organisation, or systems research from the other UK jurisdictions. Further details of studies in this section are given in table S8 and accompanying notes on [bmj.com](http://bmj.com).

### Patient and public comments

The two lay people who read this review thought that it reflected patients' priorities and concerns. However, they pointed out that patients' views on physician associates obtained in the research reported here would not have captured the more recent public concern that has emerged after adverse coverage of some physician associate related incidents in the press. These commentators underscored patients' desire to know that the person seeing them is not a doctor and for physician associates and anaesthetic associates to work within an appropriate scope of practice. Their comments are reproduced in full on [bmj.com](http://bmj.com) (see page 32 of supplementary material), along with comments from two physician associates.

## Discussion

### Summary of principal findings

The UK based research literature on physician associates in the UK is sparse and of variable quality; it has important gaps; and parts of it are outdated. Only one study of four physician associates involved any assessment by a doctor of their clinical competence by direct observation. No studies examined safety incidents. Some studies suggested that physician associates could support the work of ward based teams and work in emergency departments when appropriately deployed and supervised in low risk clinical settings. The number of individuals and settings studied was small, so these findings should be considered preliminary. Physician associates seemed to struggle in primary care, however, because the role was more autonomous, the case mix was more diverse, decisions were more uncertain, institutional support was more limited, and supervision arrangements were more challenging. Patients' views

of physician associates were positive or neutral but rarely negative except where the patient's needs exceeded the physician associate's capability to meet them. Staff expressed concern about physician associates' and anaesthetic associates' competence to manage undifferentiated, clinically complex, or high dependency patients, to order ionising radiation, or to prescribe. Physician associates reported a range of experiences and desired a clear role within the team. We found no evidence that physician associates add value in primary care, some evidence that they do not, and one study suggesting similar concerns about the cost effectiveness of anaesthetic associates. We identified no direct evidence from research studies on the competence or safety of anaesthetic associates.

Because of non-randomised study designs, non-comparability of case mix, and limitations of data (for example, crude, one dimensional outcome measures, absence of valid and reliable cost data, and underpowered studies), the finding of apparent non-inferiority when physician associates or anaesthetic associates substitute for other staff groups may obscure important unmeasured differences in quality of care. The small number of empirical studies identified no evidence of safety incidents, but this does not mean that substituting doctors with physician associates is necessarily safe.

Policy and systems research indicates a mismatch between national policy makers' settled belief that physician associates have already been shown to be effective, safe, and efficient substitutes for doctors and the views of professional bodies and front line staff that they have not. Integrating the physician associate role into a clinical service is operationally challenging and seems to be associated with unanticipated inefficiencies.

### Strengths and limitations of study

The strengths of this review include its tight focus on UK based research to inform a particular policy review in the UK, its timeliness for the work of that review, and two highly experienced authors with complementary skills. Other strengths are the comprehensiveness of the search (see next section), the classification of papers under key topic areas to ease assimilation, the inclusion of all study designs (which were formally evaluated on their merits using a bespoke structured checklist that could apply to a wide range of designs), the very detailed interpretive analysis of the most influential papers, and the identification of gaps in existing research.

The restriction to UK studies is a limitation as well as a strength. Research from countries with comparable healthcare systems, including commentaries and grey literature, might have enriched the insights, although, as noted above, the many different roles of those labelled as physician associates mean that this literature needs to be interpreted with caution. A limitation of the primary studies reviewed was that all were from England. Although we looked for studies meeting our inclusion criteria from the other three jurisdictions, we did not find any. The Wang systematic review cites a small and now very outdated study from Scotland, where the experience of 15 US trained physician associates placed in Scottish hospitals was studied in 2006-08.<sup>50</sup> This study would have scored low on our generalisability criteria as the physician associates were not UK trained. We do not believe that any published research studies of UK trained physician associates or anaesthetic associates in Scotland, Wales, or Northern Ireland exist, and we flag this as an important gap in the literature. Another limitation was that because of time pressures, only one reviewer screened the titles

(though both reviewers independently assessed and scored all the studies identified).

### Comparison with existing literature

The findings from this very focused rapid review of physician associates and anaesthetic associates in the UK since 2015 should be interpreted in the light of the wider evidence base, especially that from 13 previous systematic reviews (summarised in table S2 on [bmj.com](#)). A 2022 systematic review on physician associates and advanced nurse practitioners in the UK by Wang and colleagues identified 21 of the 52 papers in our final dataset,<sup>12</sup> and a 2024 systematic review by Zhao and colleagues of advanced practice provider roles in the UK (including many non-medical roles) identified seven (all of which had already been identified by Wang and colleagues).<sup>43</sup> Our focused search strategy thus more than doubled the empirical evidence base captured in previous UK based systematic reviews. Furthermore, the tight focus of this review and in-depth interpretive analysis of selected papers contributed nuance and caveats to arguments from previous teams.

We confirmed the finding of an earlier Cochrane review that no UK based studies of prescribing by physician associates exist.<sup>51</sup> Our findings on the limited evidence base in UK contrast with a previous systematic review covering predominantly US studies, which present an extensive body of empirical research about physician associates across multiple clinical specialties.<sup>52</sup> That literature is not, however, directly transferable to the UK because of the different training, supervision, and working arrangements for physician associates in the US.<sup>41</sup>

Our findings align with previous systematic reviews showing broadly positive patient and public attitudes to physician associates,<sup>53-54</sup> but they suggest that the level of public ignorance about the role is higher in the UK than in countries where the role is more established. Other systematic reviews suggest that a potentially relevant literature from other European countries including the Netherlands (where physician associates substitute for doctors in hospital settings) exists,<sup>55-57</sup> which may have lessons for the UK. A better understanding of the roles assumed by similar but not identical occupational groups, such as the assistant *médicaux* in

France (which seems to be a well accepted and valued role as an assistant to an individual doctor), could inform policy going forward.<sup>58</sup> A mainly US based literature on educational and professional development methods for physician associates also exists,<sup>59-60</sup> but we have not yet studied this wider literature in depth.

Our finding that expansion of non-medical roles in the pursuit of greater efficiency may generate paradoxical inefficiencies aligns with Freedman's cogent explanation of why fragmentation of care creates substantial inefficiencies.<sup>61</sup>

Interpreting the findings of this review in the context of the wider international literature is important, although, as we noted earlier, the relevance of the latter to the UK context will be a matter of judgment. Showstark and colleagues analysed scope of practice documents for physician associates from 25 countries against the World Health Organization's Global Competency and Outcomes Framework for Universal Health Coverage.<sup>41</sup> Although all are classified under the ISCO-o8 group 2240 (paramedical practitioners), their actual duties, training durations, and regulatory oversight differ widely from country to country. These authors documented very large variations in the roles, responsibilities, and regulatory structures involved.

### Key gaps in UK based research

The empirical papers summarised in this review pertain almost exclusively to the deployment of physician associates supporting multidisciplinary teams on hospital wards, seeing patients of low clinical complexity and urgency in emergency departments, and seeing triaged patients under close supervision in general practice. This review identified very limited data on the roles in which physician associates are currently being deployed, although recent surveys seem to confirm anecdotal accounts (for example, in the mainstream press) that physician associates in the UK are now being deployed in very different roles from the ones that have been researched in papers reported here (including being added to doctors' on-call rotas, for example).<sup>4-32</sup> Table 2 summarises the research gaps identified in this review and offers some suggestions for new research.

Table 2 | Gaps in UK research literature on physician associates (PAs) and anaesthetic associates (AAs), and suggested research priorities

Priority	Research gaps identified in this review	Suggested priorities for new research
Mapping current and ongoing deployment of PAs and AAs	Existing research pertains to very narrow range of deployment settings. It fails to illuminate what work PAs and AAs are doing under what supervision, or the many roles and responsibilities now assigned to these groups	Develop and test data sources and collection methods to ensure that robust and timely data are always available and emerging trends are readily detected. Needs to cover full range of settings including organisations under strain that deploy PAs/AAs in roles originally designed for doctors
Informing national scope of practice	Data gap exists not just about what PAs and AAs are expected to know (eg, taught curriculum) but also about how much depth and detail they know. Lack of nationally defined scope of practice may contribute to inappropriate deployment (PAs/AAs being asked to do things they are not confident or qualified to do), staff confusion (leading to negativity towards individual PAs/AAs), and over- or under-confidence among PAs and AAs	Urgent research is needed, underpinned by theories of professional expertise, on depth of knowledge that PAs and AAs can be expected to have and situations in which this level of knowledge is and is not adequate. This research should fully explore complex and exception filled nature of much clinical practice, role of doctors in holding risk in unfolding illness episodes, and dangers of reducing certain medical decisions and judgements to “if-then” protocols. Findings should inform decisions about supervision and regulation
Costs and cost effectiveness	Lack of robust cost effectiveness data is major limitation in published UK based literature	Mixed methods case studies (including clinically informed ethnographic observation in workplace) should examine whether (if at all) clinical staff are “freed up” by employment of PAs/AAs, how much it costs to supervise them, and indirect costs of their decisions (eg, referrals, investigations, prescriptions)
Safety incidents	UK studies were too sparse and too small to detect rare but serious safety incidents. No UK studies have examined actual safety incidents linked to PAs or (more generally) to “taskification,” in which risky procedures are uncoupled from expertise needed to use them appropriately and safely	Systematic examination of safety incidents (deaths, serious harms, and near misses) is needed (including analysis of system level implications <sup>62</sup> ). Reporting systems for safety incidents should be modified to ensure that new staff roles and associated supervision arrangements are documented and coded to support research
Informing system-wide workforce planning	UK’s workforce planning for PAs and AAs seems to have been undertaken less than comprehensively. <sup>63</sup> Findings suggest not just absence of anticipated efficiencies but also unanticipated inefficiencies <sup>4 21 39 40</sup>	Decisions on further expansion or extension of UK’s PA and AA programme should be informed by system-wide analysis of workforce problems, including expanding array of new staff roles, recruitment and retention of existing skilled staff, and place of artificial intelligence <sup>3 64 65</sup>
Training and career paths of PAs and AAs	No established postgraduate training pathway for PAs or AAs exists. Career progression is lateral rather than vertical, which is disappointing for some <sup>37</sup>	Research (aligned with above suggested work on scope of practice) should examine range of options for PA and AA career progression, including (for example) fast track into graduate entry medicine
Learning from other countries	Likely to be additional lessons to be learnt from wider review of non-UK literature. Such research is particularly important given that UK is now seeking to import PAs whose training and experience were gained in other health systems	Wider review is recommended, perhaps focusing on countries such as Netherlands, where healthcare system has many parallels to UK’s and PA role is more established, <sup>66</sup> or France, where physician assistants (rather than associates) work with doctors in very different way <sup>58</sup>

The empirical research summarised in this review can inform, but does not directly answer, the wider questions of what physician associates and anaesthetic associates should do in the UK. To answer this important question, one would need to start with a comprehensive analysis of the workforce challenges facing the NHS and the need to train, support, and retain existing health professionals (including, among others, doctors, nurse practitioners, and clinical pharmacists). A need also exists to review the literature on “physician associates/assistants” and related terms in other countries and consider the extent to which those roles are comparable to the current or potential deployment of physician associates and anaesthetic associates in the UK.<sup>41</sup>

## Conclusion

The performance, acceptability, and cost effectiveness of physician associates and anaesthetic associates seem to depend heavily on what they are being asked to do. Prevailing debates and controversies in the UK about what roles physician associates currently fill and what roles they are safe to undertake,<sup>67-75</sup> is focused on very different tasks, roles, responsibilities, and supervision arrangements from the ones on which the evidence base presented in this review was built. Coroners’ reports on a handful of tragic deaths linked to physician associates’ decisions

and actions raise the question of how “taskification” uncouples the technical knowledge needed to undertake an invasive procedure from the clinical knowledge and professional qualities needed to use this procedure appropriately and safely in clinical care.<sup>1</sup> Conflating absence of evidence of safety incidents in a small number of research studies with absence of safety concerns when physician associates directly substitute for doctors is an error of logic that is likely to cost lives. We hope that this rapid systematic review, and the Leng review more generally, will help to bring the various stakeholders together to work towards a more evidence informed position on this contested topic.

## What is already known on this topic

- Physician associates and anaesthetic associates are being introduced in the UK
- The efficacy and safety of these roles in the UK context are contested

## What this study adds

- Very few UK studies have assessed the clinical competence and safety of physician associates or anaesthetic associates

- Absence of safety incidents in a handful of small studies should not be taken as evidence that deployment of physician associates and anaesthetic associates is safe
- Findings of apparent non-inferiority in non-randomised studies may obscure important unmeasured differences in quality of care

Contributors: TG was approached by Gillian Leng in the context of the review into physician associates that Leng has been commissioned to lead, which was the initial prompt to review the academic literature for submission to the Leng review. This initial review of the literature was published as a preprint. After being encouraged by colleagues to submit this work for publication in an academic journal, she invited MM to become involved as second reviewer. MM independently read all 52 papers in the final dataset and checked and amended the data extraction done by TG. TG wrote the first draft of the paper, which MM edited. Both authors approved the final manuscript. Five colleagues and six peer reviewers read an earlier version of the manuscript, and their feedback helped to improve the paper. Two patients and two physician associates read a near-final version of the manuscript and provided comments. No other authors were involved. TG is the guarantor. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Competing interests: Both authors have completed the ICMJE uniform disclosure form at [www.icmje.org/disclosure-of-interest/](http://www.icmje.org/disclosure-of-interest/) and declare: no support from any organisation for the submitted work; TG and MM are both members of Independent SAGE and Fellows of the Royal College of Physicians of London; in the latter capacity, they helped to organise an Emergency General Meeting in March 2024 to discuss the College's policy on physician associates; TG has supervised a PhD on task shifting between general practitioners and nurse practitioners in Canada which concluded that, with appropriate support and safeguards, such arrangements were safe and acceptable; MM was president of the British Medical Association 2022-23; no other relationships or activities that could appear to have influenced the submitted work.

Transparency: The lead author (the manuscript's guarantor) affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned and registered have been explained.

Dissemination to participants and related patient and public communities: The results of this study will be fed into the Leng review, a government funded inquiry the outputs of which will be placed in the public domain.

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Ethical approval: As desk research, this study did not require research ethics committee approval.

Data sharing: All manuscripts reviewed in this paper are in the public domain. The supplement on [bmj.com](http://bmj.com) contains additional details of included papers.

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