

## SYSTEMATIC REVIEW-META-ANALYSIS

Evidence-Based Emergency Medicine

# The contribution of physician associates or assistants to the emergency department: A systematic scoping review

Nicole M. A. King MSc, DIC, PA-R, BSc | Munaf Habeeb MPharm, MSc |  
Suzannah Helps PhD, MSc

University of Portsmouth, Portsmouth, UK

**Correspondence**

Nicole M. A. King, BSc, DIC, University of  
Portsmouth, Portsmouth PO1 2DJ, UK  
Email: [Nicole.king@myport.ac.uk](mailto:Nicole.king@myport.ac.uk)

Funding and support: By JACEP Open policy, all authors are required to disclose any and all commercial, financial, and other relationships in any way related to the subject of this article as per ICMJE conflict of interest guidelines (see [www.icmje.org](http://www.icmje.org)). The authors have stated that no such relationships exist.

Nicole M. A. King and Munaf Habeeb are professional doctorate students and Suzannah Helps is a senior lecturer.

**Abstract**

**Background:** New health care professionals, such as the physician associate or assistant (PA), have expanded the ability of health systems to meet the needs of the population in both primary and secondary health care settings. Although PAs are widely deployed in the emergency department (ED), their role in the ED has not previously been formally described. This systematic scoping review synthesizes and critically analyzes existing literature on the impact and perception of the role of PAs working in the ED.

**Methods:** We performed a systematic scoping review. We searched Medline, PubMed, Scopus, PsycINFO, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Excerpta Medica Database (EMBASE) and EMCare for English language peer-reviewed studies describing PA roles in the ED. Both qualitative and quantitative studies were included. We assessed the quality of the articles using QualSyst and the mixed methods appraisal tool. Themes regarding PA roles in the ED were identified.

**Results:** We included a total of 31 studies. Themes identified in the review included perceptions of the PA, wait times, acuity of patients seen, length of stay, those leaving without being seen (LWBS), clinical outcomes, pre-admission rates, well-being and scope of practice. Both the doctors' and patients' perception of PAs in the ED were generally high. The hindrance of them not being able to prescribe was evident. Studies showed a reduction in waiting times, length of stay, readmission rates, and those leaving without being seen when PAs work in the ED seeing moderate- to low-acuity patients. Evidence shows that PAs have a positive impact and the perceptions of the PAs are high in international EDs. There is significant evidence of PAs being key members of the health care team. Their work is particularly helpful for low- to moderate-acuity patients. With the increase in health care demand and a suffering UK National Health Service (NHS), the evidence synthesized in this review supports the potential positive impact PAs can have on the NHS and more specifically, the improvements of ED throughput metrics.

Supervising Editors: Venkatesh Thiruganasambandamoorthy, MD; Henry Wang, MD, MS

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2023 The Authors. JACEP Open published by Wiley Periodicals LLC on behalf of American College of Emergency Physicians.

**Conclusions:** This review identified the roles and positive influence of PAs in the ED. These findings highlight current and future challenges for PAs in the ED.

**KEYWORDS**

emergency department, physician assistant, physician associate, systematic scoping review

## 1 | INTRODUCTION

### 1.1 | Background

To overcome the challenges of emergency department (ED) overcrowding, many health care systems have introduced or expanded the role of other clinicians such as physician associates or assistants (PA) in the ED.<sup>1</sup> PAs usually work under the supervision of senior physicians to provide first-line or complementary care to patients.<sup>2</sup> PAs have been present in the United States for approximately 40 years. There are currently over 100,000 PAs in the United States.<sup>3</sup> The role of PAs in ED care is expanding internationally.<sup>4</sup>

#### 1.1.1 | Importance

Despite their wide presence, there are only limited descriptions of the role, perception, or impact of PAs in the ED. An earlier systematic review highlighted the acceptance of PAs by emergency physicians and patients.<sup>5</sup> More recently, a review of the contribution of PAs to secondary care (including 7 studies set in the ED) assessed PA impact on patients' experiences and outcomes, service organization, working practices, other professional groups, and costs.<sup>6</sup>

#### 1.1.2 | Goals of this investigation

In this systematic scoping review, we aimed to identify contemporary perspectives of the role, impact, and perception of PAs working in the ED.

## 2 | METHODOLOGY

### 2.1 | Eligibility and search strategy

The Preferred Items for Systematic Reviews and Meta-Analyses (PRISMA) 2009 checklist<sup>7</sup> was used to report this systematic literature review and to ensure the quality of reporting (Figure 1). To obtain a full representation of the existing data, we included studies from 1960 (when PAs were first introduced in the United States) to 2022. We conducted electronic searches of relevant databases in January 2020 and January 2022, a total of 7 databases were used, 6 of which were searched via Healthcare Databases Advanced Search: Medline,

PubMed, Scopus, PsycINFO, Excerpta Medica Database (EMBASE), EMcare, and the Cumulative Index to Nursing and Allied Health Literature (CINAHL). The search terms (Table 1) and strategy also included checking reference lists of systematic reviews, use of the *cited by* options on Scopus, and *related articles* link on PubMed. We included searches for any "gray literature." The eligibility criterion is displayed in Table 2.

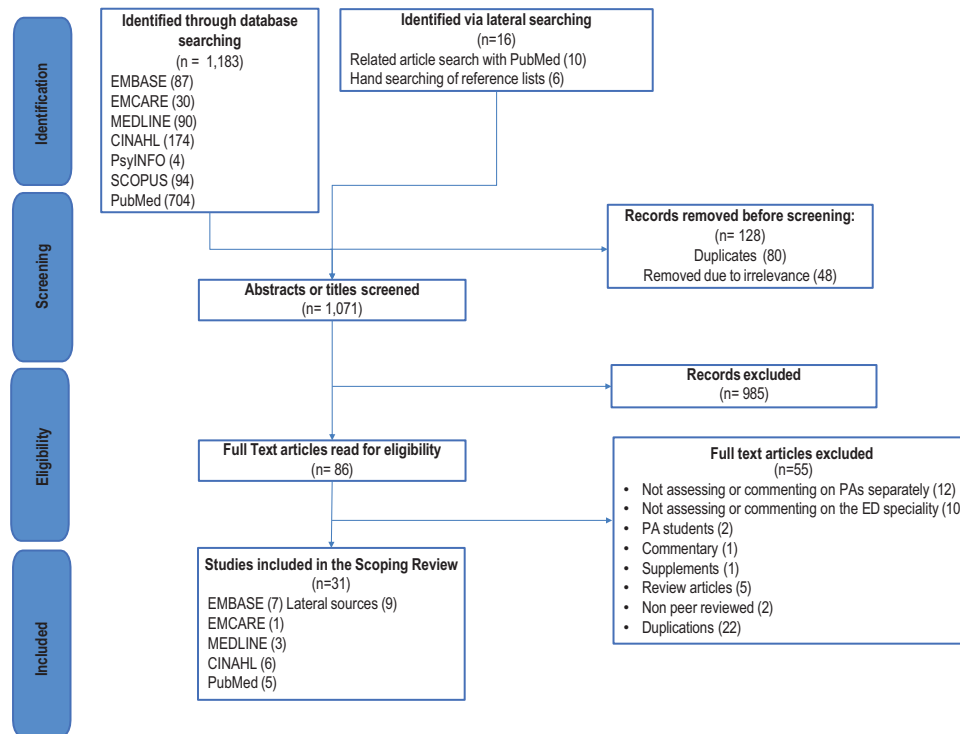
Two reviewers (N.K. and M.H.) reviewed the titles, abstracts, and full texts for inclusion in the review, with discordance resolved by consensus. We did not calculate interrater reliability. Identified studies were recorded on an Excel spreadsheet (Microsoft, Redmond, Washington).

### 2.2 | Quality assessment

We performed quality assessment of articles that passed the 2-stage screening process. We assessed quantitative studies using the adapted quality assessment tool "QUALSYST" from the "Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields."<sup>8</sup> For each study, we appraised the article based upon 14 dimensions. We included papers with summary scores of strong (>0.8) and good (0.71–0.79) (Appendix 1). The revised QualSyst was used to assess the qualitative paper (Appendix 2). The mixed methods appraisal tool (MMAT)<sup>9</sup> was used to assess the quality of the study using mixed methods (Appendix 3). The checklists were chosen as previous systematic reviews also used such checklists enabling a comparison of evidence development.<sup>10</sup>

## 3 | RESULTS

Of a total of 1199 initially identified studies, we excluded 1113 due to irrelevance or duplication. Of the remaining 86 studies, we included 31 in the final synthesis (Table 3). Included studies were published in 2002–2022 and originated from 5 countries: United States ( $n = 20$ ), Canada ( $n = 5$ ), England ( $n = 3$ ), Israel ( $n = 1$ ), and the Netherlands ( $n = 2$ ) (Appendix 1). Most of the included studies were quantitative designs ( $n = 28$ ). We identified 1 qualitative design and 2 mixed-methods studies (Table 3). Of the included studies, 24 quantitative studies were rated as "excellent," 4 studies were rated as "good," and one was rated as "adequate." Both mixed methods studies were rated as "strong" quality.



**FIGURE 1** Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) flow chart outlining the literature retrieval and study selection. Abbreviations: ED, emergency department; PA, physician associate or assistant.

**TABLE 1** Search terms and strategy for the review.

|   |
|---|
| ("physician associate" OR "physician assistant" OR "Mid-level practitioner" OR "Mid-level provider")  |
| AND   |
| ("Emergency department" OR "Emergency medicine" OR "Casualty") AND ("Impact" OR "perception" OR "doctor satisfaction" OR "patient satisfaction" OR "acceptance" OR "effectiveness" OR "appropriateness" OR "view" OR "opinion") |
| AND   |
| ("waiting times" OR "length of stay" OR "clinical outcomes" OR "patient outcomes" OR "patient mortality" OR "patient readmission").   |

**TABLE 2** Inclusion and exclusion criteria for the scoping review.

|  |
|--|
| <b>Inclusion criteria</b>  |
| Peer reviewed research studies published between January 1960 to January 2020  |
| English language   |
| Population: PAs, according to the UK definition, working within all areas of the ED (majors/minors/resus/observation wards/urgent care). Including PAs who see trauma patients in the ED         |
| Intervention: Implementation of PAs into the ED  |
| Comparison (where relevant): Another health care professional (nurse practitioner or doctor) or baseline standard  |
| Outcome: Measure of and impact (productivity, efficiency, effectiveness, and safety) on the department. Perceptions of patients and doctors on the role and impact of PAs were also of interest. |
| Study design: Any (qualitative/quantitative/mixed)   |
| <b>Exclusion criteria</b>  |
| Studies involving PA students.   |
| Studies in which findings or results relating to PAs had been amalgamated with those of other health professionals and not separated.  |
| Articles that did not present original research findings (commentaries, reviewed, etc)   |
| Specialities other than emergency medicine   |

Abbreviations: ED, emergency department; PA, physician associate or assistant.

**TABLE 3** Characteristics of studies included in the review. NP = Nurse Practitioner, UCC = Urgent Care Centre, PA = Physician Associate/Assistant LOS = Length of Stay LWBS = Left Without Being Seen ED = Emergency Department MLP = Mid-Level Provider RVU/hr = Relative Value Units per hour RVU/patient = Relative Value Units per patient.

| Author/Year       | Reference Number | Population/Setting         | Intervention/Aim   | Sample Size                                | Outcomes/Findings  | Study Design                   | Theme              |
|-------------------|------------------|----------------------------|--|--|--|--------------------------------|--------------------|
| Bell, 2002        | 36               | ED PAs, USA                | Impact of ED on PA   | 177 PAs                                    | PA burnout is linked to insomnia and dissatisfaction with the level of supervision.  | Survey                         | Impact             |
| Berkowitz, 2020   | 21               | ED PAs, Israel, ED         | Willingness to be treated by a PA                                | 6639 patients                              | 91.6% of patients were willing to be seen by a PA. 21.6% of patients were willing to be seen by a PA only in certain time saving circumstances. 8.4% of patients were not willing to be seen by a PA under any circumstance.   | Survey                         | Perception         |
| Bloenhoff, 2016   | 37               | ED PAs, Netherlands        | Autonomous PA  | 991 patients                               | PAs operate from a more general medical perspective. They refer less, consult more with medical specialities and have less re-attendance rates.  | Cross sectional document study | Impact             |
| Brook, 2012       | 23               | ED PAs, USA                | PA Productivity in the ED  | 160 PA shifts                              | Reduction in LOS and waiting times (1.16 patients per hour)  | Retrospective chart review     | Impact             |
| Brown, 2012       | 38               | ED PAs and NPs, USA        | Trends in ED use of MLP, role and volume of patients seen by PAs | 4680000 patients seen by PAs               | Increase of patients seen by PAs > NPs (twice as many) between 1993–2009 (P<0.001).  | Retrospective survey analysis  | Impact             |
| Counselman, 2000  | 17               | ED PA, USA                 | Patient satisfaction with PA                                     | 111 Patients                               | 13/111 patients (12%) were willing to wait longer to see a doctor. The remainder were satisfied with PA care via the fast track route.   | Survey                         | Patient perception |
| De la Roche, 2022 | 27               | ED PAs, Canada             | PA vs ED Doctors and primary care Doctors                        | 1 PA, 13 ED Drs and 7 primary care doctors | The PA group had a lower LWBS rate compared to the ED doctor group (3.4% vs 5.2%, p<0.001). There was a reduced initial assessment time at the 90% percentile in the ED PA group vs ED doctor (3.9 hours VS 4.5 hours, P<0.001). There was a reduced average length of stay (313.85 minutes vs 348.91 minutes, p<0.001). | Retrospective chart review     | Impact             |
| Doan, 2012        | 19               | ED, PAs, Canada            | Patient willingness to receive care from PAs                     | 230 parents of paediatric patients         | 96% were willing to be seen by a PA for themselves or their child.   | Survey                         | Patient perception |
| Doan, 2013        | 39               | PAs, Paediatric ED, Canada | The role of PAs in paediatric EM                                 | 297 doctors                                | Decreased LOS, wait times and LWBS rates in higher acuity areas with restricted PA autonomy. Slight increase in LOS in lower acuity areas. Increase in autonomy will increase the effect of PAs in all areas.  | Discrete event simulation      | Impact             |

(Continues)

TABLE 3 (Continued)

| Author/Year    | Reference Number | Population/Setting           | Intervention/Aim   | Sample Size   | Outcomes/Findings  | Study Design              | Theme                                      |
|----------------|------------------|------------------------------|--|---|--|---------------------------|--|
| Doan, 2013     | 18               | ED PAs (Paediatrics), Canada | Willingness to be seen and treated by a PA   | 273 parents of paediatric patients seen by PAs                            | Parents were willing to have a PA treat their child irrespective of waiting times and age of their child. Parents were unwilling for a PA to treat or see a more severely ill child.   | Cross sectional survey    | Patient perception                         |
| Doan, 2014     | 22               | PAs Paediatric ED, Canada    | PAs in Paediatric ED   | 1,000 hours of data   | Addition of a PA instead of extending physician coverage in low acuity areas decreased waiting times and LOS. The addition of physician extenders decreased waiting time, LOS and those LWBS in all acuity areas.  | Discrete event simulation | Impact                                     |
| Drennan, 2019  | 16               | PAs in Secondary Care, UK    | Contribution and impact of PAs in secondary care   | 43 PAs<br>77 other professionals<br>28 managers<br>28 patient & relatives | PAs are reported to be safe. There was no difference in the rate of return for the same problem compared to those seen by foundation doctors (1.33 vs 0.69 p = 0.40). PAs were valued for the continuity they brought to the ED teams.                       | Mixed Methods             | Impact / Perception                        |
| Ducharme, 2009 | 24               | ED PAs, Canada               | Impact of ED patient flow  | 369/1076 days PAs were on duty and directly involved in patient care      | Patient flow improved. Wait times decreased by 1.6 hours, LWBS rates by 44% and LOS by 30.3%.  | Retrospective review      | Impact                                     |
| Elliott, 2007  | 12               | ED PA, USA                   | ED Physician opinions of PAs in ED   | 278 doctors   | PAs are seen to be cost effective, capable, and useful in the ED. Their acceptance will increase with EM resident training.  | Survey                    | Doctor's perception                        |
| Gifford, 2011  | 13               | ED PAs, USA                  | ED Physicians views on malpractice risk with employment of PAs                                       | 724 doctors   | 80% of physicians did not think PAs increased malpractice risk. There was a negative correlation between perceived risk and the number of years a PA worked in the ED. Doctors believe PAs decrease wait times by 13%, increase patient satisfaction by 10%. | Surveys                   | Impact/ effectiveness/ Doctor's perception |
| Halter, 2020   | 11               | ED PAs, UK                   | Comparison of the contribution of PAs to the processes and outcomes of ED consultations with ED FY2s | 8816 patients<br>6 PAs<br>40 FY2s   | No difference in re- attendances in 7 days (OR 0.87 95% CI 0.61-1.24, P = 0.437). If seen by a PA the patient was more likely to receive an x-ray (OR 2.10 95% CI 1.72-4.24, P<0.001). PAs assess patients in a similar way to the FYs.                      | Mixed methods             | Impact and perceptions                     |
| Hamden, 2014   | 28               | ED PAs, USA                  | PAs in High vs Low acuity areas  | 5 PAs   | PAs in low acuity areas see more patients per hour vs those in high acuity areas (2.7 vs 1.56 respectively). With more training of managing sicker patients, PAs effectiveness in high acuity areas should improve   | Retrospective Review      | Impact                                     |

(Continues)

TABLE 3 (Continued)

| Author/Year    | Reference Number | Population/Setting | Intervention/Aim  | Sample Size  | Outcomes/Findings  | Study Design                  | Theme                        |
|----------------|------------------|--------------------|---|--|--|-------------------------------|------------------------------|
| Jeanmond, 2013 | 15               | ED PAs, USA        | Effectiveness of MLP in the ED  | 90 doctors<br>5 PAs  | MLP (5 PAs and 1 NP) saw more patients per hour compared with ED physicians in a low acuity area (2.21 patient's vs 1.53 patients respectively). Doctors generated 2.07 RVU/patient (CI+0.08) vs MLP 1.82 RVUs/patient (CI +0.03; P<0.001). MLPs generated 4.01 RVUs/hour (CI +0.18) vs Doctors 3.14 RVUs/hour (CI +0.18). Patients were highly satisfied with their ED visit irrespective of the training level of the clinician. | Retrospective Review          | Impact Patient perception    |
| Kim, 2021      | 29               | ED PAs, USA ED     | Effect on LOS post implementation of PAs discharging low acuity patients from triage              | 1044 reimplementatation patient's vs 1063 post implementation patients | There was a significant improvement in LOS post implementation by 18.43 minutes (95% CI, 15.45-21.40)  | Retrospective chart review    | Impact                       |
| Larkin, 2001   | 14               | ED, PAs, USA ED    | Survey of Emergency Medicine Physicians views on being treated by non-physicians/ other residents | 251 doctors  | Only 24% of senior residents will have a moderate illness be seen by a PA. Waiting time reduction was more of a deciding factor to be seen by a PA as opposed to cost effectiveness. 34% of residents (mainly males of higher incomes) regarded PAs as a threat.   | Survey                        | Patient/ Doctor's perception |
| Merdler, 2020  | 26               | ED PAs, Israel ED  | Investigating the impact of ED PAs on patient outcomes and ED timings                             | 58,772 patients  | PA group LWBS (Doctors 1.5% vs PA 1.1%, p<0.015)<br>Patients were seen quicker and had their medications prescribed sooner if seen by a PA. When doctors worked with a PA the patients were seen even sooner than if the doctor saw them alone (Doctor and PA 30.59 mins IQR 15.77-54.85 vs 47.79 mins IQR 27.7-78.8, p<0.001).  | Retrospective chart review    | Impact                       |
| Nestler, 2012  | 30               | ED PAs, USA        | PAs as triage liaison providers   | 353 patients- pilot days<br>371 patients- control days                 | Reduction in LOS and those who left without being seen   | Observational Cohort Study    | Impact                       |
| Palvik, 2017   | 35               | ED PAs, Canada     | PA management of paediatric patients  | 2,798 0-6-year-olds were seen by PAs                                   | There was a reduction in re-attendance rates (6.8% vs 8.0%, p<0.03) compared to physicians. There were less patients admitted post re-attendance. Similar management of paediatric patients to ED Physicians.  | Retrospective database review | Impact                       |
| Phillips, 2018 | 49               | ED PAs, USA        | Practice and role of ED PAs   | 163 responders   | PAs needed less clinical training at graduation and use less resources   | Survey                        | Impact                       |

(Continues)

TABLE 3 (Continued)

| Author/Year     | Reference Number | Population/Setting                  | Intervention/Aim  | Sample Size                                      | Outcomes/Findings   | Study Design                                  | Theme                |
|-----------------|------------------|-------------------------------------|---|--|---|---|----------------------|
| Ritesma, 2018   | 3                | PA in UCC, USA                      | Characteristics of PAs in UCC   | 14,609 PAs                                       | Increasing number of PAs working in UCC (doubled in 10 years). PAs see more patients and see more patients than those PAs in the main ED. They are less likely to require supervision and are less likely to be new graduates   | National Survey                               | Impact               |
| Shearwood, 2011 | 33               | ED PAs in ED observation units, USA | Effects on patient outcomes   | 895 patients                                     | Clinical presentations – Chest pain and trauma. Decrease in LOS and admission rates. No patient mortality, missed fractures or loss of vital signs.   | Prospective chart review                      | Impact/effectiveness |
| Silberman, 2013 | 25               | ED PA, USA                          | ED PA in high vs low acuity areas   | 8 PAs  | PAs see more patients per hour and generate more RUV/hour than ED Physicians in low acuity areas. However, PAs generated less RUV/Patient due to less time spent documenting. Improved documentation training could improve PA productivity.                            | Retrospective Review                          | Impact               |
| Taylor, 2019    | 20               | ED PA, English Secondary Care       | Assess patient's satisfaction levels with PA encounters in secondary care         | 15 patients                                      | Mainly satisfied with the relationship, communication. PAs were trusted and the patients had confidence in their abilities.   | Qualitative Study, Semi Structured Interviews | Patient Perception   |
| Wiler, 2015     | 31               | ED PAs, USA                         | To determine the differences in PA education and roles across different US states | 50 states, 72,433 PAs                            | Laws governing PA practice within the ED differ across states. Generally, allow a broad scope of practice with limited direct supervision. There is more flexibility seen in smaller rural EDs.   | Cross sectional analysis                      | Impact               |
| Wu, 2020        | 34               | ED PAs, USA                         | Comparing the effectiveness of ED PAs vs Physicians                               | 500,000,000 patient visits were with PAs         | Between 2010 and 2015, there were 805 million visits. 47% were seen by a PA. Their acuity was highest in semi-urgent and non-ambulance arrivals. PAs ordered less laboratory and radiographic investigations than ED Physicians. The length of stay was lower with PAs. | Retrospective secondary analysis              | Impact               |
| Wu, 2021        | 32               | ED PAs, USA                         | Comparing the effectiveness of ED PAs compared to ED NP:                          | 1 billion patient visits, 5% seen by ED PA alone | More PAs would see the sickest patient's vs NPs (3.2% [CI 2.2-4.5] vs 2.1% [CI 2.0-3.0]. Reduced LOS in PA only group 1-1.9 hours (32.9% CI 26.2-39.6) VS (34.4% CI 26.7-41.9). 90% of PA alone visits were for patients 65 years and younger.                          | Retrospective chart review                    | Impact               |



### 3.1 | Overview of the studies

Our review identified 9 themes describing the role of the PA in the ED.

### 3.2 | Doctors' perceptions of the role of the PA

Doctors' perceptions of PAs were reported in 4 studies.<sup>11–14</sup> The reports were mainly positive, with the presence of PAs perceived as decreasing malpractice risk,<sup>13</sup> improving efficiency without jeopardizing quality,<sup>12</sup> and increasing patient satisfaction.<sup>16</sup> In a mixed methods study by Dreenan et al<sup>17</sup> emergency doctors reported PAs to be appropriate, safe, and acceptable members of the medical team. PAs were also said to aid patient flow, be versatile in working within the department, and release doctors' time for more complex cases. However, the lack of authority to prescribe or order ionizing radiation such as x-rays or computed tomography scans in the United Kingdom was seen as an inhibiting factor to the PAs full potential within the department. Conversely, in Larkin et al's study, senior doctors reported that they would prefer to be treated by another doctor as opposed to a non-physician, such as a PA, regardless of the level of injury.<sup>14</sup>

### 3.3 | Patients' perceptions of the role of the PA

Patient views of PAs were reported in 7 studies.<sup>15–21</sup> Patients were generally satisfied with the level of care received from PAs and were willing to see a PA as opposed to waiting for an emergency physician. For example, Taylor et al reported high patient satisfaction due to good communication, holistic, and excellent patient-centered care exercised by PAs.<sup>20</sup> Similarly, Counselman et al surveyed 273 patients;<sup>17</sup> most (88%) were satisfied with the care from the PA, and only 12% of the patients would prefer to wait longer to be seen by an emergency physician rather than a PA. In a larger survey of 6639 patients, Jeanmond et al reported that 91.6% of patients were willing to be seen by a PA; however, 21.6% were willing to be treated by a PA only in time-saving conditions.<sup>15</sup> Conversely, a study of 229 mothers in a Canadian pediatric hospital reported that if their child was severely ill they would wait longer to see an emergency physician rather than a PA.<sup>18</sup> However, in some studies, patients misconceived PAs to be doctors due to a lack of understanding of the role of a PA.<sup>11,16,20</sup>

### 3.4 | Waiting times

Waiting times was an outcome measure in 7 studies.<sup>14,22–27</sup> The majority of studies showed PA presence to reduce ED wait times. PAs were reported to be more effective in reducing wait times in lower acuity areas versus high-acuity areas.<sup>14,22,25</sup> De la Roche found a reduction in the initial assessment time for ED PAs compared to emergency doctors (3.9 hours vs 4.5 hours,  $P < 0.001$ ).<sup>27</sup> Merdler et al<sup>26</sup> reported that if the doctor saw a patient with the assistance of the PA, then they were attended to quicker than if the doctor saw the patient without PA assistance (30.59 minutes vs 47.79 minutes,  $P < 0.001$ ).

### 3.5 | Acuity of patients seen

The number of patients seen per hour was significantly higher in lower acuity ED areas and was reported in 4 studies.<sup>15,18,25,28</sup> In one such study, the relative value units per hour (RVU/hour) was higher for the PA group 4.01 RVU/hour (CI +0.18) vs 3.14 RVU/hour (CI +0.18) for the doctors' group.<sup>15</sup> However, the RVU/patient was significantly lower (2.07 vs 1.82;  $P < 0.001$ ), owing to PAs generally spending more time with documentation compared to emergency physicians. Only one of the included studies disagreed with the time effectiveness of ED PAs, but it was focused on high-acuity areas, which is consistent with other studies commenting on the PA performance in low- versus high-acuity areas.<sup>29</sup> Studies have also reported patient satisfaction to decrease with decreasing acuity levels, demonstrating low-acuity areas to frequently be challenging areas to work in.<sup>15</sup>

### 3.6 | Length of stay

Length of stay (LOS) was an outcome measure in 11 studies.<sup>18,19,22–24,26,27,30–33</sup> In all 11 studies the LOS of patients who had PAs involved in their care was reduced. Ducharme et al showed the length of stay was 30.3% lower when a PA was on duty.<sup>24</sup> Nestler et al. reported that the PA presence decreased LOS from 270 minutes to 229 minutes ( $P < 0.001$ ). De La Roche reported a reduction in the length of stay of an adult patient seen by an ED PA compared to those seen by an emergency doctor (313.83 minutes vs 348.91 minutes,  $P < 0.001$ ).<sup>7,28</sup> In an intervention assessing the effect of PA discharging of low-acuity patients from triage over a 2-week period LOS was reduced of 18.43 minutes.<sup>29</sup> Doan et al used a discrete event simulation model to simulate the effect on parameters such as LOS, if a PA versus physician was working within a Canadian pediatric setting.<sup>18</sup> They reported that PAs benefitted the high-acuity patients with a decreased LOS by 133.4 minutes (confidence interval [CI] 129, 137.8), but an increase in LOS was found in low-acuity patients by 169.1 minutes (CI 167.9, 170.2).

### 3.7 | Leaving without being seen

Those who left the department without being seen (LWBS) were another outcome measure common in 6 studies.<sup>19,22,24,26–27,30</sup> All the studies showed that there was a significant reduction in the number LWBS when a doctor was on duty with PA support as opposed to when the doctor was on duty with no PA support. Nestler et al showed a lower proportion of patients LWBS with a PA in triage (1.4% vs 9.7%,  $P < 0.001$ ).<sup>30</sup> Merdler found a reduction in those LWBS when a patient was first seen by a PA compared to when the patients were first seen by a doctor (1.0% vs 1.5%,  $P < 0.015$ ).<sup>26</sup> De La Roche in 2022 reported that if a PA was on duty there was a reduced LWBS compared to when the doctors were on duty in absence of a PA (3.4% vs 5.2%,  $P < 0.001$ ).<sup>27</sup> Ducharme et al showed that when PAs



were on duty 24.6% fewer patients LWBS, and this rose to 50% fewer patients LWBS when adjustments were made for acuity and time of day.

### 3.8 | Clinical outcomes

Clinical outcomes were reported in 1 study in terms of patient mortality, loss of vital signs, and missed fractures in patients seen by a PA compared to those patients seen by a doctor.<sup>33</sup> In a 30-day follow-up, there were no reported mortalities, deterioration, or missed fractures in those patients seen by a PA.

### 3.9 | Readmission rates

Readmission rates within 72 hours were reported in 3 studies.<sup>11,26,35</sup> Merdler (2020) reported a reduction in the rate of readmission within 48 hours when seen by a PA compared to emergency doctors (1.0% vs 1.5%,  $P = 0.028$ ).<sup>26</sup> Halter et al, found no difference in reattendances in 7 days when comparing ED PAs to Foundation Year 2 doctors (63 (5.6%) vs 131 (6.3%),  $P = 0.437$ ).<sup>11</sup> Pavlik et al (2017) showed similar readmission rates in children aged 6 years or below was seen by a PA compared to when they were seen by an emergency physician (6.8% vs 8.0%).<sup>35</sup>

### 3.10 | Physician assistant or associate well-being

PA well-being was assessed in one study by measurements of perceived burnout rates.<sup>36</sup> Low satisfaction was correlated with level of supervision and insomnia. However, burnout rates were similar to that of emergency physicians.

### 3.11 | Experience and scope of practice

Many studies investigated the scope of PA practice, often comparing PA responsibilities with those of nurse practitioners (NPs).<sup>24,26,32,34,37,38</sup> Wu et al (2020) compared new graduate PAs to NPs and reported that PAs are better clinically prepared to work in the ED, because PAs' education is based on a medical model, the same model doctors are trained on, as opposed to the nursing care model.<sup>34</sup> Bloemhoff et al reported that in the Netherlands EDs, PAs ordered fewer investigations and consulted with other specialties more than NPs (33% vs 17%;  $P < 0.001$ ) as opposed to referring patients (50% vs 73%,  $P < 0.0001$ ).<sup>37</sup> However, PAs and NPs were similar in terms of imaging requested, diagnostic screening, procedures performed, medications ordered, or hospital admission rates. Brown et al reported that PAs saw a higher volume of patients in the ED compared to NPs ( $P < 0.0001$ ).<sup>38</sup> Ritessma et al found PAs who worked within the urgent care center saw more patients than their PA colleagues working in US EDs and were less likely to be new graduates.<sup>3</sup> When comparing

PAs to NPs, Wu et al in 2021 reported PAs to see more of the sickest patients in the US EDs compared to NPs (3.2% [CI 2.2-4.2] vs 2.1% [CI 2-3.0];  $P < 0.001$ ), respectively.<sup>32</sup> One study reported PAs to be working solo within the ED.<sup>33</sup> PAs were said to often perform "repetitive tasks" allowing the emergency physicians to concentrate on running the department in the case of consultants or seeing more complex cases.<sup>24,26</sup>

### 3.12 | Limitations

The methods employed by the studies included in the review may have affected the accuracy of the findings reported. For example, perception of the PA role in the included studies was frequently measured by means of surveys. However, not all studies used the same standardized or validated tool suitable for use within health care settings; therefore, direct comparisons between studies were not always possible. Furthermore, the surveys assess the service delivery and the patient's viewpoint of the organization and individual providing the service together, not separately. This can affect the patients' reports, as one may be satisfied with the person delivering the service but dissatisfied with the organization, so satisfaction ratings might relate to satisfaction or dissatisfaction with the organization rather than the PA specifically.<sup>42</sup>

Similarly, the impact of PA role in the ED was typically measured by means of retrospective chart reviews. This method is increasingly popular in emergency medicine research because data are precollected, increasing efficiency as prospective data collection is not required,<sup>44</sup> and is employed by approximately 53% of studies published in emergency medicine research journals.<sup>43</sup> Not all institutions use the same chart reviews, so there may be inconsistencies in recording of the data. For example, some institutions are paper based for note taking before the notes get scanned to make the documents visible electronically. In such cases the time the patient is seen, discharged, referred, or those who left without being seen is documented electronically by the clinician. This system may add time to the patient's journey, so could be inconsistent and not directly comparable with other studies using retrospective chart review based on a purely electronic hospital system. However, retrospective chart reviews based completely on digital records can still be biased because of the incorrect information entered, which can be determined by meta-data, but this is rarely performed.<sup>43-44</sup>

A further limitation of the review is that the majority of the studies included were from the United States ( $n = 20$ ). Health services differ outside of the United States, which may limit the generalizability of the findings. The US health care facilities are more experienced with the use of PAs and the PA scope of practice is wider in the United States than many other countries, for example including prescribing medication and ordering ionizing radiation.<sup>49</sup> This may affect outcome measures if comparing PAs working in the United States, to countries less experienced with use of PAs. Similarly, health care funding in the United States, which relies on private insurers, is different from other countries such as Canada where EDs obtain their funds from the

government<sup>50</sup> or the United Kingdom where health care is funded by National Insurance contributions.<sup>51</sup>

## 4 | DISCUSSION

This systematic literature review identified 31 relevant studies of PAs working in the ED, internationally. This review found that both patients and staff were generally satisfied with the work of the PA in the ED. PAs were also reported to be productive within the ED with a reduction in the length of stay, waiting times and those leaving the department without being seen. There were no reported adverse clinical outcomes nor increase in readmission rates when patients were seen by PAs.

When developing a new role within a health system it is important to find out whether the health role will meet the needs of society.<sup>45</sup> Patient acceptance and awareness of the PA role is a cornerstone of health policy research. The patient satisfaction studies indicate the increasing growth of the acceptance and awareness of the PA role in theory and or in practice in countries such as the United States. Patient satisfaction positively correlates with compliance, health outcomes, and a willingness to be seen by the same clinician or clinician type in future attendances.<sup>45-48</sup>

This review adds to the existing international evidence surrounding the impact and perception of PAs in the ED.<sup>40</sup> The quality of the studies included in the review varied but were mainly of high quality providing comparative data. However, of the included studies there was a common omission of adjustment of confounding factors such as for age of patient or clinician or the number of years post qualification of the PA or clinician. This may have significantly affected the throughput, that is, patient safety measures, wait time, or LOS due to the potential bias the confounder could have posed to the population group or outcome.<sup>41</sup> Implications of the review and recommendations are outlined in Appendix 4.

To conclude, PAs appear to have a positive impact in the ED and are typically viewed positively by patients and other staff. However, further research into the impact and perceptions of PAs within health care settings outside of the US EDs is required.

### AUTHOR CONTRIBUTIONS

Nicole M. A. King is the main author of the manuscript. Munaf Habeeb and Dr Suzannah Helps were reviewers.

### ACKNOWLEDGMENTS

Dr Karen Pilkington who was Nicole M. A. King's original supervisor provided comments on an earlier version of this manuscript. The University of Portsmouth covered the APC fees via the institution's subscription to Wiley.

### CONFLICT OF INTEREST STATEMENT

Nicole King is currently employed as an emergency medicine physician associate. The authors have no other conflicts of interest.

### PRIOR PRESENTATION

There has not been any prior presentation of this review.

## REFERENCES

- Schull MJ, Morrison LJ, Vermeulen M, Redelmeier DA. Emergency department gridlock and out-of-hospital delays for cardiac patients. *Acad Emerg Med*. 2003;10(7):709-716. doi:10.1111/j.1553-2712.2003.tb00064.x
- The Faculty of Physician Associates at the Royal College of Physicians. 2023. Accessed March 30, 2023. <https://www.fparcp.co.uk/about-fpa/who-are-physician-associates>
- Ritsema TS, Cawley JF, Smith N. Physician assistants in urgent care. *JAAPA*. 2018;31(8):40-44. doi:10.1097/01.JAA.0000541483.62234.b1
- Ross N, Parle J, Begg P, Kuhns D. The case for the physician assistant. *Clin Med (Lond)*. 2012;12(3):200-206. doi:10.7861/clinmedicine.12-3-200
- Lee L, Packer TL, Tang SH, Girdler S. Self-management education programs for age-related macular degeneration: a systematic review. *Australas J Ageing*. 2008;27(4):170-176. doi:10.1111/j.1741-6612.2008.00298.x
- Doan Q, Sabhaney V, Kissoon N, Sheps S, Singer J. A systematic review: the role and impact of the physician assistant in the emergency department. *Emerg Med Australas*. 2011;23(1):7-15. doi:10.1111/j.1742-6723.2010.01368.x
- Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71. doi:10.1136/bmj.n71. Published 2021.
- Pace R, Pluye P, Bartlett G, et al. Testing the reliability and efficiency of the pilot mixed methods appraisal tool (MMAT) for systematic mixed studies review. *Int J Nurs Stud*. 2012;49(1):47-53. doi:10.1016/j.ijnurstu.2011.07.002
- Pluye P, Gagnon MP, Griffiths F, Johnson-Lafleur J. A scoring system for appraising mixed methods research, and concomitantly appraising qualitative, quantitative and mixed methods primary studies in mixed studies reviews. *Int J Nurs Stud*. 2009;46(4):529-546. doi:10.1016/j.ijnurstu.2009.01.009
- Kmet L, Lee RC, Cook LS. Standard quality assessment criteria for evaluating primary research papers from a variety of fields. *Institute of Health Economics*. 2004:1-31. doi:10.7939/R37M04F16
- Halter M, Drennan V, Wang C, et al. Comparing physician associates and foundation year two doctors-in-training undertaking emergency medicine consultations in England: a mixed-methods study of processes and outcomes. *BMJ Open*. 2020;10(9):e037557. doi:10.1136/bmjopen-2020-037557
- Elliott EP, Erdman K, Waters V, Holcomb JD. Opinions of Texas emergency medicine physicians regarding the use of physician assistants in the emergency department. *J Physician Assist Educ*. 2007;18(4):40-43.
- Gifford A, Hyde M, Stoehr JD. PAs in the ED: do physicians think they increase the malpractice risk. *JAAPA*. 2011;24(6):34-38. doi:10.1097/01720610-201106000-00007
- Larkin GL, Kantor W, Zielinski JJ. Doing unto others? Emergency medicine residents' willingness to be treated by moonlighting residents and nonphysician clinicians in the emergency department. *Acad Emerg Med*. 2001;8(9):886-892. doi:10.1111/j.1553-2712.2001.tb01149.x
- Jeanmonod R, Delcollo J, Jeanmonod D, Dombchewsky O, Reiter M. Comparison of resident and mid-level provider productivity and patient satisfaction in an emergency department fast track. *Emerg Med J*. 2013;30(1):e12. doi:10.1136/emermed-2011-200572
- Drennan VM, Halter M, Wheeler C, et al. *The role of physician associates in secondary care: the PA-SCER mixed-methods study*. NIHR Journals Library; 2019.
- Counselman FL, Graffeo CA, Hill JT. Patient satisfaction with physician assistants (PAs) in an ED fast track. *Am J Emerg Med*. 2000;18(6):661-665. doi:10.1053/ajem.2000.16301
- Doan Q, Hooker RS, Wong H, et al. Canadians' willingness to receive care from physician assistants [published correction appears

- in *Can Fam Physician*. 2012 Oct;58(10):1084-5]. *Can Fam Physician*. 2012;58(8):e459-e464.
19. Doan Q, Sheps S, Wong H, Singer J, Johnson D, Kisson N. Parents' willingness to have their child receive care by physician assistants in a pediatric emergency department. *CJEM*. 2013;15(6):330-336. doi:10.2310/8000.2013.130745
  20. Taylor F, Halter M, Drennan VM. Understanding patients' satisfaction with physician assistant/associate encounters through communication experiences: a qualitative study in acute hospitals in England. *BMC Health Serv Res*. 2019;19(1):603. doi:10.1186/s12913-019-4410-9
  21. Berkowitz O, Hooker RS, Nissanholtz-Gannot R, Zigdon A. Israeli willingness to be treated by a physician assistant. *J Community Health*. 2020;45(6):1283-1290. doi:10.1007/s10900-020-00835-7
  22. Doan Q, Hall W, Shechter S, et al. Forecasting the effect of physician assistants in a pediatric ED. *JAAPA*. 2014;27(8):35-41. doi:10.1097/O1.JAA.0000451860.95151.e1
  23. Brook C, Chomut A, Jeanmonod RK. Physician assistants' contribution to emergency department productivity. *West J Emerg Med*. 2012;13(2):181-185. doi:10.5811/westjem.2011.6.6746
  24. Ducharme J, Alder RJ, Pelletier C, Murray D, Tepper J. The impact on patient flow after the integration of nurse practitioners and physician assistants in 6 Ontario emergency departments. *CJEM*. 2009;11(5):455-461. doi:10.1017/s1481803500011659
  25. Silberman M, Jeanmonod D, Hamden K, Reiter M, Jeanmonod R. Mid-level providers working in a low-acuity area are more productive than in a high-acuity area. *West J Emerg Med*. 2013;14(6):598-601. doi:10.5811/westjem.2012.12.12848
  26. Merdler I, Hochstadt A, Sheffy A, Ohayon S, Loewenstein I, Trotsky D. The Israeli physician assistant in a tertiary medical center emergency department. *Isr Med Assoc J*. 2020;22(7):409-414.
  27. De la Roche MRP, Dyer N, Froats M, et al. Effect of a physician assistant on quality and efficiency metrics in an emergency department: population cohort study. *Can Fam Physician*. 2021;67(2):e61-e67. doi:10.46747/cfp.6702e61
  28. Hamden K, Jeanmonod D, Gualtieri D, Jeanmonod R. Comparison of resident and mid-level provider productivity in a high-acuity emergency department setting. *Emerg Med J*. 2014;31(3):216-219. doi:10.1136/emered-2012-201904
  29. Kim TY, Ohmart C, Khan Z, Lance M, Kim S. The effect on length of stay after implementation of discharging low acuity patients from triage. *Cureus*. 2021;13(9):e17640. doi:10.7759/cureus.17640
  30. Nestler DM, Fratzke AR, Church CJ, et al. Effect of a physician assistant as triage liaison provider on patient throughput in an academic emergency department. *Acad Emerg Med*. 2012;19(11):1235-1241. doi:10.1111/acem.12010
  31. Wiler JL, Ginde AA. State laws governing physician assistant practice in the United States and the impact on emergency medicine. *J Emerg Med*. 2015;48(2):e49-e58. doi:10.1016/j.jemermed.2014.09.033
  32. Wu F, Darracq MA. Comparing physician assistant and nurse practitioner practice in U.S. emergency departments, 2010-2017. *West J Emerg Med*. 2021;22(5):1150-1155. doi:10.5811/westjem.2021.5.519
  33. Sherwood K, Sugerman S, Bossart P, et al. EDOU staffing by PAs: what are the effects on patient outcomes. *JAAPA*. 2011;24(8):31-37. doi:10.1097/O1720610-201108000-00007
  34. Wu F, Darracq MA. Physician assistant and nurse practitioner utilization in U.S. emergency departments, 2010 to 2017. *Am J Emerg Med*. 2020;38(10):2060-2064. doi:10.1016/j.ajem.2020.06.032
  35. Pavlik D, Sacchetti A, Seymour A, Blass B. Physician assistant management of pediatric patients in a general community emergency department: a real-world analysis. *Pediatr Emerg Care*. 2017;33(1):26-30. doi:10.1097/PEC.0000000000000949
  36. Bell RB, Davison M, Sefcik D. A first survey. Measuring burnout in emergency medicine physician assistants. *JAAPA*. 2002;15(3):40-2, 45-8, 51-2.
  37. Bloemhoff A, Schoonhoven L, de Kreek AJ, van Grunsven PM, Laurant MG, Berben SA. Solo emergency care by a physician assistant versus an ambulance nurse: a cross-sectional document study. *Scand J Trauma Resusc Emerg Med*. 2016;24:86. doi:10.1186/s13049-016-0279-3
  38. Brown DM, Sullivan AF, Espinola JA, et al. Continued rise in the use of mid-level providers in US emergency departments, 1993-2009. *Int J Emerg Med*. 2012;5:21. doi:10.1186/1865-1380-5-21
  39. Doan Q, Piteau S, Sheps S, et al. The role of physician assistants in pediatric emergency medicine: the physician's view. *CJEM*. 2013;15(6):321-329. doi:10.2310/8000.2013.131030
  40. Hooker RS, Klocko DJ, Larkin GL. Physician assistants in emergency medicine: the impact of their role. *Acad Emerg Med*. 2011;18(1):72-77. doi:10.1111/j.1553-2712.2010.00953.x
  41. Skelly AC, Dettori JR, Brodt ED. Assessing bias: the importance of considering confounding. *Evid Based Spine Care J*. 2012;3(1):9-12. doi:10.1055/s-0031-1298595
  42. Cowing M, Davino-Ramaya CM, Ramaya K, Szmerekovsky J. Health care delivery performance: service, outcomes, and resource stewardship. *Perm J*. 2009;13(4):72-78. doi:10.7812/TPP/08-100
  43. Cooper RJ. Journal club: the NHAMCS database, chart review methods, and more on regression modeling. *Ann Emerg Med*. 2010;55(5):458-459. doi:10.1016/j.annemergmed.2010.03.021
  44. Kaji AH, Schriger D, Green S. Looking through the retrospective: reducing bias in emergency medicine chart review studies. *Ann Emerg Med*. 2014;64(3):292-298. doi:10.1016/j.annemergmed.2014.03.025
  45. Halse J, Reynolds L, Attenborough J. Creating new roles in health-care: lessons from the literature. *Nurs Times*. 2018;114(5):34-37. ISSN 0954-7762.
  46. Donabedian A. The quality of care. How can it be assessed. *JAMA*. 1988;260(12):1743-1748. doi:10.1001/jama.260.12.1743
  47. Jenkinson C, Coulter A, Bruster S, Richards N, Chandola T. Patients' experiences and satisfaction with health care: results of a questionnaire study of specific aspects of care. *Qual Saf Health Care*. 2002;11(4):335-339. doi:10.1136/qhc.11.4.335
  48. Bombard Y, Baker GR, Orlando E, et al. Engaging patients to improve quality of care: a systematic review. *Implement Sci*. 2018;13(1):98. doi:10.1186/s13012-018-0784-z
  49. Phillips AW, Klauer KM, Kessler CS. Emergency physician evaluation of PA and NP practice patterns. *JAAPA*. 2018;31(5):38-43. doi:10.1097/O1.JAA.0000532118.98379.f
  50. Sibley LM, Weiner JP. An evaluation of access to health care services along the rural-urban continuum in Canada. *BMC Health Serv Res*. 2011;11:20. doi:10.1186/1472-6963-11-20
  51. McKenna H, Dunn P, Northern E, Buckley T. The NHS in a nutshell. How the NHS is funded. 2017. Last accessed March 21, 2023. <https://www.kingsfund.org.uk/projects/nhs-in-a-nutshell/how-nhs-funded>

## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**How to cite this article:** King NMA, Habeeb M, Helps S. The contribution of physician associates or assistants to the emergency department: A systematic scoping review. *JACEP Open*. 2023;4:e12989. <https://doi.org/10.1002/emp2.12989>