



A systematic review: The role and impact of the physician assistant in the emergency department

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Abstract

This systematic review describes the role and impact of physician assistants (PAs) in the ED. It includes reports of surveys, retrospective and prospective studies as well as guidelines and reviews. Seven hundred and twelve studies were identified of which only 66 were included, and many of these studies were limited by methodological quality. Generally the use of PAs in the ED is modest with 13–18% of US EDs having PAs although academic medical centres report PA use in 65–68% of EDs. The evidence indicates that PAs are reliable in assessing certain medical complaints and performing procedures, and are well accepted by ED staff and patients alike. There is limited evidence as to whether PAs improve ED flow or are cost-effective. Future studies on work processes, cost-effectiveness, unfamiliar patients' willingness to be treated by non-physician providers, and ED physicians' acceptability of PAs are needed to inform and guide the integration of PAs into EDs.

Key words: *emergency department, physician assistant, workforce.*

Introduction

As the balance between health-care needs and available resources is constantly challenged, cost-effective alternatives to training and retaining more physicians are being considered. One such alternative is physician assistants (PAs). PAs are fully licensed medical practitioners who are trained to provide care under the direction and supervision of a doctor. Although the doctor is ultimately responsible for the patient and establishes the degree of PA supervision, PAs exercise autonomy in medical decision-making.

There is growing interest in introducing PAs into the health-care system in Australia, Canada and

Europe. The use of PAs in EDs is common in the USA,¹ where they are viewed favourably with evidence of high patient satisfaction^{1–3} and acceptance by other health-care providers.² The Canadian military has also had good experience in using PAs since the 1960s.⁴ PAs are now being trained outside the military system in Canada (Manitoba and Ontario) with the hope that they will be integrated into the Canadian health-care system.

Despite their use in Manitoba, and pilot programmes in Ontario, Canada and in Queensland, Australia the PA profession has yet to be fully integrated outside the USA. Their role, scope of practice and contribution to health-care services are not well understood. The

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purpose of this review is to assess the role of PAs in the ED, their impact on ED efficiency and on patient satisfaction.

Methods

Search strategy

We performed a systematic search of English and French literature on PAs using six electronic databases. We also consulted topic experts to identify sources of unpublished data. Librarian support allowed translation of the terms for the other electronic databases.

References of all selected papers were screened for relevant titles and were tracked forward using the Cited Reference Search feature in Web of Science™ (Thomson Reuters, New York, USA).

Inclusion criteria

The intervention studied was the use of PAs in EDs and the outcomes of interest included: prevalence of PAs in EDs; roles and responsibilities; quality of care (performance comparisons between physicians and PA); changes in patient flow and ED costs with PA presence; patient satisfaction; and emergency physician opinion concerning PA.

We included the results of surveys, retrospective and prospective controlled and observational studies, as well as comprehensive reviews. We excluded commentaries and opinions.

Study analysis

Two independent reviewers assessed studies for relevance and if both reviewers considered they met inclusion criteria, they were selected for analysis. Level of agreement was assessed using the Kappa statistic. Differences were resolved by expert consensus. Each study was assessed independently by two reviewers using the 'Quality Assessment Tool for Quantitative Studies Method' developed by Thomas,⁵ which has been found to be suitable for use in a systematic review of non-randomized studies.⁶

Results

The electronic search yielded 712 original titles. After excluding papers that did not involve PAs in the ED

(e.g. only nurse practitioners [NPs] were studied) and editorial comments, 66 papers were accepted and reviewed, having met the above criteria. There was good agreement in the selected papers between the two reviewers with a Kappa score of 0.83.

Prevalence in EDs

Eight surveys were found from the USA describing the proportion of EDs using PAs, with response rates ranging from 56% to 96%. National surveys of general EDs (including paediatric and rural EDs) reported that 13–18% of surveyed EDs used some non-physician health-care providers who were mostly PAs, although some used NPs.^{7–9} A smaller survey, looking only at EDs in Louisiana, found a much lower proportion of EDs using PAs (only 4%).¹⁰ In contrast, studies limited to academic EDs in the USA, the use of PAs was significantly greater (65 to 68% of EDs), mainly in managed care contexts.^{11–13}

ED guidelines and policies

Five papers addressed policies and guidelines concerning PA use in EDs. Guidelines were published in the Clinical Privilege White Paper in 2005,¹⁴ outlining the scope of practice for PAs as well as addressing other issues in the ED. In the USA, the scope of practice of PAs includes triage, fast track, trauma and administration. PAs are most often used in fast track units (FTUs), with over half of EDs that had an FTU using PAs. However, although 18.5% of EDs used PAs exclusively in FTUs,¹⁵ PAs' privileges ranged from being the solo provider in a rural ED to providing patient care at a Level 1 trauma centre. Guidelines published by the American College of Emergency Physicians in 1995¹⁶ described a similarly wide scope of practice. Major differences between the two guidelines included stipulations that PAs should work under the supervision of a physician who was present in the ED and should have, or acquire, specific experience or training in emergency medicine, should partake in continuing education and participate in quality improvement initiatives. The American College of Emergency Physicians guideline was revised in 2002, although no substantial changes were made.^{17,18}

Roles and task assignments

Seventeen papers described the roles and tasks allocated to PAs in the ED. The first was published in 1973

and described the use of military corpsmen as PAs to suture lacerations in a paediatric ED.¹⁹

Typical duties of a PA in an ED currently include taking a history and performing a physical examination, evaluating laboratory data, instituting treatment, performing procedures, screening ED patients with 'routine' problems, admitting certain patients and communicating with consultant services.^{20–22} Innovative PA roles such as a 'patient navigator' have been created.²³ These PAs liaise between the ED and primary care physicians, follow-up investigations and attend bed allocation meetings, resulting in improved patient flow through the ED. Another specific role of PAs is as a part of a transition team^{24,25} caring for admitted patients although still in the ED.

In some studies, suggesting that a PA can manage up to 53–62% of all ED patients,^{26,27} patients were younger with non-urgent conditions and were less likely to require admission (8% *vs* 14%) than those managed by ED physicians.^{28,29} Examples of common conditions managed and those procedures performed by PAs are summarized in Table 1.^{21,28,29,32}

More recently, PAs have been trained to use bedside ultrasonography for focused assessment with sonography for trauma and to aid visualization for minor procedures such as cannula insertion.³³ PA procedures such as blood drawing and intravenous cannulation, and clinical duties including clerical work and answering telephone calls, have allowed the ED physician more time to supervise trainees, consult with colleagues and care for sicker patients spends.³⁴

Table 1. Common clinical conditions and procedures managed by physician assistants (PAs)

Clinical conditions commonly managed by PA	Diagnostic and therapeutic procedures performed by PAs
Uncomplicated open wounds	Intravenous insertion
Musculoskeletal injuries	Nasogastric tube
Abdominal pain	Foley catheter placement
Head injury	Lumbar punctures
Otitis media	Intubation
Upper respiratory illnesses as bronchitis, pharyngitis	Abscess drainage
Chest pain	Arterial lines and central venous line insertions
Headaches	Chest tube placement
Skin rash	Peritoneal lavage
	Soft tissue injury and wound care
	Wound suturing

Quality of care

Thirteen papers evaluated the quality of care provided by PAs in the ED, by comparing PAs' performance of clinical assessment with those of ED physicians. These can be grouped into four task categories.

Clinical decision and management

Table 2 summarizes the studies reporting performance related to clinical decision-making and management.^{35–40} All six studies were weak to moderate in methodological quality. Although there were some statistical differences in the practice patterns between physicians and PAs such as rate of investigations ordered (PAs ordered more throat cultures for pharyngitis and fewer blood cultures for febrile children), no studies addressed whether these differences had an impact on patient outcome.

Procedure performance

Four studies compared PAs' skills in performing procedures. These are presented in Table 3.^{41–44} PAs appear equally capable of performing procedures if adequately trained and supervised. Methodological quality among these studies was moderate to strong.

Patient outcomes

There was no study of the outcome of patients treated by PAs in the ED, although two studies of trauma services (likely inpatient) were reviewed. Rudy *et al.*⁴⁵ compared the outcomes of patients treated by 14 NPs and PAs versus 16 resident physicians over a 1-month period from two academic centres. They found no significant differences, but were unable to control for important differences such as age and level of acuity in patient characteristics between the two groups.

A more recent retrospective chart review⁴⁶ at a large hospital compared patient outcomes treated by three different in-house trauma teams: (i) general surgery residents and staff surgeons versus (ii) trauma surgeons versus (iii) trauma surgeons with PAs. The patients treated by Group 3 resulted in significant lower adjusted odds ratio for mortality and shorter length of stay (LOS) (decreased by less than half a day). These trauma teams were implemented in sequence over three study periods (1999–2002, 2002–2005 and 2005–2006). Although analyses were adjusted for patient characteristics including demographics and injury severity, other patient management variables such as staffing policies in addition to PAs, or clinical practice guideline use were not taken into account.^{45,46} These studies were not

Table 2. Comparison of clinical decision and patient management in the ED

Task category	Study	Methods and outcome measures	Results
Clinical decision and management	Hirshberg 1997 ³⁵	Cross-sectional survey of management of five hypothetical clinical cases. Very few PAs participated in this survey: only 12% of Pennsylvania PA registry.	Cystitis: Similar management patterns between ED physicians and PA. Asthma: PAs frequently reported using subcutaneous adrenaline and arterial blood gas, whereas no physicians reported using these. Pharyngitis: PAs more commonly requested rapid Strep tests (75% <i>vs</i> 20% $P < 0.0001$) and complete blood count (33% <i>vs</i> 5% $P = 0.008$) than ED physicians. One-year-old child with febrile viral symptoms: PA reported requesting blood cultures less often than ED physicians (18% <i>vs</i> 50% $P = 0.008$). Back strain: PA reported requesting lumbar spine imaging more frequently than ED physicians (51% <i>vs</i> 15% $P = 0.008$).
	Currey 1980 ³⁶	Retrospective chart review, comparing guideline adherence for two ED clinical conditions.	Pharyngitis: Using results of throat swabs, PAs' diagnosis was confirmed 67.4% of the time, and ED physicians' diagnosis was confirmed 42.2% of the time ($P < 0.05$) Ankle trauma: Both PA and ED physicians diagnosis were accurate >90% of the time. No significant difference was observed.
	Roumie 2005 ³⁷	Cross-sectional survey of antibiotic prescription patterns for outpatient visits (including ED)	Antibiotic prescription patterns in the ED for mid-level providers (MLP) and physicians were comparable.
	Wiest 2001 ³⁸	Retrospective chart review comparing appropriateness of empiric treatment of women presenting to the ED with potential gonorrhea or Chlamydia infection based on results of STD DNA testing	MLP appropriately managed 65% of cases (i.e. antibiotics were empirically given and then the test was subsequently positive and did not prescribe antibiotics when the DNA test was subsequently found to be negative) compared with 79% for physicians. The discrepancy is explained by higher rate of empirical treatment in the MLP group (45%) than in the physicians group (18%) and the low rate of positive test results (11%).
	Kozlowski 2002 ³⁹	Retrospective cohort of patients who were investigated with radiography at an ED for isolated lower extremity, comparing analgesia provision patterns. Surveys were conducted days following ED discharge and were dependent on patients' recall. Responses related to type of practitioner encounter and prescription were not validated against health records.	EPs gave a significantly larger proportion of patients' analgesia (29% <i>vs</i> 10%) and provided a prescription on discharge more frequently (44% <i>vs</i> 21%).
	Ritsema 2007 ⁴⁰	Retrospective cohort study of patients with long-bone fractures coming to the ED comparing the quality of pain management among care providers.	Rates of receiving any analgesia were not associated with practitioner seen; however, narcotic analgesic was significantly associated with having been seen by a PA (OR 2.05, 95% CI 1.24–3.39).

EP, emergency physician; PA, physician assistant; STD, sexually transmitted disease.

Table 3. Comparison of procedure performances between physicians and physician assistants (PAs)

Task category	Study	Methods and outcome measures	Results	Notes and conclusions
Procedure performance	Singer 1995 ⁴¹	Prospective cohort study comparing wound care practice and rate of wound infections among more junior providers (medical students and junior residents) and experienced practitioners (ED physicians, senior residents and PAs). Wound care was assigned in a non-randomized fashion, resulting in more experienced providers caring for facial wounds more frequently.	Junior providers used pressure irrigation (42% vs 26%, $P < 0.0001$) and antibiotic ointment (74% vs 59%, $P = 0.0003$) significantly more frequently than experienced providers. They also performed deep sutures less often (17% vs 28%, $P = 0.0007$). Wound infection rates were not significantly different among care practitioners (PAs 3.6%, attending physicians 5.6%).	Of the six papers that assessed clinical decision-making and patient management, all studies were weak to moderate in methodological quality. Although there were some statistical differences in the practice patterns between physicians and PAs, no studies addressed whether these differences had any impact on the clinical outcome of the patient.
	Singer 1996 ⁴²	Retrospective review of a wound care registry comparing short-term cosmetic appearance resulting from wound care performed by junior providers and more experienced providers as in the above study.	Proportion of repairs, which achieved the maximal cosmetic score, was higher in experienced practitioners as compared with junior practitioners (68% vs 52%, $P = 0.016$). Experienced practitioners = ED physicians, senior residents and PAs.	
	Kaups 1998 ⁴³	Retrospective chart review examining the outcomes of ICP monitor placement by Neurosurgeons and MLPs (nurse practitioners and PAs).	There was no significant difference among various providers in rates of minor complications. No major complications were observed in either group.	
	Bevis 2008 ⁴⁴	Retrospective chart review examining the outcomes of patients undergoing tube thoracostomy by trauma surgeons and MLPs (advanced nurse practitioners and PAs).	There was no significant difference in the rate of adverse outcomes when comparing MDs and MLPs. The quality of tube placement was only significantly different for tubes extending caudad, as this occurred in 11% of placements by a surgeon as compared with 21% of placements by an MLP.	

ICP, intracranial pressure; MD, medical doctor; MLP, mid-level provider.

sufficiently powered to determine equivalence; however, they suggested that patients' outcomes were 'not negatively affected' by the implementation of PA on trauma services.

History taking and documentation

A prospective observational study assessed the completeness of medical records for the documentation of

'cause of injury' data among physicians, PAs and NPs, residents and medical students working in an ED.⁴⁷ Health-care providers' documentation was compared with that of the gold standard of a research assistant trained to document a comprehensive history.

There was significant loss of information among all health-care providers at the history taking stage (only elicited 68% of all pertinent information retrieved by the

research assistant) and at the documentation stage (only 67% of information was documented). The key finding was that there were no significant differences between provider types.

Use in the ED on ED flow and costs

Four papers reported the results of primary studies regarding the effect of PA on ED system outcomes. The most recent study reported the outcome of introducing PAs and NPs as additional providers in six EDs in Ontario, Canada.⁴⁸ The proportion of patient visits which met a wait time benchmark (by acuity level) and length of visit were compared during a 2-week period before and after PAs were introduced to the ED. After adjustments for hospital site, time of day and patient acuity level, the odds of achieving the waiting time benchmarks were 1.9 (95% CI 1.6–2.4) for patients visiting the ED after PA implementation, compared with those who visited the ED before PAs were introduced. The average ED LOS when a PA was present was 9% shorter than before PAs were introduced. ED patient volume varied significantly over time, and the short study period limited its generalizability.

A similar study in a US hospital that implemented an FTU staffed by PAs and a technician resulted in a reduction in LOS from an average of 127 to 53 min, and patient satisfaction was significantly higher among patients with lower acuity after PA implementation. Only 36% of patients were willing to wait longer to see a physician.⁴⁹

A retrospective review of Urgent Care Clinics charts⁵⁰ showed that PAs took more time to assess and treat patients (82 *vs* 75 min) than ED physicians, whereas the cost per visit was slightly lower (\$159 *vs* \$164). The breadth of clinical conditions seen by both providers was similar, although there was a significant difference in the demographics as PAs saw fewer paediatric patients. In addition, the shifts evaluated were all in the morning for PA, and in the evening for physicians. The effect of ED volume surges and access to resources such as ancillary investigations or specialist consultations are likely different between these scheduled shifts, but were not discussed.

One rural ED staffed by both ED physicians and PAs found that the net cost of using ED physicians (net loss of \$50) was higher than that of using PAs (gain of \$260 dollars, because of increased billings).⁵¹ However, the present study's applicability to Australian and Canadian EDs and those with dedicated physicians is limited as reimbursement arrangements

would be different, and lost practice time plus associated costs for the physicians were not factored into the net costs.

Physician attitudes towards physician assistants and patient satisfaction

Four papers described the attitudes of physicians towards the use of PAs in the ED and their opinions regarding PA skills and aptitudes. One survey of ED physicians in the USA ($n = 960$ with 29% response rate) showed 91% of respondents had worked with a PA and were confident in their overall performance.⁵² PA performance was rated highest for patient education, history and physical examination whereas diagnosis and clinical management were rated slightly lower. Respondents also rated PAs overall utility, cost-effectiveness and capability in the ED at 5.0–5.4 on a scale to 7, but felt that general training of PAs did not provide enough emergency medicine education.

Two studies surveyed non-ED physicians regarding their opinion on PAs working in the ED. A US survey from 1972⁵³ found that most physicians felt that PAs were able to take a good medical history and provide patient care relevant to the ED. The other survey addressed primary care physicians⁵⁴ of whom 78.5% had previously worked with PAs. Eighty per cent felt that PAs were competent to handle routine care, but ranked ED coverage on average 2.5 out of 5 (1 being no importance and 5 being major importance) as a role for PAs and NPs.

Larkin *et al.*⁵⁵ undertook a cross-sectional survey of senior ED residents acting as patients using case-based scenarios. There was a preference to be treated by a moonlighting senior ED resident, followed by PAs, and then NPs; the willingness to be treated by a PA decreased as the severity of the clinical scenario increased (44.3% dropping to 0.8%). In the scenario of being the parent of a young child, the willingness to receive care by a PA dropped to 38.3%. If an ED physician was also evaluating them, however, 83.7% of respondents were willing to see a PA initially.

The methodological quality of all four studies was rated as weak with low response rates (29–46%). Overall, the responses suggested that physicians found PAs in the ED acceptable.

Only two papers evaluated patient satisfaction with PA care in the ED, and both found high rates of satisfaction with PA care, although response rates were low (11% and 25%, respectively).^{2,3}

Prior reviews

One systematic review of PA and NP use in the ICU and 14 narrative reviews of PAs in the ED were found. The systematic review⁵⁶ assessing more than 145 papers found a paucity of high-quality data on PAs working in the ED. The narrative reviews described PAs' role and task allocation, quality assurance, effect on flow, and costs and litigation risk issues.⁵⁷⁻⁶⁹ These reviews indicated that the level of care paralleled that of physicians, that the cost of using a PA was lower and that patient acceptance of PAs was high. One review paper described the implementation of NPs and PAs into six EDs in Ontario.⁷⁰ After implementation of PAs, there were increased patient and provider satisfaction, a reduction in wait times, increased physician revenue and a high level of acceptance. Challenges in implementation included uncertainty among staff as to the scope of practice of PAs within the ED, a lack of resources for education and team building, and increased pressure on other resources because of increased volumes of patients flowing through the ED.

Discussion

Much has been written about PAs working in EDs in the USA since the early 1970s. However, the heterogeneity in the type of EDs studied (academic, public, rural) and the fact that PAs were often used in combination with NPs prevented pooling of data.

The range of procedures performed and clinical decision-making by PAs is wide. PAs' responsibilities are often tailored to their working environment to meet the specific needs of their employer, according to the acceptability of the supervising ED physicians.

The quality of the care provided by PAs was comparable with that of ED specialist (attending) physicians and senior residents, and their use resulted in shorter wait times for ED patients. However, it is unclear whether this was attributable to PA presence, or the effect of having additional health-care providers (of any type) within the department. However, if this were true, PAs would represent a less expensive alternative for increased staffing. Indirect evidence⁵⁰ suggests some differences in total visit duration and cost for some clinical conditions managed by an emergency physician versus a PA.

The generalizability of many of these studies was limited. Also the methodological quality of these studies was weak to moderate. Limitations included

the small number of PAs or patients studied, use of historical controls and comparison of study populations with different baselines without adequate adjustment. Similar limitations were observed in studies that evaluated the impact of PAs on patient flow and satisfaction.

The presence of PAs in US EDs is now well established, where they have been working alongside emergency physicians successfully for several decades, earning acceptance and appreciation by emergency health-care workers. However, these working relationships are still primarily limited to academic centres, have not been established in Australia, Canada or Europe. There, the role PAs and their scope of practice within significantly different health-care models remain to be defined. Financial, licensing and legal implications would also need to be addressed. For example in the Canadian model, EDs bill the government rather than private insurers, and fee structures are tightly regulated. The financial implications of PAs might therefore be significantly different in countries other than the USA. The legal implications of PAs in the ED in the USA are well described by Klig,⁷¹ and the issues of liability and coverage by malpractice insurance would have to be formally established.

There are no good data from controlled trials addressing the role or impact of PAs on ED patient care, although there are many studies that describe the evolution of the role of PAs in the ED. PAs appear able to supplement physician services in the ED, might improve flow within the department and are an acceptable alternative provider from the patient perspective. However, further research on PA cost-effectiveness, acceptability by other health-care providers and on patients must be undertaken to optimize their role in countries wanting to explore their additional role in ED care.

Acknowledgements

The authors are grateful for Dr. Roderick Hooker's advice on papers of interest for this review.

Competing interests

None declared.

Accepted 5 November 2010

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