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## Do Emergency Nurse Practitioners Provide Safe Patient Care?

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### Abstract:

**Objectives:** To systematically review and evaluate the evidence demonstrating the ability of Emergency Nurse Practitioners (ENPs) to provide safe patient care.

**Methods:** A systematic literature search of online databases and bibliographies identified studies involving nurse practitioners in an emergency setting. Two physicians independently selected studies examining the safety of complete patient management by ENPs compared to physicians. Studies were evaluated in a structured format according to study design, standards of comparison and outcomes.

**Results:** 5 studies of ENP care of patients from presentation to disposition were identified and evaluated. All studies compared ENPs to physicians-in-training. Overall, they indicate that ENPs are comparably safe to junior physicians-in-training, and make significant numbers of errors in patient management. No studies compared ENP care to staff Emergency Physician (EP) care.

**Conclusions:** Review of the world literature fails to find adequate data on the safety of complete patient care by ENPs. Further studies are required to provide evidence that their patient management is comparable to that of an attending EP. Additionally, in light of international practice pattern variations in emergency medicine, the standards of best care expected from ENPs cannot be extrapolated between jurisdictions.

**MeSH Words:** nurse practitioner; emergency; patient care; standards; emergency physician

### Introduction

The introduction of emergency nurse practitioners (ENPs) in emergency departments (EDs) began in the 1970s in the United States.<1, 2> Today, ENPs are being used in an

increasing number of EDs in the United Kingdom (UK), the United States (US), and to some extent in Australia. <3-11>. Their role is generally to assess, diagnose and treat patients as an adjunct to, and under certain circumstances, in lieu of, emergency physician (EP) care.

From a global perspective, ENP education and scope of practice vary widely. In the US, where a 2001 census found 1380 hospitals employ ENPs, a national nurse practitioner (NP) certification exists, but not all practicing individuals have this qualification.<9, 12> The NP title requires a Master level graduate degree in an area of specialization, but in emergency medicine (EM) only 15% of ENPs have dedicated education in EM and 70% have family NP training.<12> As of 2002, in the US there were only two nurse practitioner training Masters programs

specializing in EM.<9> As with their levels of training, the scope of ENP practice in the US is also broad and variable. Clinical roles may include medication prescription, diagnosis and treatment of ailments from minor to life-threatening illness and injuries, and the performance of procedures from simple suturing to managing pediatric cardiac arrest.<13> Publications to date shed no light as to the level of EP involvement in the education or clinical care delivery supervision of these tasks, nor do they systematically and comprehensively evaluate ENP practice.<13, 14>

In the UK, the presence of ENPs in EDs is common. Their training is less structured, compared to the US. National guidelines for training, and minimal education standards do not exist.<15> Studies from England, Scotland and Wales indicate that over 10% of ENPs have no EM-specific training at all. Fewer than 10% of them possess Master's-level education in emergency nursing, and most have on-the-job training that is supplemented with local ENP skill development courses.<6, 8, 15> The scope of clinical practice in the UK is limited to minor injuries and illnesses such as extremity bone and soft tissue injury, simple burns, soft tissue infections, and ENT complaints.<16>

Australia and Canada have less experience with ENPs than either the US or the UK. Neither of these countries has formal, nationally accredited training programs, certifications, or standardized scopes of practice.<11, 17> Australia has so far limited their use to understaffed rural areas and Canadian institutions, with a few exceptions, have largely abstained from utilizing ENPs.

While the worldwide use of these practitioners continues to grow, the evidence demonstrating their ability to provide safe patient care needs to be evaluated.

We hypothesize that in light of the current pattern of increased use of ENPs, there is evidence of ENP safety in complete patient care. The objective of this review is to find such evidence.

## Methods

The lead author and a research librarian carried out independent literature searches and the results were combined for review. The following

databases were searched for any references pertaining to nurse practitioners in an emergency setting: MEDLINE, PubMed, CINAHL, EMBASE and Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials, ACP Journal Club and DARE: Database of Abstracts of Reviews of Effects.

For controlled vocabulary databases (MEDLINE, PubMed, CINAHL and EMBASE), the search strategy incorporated terms and database limits for 'nurse practitioners' and 'emergency services' as appropriate to the database. The 'nurse practitioners' terms/limits were ANDed with the 'emergency services' terms/limits. The search was augmented with a keyword search as follows: (nurse practitioner\$ OR advanced nursing pract\$) AND emergenc\$. For those databases lacking a controlled vocabulary (Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials, DARE, and ACP Journal Club, Health Source), the keyword search cited above was used.

Independent review of the studies from the search, and application of the inclusion and exclusion criteria for each manuscript was performed by two of the authors (DNN, IPS). Inclusion criteria required that the study deal with complete ENP management of patients in the ED. The term *complete management* was defined as patient care from the time of the first evaluation until the discharge or admission of the patient. Only studies that addressed patient management as compared to a physician were considered. All physicians, even those in their post-graduate training, were included.

The three parameters that were used in this review to evaluate the validity of the selected studies were: the study design and size, the standard against which ENP care was compared, and the patient outcomes. The ideal study design is considered to be a large, prospective, blinded, randomized control trial.<18> The ideal standard for comparison is considered to be the emergency physician (EP) (sometimes referred to as the attending, consultant, or staff physician). Patient outcomes should reflect reliable, significant clinical end points.

Studies were graded on the evidence they provide for safe patient care according to the following original scale:

Class I: indicates high strength of evidence and includes randomized clinical trials; observational studies including prospective cohort studies; and aggregate studies including meta-analyses of randomized clinical trials or large database outcome trials. The standard of comparison is the gold standard, the EP.

Class II: indicates intermediate strength of evidence and consists of observational studies including retrospective cohort studies, case-control studies, and observational registries; and aggregate studies including other meta-analyses. The standard of comparison is the gold standard, the EP.

Class III: indicates the weakest strength of evidence for patient safety and, when the gold standard EP is used, consists of descriptive studies, including observational reports and case series; and consensual studies including expert panel consensus statements. This class also includes any study not using the gold standard of comparison, that is, any study using physicians who have not completed their post-graduate education.

## Results

### Results of the literature search

Searches of MEDLINE, PubMed, CINAHL, EMBASE identified 551, 474, 703, 140 studies respectively; the Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials, ACP Journal Club and DARE were searched together yielding 48 studies. Of all publications, 5 met the inclusion criteria and were chosen independently by each author. All 5 studies focused on the management of patients with minor injuries.

The remaining articles were excluded for the following reasons:

1. Many articles using this broad search strategy pertained to non-NP nursing care, did not have any relevance to ENP practice or care, or pertained to a specific discipline other than EM. In many, the words "Nurse Practitioner" were incidental in these publications.
2. Several studies purported to address patient safety but did so using limited, non-clinical endpoints such as patient satisfaction,

referral patterns by the ENP, or subjective ENP comfort with their patient management. Whereas the measure of these endpoints can be helpful they do not provide information on the objective safety of clinical care rendered.

3. A number of articles assessed safety of specific, limited ENP skills such as radiograph interpretation or application of specific clinical decision rules. They did not meet the "complete" patient management inclusion criteria.
4. The remaining articles involving ENP care were publications of opinions, articles containing descriptions of training programs, or studies involving NP demographics.

### Review of the selected articles

Four of the five studies which assessed the safety of care provided by ENPs use postgraduate trainees as the benchmark of safety. Only one, a small retrospective chart review, used an EP as the gold standard for patient care. All 5 studies focused exclusively on patients with minor injuries (such as extremity bone and soft tissue injury, simple burns, soft tissue infections and patients with ENT complaints).<sup>[11, 19-22]</sup> [Table 1] None of them evaluated ENP care of patients triaged with anything other than a minor injury.

The first of the studies examined is a randomized control trial by Sakr et al. in which the "rigorous gold standard of the experienced emergency registrar" (ER) was used to compare and evaluate the assessment and management of patients with minor injuries treated by ENPs and Senior House Officers (SHO).<sup>[19]</sup> ERs are senior trainees with experience in the UK system, but they are not attending EPs. SHOs are doctors in their second year of post-graduate training who deliver much of the EM care in the UK. All patients were randomized to SHO or ENP care and then underwent a second, blind research assessment by the ER, but the ER did not alter the management plan of the ENP or SHO. Adequacy of care was evaluated using a standard form comparing aspects of patient management between the groups and control. The data shows that both groups made approximately 10% of clinically important errors that would have altered patient management had the ER's management prevailed. Compared to

Table 1. Results: Studies that address ENP safety in emergency patient care

<i>Author</i>	<i>Study design</i>	<i>Standard of Comparison</i>	<i>Patient Population</i>	<i>ENP patient encounters</i>	<i>Class of Evidence</i>
<b>1. Sakr, 1999</b>	RCT* comparing SHO† and ENP	ER‡	Minor injuries, urban UK	704	III
<b>2. Sakr, 2003</b>	Prospective cohort trial comparing SHO and ENP	ER	Minor injuries, urban UK	1313	III
<b>3. Cooper, 2002</b>	Prospective randomized trial comparing SHO and ENP	SHO	Minor injuries, urban UK	102	III
<b>4. Chang, 1999</b>	Prospective comparing ENP and resident medical officer	RMO**	Minor injuries, rural Australia	78	III
<b>5. Tachakra, 2001</b>	Retrospective chart review comparing SHO and ENP	EP	Minor injuries, urban UK	200	III

\* Randomized control trial

† Senior House Officer

‡ Emergency Registrar

\*\* Resident Medical Officer

the ER, ENPs took an inaccurate history (24% of cases, compared to 45% with SHOs), did not adhere to guidelines (4.4%, SHO 5.9%), made errors in examination (3.7%, SHO 2.7%), committed errors in radiograph requisitioning (16.9%, SHO 17.9%) and interpretation (2.8%, SHO 3.6%) and in arranging follow up (2.8%, SHO 4.8%). 28-day follow-up was not completed in 39% of the 704 patients seen by ENPs, nor in 35% of 749 patients seen by SHOs. The review of outcomes of those patients who completed follow-up questionnaires (61% of ENP patients, 66% SHO) focused on self-reported improvement and showed no significant difference between groups. The study concludes that ENPs “provide a safe alternative to junior doctors”.

A second prospective cohort study by Sakr et al. compared the care of 1313 minor injury patients in an ENP-run minor injury unit to 1447 similar patients receiving “doctor-led” (73% SHOs, 27% ERs, general practitioners or unknown) care in an ED.<20> The standard used for comparison was, again, the judgment of the ER. All patients underwent a second, blind research assessment by the ER, but patients were again managed according to the assessment of an ENP or a non-EP doctor (usually an SHO). The authors found

that the doctor-led care in the ED led to 13.2% of clinically important errors while the ENPs made 9.6%. Patient outcomes were not reported. As in their first study, they conclude that ENP care is as safe as “doctor-led care” in the ED.

Cooper et al. randomized 204 patients with minor injuries to ENP care or SHO care.<21> 102 were allocated to each group. A senior SHO or ER was available for consultation. Patient assessments and management plans by the ENPs and SHOs were not compared and safety was assessed by evaluating patient outcomes. Outcomes were measured by using the following: a 1-month post-ED intervention questionnaire completed by patients in each group (64% responders in each group), documenting those who returned to the same ED (2 ENP, 4 SHO), made a formal complaint (0 ENP, 0 SHO), and finally those for whom the researchers received notification from a consultant (0 ENP, 0 SHO). Outcomes are unknown for those lost to follow-up and for those who may have attended other EDs. Returned questionnaires demonstrated no difference between the two groups in patients’ duration of symptoms, time to recovery, and level of function or unplanned follow up. The authors do not comment on overall safety of

patient care and conclude “further research is required to examine unplanned follow-up in minor injury patients”.

Chang et al. randomized 169 patients with minor wounds and blunt extremity trauma to care by resident medical officers (post-graduate trainees with a level of training unspecified by this study) and ENPs in a rural Australian hospital.<sup><11></sup> 78 patients were assigned to ENPs and 91 to medical officers. Patient care was judged based on the ENPs’ documentation of clinical assessment and management. Patients were also invited to return for follow-up evaluation but only 16 of 169 did so. No significant differences were noted in any area of care between ENPs and medical officers when an EP reviewed their clinical notes. The study does not address on how the care provided compared to the care that would have been provided by an EP. The conclusion drawn by the authors of this small study was that ENPs could provide care “consistent with acceptable standards”.

Tachakra and Deboo completed a retrospective chart review with the goal of determining the “clinical effectiveness” of ENPs and SHOs.<sup><22></sup> Two hundred patient charts were reviewed for each group and the quality of record keeping, assessment, diagnosis and management was made by an EP, the lead author. The overall quality of management was subjectively ranked “above average, average or deficient” against, presumably, the EP’s standard of care, although this is not clear from the study. The authors’ conclusion is that ENPs are able to manage patients “to a level comparable to that of SHOs”. Patient outcome measures were not included in this study.

## Discussion

Review of the world literature to date fails to provide evidence that ENPs’ management of patients is safe or unsafe compared to EPs.

The best of the studies reviewed is Sakr et al’s 1999 research, which has a large number of patients properly randomized to two similar groups.<sup><19></sup> The ER providing the control assessment was blind to the study assessments, but may have been aware of whether the patient was seen by an ENP or SHO. The non-validated, qualitative tool used to assess their patient assessment and management was based on

current best evidence and local practice. The major weaknesses of this paper are the lack of comparison to the care provided by an EP, and the unknown outcome of 36% of study subjects. Additionally, the conclusion that ENPs “provide a safe alternative to junior doctors” is not valid because both groups made a significant and similar number of management-altering errors, based on the evaluation of the senior trainee, the ER.

Sakr et al’s 2003 study compares two large cohorts of similar patients cared for in different settings by either ENPs or non-EP doctors, usually SHOs.<sup><20></sup> As in their 1999 study, the control assessments were blind, and the control for best care was the ER. Patient outcomes were not measured. The 10% of visits that involved patient care errors contradicts the conclusion that ENPs “provide a clinically safe service”.

Cooper et al. provide the only study relying solely on patient outcomes, and did not attempt to directly study or compare patient assessment and management by ENPs and physicians.<sup><21></sup> As described in the results, the study population was small and follow-up was too incomplete to draw any valid conclusions.

Chang et al. and Tachakra et al. have small sample sizes and neither describe how the ENPs were compared to junior doctors, nor how patient management would have been altered by the EP reviewing their clinical notes.<sup><11, 22></sup> The nonspecific methodologies of both studies leave any conclusions questionable.

These five studies attempt to determine “safe practice” in two fashions. The first method relies on comparing ENP decision-making to that of a “physician”. At best, all these studies demonstrate that ENPs are as unsafe as doctors-in-training. The majority of the studies in this review used junior physicians for comparison rather than the most competent EP available in that setting. We postulate in the methodology that the gold standard for emergency patient care is the EP (attending, consultant, or staff physician) working in the ED. Even though this standard is imperfect given the variation in worldwide EM training, certification, and individual practice, it nonetheless remains the current benchmark of best care for emergency patients everywhere. It is also important to note that research in education in EM and other

disciplines demonstrates that the diagnostic and treatment decisions of trainees, even senior ones, differ from the decisions of the attending physician to the point of requiring changes in the management of the patients in 4% - 33% of the cases.<sup><23- 25></sup>. To date, studies directly comparing ENPs to EPs have not been done.

The second method used to determine safety is to follow patient outcomes, which these studies do not succeed in doing. In situations where planned follow-up from the ED is not specifically provided, a substantial number of ED patients remain lost to follow-up and their clinical outcome remains unknown. Additionally, in a population of patients with minor injuries, large numbers must be followed for a sufficient time in order to detect differences in rare, serious outcomes. Near-miss errors are also left undiscovered.

Studies comparing ENP to EP patient care are needed from various parts of the world to demonstrate ideal patient care safety in each ED setting. The use of evidence based medicine in EM is universally applicable to all the locations where ENPs are currently being used and the quality of clinical care provided in all of these jurisdictions should theoretically be subject only to minor variations. However, the qualifications of the physicians and other EM health care providers, and the methods of supervising trainees in the ED are subject to substantial geographical variations. For example, in Canadian teaching centers, around-the-clock supervision of residents working in the ED by a qualified EP is mandatory though this practice may differ with approaches from other parts of the world. In the US, in contrast with the UK, ENP care is not always limited to patients with minor injuries therefore the patient population and the management expectations of the ENP differ.<sup><13, 26></sup> As a result, information from one country cannot be extrapolated to another until the benchmarks for highest level of care, as well as the actual EP and ENP training and practice, are substantially similar. This is not likely to happen and UK data will probably remain inapplicable to other nations' ENPs. Consequently researchers must develop data on the safety of ENP care that has local relevance. Despite international differences, defining patient care safety standards based on the "best level of EM care" in each jurisdiction would at

least establish a uniform starting point for discussion.

In conclusion, no evidence to date substantiates the equivalence of ENP-delivered complete patient care compared to that of EPs . Further studies of ENPs in EDs are needed to provide evidence that the patient care they provide in general or specific patient populations is comparable to the highest available level of current EM care, that is the EP. Additionally in light of geographical practice pattern variations in EM, the standards of best care expected from ENPs cannot be extrapolated between jurisdictions, and setting-specific evidence must be gathered.

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