Abstract of thesis entitled

“An Evidence-based Guideline on Nurse-led Management of Minor Injury in Patients Attending the Accident and Emergency Department”

Submitted by

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In Hong Kong, emergency healthcare providers have to treat a fairly large number of patients with low complexity problems, particularly minor injury is commonly seen. Such a growing utilization of less urgent emergency services, shortages of medical staff and ageing populations have driven patients to wait for a long time before seeing a doctor, leading to issues of overcrowding in the emergency department which could be detrimental. Possible delays in care could end up with complications if patients were left unseen for a prolonged time. Not only patient dissatisfaction, but also complaints and even aggression because of frustration with the long waiting could exaggerate stress levels of emergency
department staff, affecting manpower retention and the quality of patient care that can be provided. Nurse-led service instead of traditional physician-directed care for the low acuity conditions has been well established in emergency departments of overseas countries as an alternative to stream such a large group of patients to be treated separately by non-medical staff, thereby allowing more time spent by emergency physicians on other urgent presentations and consequently reducing the patients waiting in the department. Possible interventions are known to include the assessment, diagnosis, treatment and discharge planning of minor injuries to be led by appropriately trained nurses, however, this is not the case in local emergency settings. For this reason, this dissertation aims to evaluate the best available evidence to determine the effectiveness of nurses in the assessment, treatment and management of minor injuries in adults, to formulate an evidence-based guideline on the innovation, as well as to assess its implementation potential and to develop implementation strategies and evaluation plan for its use in an emergency department of a public hospital in Hong Kong.

A systematic literature search using three electronic databases, including the CINAHL, PubMed and the Cochrane Library was first conducted from 1st August 2014 to 31st August 2014. Of which seven randomized-controlled studies which compared the nurse-led intervention with the doctor-initiated one on those aged 16 or above with any types of minor injury and addressed at least one of the following outcomes of interest: patient satisfaction, waiting times, quality of care and cost were ultimately included for the review. Data were extracted and critical appraisal on quality of the included studies was individually performed using a methodology checklist developed by the Scottish Intercollegiate Guidelines
Network. Evidences in six out of the seven trials comparing the effectiveness of the nurse-led management to the mainstream management of minor injuries were acceptable to be high methodological quality. They consistently ascertained that appropriately trained and experienced emergency nurses who worked within an agreed guideline could provide a quality care for minor injured patients with better patient satisfaction and reduced waiting times with at least as good clinical outcomes as that of provided by doctors.

Implementation potential of the innovation of nurse-led minor injury management within the context of the practicing emergency department was further established by assessing its transferability, feasibility and pertaining cost-benefit ratios. Setting, population and philosophy of care of the target context were shown to be congruent with those in the studies. By estimation, potential savings of a minimum of one million dollars a year could be produced on top of the operational cost of running the innovation with minimal barriers and relative low risks to patients. In view of such a high implementation potential of the innovation and based on synthesis of the quality research findings, an evidence-based guideline on the nurse-led management of a more familiarize type of minor injury, minor wound embedded with a set of eight recommendations is subsequently developed to guide the practice.

A 15-month implementation programme including marketing of the innovation, training of staff and clinical application of the proposed guideline, and pilot testing was designed. Multifaceted implementation strategies including consistent communication efforts with key stakeholders, audit and feedback
would be employed to initiate, guide and sustain the practice change. Quantitative and qualitative data on patient outcomes, healthcare provider outcomes and system outcomes would be monitored and evaluated throughout the process.

Effectiveness of the proposed nurse-led model of management for minor wound would be primarily determined by the incidence rate of adverse events among the patients seen, and the shortening of their waiting times to assessment and overall length of hospital stay. With the introduction of the innovation, it is anticipated that emergency nurses could contribute their knowledge and skills to provide high quality, safe and timely care to patients with minor injury, and of importance is that issues of waiting and overcrowding could be addressed.
An Evidence-based Guideline on Nurse-led Management of Minor Injury in Patients Attending the Accident and Emergency Department

by

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July 2015
Declaration

I declare that this thesis represents my own works, except where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualifications.

Signed ………………………………………………………………………

Chow Yuen Kei
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<th>Description</th>
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<tbody>
<tr>
<td>AED</td>
<td>Accident and Emergency department</td>
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<td>AEIS</td>
<td>Accident and Emergency Information System</td>
</tr>
<tr>
<td>APN</td>
<td>Advanced Practice Nurse</td>
</tr>
<tr>
<td>C-MISS-R</td>
<td>Chinese Medical Interview Satisfaction Scale-Revised</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence interval</td>
</tr>
<tr>
<td>CINAHL</td>
<td>Cumulative Index to Nursing and Allied Health Literature</td>
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<tr>
<td>COS</td>
<td>Chief of Services</td>
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<tr>
<td>CQI</td>
<td>Continuous quality improvement</td>
</tr>
<tr>
<td>DOM</td>
<td>Department Operations Manager</td>
</tr>
<tr>
<td>EBP</td>
<td>Evidence-based practice</td>
</tr>
<tr>
<td>ED</td>
<td>Emergency department</td>
</tr>
<tr>
<td>ENP</td>
<td>Emergency nurse practitioner</td>
</tr>
<tr>
<td>HA</td>
<td>Hospital Authority</td>
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<tr>
<td>HK</td>
<td>Hong Kong</td>
</tr>
<tr>
<td>LOS</td>
<td>Length of stay</td>
</tr>
<tr>
<td>NP</td>
<td>Nurse practitioner</td>
</tr>
<tr>
<td>PISMA</td>
<td>Preferred Reporting Items for Systematic Reviews and Meta-Analyses</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomized controlled trial</td>
</tr>
<tr>
<td>RN</td>
<td>Registered Nurse</td>
</tr>
<tr>
<td>SD</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>SEN</td>
<td>Specialized emergency nurse</td>
</tr>
<tr>
<td>SIGN</td>
<td>Scottish Intercollegiate Guidelines Network</td>
</tr>
<tr>
<td>WM</td>
<td>Ward Manager</td>
</tr>
<tr>
<td>WT</td>
<td>Waiting times</td>
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Chapter 1

Introduction

1.1 Background

Emergency department (ED) overcrowding has long been the topic of global interest (Forero et al., 2010; Higginson, 2012; Hoot & Aronsky, 2008; Trzeciak & Rivers, 2003), hence Hong Kong (HK) is no exception. Given the lack of accessibility to primary care (Chung, 2000; Lee et al., 2000) and the usual higher expectations to the quality of ED services (Graham, Kwok, Tsang & Rainer, 2009; Lee et al., 2000; Lee, et al., 2001), there is a substantial population presenting to the ED with low complexity problems without attending any outpatient clinics or general practitioners beforehand. Nowadays, EDs in HK therefore function as the providers of not only emergent care, but also increasingly, primary care for neither life-threatening nor critical problems. Elderly, by contrast, are in need of more urgent ED resources than the younger (Lee et al., 2001; Yim, Graham & Rainer, 2009). As a result, the growing utilization for less urgent services in addition to the aging population would provide local emergency settings a more intensified crowding scene in future.

From the international standpoint, ED overcrowding indicates a failure of healthcare system in compromising patient health and cost (Canadian Association
of Emergency Physicians and National Emergency Nurses Affiliation, 2001). For this, Western governments recommended to stream the large group of patients with low acuity conditions from triage to management separately from more acute problems by non-medical staff (Garling, 2008; Institute of Medicine, 2006), thereby reducing the number of patients waiting in EDs and attending those seriously ill cases by more available doctors without delaying the care (Cooke, Wilson & Pearson, 2002; Ieraci, Digiusto, Sonntag, Dann & Fox, 2008; Quattrini, 2009; Rodi, Grau & Orsini, 2006). Possible interventions are known to include the assessment, diagnosis and treatment of the common and less urgent minor injuries by appropriately trained nurses. By definition, minor injury is a blanket term of injury without tendon or ligament damage and long bone fracture, covering minor wounds, like abrasions and lacerations, musculoskeletal sprains and simple fracture (Purcell, 2003), which is a low complexity problem commonly seen in local EDs as well (Wong, Chan, Rainer & Chair, 2007). With international trends, nurse-led management instead of traditional physician-directed care for minor injuries has been therefore widely implemented in EDs of the United States (Carter & Chochinov, 2009), the United Kingdom (Hoskins, 2011) and Australia (Considine et al., 2012), yet this is not the case in HK.

1.2 Affirming the Need
The practicing setting is providing services at one of the seventeen Accident and Emergency Departments (AED) located at a public hospital. It handles the second highest volume of daily attendance among others in the same cluster. In 2013, data from the Accident and Emergency Information System [AEIS] (2014a, 2014b) revealed that an average of about 310 people visited daily with an increase of 4.8% compared to 2012. Over 50% were triaged as semi-urgent (AEIS, 2014a), in which minor injuries made up a significant proportion of the workload. There were an average of about 400 cases monthly required dressing and suturing for their minor wounds (AEIS, 2014c) which had already accounted for nearly 20% of the semi-urgent cases. Other common minor injuries like musculoskeletal sprains, contusions and simple fracture were not yet included due to the lack of readily accessible statistics.

**Gap in existing practice**

In the existing practice, people come to the practicing AED for minor injuries will be first assessed by a triage nurse and usually categorized as semi-urgent if clinically stable (Hospital Authority [HA], 2010). With the introduction of triage system, waiting for consultation by these patients is often prolonged upon the arrival of more urgent cases. Though management of minor injuries is relatively straightforward (Choi, Wong & Lau, 2006), it is the standard practice that patients need to wait again until doctors’ orders of administrating
medications, dressing, suturing, discharge or other definitive treatments to be followed and done by nurses. In 2013, about one-third of patients in this group was not treated within the targeted performance pledge of 120 minutes in the practicing setting (AEIS, 2014c). The ongoing shortage of physicians as in other local EDs (Panel on Health Services of the Legislative Council, 2013) has sometimes resulted in their waiting times of even over 10 hours.

Negative impacts of prolonged waiting

Minor injury is not life-threatening, yet wounds could be easily infected in a crowding ED environment (Williamson, Bisaga, Paquette & Lovell, 2013). Delays in wound closure due to long waiting also increases risk of infection as lacerations are likely contaminated by high level of bacteria if they remained to be unrepaired 6 to 10 hours after the injury (Lammers, Hudson & Seaman, 2003; Moreira & Markovachick, 2007). Besides, studies found that a significant portion of patients experienced worsening pain during their long waiting in EDs (Jantos et al., 1996; Salomone, Price & Watson, 1995), while pain would cause muscle spasm, impair muscle function, and increase fatigue and immobility (Purcell, 2003). With these complications, it could be imagined that additional healthcare cost would inevitably occur consequently. Other than this, the prolonged waiting not only contributes to patient dissatisfaction because of delays in care and pain management (Blank et al., 2001), but also conflicts between patients and
healthcare providers which could end up with complaints (Tam & Laum, 2000) and even workplace violence (Taylor & Rew, 2011). Not surprisingly, long-waiting patients have been therefore always witnessed scolding nurses with foul language for demanding to see doctors and get their treatments done earlier in the practicing AED. Both doctors and nurses would suffer from decreased job satisfaction under constant threat of such verbal abuse or physical violence by these agitated people. Poor productivity, increasing staff turnover and ultimately poor ED efficacy would be likely to result (Brunetti & Bambi, 2013; Kowalenko, et al., 2012; Rondeau & Francescuttiin, 2005).

**Indicators for potential innovation**

Indeed, in line with the global trends (Hoskins, 2011; Schneider et al., 2010), both shortage of medical manpower (Panel on Health Services of the Legislative Council, 2013) and evolution towards nursing professionalism (Wong & Lau, 2008) have urged the necessity for nurse-led emergency service in HK. Brook and Crouch (2004) further affirmed that such new role has been evolved from the costly healthcare expenditure due to the increasing AED visits.

Moreover, suturing is the only extended role of nurses in managing minor injuries in local emergency settings. Other than this, nurses are not taking patient histories, performing physical examinations, ordering investigations and treatment, and planning discharge for minor injuries as those titled as nurse practitioners
(NPs) or emergency nurse practitioners (ENPs) in the western countries (Carter & Chochinov, 2009; Considine et al., 2012; Hoskins, 2011). Nurse-initiated tetanus immunization and analgesic prescription are currently implemented in the practicing AED with well-established protocols. Nevertheless, there is no existing evidence-based guideline for nurses to extend their scope of practice to assess, diagnose, treat and discharge patients with minor injuries. Altogether, taking into account the previously mentioned negative impacts of prolonged waiting, the consideration of managing the fairly large group of minor injury patients separately by nurses in the target AED is affirmed.

1.3 Significance and Objectives

On the other side, switching the existing practice from physician-led to nurse-led to manage the relatively stable and large group of patients with minor injury would benefit at least three parties, patients, nurses and the institution.

With the innovation, a continuum of holistic care could be received by patients even in the busy AED as they could be seen by the same healthcare provider from consultation to discharge (Byrne, Richardson, Brunsdon & Patel, 2000; Olive, 2003). Besides, patients are more likely to be satisfied as nurses are usually better at communication than doctors in providing information regarding the therapeutic regimen (Sandhu, Dale, Stallard, Crouch & Glucksman, 2009).
The switching of practice could also enable more available medical resources to treat some time-sensitive conditions such as acute myocardial infarction, stroke and sepsis timely, avoiding unnecessary complications and deaths (Collis, 2010; Moskop, Sklar, Geiderman, Schears & Bookman, 2009).

Furthermore, professionalism of emergency nursing in HK can evolve towards a greater extent as in the overseas countries with the nurse-led practice (Wong & Lau, 2008). Such independent nursing role would increase autonomy in practice, thereby helping to boost morale among nurses (Crimson, 1995). Sharing the workload with physicians, lesser people would leave without being seen and revisit later with worsening problems, hence long-term burden to healthcare system would be lessened in the interest of the institution (Krochmal & Riley, 1994; Kyriacou, Ricketts, Dyne, McCollough & Talan, 1999). Studies have illustrated that nurse-led care achieved equal clinical and cost effectiveness as the physician-directed one with stable patients in other settings (Antic et al., 2009; Goldie, Prodan-Bhalla & Mackay, 2012; Nicholson, Coldwell, Lewis & Smith, 2013). Thus there could be possibly a similar use of resources if the innovation was feasible in the target AED.

To evaluate the feasibility of introducing a new professional group to manage patient care, it is important to ascertain if the care is better possible compared to the existing one. For this reason, a translational nursing research
dissertation is conducted to translate the best evidence so to determine the feasibility of nurse-led management of minor injuries in the practicing AED on behalf of the proposed research question: in patients with minor injuries attending the Accident and Emergency department, is nurse-led management compared with the existing physician-led care improves patient satisfaction, waiting times, quality of care and cost?

And the objectives of this dissertation are:

1. to conduct a systematic search of evidence on effect of nurse-led management of minor injuries;

2. to critically appraise, summarize and synthesis of cumulative findings in the identified studies;

3. to assess the implementation potential of the proposed practice;

4. to develop an evidence-based practice guideline on nurse-led management of minor injury in the target AED. In view of the broad spectrum, guidelines on management of each type of injuries would be developed stage by stage. To get start with, guideline on nurse-led management of a more familiar type of minor injury, minor wounds would be first developed in this paper;

5. to outline implementation and evaluation plan of the proposed guideline.
Chapter 2

Critical Appraisal

To ascertain whether nurse-led management of minor injuries is an effective alternative to the current practice, a systematic review of evidence is presented in this chapter. Search and appraisal strategies for the best evidence followed by quality assessment will be discussed. Summary and synthesis of findings among the retrieved studies will be subsequently elaborated for making evidence-based recommendations.

2.1 Search and Appraisal Strategies

2.1.1 Identification of studies

An initial search of three electronic databases, namely the Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed and the Cochrane Library was undertaken using a combination of keywords identified from the population, intervention and outcomes in the research question set previously (see Appendix A). Keywords within each group and those between different groups were linked to search by using the Booleans ‘OR’ and ‘AND’ respectively to yield as many potential results as possible. Language, year of publication and availability of full text of articles were not limited to avoid
missing any quality evidence. Potential articles were selected manually after screening the titles among the searching results followed by the review on the basics of the relevance of the abstracts. Eligibility of study for inclusion was then checked against the inclusion and exclusion criteria by reading thoroughly the full papers. Hand search of reference lists in all included studies for any additional articles which were not found in the preceding search strategies was performed when necessary. Duplicated studies identified among the three databases were finally eliminated.

2.1.2 Inclusion and exclusion criteria

Studies were included if they met all the following criteria:

(i) subjects aged ≥ 16 presenting with any types of minor injury;

(ii) intervention involved scope of practice in the assessment, diagnosis, treatment and or discharge planning of minor injury;

(iii) addressed at least one of the following outcomes of interest: patient satisfaction, waiting times, quality of care and cost.

However, studies were excluded if they met any one of the following criteria:

(i) any unpublished studies, newspaper articles, dissertations or conference reports;
(ii) subjects presented with multiple trauma or concurrent health conditions in need of urgent treatment or resuscitation;

(iii) intervention was outreached, internet-based or telephone-based;

(iv) intervention was provided in settings outside EDs.

The above criteria were set to allow easier and greater transferability of evidence to the actual clinical setting of the target AED so as to determine if quality, safe and effective care could be similarly provided in future. First, in regard of the legal age of at least 16 years old in HK to consent for any clinical procedure without a guardian and a majority of over 70% of minor wounded cases was aged 16 or above (AEIS, 2014c), hence studies which recruited subjects aged ≥ 16 were particularly included. Besides, adult was the targeted patient group as advanced knowledge is always necessary for pediatric management and children are usually less cooperative to be managed. Parents might also feel less comfortable with this newly introduced nursing role for the management of their children. Therefore, it would be rather ambitious to manage patients of all ages by nurses at such an immature phase for the proposed guideline to be implemented on its first trial in the practicing setting.

2.1.3 Data extraction

In order to provide a precise summary of relevant information from the selected studies for data synthesis, a table of evidence modified from the one
suggested by the Scottish Intercollegiate Guidelines Network [SIGN] (2013) was established to organize the data. Specific data including details about the bibliographic citation, study type, evidence level, patient characteristics, intervention, comparison, length of follow up, outcome measures and results were extracted independently from each eligible study.

2.1.4 Quality assessment

Quality of the included studies was then assessed independently with the use of an appropriate methodology checklist developed by SIGN (SIGN, 2014a) for various study type. The checklist consisted of two sections. The first section concerned the internal validity of the study. The second section focused on the overall assessment of the study. With the quality rating coded as ‘++’, ‘+’ or ‘-’, the level of evidence provided by individual study was then graded according to the SIGN Grading System (SIGN, 2014b) (see Appendix B).

2.2 Results

2.2.1 Search history and result

The initial search of CINAHL, PubMed and the Cochrane Library conducted from 1st August 2014 to 31st August 2014 using the keyword search had elicited a total of 1320 articles. The second limited search for experimental studies narrowed the results to a total of 183 articles. Full text of 20 potential
inclusions were retrieved to assess for eligibility in details against the inclusion and exclusion criteria after screening the information provided in the titles and abstracts of the previous 183 results. Of these, 13 eligible studies were included and 1 additional relevant article was retrieved manually from the reference list in one of the included studies. Eventually, 7 duplicates were eliminated. The remaining 7 were included in which all were primary studies published in English. A flow diagram in form of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Polit & Beck, 2008) is illustrated in Appendix C for their identification.

2.2.2 Summary of study characteristics

As mentioned previously, specific data from each of the seven eligible studies was extracted and put into the table of evidence which is well presented in an ascending order of the year of the publication of the inclusions in Appendix D. All included studies were randomized controlled trials (RCTs) published from 1999 to 2013 with both an intervention and a control group except one compared two intervention groups to a control group (McClellan, Cramp, Powell & Benger, 2012). Of these, Derksen et al. (2006) and McClellan, Cramp, Powell & Benger (2012) first described the clinical outcomes and further evaluated the cost regarding the same intervention in their companion papers respectively (Derksen,
Four studies were conducted in England (Cooper, Lindsay, Kinn & Swann, 2002; McClellan, Cramp, Powell & Benger, 2012, 2013; Sakr et al., 1999), two in the Netherlands (Derksen et al., 2006; Derksen, Coupé, van Tulder, Veenings & Bakker, 2007) and one in Australia (Charles, Le Vasseur & Castle, 1999). All were single-centered trials conducted in an ED inside an inner city of the country with the sample size ranged from 80 (Charles, Le Vasseur & Castle, 1999) to 1453 (Sakr et al., 1999).

All trial participants were recruited consecutively during their attendance to the participating ED. A convenience sample was used. All were adults of both genders, aged from 16 to 92 presenting with a minor laceration (Charles, Le Vasseur & Castle, 1999), ankle and foot injury (Derksen et al., 2006; Derksen, Coupé, van Tulder, Veenings & Bakker, 2007), peripheral soft tissue injury (McClellan, Cramp, Powell & Benger, 2012, 2013) or any types of minor injury which fell within the management protocol for nurses (Cooper, Lindsay, Kinn & Swann, 2002; Sakr et al., 1999). Informed written consent were all obtained prior the trials.

2.2.3 Summary of methodological issues
Using the checklist for controlled trials provided by SIGN (2014a) (see Appendix E), a methodology quality assessment was done for every study. The corresponding results were shown in Appendix F.

Of the seven RCTs included, their level of evidence was graded from 1++ to 1- (SIGN, 2014b). All addressed an appropriate and clearly focused research question with well-defined population, intervention, comparison and outcome measures. Fundamentally, they assigned subjects to treatment group randomly yet two did not specify the method while others employed the good use of block randomization (Derksen et al., 2006; Derksen, Coupé, van Tulder, Veenings & Bakker, 2007; McClellan, Cramp, Powell & Benger, 2012, 2013) or computer off-site generalized allocation (Sakr et al., 1999). The use of simply unmarked envelopes by Charles, Le Vasseur and Castle (1999) and no concealment method reported by Derksen and colleagues (2006, 2007) had possibly imposed allocation bias.

Due to the study nature, all participants were less likely to be kept unaware of which treatment officer provided the care they were receiving, however, this could have unlikely affected the patient satisfaction results. Only the investigator was clearly reported to be blinded in the trial of McClellan, Cramp, Powell and Benger (2012) and so as in their companion paper while Cooper, Lindsay, Kinn and Swann (2002) did not detail so. Investigators in the remaining four studies
were not feasible to keep blinded as they were necessary to be directly involved in the clinical assessment of patient outcomes at the follow up. They might be told by the patients who had treated them previously or recognize the handwriting of the treatment officer when reviewing the documentation. Results for the outcome evaluation could have been therefore possibly biased.

Baseline characteristics of subjects in relation to their gender, age and injury type revealed no significant differences between the treatment group and the control group in most of the trials. However, no such information was provided by Charles, Le Vasseur and Castle (1999), hence it could not determine if the two groups were reasonably similar at the start of trial and assure that any between-group differences in results were due to the effect of intervention instead of the demographic variables.

Outcome measures were clearly described in all studies, provided that the questionnaires and tools used were validated previously except the ones used in Charles, Le Vasseur and Castle’s trial (1999). Reliability of their outcome results could be therefore not consolidated in some ways. However, no subjects in this trial were lost to follow up as its follow up process for the necessary removal of stitches had enabled completeness of the data collection. On the contrary, refusal of responders to return the follow-up questionnaires had possibly accounted for the particularly high dropout rate of over 40% and 30% in the studies of Sakr et al.
(1999) and Cooper, Lindsay, Kinn and Swann (2002) respectively, though no explicit explanations were given by the authors. Bias would be likely to result if non-respondents were different from respondents. Only the trial conducted by McClellan, Cramp, Powell and Benger (2012) had reported its data analysis was on an intention to treat basis.

The seven studies were undertaken at a single center and therefore results were possibly less representative of all ED patients in the authors’ country. Nevertheless, given the similar characteristics of the study subjects to the target population, all outcomes results are applicable to the patient group in the practicing setting.

Five out of the seven studies were well-powered (Derksen et al., 2006; Derksen, Coupé, van Tuller, Veenings & Bakker, 2007; McClellan, Cramp, Powell & Benger, 2012, 2013; Sakr et al. 1999). Their sample size had been calculated to be large enough for detecting significant differences in results. However, in any prospective clinical studies as the seven trials, behavior of both groups could be altered during the study as they were fully informed of the assessment. This is known as the Hawthorne effect (Burns & Grove, 2009) which was the common limitation in all inclusions. It is therefore possible that one group might have put extra effort into the management of patients when the study was
taking place especially in the case for nurses who were allowed to treat patients themselves for the first time.

2.3 Summary and Synthesis

Patients with minor injuries in all studies were randomized to management by either a nurse in the intervention group or a doctor in the control. Between-group comparison was made to evaluate the care provided in terms of at least 1 of the 4 a priori determined outcomes of interest: patient satisfaction, waiting times, quality of care and cost.

2.3.1 Summary of results

Patient satisfaction

Patient satisfaction was consistently high with both healthcare providers, but was often higher for nurses. The largest trial of Sakr et al. (1999) found levels of overall patient satisfaction in the two groups were equally high most of the times, while Cooper, Lindsay, Kinn and Swann (2002) found patients were significantly more in favor of the care provided by nurses than the one provided by doctors during their initial ED visits and remained higher with nurses at follow up as reported by Charles, Le Vasseur and Castle (1999) and Derksen et al. (2006). In particular, patients were better satisfied with nurses on the basic of better quality of suturing received ($p = 0.0016$) (Charles, Le Vasseur & Castle, 1999), more information provided for their injury ($p = 0.007$) and injury prevention ($p = 
0.001), how easier it was to talk with for their injury \((p = 0.009)\) (Cooper, Lindsay, Kinn & Swann, 2002), thorough treatment to be offered \((p < 0.01)\) and how clearer it was the proposed treatment explained \((p < 0.01)\) (Derksen et al., 2006).

Waiting times

Three studies examined effect of care provided by the two groups on waiting times for patients to be assessed and treated, and overall times spent in ED. Of which, two reported that patients in the nurse-led care group had significantly shorter waiting times to assessment than those in the doctor-group (48.6 minutes versus 70.1 minutes, \(p < 0.001\); 21 minutes versus 32 minutes, 95% CI: 5-13 minutes, respectively) (Cooper, Lindsay, Kinn & Swann, 2002; Derksen et al., 2006), yet Charles, Le Vasseur and Castle (1999) reported that patients sutured by nurses did not significantly differ from those sutured by doctors either in their waiting times until consultation and suturing commenced or total time stayed in the ED. With the smallest sample size \((n = 80)\), poor power of this study might account for its failure to detect a significant difference as the other two trials.

Quality of care

Several studies evaluating quality of care examined both accuracy and adequacy of the care as well as the clinical outcomes of injuries. Three studies consistently provided evidence that nurses were at least as accurate as doctors in
assessing and treating the injuries. Compared with the golden standard of the
researcher, NPs and junior doctors made similar clinically important errors in
history taking, examination, radiography interpretation, treatment and follow-up
among 65 (9.2%) out of 704 patients and 80 (10.7%) out of 749 patients
respectively ($p = 0.2$) (Sakr et al., 1999). Similarly, specialized nurses were
equally sensitive as doctors in detecting ankle or foot injuries required treatment
($p = 0.14$) (Derksen et al., 2006). Cooper, Lindsay, Kinn and Swann (2002) also
reported both groups had only one missed injury. More strikingly, nurses provided
a more adequate care to patients than doctors to a significant extent. Quality of
NPs' clinical documentation was significantly higher than that of doctors ($p <
0.001$) (Cooper, Lindsay, Kinn & Swann, 2002). Besides, Sakr et al. (1999) found
a significant between-group difference that 37 (8.6%) of 432 patients in the
NP-led group compared with 64 (13.1%) of 488 in the junior doctor-led group had
at least one unplanned follow-up visit ($p = 0.03$).

Of the four studies addressed, clinical outcomes of minor injuries managed
by nurses were equivalent to the routine care provided by doctors. Three
examined the patient outcomes with their level of functional recovery, level of
symptoms and number of days unable to work in which they were assessed by
either patient self-completion questionnaires (Cooper, Lindsay, Kinn & Swann,
2002; Sakr et al., 1999) or phone interviews (McClellan, Cramp, Powell & Benger,
No significant between-group differences were found in all measures. However, the less satisfactory follow-up rates in these studies might lead to bias if those non-respondents differed from those who had completed the questionnaires or interviews. In Charles, Le Vasseur and Castle’s trial (1999), again no significant between-group differences in the incidence of wound approximation ($p = 0.71$) and complications ($p = 1.00$) were reported, yet possible bias resulted from its unknown follow up period and poor methodological quality should be also considered.

Cost

Cost evaluation for the care provided by nurses and doctors was done alongside three RCTs (Derksen, Coupé, van Tulder, Veenings & Bakker, 2007; McClellan, Cramp, Powell & Benger, 2013; Sakr et al., 1999). Overall cost, however, appeared to be higher if NPs were deployed to manage the care. Sakr et al. (1999) reviewed that NPs and junior doctors were equally likely to request for radiography and arrange follow up for patients. Similar finding was reported by McClellan and colleagues (2013). As such, there was no significant between-group difference in the direct costs associated with the two groups’ treatments or investigations in both studies. Instead, apart from the usual expensive trainings for NPs and their increased work costs at nights and weekends (Sakr et al., 1999), the substantial indirect costs spent in for example, unplanned
healthcare visits and purchase of additional items for pain relief (£52.7 [95% CI: £33.0-£81.6] for ENP-group versus £19.6 [95% CI: £11.2-£38.6] for doctor-group) (McClellan, Cramp, Powell & Benger, 2013) had subsequently made the NP care more expensive than doctors. More important long-term costs were considered to advance the total cost as economic evaluation was conducted only in the first 8 weeks following the injury in this trial.

The likelihood of costing less seemed to be greater in the total costs associated with the care of specialized emergency nurses (SENs) in another trial (Derksen, Coupé, van Tulder, Veenings & Bakker, 2007). On a basis per patient, the total costs were €186 (SD €623) in the SEN group and €153 (SD €529) in the doctor group. The difference of €33 (95% CI: -€84-€155) could be explained by the insignificant between-group differences in the substantial costs associated with hospitalizations and trainings, and therefore was not statistically significant.

2.3.2 Data synthesis

Instead of simply investigating how effective was the nurse-led management with minor injuries, this review aims at assessing its potential benefits in comparison with the one managed by physicians within ED settings. Therefore, RCTs were appropriately included. Subjects were generally homogeneous in all trials. They represented adult patients with a spectrum of
minor injuries that resembled those in the local A&E, which generalized the findings to the target population in the proposed setting.

Several studies reported that patients were significantly more satisfied with the overall care and information provided by nurses. With the higher level of patient satisfaction, nurses were found to be better at providing health education to patients than doctors. Other reason for the better satisfaction was that nurses provided a continuous care for patients after assessment, whereas doctors delegated the tasks to departmental nurses as in the practicing ED. Evidence illustrated that such a prolonged contact time afforded by nurses along with improved communication and shorter waiting times would satisfy patients to a significant extent. It therefore added a holistic value of having a nurse-led service in the busy practicing AED. As a result, it is highly recommended that scope of practice in not only the advanced assessment, diagnosis and treatment, but also patient education should be considered when developing the protocol for the nurse-led minor injury care.

Furthermore, findings in this review showed that, there was no statistically significant differences between quality of care provided by nurses and doctors overall. No adverse events were reported. Importantly, quality of nurses’ clinical documentation was found to be significantly more excellent than that of physicians. Good practice is said to be always resulted from good notes.
(Montague, 1996) as accurate written clinical documentation is essential for effectively communicating critical information about patient care between colleagues. It is therefore evident that nurses are capable of managing patients with minor injuries independently in this vital aspect. In other words, appropriateness of the practice could be evaluated upon the implementation by means of auditing the clinical records filled by those trained nurses.

To extend practice effectively, advanced knowledge and clinical experience were also found to be the prerequisites for quality care. Of the trials reviewed, nurses were staff either qualified as NPs or specialized nurses who had at least 4-year ED experience (Sakr et al., 1999). They were all trained in the anatomy, physiology, examination skills, treatment and suturing prior to the implementation of intervention. Results from included studies confirmed that management of minor injuries could be carried out safely by well-trained and experienced non-medical healthcare professionals. However, partly due to the usual long and expensive trainings for NPs, overall cost associated with their care appeared to be more expensive than residents, but it was not the case in one trial (Derksen, Coupé, van Tu lder, Veenings & Bakker, 2007). To get start with lower costs, a convincing idea is that instead of training and deploying higher-payed Advanced Practice Nurses (APNs) as NPs in the studies, it is recommended that experienced Registered Nurses (RNs) in the target ED can be trained on a short injury-specific
course related to, for example, minor wounds at the first phase to led the care.

Costs for developing additional educational program can be saved when the first group of RNs is trained.

To another extent, nurses were able to seek advice from doctors in the studies. As a team in the AED, doctors are always welcomed to intervene when problems arise in real-time clinical situation. Thus the protocol of nurse-led management of minor injury can be regarded as a meaningful clinical tool that aids nurses to extend scope of practice and advance standard of care in joint efforts with the medical staff, enhancing collaboration for the best of patient outcomes.

In short, sufficient quality evidence have demonstrated nurse-led management of minor injuries could provide a care that is equivalent to or even in some ways better than the existing one provided by physicians. It justified that appropriately trained and experienced emergency nurses who work within an agreed guideline could provide accurate, adequate and affordable care of minor injured patients with better patient satisfaction, reduced waiting times and at least as good clinical outcomes as doctors. To make the best use of the nursing and medical resources, it is therefore worthwhile to develop an evidence-based nurse-led minor injury management guideline in the practicing AED.
Chapter 3

Assessing Implementation Potential

Integrative review in Chapter 2 clearly demonstrated that nurse-led management of minor injuries could provide a care better than or at least equivalent to physicians in the best interest of patients. With respect to its lack of protocol in the local context, it is worthwhile to translate the quality findings into everyday practice. To effect the change appropriately, implementation potential within the target setting should be preliminarily assessed in terms of its transferability, feasibility and pertaining cost-benefit ratios (Polit & Beck, 2008) as follows.

3.1 Target Setting/Audience

The innovation is proposed to be implemented in a designated AED situated at a public hospital. In 2013, a total of approximate 5000 patients attended for minor abrasions and lacerations. Among which, over 70% were aged 16 or above (AEIS, 2014c). Although number of other minor injury types like musculoskeletal sprains was not exactly known due to inaccessible statistics, cases of minor wound had already made up a fairly large proportion of workload within the designated AED. To benefit a larger population and introduce a guideline on
managing a more familiarized type of minor injury to nurses in the first place, those who (i) are aged 16 or above, (ii) attend for minor wound(s), including abrasions and lacerations as defined (Purcell, 2003), (iii) without multiple trauma or concurrent health conditions in need of urgent treatment and (iv) are triaged as either semi-urgent (category 4) are certainly the target audience.

3.2 Transferability of the Findings

According to Polit and Beck (2008), whether an innovation is fit within the proposed context is highly dependent on its transferability. To assess so, similarities in the setting, population and philosophy of care between the study contexts and the target AED, sufficiency of the clients benefited, and reasonableness of the timeframe for implementation and evaluation are considered.

3.2.1 Setting and population

Despite the seven included trials were conducted within the setting of ED in England (Cooper, Lindsay, Kinn & Swann, 2002; McClellan, Cramp, Powell & Benger, 2012, 2013; Sakr et al., 1999), the Netherlands (Derksen et al., 2006; Derksen, Coupé, van Tulder, Veenings & Bakker, 2007) and Australia (Charles, Le Vasseur & Castle, 1999), there could not be any differences between the standard management of minor injuries from the target AED in HK. Quality of
care remains to be dependent on individual competency and attitude regardless of the cultural context of the service provision.

Regarding the demographic characteristics, all the trial participants were ED patients of both genders. Five out of the seven studies recruited those aged 16 or above without upper limits except two specified to include those aged from 18-65 (Derksen et al., 2006; Derksen, Coupé, van Tulder, Veenings & Bakker, 2007). Their age and sex were highly comparable to those of the target audience. Furthermore, those with any mental or physical conditions known to complicate the simple management of minor injury were excluded in the seven included studies, while people solely presenting with any types of minor injury are usually categorized as semi-urgent in the local practice according to the triage guideline (HA, 2010). In other words, the study populations shared the similar severity of injuries with the target audience in the practicing AED who are expected to be absent from any unstable conditions.

3.2.2 Philosophy of care

In accordance with the core value of the HA (HA, 2014a), the target hospital puts quality patient-centered care as its top priority (HA, 2014b). Nurses in the target setting are essential to optimize patient outcomes through implementing strategy with proven effectiveness. Translating the innovation with demonstrated holism, accuracy and adequacy therefore shares the same ground
with the prevailing philosophy of care in the practicing AED, and helps conveying the commitment: ‘your trusted Accident & Emergency service provider’ (HA, 2014c) to the public to some extent. More importantly, the innovation does not only serve to benefit minor injured patients, but also allows those of greater need to be likely seen by doctors earlier. Such priority to provide all a timely care is again in line with the mission of the target AED: ‘saving life and helping every people stay healthy’ (HA, 2014c).

To another extent, the Nursing Council of Hong Kong (2001) emphasized that local nurses are necessarily to engage in advanced practice for professional development. Expansion of independent role in managing minor injuries beyond the traditional boundary would hence not violate the value of nursing practice in the target setting, but advance their professionalism instead.

3.2.3 Number of clients benefited

While wound repairs are usually infeasible in general practitioners, hence EDs in HK and so the practicing one is always the care provider of many minor wound patients referred by private clinics in addition to those who walk in themselves. Besides, people got minor injured in China would often come to the practicing AED for management because of the readily accessible location within the broader and the costly consultation fee in the Mainland. As a result, an average of about 400 cases of minor wounds had attended the target AED
monthly in the previous year (AEIS, 2014c). It is therefore estimated that a satisfactorily large number of an average of 4800 minor wound cases could be benefited from the innovation a year. Of importance is the innovation would ultimately benefit all ED patients as those in more urgent needs would be attended earlier by the more available medical resources as discussed before.

3.2.4 Time for implementation and evaluation

The innovation plans to start off with a 3-month communication period with different key stakeholders. Among which, 4 weeks would be particularly spent on writing up a proposal detailing empirical evidences from research studies, the EBP guideline, budget, and implementation and evaluation plan in an attempt to obtain approval from the managerial level. Once approval for the proposed change is obtained, another 3-week promotion period would follow to present the evidence-based innovation during the times of shift handover to try convincing the frontline nurses as they are in a prime position to lead the intervention. The remaining times would be spent for other preparatory works for the pilot testing thereafter.

As emergency nurses in the target setting are all already equipped with skills of suturing, three eligible and interested RNs would first receive a reasonably short, 30-hour in-house training workshop related to management of minor wounds prior to a 3-month pilot study. The study would then be executed
between 0900 and 1700 hour from Monday to Friday in view of the more adequate nursing and medical manpower for the data collection, observation and facilitation for the process. Accordingly, data process for the post-pilot evaluation is estimated to take another 2 months and followed by a 6-month full scale implementation period of the innovation.

Depending on the type of minor injury the designated nurses managed, time duration for the study varied from 2 to 14 months among the seven included trials. While the coarse timeframe for the implementation and evaluation of the nurse-led management of a rather familiarize type of minor injury, minor wounds in the first place is anticipated to take a total of about 15 months in the target AED. It therefore sounds sensible in such a way. Details of both the implementation and evaluation plan would be discussed in the next Chapter.

3.3 Feasibility

On the other hand, the best written implementation plan can go awry because of barriers. Practical concerns about administrative support, organizational climate, freedom to try the innovation, consensus, availability of resources at individual and institutional levels are therefore necessary to be addressed as well (Polit & Beck, 2008).

3.3.1 Administration support and organizational climate
In support of the idea of ‘knowledge, anytime, anywhere’, the HA provides various platforms to facilitate research utilization in clinical settings. For example, the online platform known as the ‘e-Knowledge Gateway’ has been launched since 2004 to provide readily access to thousands of full-text journals to healthcare professionals (HA, 2014d). The target hospital also holds journal club twice monthly to give opportunities to nurses to share the latest evidence with others. Building upon such an encouraging culture to utilize research, the proposed innovation grounded on sufficient quality evidence is therefore believed to be kindly welcomed by the Chief of Services (COS), Department Operations Manager (DOM) and Ward Manager (WM) of the target setting in regard of quality care.

To another extent, an evidence-based practice (EBP) workgroup with a workforce of 8, including one APN and four RNs supervised by two departmental physicians, who are the Consultant and one Associate Consultant, and the WM is also well established to develop and review clinical guidelines from time to time on the basics of the latest evidence in the practicing setting. Previous successful attempts have been made to develop protocols of nurse-initiated paracetamol in triage and urinary catheterization. Interdisciplinary expertise are also occasionally invited to share their updated evidence related to emergency care with nurses such as the massive blood transfusion management has been recently introduced by the
laboratory technologist. In this way, the organizational climate is agreed to be healthy and conductive to research utilization not only among nurses themselves, but also collaboratively with other expertise.

3.3.2 Freedom to try the innovation

To take advantage of the supportive organizational climate in helping to attract individuals who share the same philosophy to make evidence into action (Fink, Thompson & Bonnes, 2005), DOM of the target AED is open-minded to welcome nurses to initiate studies and continuous quality improvement (CQI) programs provided that they are evidence-based and safe to patients. For example, a cross-sectional study was conducted in 2012 to study the effect of a nurse-led hypertension referral intervention system for those patients with asymptomatic elevated blood pressure (Tsoi, Tung & Wong, 2012) while a CQI project on evaluating a type of innovative dressing, ‘Mepitel One’ for skin tears lead by the WM and three RNs is now in progress.

3.3.3 Consensus

Nevertheless, EBP might not well known to nearly half of the senior RNs in the target setting as it was not formally introduced in their pre and post-registration curricula but until the early 2000s (Lee, 2003). They might perceive the switching of practice from doctor-dominated to nurse-led as increasing workloads on their usual clinical duties and so possibly resist the
change even they are experienced and in a prime position to carry out the innovation. Hesitation among frontline nurses might be encountered similarly as in the recent introduction of evidence-based fall alarm pads and community intravenous antibiotic programme. To maximize the degree of consensus among the nursing staff, communication is said to be the best tool to make use of (Polit & Beck, 2008). Thus, feasible communication between the administrators and the frontline staff is suggested to be readily made in the monthly ward meeting to resolve any ambiguities.

3.3.4 Availability of resources

Designated nurses in the target AED are necessary to be well trained prior the implementation as suturing is their only qualified skills. However, unlike other university-affiliated hospitals, the practicing one can only release a maximum of two RNs to participate the specialty training provided by the HA every year regarding the restraint of manpower. In this case, a better convincing idea is to train a small group of RNs stage by stage on a short in-house course related to management of one type of minor injury at a time so as to minimize the distribution to the manpower allocation, thereby maximizing the implementation potential of the innovation. In this way, costs for developing additional training program could be also saved when the first group of RNs is trained.
In view of the innovation focuses on switching the existing practice from physician-initiated to nurse-led, no additional new equipment are required to be purchased. The only material resources required are some stationery, copies of guideline, posters, documentation forms and questionnaires for the implementation and evaluation which are all minimal to cost.

3.4 Cost/Benefit Ratio

Last but not least, costs and benefits of the innovation to various groups, including clients, staff and the organization should be also carefully assessed prior any decisions to proceed with the innovation as they can either hinder or promote the implementation (Polit & Beck, 2008).

3.4.1 Potential risks of innovation

Minor wounds are managed using simple techniques and expected to heal within a relatively short time, yet problems such as fractures are possibly missed by physicians at the initial ED visit. Clinical, functional and cosmetic outcomes could be jeopardized if the injuries were mismanaged (Gwynne, Barber & Tavener, 1997). Therefore, the same could be resulted in cases managed by nurses as reported in some of the included trials (Cooper, Lindsay, Kinn & Swann, 2002; Derksen et al., 2006; Sakr et al., 1999). Though the differences were statistically insignificant, extra out-of-pocket money for unplanned follow-ups and delays in
receiving proper care could result. In this regard, the usual practice of senior physicians in the target AED to review radiographic films on the next day following discharge could safeguard patients by calling them back for reassessment if indicated. Adequate on-site medical consultation during the nurse-led service provision is also helpful as suggested in the trials to minimize chance of mismanagement.

3.4.2 Potential benefits from innovation

On the other side, sufficient quality evidence in the review justified appropriately trained and experienced emergency nurses who work within an agreed guideline could provide accurate, adequate and holistic care for minor injured patients, allowing better patient satisfaction and reduced waiting times. Switching of practice to nurse-led also enables more available medical resources to treat especially those time-sensitive conditions timely, avoiding unnecessary complications and deaths (Moskop, Sklar, Geiderman, Schears & Bookman, 2009; Collis, 2010). While the extended independent role would not only increase autonomy in practice to help boosting morale among nurses (Crimson, 1995), but also act as a milestone to evolve professionalism of emergency nursing towards a greater extent in the local context (Wong & Lau, 2008). Other than this, the establishment of an EBP guideline also allows standardization and optimization of care delivery within organizational and cost constraints (Medical Services
Development Committee, 2002). More importantly, it conveys a message of organizational commitment to quality care to the public.

3.4.3 Risks of maintaining current practice

On the contrary, if the existing practice was maintained, wounds are likely infected when they are left to be unrepaired 6 to 10 hours post injury due to the long waiting in the AED (Moreira & Markovachick, 2007). Patients would experience unrelieved or even worsening pain which will cause muscle spasm, impair muscle function, and increase fatigue and immobility (Purcell, 2003). With these, not only patient dissatisfaction, but also complaints and even workplace violence (Taylor & Rew, 2011) could result, leading to decreased nursing job satisfaction and consequently more manpower turnover (Brunetti & Bambi, 2013).

3.4.4 Costs of implementing the innovation

The innovation involves the key change of switching the existing practice from physician-led to nurse-initiated, no additional medical equipment is thus necessary to be purchased. Only it is the prerequisite for the emergency physicians and nurses to provide and attend the training on managing minor wounds prior to the commencement. Their additional time spent would contribute to the manpower cost. Another substantial setup cost should count those ‘extra’ nursing time devoted to manage a minor wound patient. Other short-term
expenses would include those minimal material cost for preparing training materials and the clinical guideline (see Appendix G).

If the change was to be institutionalized, only short refreshing course is necessary and the involved man-hours are relatively insignificant. Maintenance of equipment is not needed as quality of the innovation is determined by individual competency instead of functioning of those used accessories. Details of the estimated expenses are tabulated in Appendix H.

Though the average cost per hour of the patient contact by the healthcare provider would occupy a relatively huge portion of the total expenses on implementing such one-to-one practice, of importance is that it can reallocate more medical resources to attend those urgent complaints. Moreover, there could be some hidden or potential savings in relation to the reduction in waiting times and additional treatment while the average cost per hour of patient contact by a RN must be less than that of an emergency physician of any ranks by at least $500. As a result, by calculation, the potential savings resulted from the innovation can reach at least $2,284,800 a year which is far more than the operational cost of running the innovation for a longer 12-month period (see Appendix I).

To sum up, benefits of the innovation outweigh its costs and relatively low risks. Together with taking the advantage of its high transferability, the innovation
complementing with appropriate strategies to overcome those identified barriers and frictions would have a strong potential to be successfully translated into the practicing AED.
Chapter 4

Developing An Evidence-based Practice Guideline

With respect to the relatively high implementation potential of the innovation within the target setting, it is worthwhile to translate the quality findings into practice. To provide a sound basis for consistent care, the next step is to establish a clear and user-friendly EBP guideline for the nurse-led management of the different types of minor injury. As discussed previously to get off the ground, the proposed guideline in this dissertation would first focus on the management of a more familiarize type of minor injury among nurses, that is the minor wounds. Extended practice of not only following the physicians’ order to perform wound dressing and or suturing, but also involving activities of assessment, diagnosis, treatment and discharge planning for patients with minor wounds would be involved. Details of the EBP guideline are outlined below.

4.1 Title of Guideline

‘Evidence-based practice guideline on nurse-led minor injury (minor wound) management'

4.2 Definition of Terms
Minor wound: a break in the skin which is caused by accident, including cut, laceration, penetrating wound and abrasion (see Table 1 for details);

Management: scope of practice included activities of assessment, diagnosis, treatment and patient education

4.3 Aim

To achieve optimal outcomes (functional & cosmetic) of minor wound management in emergency setting

4.4 Objectives

(i) To formulate clinical practice recommendations for the nurse-led management of minor injury on the best available evidence;

(ii) To ensure patients to receive appropriate minor wound management from AED;

(iii) To streamline and standardize the extended scope of practice of emergency nurses in the assessment, investigation, diagnosis, treatment for a patient with minor wound

4.5 Intended Users of Guideline

Emergency nurses who are certificate holders of
Emergency Nursing Core Course (Post-Registration Certificate Course);  

‘Certificate Course in Emergency Wound Management & Techniques of Skin Suturing’ jointly organized by the Central Coordinating Committee (A&E Service), Hospital Authority and Hong Kong Society for Emergency Medicine & Surgery (HKSEMS);  

with ≥ 5 years of working experience in AED

4.6 Target Patient Population

AED adult patients who

(i) are aged 16 or above;

(ii) attend for minor wounds, including abrasions and lacerations (Purcell, 2003);

(iii) without multiple trauma or concurrent health conditions in need of urgent treatment;

(iv) are triaged as semi-urgent (category 4)

4.7 Recommendations

The level of evidence provided by individual study included in the review was graded from ‘1++ to 1-’ (see Table 3) according to the SIGN Grading System (SIGN, 2014) (see Table 2). Based on the synthesis of the best available evidence,
the guideline embedded with a set of eight recommendations is formulated as follows. Each recommendation was graded from ‘A to D’ according to the same grading system developed by the SIGN (2014) (see Table 4). The grading does not depict the clinical importance of the recommendation. Instead it is the matter of the strength of its supporting evidence. In other words, the grading assigned to a recommendation indicates the likelihood that the anticipated outcome suggested by the supporting evidence would be achieved if the corresponding recommendation was taken into account when establishing the EBP guideline. The majority of recommendations in this guideline are of grade A, in which they are generated from the seven reviewed studies and categorized under four parts, namely the preparation, assessment, intervention and evaluation. With the clear and user-friendly recommendations, the algorithm of the assessment, investigation, diagnosis and management of a minor wound patient is outlined in a form of flow chart as shown in Appendix J which forms the basis for nurses to follow.

4.7.1 Preparation

- Recommendation 1.0 (Grade A)

‘To train experienced emergency nurses to assess and treat minor injury for quality care prior to the implementation of intervention.’

Evidence:
• Results from included studies confirmed that management of minor injuries could be carried out safely by well-trained and experienced non-medical healthcare professionals beyond the traditional boundary without any adverse events identified, in which they all had (i) a minimum of 4-year clinical experience in the ED and (ii) were trained in the anatomy, physiology, examination skills, interpretation of radiographs, treatment and suturing prior to the implementation of intervention. (Charles, Le Vasseur & Castle, 1999 [1-]; Cooper, Lindsay, Kinn & Swann, 2002 [1+]; Derksen et al., 2006 [1+]; Derksen, Coupé, van Tulder, Veenings & Bakker, 2007 [1+]; McClellan, Cramp, Powell & Benger, 2012 [1++], 2013 [1++]; Sakr et al., 1999 [1++])

☐ Recommendation 2.0 (Grade B)

‘Training could be provided on the basics of an in-house, short, injury-specific course to be received by regular nurses in addition to performing their usual nursing duties.’

Evidence:
• The substantial cost for the deployment and usual intensive, long and expensive trainings for NPs made the overall cost associated with their care more costly than the routine care provided by doctors. (McClellan, Cramp, Powell & Benger, 2013 [1++])
• The likelihood of costing less was greater in the total costs associated with the care of SENs than doctors by means of training regular emergency nurses to receive short and injury-specific course in an attempt to take care the disadvantage of the costly NP training. (Derksen, Coupé, van Tulder, Veenings & Bakker, 2007 [1+])

4.7.2 Assessment

☐ Recommendation 3.0 (Grade A)

‘Assess patient wound history prior commencement of the management plan.’

Evidence:

• Injury sustained more than 72 hours before presentation were known to complicate the scope of simple management by NPs. (McClellan, Cramp, Powell & Benger, 2012 [1+]; Sakr et al., 1999 [1+]; Derksen et al., 2006 [1+])

☐ Recommendation 4.0 (Grade B)

‘Assess client concerns in terms of

a) client level of understanding about the mechanism of injury, condition and risk factors;

b) client preferences for the treatment and the goal of care;
c) client ability to comprehend the management plan before formulating individualized plan of care.’

Evidence:

- a) +b) +c) Patient acceptance of being managed by NPs was high if they felt being listened, able to ask questions about their condition and easy to tell about their difficulties. (Cooper, Lindsay, Kinn & Swann, 2002 [1+]; Sakr et al., 1999 [1++])

- a) Patients were better satisfied with the care provided by NPs on the basics of the adequate information provided for their injury condition, and practical advice on the prevention and self-management skill at home. (Cooper, Lindsay, Kinn & Swann, 2002 [1+]; Derksen et al., 2006 [1+])

4.7.3 Intervention

- Recommendation 5.0 (Grade A)

‘Nurses should document the essential patient history, physical examination, investigations as indicated, treatment decision, advice and follow-up plan on a standardized clinical form in the meantime of service provision.’

Evidence:

- Accurate and adequate care always resulted from good written notes on mechanism of injury, medical history, examination, treatment/advice,
interpretation of investigation and follow-up on the clinical records. (Cooper, Lindsay, Kinn & Swann, 2002 [1+]; Sakr et al., 1999 [1++]

Recommendation 6.0 (Grade B)

‘Nurses should include the activity of patient education in the scope of advanced practice other than assessment, diagnosis and treatment of minor injury.’

Evidence:

- Evidence illustrated that the prolonged contact time afforded by nurses to provide the continuous care after assessment along with appropriate communication on the care of injury would satisfy patients to a more significant extent. (Cooper, Lindsay, Kinn & Swann, 2002 [1+]; Derksen et al., 2006 [1+])

- Patients were found to be particularly pleased with the practical information provided on injury prevention and how to self-care it at home. (Cooper, Lindsay, Kinn & Swann, 2002 [1+])

Recommendation 7.0 (Grade A)

‘Consultation to emergency physician is suggested to be available for nurses in the meantime of the service provision.’
Evidence:

- Nurses were able to seek advice from doctors in the studies. The agreed guideline on the management of minor injury by the NPs was regarded as a meaningful clinical tool that aids nurses to not only extend scope of practice, but also advance standard of care in joint efforts with the medical staff, enhancing collaboration for the best of patient outcomes. (Sakr et al., 1999 [1++])

- Reassessment of radiograph interpretation done by senior medical staff was required during the implementation of the nurse-led practice to provide a safety net to safeguard patients for any missed injuries. (Derksen et al., 2006 [1+])

4.7.4 Evaluation

☐ Recommendation 8.0 (Grade B)

'Patient should be asked to complete the questionnaire used to measure satisfaction to care at the time of their attendance at the ED prior their leaving.'

Evidence:

- The usual refusal of responders to return the follow-up questionnaires by post was considered as the possible reasons for the particular high dropout rate of
over 40% and 30% in the studies of Cooper, Lindsay, Kinn and Swann (2002) [1+] and Sakr et al. (1999) [1++].
Chapter 5

Implementation Plan

Guideline on the nurse-led minor wound management established in the previous Chapter operationalizes the EBP. It is anticipated to improve patient care with high transferability in the practicing setting, yet the best written guideline can go awry unless there is an explicit implementation plan to accomplish the planned change with appropriate strategies. The plan consists of two parts, including the communication plan and the pilot testing (Polit & Beck, 2008), and is discussed as follows.

5.1 Communication Plan

Introduction of the nurse-led minor wound management implicates a change in practice in the target setting. To effect the evidence-based change, an interpersonal process of knowledge transfer from those who have it to those who do not prior the research utilization is crucial (Aita Richer & Heon, 2007) which occurs effectively once the right people at different levels of an organization are engaged in the communication process by appropriate strategies (Kerner, Rimer & Emmons, 2005; Polit & Beck, 2008). Right people are known as the ‘stakeholders’ who are affected by the proposed change either directly or indirectly (Melnyk &
Fineout-Overholt, 2011). In other words, they are the ones who have a stake in effecting the change. The basis of ‘who’, ‘what’ and ‘how’ to talk with should be therefore first considered before communicating the innovation-specific information to initiate, guide and sustain the planned change.

5.1.1 Stakeholder analysis

To get the buy-in for the success of change, administrators who have the strongest stake in approving the change, namely the COS, DOM and WM of the target AED, opinion leaders including other physicians and APNs in the department, the target users and population of the guideline, that is the RNs and minor wound patients respectively are likely the key stakeholders.

5.1.2 Initiating change

People have to be motivated to accept what and why change is necessary before any meaningful changes can occur. The key is to first deliver a compelling message to show a gap existing in current practice (Polit & Beck, 2008). It can start by having a casual chat with nursing colleagues about the negative impacts of prolonged waiting in AED and its possible solutions in the nursing aspect. Such discussion can create a ‘controlled crisis’ to allow people to reexamine their existing attitudes and behaviors that might no longer support the add-on pressure, thereby building a motivation to seek out a new equilibrium (Manchester et al., 2014). Variety of solutions with questioning effectiveness is hence expectedly
elicited in the chatting. The EBP of nurse-led management of low-complexity problems such as the common minor wounds in overseas EDs can be just brought up to fill the gap. Meanwhile, the successful identification and recruitment of the best of four RNs who show positive attitudes towards the innovation to form an implementation workgroup would get the support from other peer easier (Marquis & Huston, 2006). Of particular interest, one APN will be invited to be the project coordinator in view of her knowledge in research utilization and minor injury management equipped from the master curriculum, and her leverage to the upper management on decision making.

In concern with the innovation goes beyond the traditional medical practice, the workgroup will next initiate individualized face-to-face meetings with the managerial levels to make clear the vision (Melnyk & Fineout-Overholt, 2011) along with submitting the proposal detailing the innovation with empirical evidences supported. Once the WM first becomes convinced, further discussions are likely to move on to upper levels under such a bottom-up approach (Marquis & Huston, 2006).

On the other hand, as the practicing AED is well-known to serve a fairly high volume of population because of its readily accessible location within the boarder, costs outweighed by the macroscopic benefits resulting from the innovation should be emphasized on the minimal interference to physician
activities but possible shortening of the waiting times in the formal meetings thereafter with the COS and DOM. Of importance is that not simply the large group of minor wound patients could be seen earlier, but also all the others would be ultimately benefited as more available physicians could be allowed to attend them earlier in this way. Such priority is therefore likely to attract the upper management for granting the approval.

5.1.3 Guiding change

Once approval for change is gained, the workgroup would set up a timeline (see Appendix K) to monitor the following change progress (Polit & Beck, 2008). To catalyze the process, the workgroup will market the innovation vision to frontline nurses during shift handover for a three-week times. To avoid misunderstandings, feasible communication between the managerial level and representatives of both APNs and RNs could be further made in the monthly ward meeting to resolve any ambiguities. Nurses usually regard acceptance of doctors as a great facilitator to advance own role (Christiansen, Vernon & Jinks, 2013). It is thus crucial to invite representatives of emergency physicians as well to attend the meeting so to empower nurses feeling supported to develop autonomy in managing patients with minor wounds. Any questions raised from nurses would be also reviewed in the weekly workgroup meeting for resolutions.
The promotion is then followed by a three-month pilot study. Three RNs with at least 5-year AED experience on a voluntary basis will first attend six five-hour in-house training workshops provided by the AED Consultant on every Thursday and Friday. Main topics on basic skin physiology and anatomy, physical examination skills, documentation, treatment plans, case discussions and the use of the proposed EBP guideline will be covered. Each of the RNs would subsequently have a 10-day supervised clinical practice. Upon the pilot evaluation, the EBP guideline would be refined prior to the full-scale implementation. Meanwhile, the launching of the innovation and its vision could also share with patients by posters in the waiting hall so to allow the practice change to take shape with their support and participation.

5.1.4 Sustaining change

Eradicating barriers and promoting facilitators are keys to sustain the change (Melnyk & Fineout-Overholt, 2011). To make this happen, ongoing communication between the managerial levels and nursing representatives in the monthly ward meeting is encouraged. Besides, assessment of adequacy of the facilitation to the change process could be done by auditing nursing compliance with the new guideline, collecting patient feedback regarding nurses’ performance and monitoring patient outcomes on a continuous basis. Sharing of successful stories would inspire stakeholders to embrace the new practice. Last but not least,
the workgroup should also revise the nurse-led practice and guideline once evidence is updated in regard of quality care.

5.2 Pilot Testing

As mentioned previously, a pilot testing will be conducted to try out the proposed innovation on a small-scale basis prior to actual implementation. The purposes are:

(i) to test the feasibility of the practice change in order to correct any problems that might impact the future success;

(ii) to assess the applicability of evaluation tools;

(iii) to identify any potential barriers in the implementation process in order to make any revisions to the proposed change if necessary.

5.2.1 Design, setting and sample

For the most meaningful results, the innovation will be tested out in the target AED on a small group of the patient population that the proposed guideline intends to cover (Melnyk & Fineout-Overholt, 2011).

First, in-house trainings about minor wound management will be provided for three interested and eligible RNs. Meanwhile, the workgroup members will use a timer to record the time control in every session. At the end, the attending nurses will be given a questionnaire (see Appendix L) about the adequacy of the
training. Their inputs are helpful to refine the training contents when necessary in future.

As a minimum of around 250 minor wound patients attended monthly (AEIS, 2014c), it is anticipated that a convenience sample of 60 eligible patients could be recruited during their AED attendance within three weeks. The pilot study will be carried out between 0900 and 1700 hour on weekdays in view of the more available manpower for data collection, observation and facilitation for the process. One of the three trained RNs will be on duty at a time. Triage nurse will first identify and explain the new practice to eligible patients. Those refuse to participate will wait for receiving the usual care and the trained nurse will see and treat those consented one. Each subject will be asked to complete a satisfaction questionnaire (see Appendix M) (Lam et al., 2005) after their treatment. Patient acceptance towards the innovation could be revealed in the percentage of those refusals to study and the after-care survey results. The 60 patient clinical records will be also audited by the Consultants (see Appendix N for the audit form) to check on the practicability of the EBP guideline. In addition, not only the workgroup will make the ongoing observation throughout, but the participating nurses will be also invited to a focus group interview about experiences and perception towards the innovation at the end of the pilot study (see Appendix O for the topic guide).
5.2.2 Post-pilot evaluation

With the information sought from the observation, questionnaire and interview in the pilot testing, the workgroup will then process the data for evaluation. Weakness and potential pitfalls identified during the pilot phase should be tackled. Hence, any necessary refinement of the logistics of the proposed change and guideline will be made. The corresponding refinement of the innovation will be presented to the upper management for approval prior to the full-scale implementation.
Chapter 6

Evaluation Plan

Implementation followed by evaluation will provide stakeholders with the information about effectiveness of the practice change so to determine if it would be implemented on a longer basis (Melnyk & Fineout-Overholt, 2011). In such case, identifying ‘what’ and ‘how’ factors are measured to illustrate the level of success of the proposed change in the target AED are indispensable. An evaluation plan is therefore detailed below.

6.1 Identifying Outcomes

To determine whether the proposed innovation impacts in a similarly effective way when being translated into the real-world practice, the innovative change will be evaluated in terms of the patient, healthcare provider and system dimensions.

6.1.1 Patient outcomes

The aim of proposing the nurse-led model for minor wound management is to provide safety, timely and quality care beyond the traditional medical boundary as evident in the included studies. Both the incidence of adverse outcomes on patients seen and reduction in the waiting times (WT) to assessment are thus the
primary outcomes to assess the safety and efficiency of the care in the first place.
By measuring patient satisfaction with the care as the secondary core of
evaluation, one could also determine if the innovation had its intended effect to
please and hence benefit patients to another extent.

6.1.2. Healthcare provider outcomes

The EBP guideline is proposed to standardize the extended scope of nursing
practice to see and treat minor wounds properly. Hence, compliance level of
nurses to the new guideline is correlated to the appropriateness of practice and
requires measurement in concern with patient benefits. Besides, staff acceptance
is crucial for the success of change (Marquis & Huston, 2006). As a result,
perception towards the innovation among practicing nurses is another important
parameter necessary to be evaluated.

6.1.3 System outcomes

Another important aim of implementing the innovation is to address the
overcrowding issue by making use of the invaluable nursing resources to treat
those low-acuity problems, thereby reducing such a fairly large group of people
waiting in the AED. Reduction in the overall length of stay (LOS) times for
patients seen by nurses is therefore another primary core of evaluation to
determine the system effectiveness.
Minimal material cost is necessary for switching the practice from physician-led to nurse-initiated. Yet in concern with the increasing demand for less costly healthcare service (Panel on Health Services of the Legislative Council, 2013), cost-effectiveness in terms of the reduction costs of involved personnel per hour of patient contact will be the secondary outcome of evaluation.

6.2 Time and Frequency to Take Measurements

The time and frequency to take measurements vary according to nature of different parameters to take effect.

Patient outcomes would effect in place immediately and hence suit for short-term measurements. Data will be collected prospectively for recruited patients throughout the 6-month implementation period to compare with the historical counterparts and evaluated on a monthly basis.

Regarding the healthcare provider outcomes measurement, compliance level of nurses to the new guideline will be audited on a monthly basis for quality control. Staff perception towards the innovation will be measured in the sixth month and thereafter yearly so to allow eliciting more fruitful responses to the process evaluation over an extended period.

On the contrary, system outcomes require long-term measurement to determine the system sustainability for the change. Overall LOS for the patients
seen and the cost-effective analysis will be measured at the end of the implementation period and thereafter on an annual basis.

6.3 Nature and Number of Clients to be involved

Client characteristics involved in the outcomes measurement should be consistent to those of the target population in the guideline and the identified studies. Therefore, only patients who are aged 16 or above; presenting with an isolated single injury with minor wound(s) and triaged as semi-urgent are involved. Those who have cognitive impairment and concurrent health conditions in need of urgent treatment will be excluded. Similar to the pilot testing, a convenience sample will be recruited consecutively during patient attendance to the target AED. And the three well-trained RNs will be involved in providing the intervention for eligible clients.

Nevertheless, no sample size estimation could be made from included studies in view of the lack of effect size presented. Alternatively, based on the statistics of a usual minimum of 250 minor wound patients attend the target AED monthly (AEIS, 2014c), a 6-month implementation period is believed to recruit a large meaningful number of over 1000 patients to evaluate the innovation.

6.4 Data Analysis
AEIS is an electronic database of demographic, clinical record and patient flow data operating in all local AEDs. Using the AEIS, incidence of adverse events can be analyzed by retrieving clinical records of those re-attended cases to the public AEDs within 14 days after the initial visit so to examine if the reason for return was related to any complications or missed injuries. Besides, consultants will review the radiographs for any missed fractures on the next day after the first visit. WT to assessment and LOS are the total minutes the patient spent from registration until first seen by the healthcare provider and until discharge respectively, which are derived again from the AEIS.

All patients managed by nurses will be asked to complete a self-rating questionnaire regarding satisfaction with care right after treatment. The validated Chinese Medical Interview Satisfaction Scale-Revised (C-MISS-R) (Lam et al., 2006) (see Appendix M) containing eight questions with ‘Yes’ and ‘No’ answers and one open-ended question for additional comments is adopted. Percentage of the two answers to each question will be computed respectively for evaluation.

On the other hand, AED Consultants will review case notes to enter data pertaining the appropriateness of nurses’ documentation on minor wound assessment, diagnosis and treatment onto an audit form (see Appendix N), thereby assessing their compliance level with the guideline.
For the process evaluation, all participating nurses will be consented for having a 20 to 30-minute-semi-structured interview individually. Satisfaction with the innovation will be particularly explored (see Appendix P for the topic guide). All interviews will be audiotaped and transcribed verbatim.

Using the software of Statistical Package for Social Science version 17.0, data collected on the incidence of adverse events, WT and LOS will be compared with the retrospective counterparts on a random sample of same size of patients with minor wounds from the 6-month period preceding the implementation by quantitative analysis. Descriptive statistics will be used to analyze the clinical and demographic characteristics, incidence of adverse events, WT and LOS of subjects in the two groups. For the two group comparisons on adverse outcomes on the patients seen, the chi-square test will be used. Pre-and-post differences in WT and LOS for minor wounded patients will be analyzed by the use of two-tailed independent-samples t-test. Statistical significance is set at $p < 0.05$ and the confidence interval is 95%. Results will be reported as mean ± standard deviation and median ± interquartile range when normality of distribution is violated. Content analysis will be used to analyze the transcribed qualitative data.

6.5 Basis for an Effective Change of Practice
Based on the consensus among included studies or clinical experiences, the innovation will be considered as an effective change of practice if its main outcomes achieved to some extent of particular interest.

When evaluating the clinical effectiveness of a new professional group of care, the foremost important aim is to ascertain if it is at least equivalent to the existing one. For this reason, the proposed nurse-led model for minor wound management will be considered as an effective change if there was no significant difference found in the adverse event rates between the before-and after-innovation group with a $p$-value < 0.05 shown. The incidence of different adverse events were also low as less than 10% among the nurse-led care group of subjects in studies (Charles, Le Vasseur & Castle, 1999; Cooper, Lindsay, Kinn & Swann, 2002; Sakr et al., 1999). Hence, altogether, the innovation is effective if it achieved a similar rate among the involved clients.

Reduction in the mean WT to be first seen by nurses ranged from 9 minutes to 32 minutes in three studies (Charles, Le Vasseur & Castle, 1999; Cooper, Lindsay, Kinn & Swann, 2002; Derksen et al., 2006). In this way, the innovation will be considered to be effective if it reduced the WT to assessment by an average of at least 10 minutes than those under the traditional model of care. LOS is influenced by the WT to assessment and hence, the innovation is effective if
similarly, an average of at least 10 minutes shorter in the overall LOS was spent by patients treated by nurses than those by physicians.
Chapter 7

Conclusion

In conclusion, this translational nursing research has demonstrated sufficient quality evidence to justify management of minor injury led by nurses could provide a care that is equivalent to or even in some ways better than the one provided by physicians. It was believed that appropriately trained and experienced emergency nurses who work within an agreed guideline are capable to provide accurate, high quality and affordable care for minor injury patients with better patient satisfaction, reduced waiting times and at least as good clinical outcomes as doctors.

In regard of the high transferability and the sound pertaining cost-benefit ratios, the innovation of the nurse-led minor injury management complementing with appropriate strategies would have a strong potential to be feasibly translated into the practicing ED. For this reason, a well-structured EBP guideline on the nurse-led management of a familiar type of minor injury of interest, minor wound, was developed to get off the ground. It formulated quality clinical practice recommendations for the proposed innovation on the best available evidence, so as to streamline and standardize the extended scope of practice of emergency
nurses in the assessment, investigation, diagnosis and treatment for patients with minor wounds.

With the comprehensive implementation and evaluation plans formulated to guide, initiate and sustain the proposed change, it is anticipated that emergency nurses could contribute their knowledge and skills to provide safe and timely care to patients with minor injury. Based upon the defined outcomes core of evaluation in the particular interest of patients, the proposed nurse-led management for minor wound would be kindly rewarded to be implemented on a long-term basis in the practicing AED if concurrently, the incidence rate of adverse events among the patients seen, and the shortening of their waiting times to assessment and length of stay reached certain basis. More importantly, the innovative nurse-led model of care is expected to not only serve to address issues of waiting and length of stay of patients with minor injury, but also allow those in greater needs to be more likely seen by doctors earlier. The priority therefore is hopeful to benefit all AED patients ultimately.
Appendix A

Keyword Search

The keywords used for the search in the three electronic databases is categorized into three groups: population (P), intervention (I) and outcomes (C) as identified in the proposed research question: ‘in patients with minor injuries attending the accident and emergency department (P), is nurse-led management (I) compared with the existing physician-led care (C) improve patient satisfaction, waiting times, quality of care and cost (O)’? Keywords in each of the categories used are shown below:

<table>
<thead>
<tr>
<th>Categories</th>
<th>Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Population (P)</td>
<td>minor injury/ minor trauma/ soft tissue injury/ musculoskeletal sprain/ simple fracture/ wound/ laceration</td>
</tr>
<tr>
<td>2. Intervention (I)</td>
<td>nurse led/ nurse practitioners/ nurse specialists/ specialized nurses/ extended practice/ advanced practice</td>
</tr>
<tr>
<td>3. Outcomes (O)</td>
<td>effectiveness / quality/ satisfaction/ cost/ waiting times</td>
</tr>
</tbody>
</table>
**Appendix B**

**SIGN Grading System 1999 – 2013**

<table>
<thead>
<tr>
<th>LEVELS OF EVIDENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1++ High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias</td>
</tr>
<tr>
<td>1+ Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias</td>
</tr>
<tr>
<td>1- Meta-analyses, systematic reviews, or RCTs with a high risk of bias</td>
</tr>
<tr>
<td>2++ High quality systematic reviews of case control or cohort or studies</td>
</tr>
<tr>
<td>High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal</td>
</tr>
<tr>
<td>2+ Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal</td>
</tr>
<tr>
<td>2- Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal</td>
</tr>
<tr>
<td>3 Non-analytic studies, e.g. case reports, case series</td>
</tr>
<tr>
<td>4 Expert opinion</td>
</tr>
</tbody>
</table>
Records identified through database: CINAHL, PubMed and Cochrane Library searching (n = 1320)

Records screened by keywords (n = 1320)

Excluded (n = 1137)
Reasons:
Non-clinical trials / Non-randomized controlled trials (n = 266)
Non-trials (n = 871)

Records screened by title (n = 183)

Excluded by title (n = 156)

Records screened by abstract (n = 27)

Excluded by abstract (n = 7)

Records screened by full-text articles (n = 20)

Full-text articles excluded (n = 7)
Reasons:
Methodological flaws (n = 3)
Limits of generalizability (n = 4)

Additional relevant articles reviewed and hand searched from reference lists (n = 1)

Studies retained for data extraction (n = 14)

Removed duplicated studies (n = 7)

Studies included in final narrative synthesis (n = 7)
**Appendix D**

**Table of Evidence**

<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study type(^1) (Evidence level)(^2)</th>
<th>Patient Characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Length of follow up</th>
<th>Outcome measures</th>
<th>Results(^6) (intervention group vs control group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charles et al., 1999</td>
<td>RCT (1-)</td>
<td>- Aged 16-92 (mean age=38.6) - Presenting with minor lacerations over the head, lower and upper extremities without bony involvement or neurovascular damage</td>
<td>Assessment and suturing of minor laceration provided by a CNS(^3) ((n=40))</td>
<td>Assessment and suturing of minor laceration provided by a MO(^4) ((n=40))</td>
<td>Not reported</td>
<td>(1) Waiting times (mean rank): (a) total time until consultation (b) total time until suturing commenced (c) total time spent in the ED(^5) (2) Patient satisfaction (mean rank): (a) rating of care received for the repair of laceration (b) rating of overall service received (3) Wound healing outcomes: (a) incidence of adequate wound approximation ((n)) (b) incidence of wound complications ((n))</td>
<td>(1) (a) 36.33 vs 44.67 ((p=0.137)) (b) 37.13 vs 43.88 ((p=0.194)) (c) 36.33 vs 44.67 ((p=0.108)) (2) (a) 47.65 vs 33.35 ((p=0.0016)) (b) 46.80 vs 34.20 ((p=0.008)) (3) (a) 35 vs 37 ((p=0.71)) (b) 4 vs 5 ((p=1.00))</td>
</tr>
<tr>
<td>Bibliographic citation</td>
<td>Study type (Evidence level)</td>
<td>Patient Characteristics</td>
<td>Intervention</td>
<td>Comparison</td>
<td>Length of follow up</td>
<td>Outcome measures</td>
<td>Results (intervention group vs control group)</td>
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</table>
| Sakr et al., 1999      | RCT (1++)                   | - Aged >16 (mean age=36)  
- Presenting with laceration, inversion, crush, blunt or sprain injury over fingers, hand, ankle or foot | Assessment, request for radiography, treatment, advice and plans for follow-up of minor injury provided by a NP<sup>7</sup> (n=704) | Assessment, request for radiography, treatment, advice and plans for follow-up of minor injury provided by a junior doctor (n=749) | 6 months | Primary  
(1) Adequacy of care:  
(a) at least one important error made in history taking, examination, interpretation of radiograph, treatment and follow-up (%)  
(b) at least one unplanned follow-up visit (%) | (1) (a) 9.2 vs 10.7 (p=0.2)  
(b) 8.6 vs 13.1 (p=0.03)  
(2) (a) 0.8 vs 1.9 (p=0.28)  
(b) 96.5 vs 94.9 (not significant; no p-value reported)  
(3) (a) 8.8 vs 10.2 (p=0.41)  
(b) 17.5 vs 15.6 (p=0.45)  
(4) [12.18 (daytime), 15.81 (evening and Saturdays), and 19.44 (Sundays)] vs [14.91 (all the time)] (NP > junior doctor) |
<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study type (Evidence level)</th>
<th>Patient Characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Length of follow up</th>
<th>Outcome measures</th>
<th>Results (intervention group vs control group)</th>
</tr>
</thead>
</table>
| Cooper et al., 2002     | RCT (1+)                    | - Aged >16 (mean age=36.3)  
- Presenting with sprain or fracture over ankle/foot or wrist/hand, burns and scalds, contusion injury or minor hand injury | ENP\(^a\)-led care of patient with minor injury for diagnose, treatment, referral and discharge \((n=99)\) | SHO\(^b\)-led care of patient with minor injuries for diagnose, treatment, referral and discharge \((n=100)\) | 2 months | (1) Waiting times (mins):  
(a) average waiting time until consultation  
(b) total time taken for consultation | (1) (a) 48.6 vs 70.1  
(95 % CI\(^{11}\): 11.2-31.8, \(p<0.001\))  
(b) 24.9 vs 30.0  
(95% CI: -1.3-11.5, \(p=0.115\)) |}
|                         |                             |                         |              |            |                     | (2) Patient satisfaction:  
(\% agreed)  
(a) was given enough information about the injury  
(b) was given information on injury prevention  
(c) feeling easier to tell about the injury  
(d) was given satisfied treatment | (2) (a) 95.2 vs 82.5 (\(p=0.007\))  
(b) 75.3 vs 45.2 (\(p=0.001\))  
(c) 97.6 vs 84.0 (\(p=0.009\))  
(d) 98.8 vs 87.7 (\(p<0.001\)) |}
|                         |                             |                         |              |            |                     | (3) Quality of clinical documentation (by validated Documentation Audit Tool\(^{10}\)) | (3) 28.0/30 vs 6.6/30 (\(p<0.001\)) |}
|                         |                             |                         |              |            |                     | (4) Functional recovery at 1 month (by self-reported):  
(a) times to recovery  
(b) level of symptoms  
(c) ability to return to usual activities | (4) (a) (no comparable data) (\(p=0.96\))  
(b) (no comparable data) (\(p=0.92\))  
(c) (no comparable data) (\(p=0.4\))  
(d) (no comparable data) (\(p=0.14\)) |}
|                         |                             |                         |              |            |                     | (5) 18.3 vs 21.5 (\(p=0.654\)) | (5) 18.3 vs 21.5 (\(p=0.654\)) |}
<p>|                         |                             |                         |              |            |                     | (6) 1 vs 1 (no difference) | (6) 1 vs 1 (no difference) |</p>
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<tr>
<td>(d)</td>
<td>time off work</td>
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<tr>
<td>(5)</td>
<td>Unplanned follow up (%)</td>
<td></td>
<td></td>
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<tr>
<td>(6)</td>
<td>Missed injuries (n)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Bibliographic citation</td>
<td>Study type (Evidence level)</td>
<td>Patient Characteristics</td>
<td>Intervention</td>
<td>Comparison</td>
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</tbody>
</table>
| Derksen et al., 2006   | RCT (1+)                    | - Aged 18-65 (mean age=36)  
- Presenting with a traumatic ankle/foot injury including distorsion, avulsion chip, fracture or contusion | Assessment and treatment of ankle/foot injury given by a SEN^{12} (n=263) | Assessment and treatment of ankle/foot injury given by a HO^{13} (n=249) | 9 months | Primary  
(1) Diagnostic accuracy in making a diagnosis of an injury requiring a cast/operation:  
(a) sensitivity  
(b) specificity  
(c) positive predictive value  
(d) negative predictive value | (1) (a) 0.94 vs 0.78 (p=0.14)  
(b) 0.94 vs 0.95 (p=0.71)  
(c) 0.74 vs 0.70 (p=0.73)  
(d) 0.99 vs 0.97 (p=0.07)  
(2) (a) 98.8 vs 98.2 (p=0.60)  
(b) 96.7 vs 92.2 (p=0.02)  
(c) 97.6 vs 94.5 (p=0.08)  
(d) 90.2 vs 80.7 (p<0.01)  
(e) 92.2 vs 83.1 (p<0.01)  
(3) 21 vs 32 (95% CI: 5-13) |
<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study type (Evidence level)</th>
<th>Patient Characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Length of follow up</th>
<th>Outcome measures</th>
<th>Results (intervention group vs control group)</th>
</tr>
</thead>
</table>
| Derksen et al., 2007   | RCT (1+)                   | - Aged 18-65 (mean age=36)  
- Presenting with a traumatic ankle/foot injury including distorsion, avulsion chip, fracture or contusion  
- Injury sustained more than 48 hours | Assessment and treatment of ankle/foot injury given by a SEN ($n=263$) | Assessment and treatment of ankle/foot injury given by a HO ($n=249$) | 9 months | (1) Total costs (€ per patient)  
(2) Total direct costs related to clinical resources utilization, hospitalization, operation, consultation and training (€ per patient)  
(3) Total indirect costs related to patient waiting times to assessment and treatment (€ per patient) | (1) 186 vs 153 (95% CI: -84 - 155)  
(2) 178 vs 142 (95% CI: -50-123)  
(3) 8 vs 12 (95% CI: -4- -2) |
<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study type</th>
<th>Evidence level</th>
<th>Patient Characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Length of follow up</th>
<th>Outcome measures</th>
<th>Results (intervention group vs control group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>McClellan et al., 2012</td>
<td>RCT (1++)</td>
<td>- Aged 17-84</td>
<td>- Presenting with a soft tissue injury over lower and upper extremities without associated fracture or open wounds - Injury sustained less than 72 hours</td>
<td>ENP-led care of patient with soft tissue injury for assessment and treatment from arrival to discharge (n=84)</td>
<td>Doctor (of any grades) - led care of patient with soft tissue injury for assessment and treatment from arrival to discharge (n=94)</td>
<td>1 year and 2 months</td>
<td>Primary (1) Functional recovery (by validated DASH(^{14}) and LEFS(^{15})): (a) percentage improvement at 2 weeks (b) percentage improvement at 8 weeks Secondary (2) Self-reported recovery to pre-injury levels at 8 weeks (by validated SF-6D(^{16})) (3) Number of day off work</td>
<td>(1) (a) 46.25 (95% CI, 36.0-47.8) vs 47.9 (95% CI, 38.3-58.5) (b) 60 (95% CI, 55.0-66.3) vs 63.3 (95% CI, 45-80) (2) 92.2 (95% CI, 87.8-99.5) vs 92.2 (95% CI, 86.2-105.8) (3) 1.0 to 2.5 vs 0.0 to 6.0</td>
</tr>
<tr>
<td>Bibliographic citation</td>
<td>Study type¹ (Evidence level)²</td>
<td>Patient Characteristics</td>
<td>Intervention</td>
<td>Comparison</td>
<td>Length of follow up</td>
<td>Outcome measures</td>
<td>Results⁵ (intervention group vs control group)</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------------------------------</td>
<td>-------------------------</td>
<td>--------------</td>
<td>------------</td>
<td>-------------------</td>
<td>----------------</td>
<td>---------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>McClellan et al., 2013</td>
<td>RCT (1++)</td>
<td>- Aged 17-84</td>
<td>ENP-led care of patients with soft tissue injury for assessment and treatment from arrival through to discharge (n=84)</td>
<td>Doctor (of any grade)-led care of patients with soft tissue injury for assessment and treatment from arrival through to discharge (n=94)</td>
<td>1 year and 2 months</td>
<td>Primary&lt;br&gt;(1) Average total cost per hour of patient care (£)&lt;br&gt;(2) Average total direct cost per hour of patient care (hospital-based) (£)&lt;br&gt;(3) Average total indirect cost per hour of patient care (individual and community-based) (£)</td>
<td>(1) 109.81 (95% CI, 83.0-142.1) vs 80.91 (95% CI, 66.5-101.6)&lt;br&gt;(2) 55.21 (95% CI, 47.0-66.0) vs 60.96 (95% CI, 51.1-73.6)&lt;br&gt;(3) 52.7 (95% CI, 33.0-81.6) vs 19.6 (95% CI, 11.2-38.6)</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

1. RCT = randomized controlled trial
2. Level of evidence of the study is established based on the assessment by the SIGN grading system (see Appendix 2).
3. CNS = clinical nurse specialist
4. MO = medical officer
5. ED = emergency department
6. Results expressed as comparisons between intervention and control. Between group difference is considered significant if p<0.05.
7. NP = nurse practitioner
8. ENP = emergency nurse practitioner
9. SHO = senior house officer
11. CI = confidence interval. With a corresponding hypothesis test is performed, the confidence level is the complement of respective level of significance, i.e. a 95% confidence interval reflects a significance level of 0.05.

12. EN = specialized emergency nurse

13. HO = house officer

14. DASH = Disability of the Arm, Shoulder and Hand score

15. LEFS = Lower Extremity Functional Score

16. SF-6D = Short Form-6D
Appendix E

Methodology Checklist for Controlled Trials

### Methodology Checklist 2: Controlled Trials

<table>
<thead>
<tr>
<th>Study identification</th>
<th>Guideline topic:</th>
<th>Key Question No:</th>
<th>Reviewer:</th>
</tr>
</thead>
</table>

**Before** completing this checklist, consider:

1. Is the paper a **randomised controlled trial** or a **controlled clinical trial**? If in doubt, check the study design algorithm available from SIGN and make sure you have the correct checklist. If it is a **controlled clinical trial** questions 1.2, 1.3, and 1.4 are not relevant, and the study cannot be rated higher than 1+

2. Is the paper relevant to key question? Analyse using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist.

Reason for rejection: 1. Paper not relevant to key question 2. Other reason __________________________ (please specify):

**SECTION 1: INTERNAL VALIDITY**

**In a well conducted RCT study...**

<table>
<thead>
<tr>
<th>Question</th>
<th>Does this study do it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>The study addresses an appropriate and clearly focused question.¹</td>
</tr>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.²</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.³</td>
</tr>
<tr>
<td>1.4</td>
<td>Subjects and investigators are kept ‘blind’ about treatment allocation.⁴</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.⁵</td>
</tr>
<tr>
<td>1.6</td>
<td>The only difference between groups is the treatment under investigation.⁶</td>
</tr>
<tr>
<td>1.7</td>
<td>All relevant outcomes are measured in a standard, valid and reliable way.⁷</td>
</tr>
<tr>
<td>1.8</td>
<td>What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?⁸</td>
</tr>
<tr>
<td>1.9</td>
<td>All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).⁹</td>
</tr>
</tbody>
</table>
Where the study is carried out at more than one site, results are comparable for all sites. Yes □ Can’t say □ No □ Does not apply □

SECTION 2: OVERALL ASSESSMENT OF THE STUDY

2.1 How well was the study done to minimise bias? High quality (++): □ Acceptable (+): □ Unacceptable – reject 0 □

Code as follows:

2.2 Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?

2.3 Are the results of this study directly applicable to the patient group targeted by this guideline?

2.4 Notes. Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.

Notes:

i. Unless a clear and well defined question is specified, it will be difficult to assess how well the study has met its objectives or how relevant it is to the question you are trying to answer on the basis of its conclusions.

ii. Random allocation of patients to receive one or other of the treatments under investigation, or to receive either treatment or placebo, is fundamental to this type of study.

iii. Allocation concealment refers to the process used to ensure that researchers are unaware which group patients are being allocated to at the time they enter the study. Research has shown that where allocation concealment is inadequate, investigators can overestimate the effect of interventions by up to 40%.

iv. Blinding refers to the process whereby people are kept unaware of which treatment an individual patient has been receiving when they are assessing the outcome for that patient. It can be carried out up to three levels. Single blinding is where patients are unaware of which treatment they are receiving. In double blind studies neither the clinician nor the patient knows which treatment is being given. In very rare cases studies may be triple blinded, where neither patients, clinicians, nor those conducting the analysis are aware of which patients received which treatment. The higher the level of blinding, the lower the risk of bias in the study.

v. Patients selected for inclusion in a trial must be as similar as possible. The study should report any significant differences in the composition of the study groups in relation to gender mix, age, stage of disease (if appropriate), social background, ethnic origin, or co-morbid conditions. These factors may be covered by inclusion and exclusion criteria, rather than being reported directly. Failure to address this question, or the use of inappropriate groups, should lead to the study being downgraded.

vi. If some patients received additional treatment, even if of a minor nature or consisting of advice and counselling rather than a physical intervention, this treatment is a potential confounding factor that may invalidate the results. If groups were not treated equally, the study should be rejected unless no other evidence is available. If the study is used as evidence it should be treated with caution.

vii. The primary outcome measures used should be clearly stated in the study. If the outcome measures are not stated, or the study bases its main conclusions on secondary outcomes, the study should be rejected. Where outcome measures require any degree of subjectivity, some evidence should be provided that the measures used are reliable and have been validated prior to their use in the study.

viii. The number of patients that drop out of a study should give concern if the number is very high. Conventionally, a 20% drop out rate is regarded as acceptable, but this may vary. Some regard should be paid to why patients dropped out, as well as how many. It should be noted that the drop out rate may be expected to be higher in studies conducted over a long period of time. A higher drop out rate will normally lead to downgrading, rather than rejection of a study.

ix. In practice, it is rarely the case that all patients allocated to the intervention group receive the intervention throughout the trial, or that all those in the comparison group do not. Patients may refuse treatment, or
contra-indications arise that lead them to be switched to the other group. If the comparability of groups through randomisation is to be maintained, however, patient outcomes must be analysed according to the group to which they were originally allocated irrespective of the treatment they actually received. (This is known as intention to treat analysis.) If it is clear that analysis was not on an intention to treat basis, the study may be rejected. If there is little other evidence available, the study may be included but should be evaluated as if it were a non-randomised cohort study.

In multi-site studies, confidence in the results should be increased if it can be shown that similar results were obtained at the different participating centres.

Rate the overall methodological quality of the study, using the following as a guide: High quality (++): Majority of criteria met. Little or no risk of bias. Results unlikely to be changed by further research. Acceptable (+): Most criteria met. Some flaws in the study with an associated risk of bias. Conclusions may change in the light of further studies. Low quality (0): Either most criteria not met, or significant flaws relating to key aspects of study design. Conclusions likely to change in the light of further studies.
### Appendix F

**Methodology Quality Assessment**

**Methodology Quality Assessment (1)**


<table>
<thead>
<tr>
<th>SECTION 1: INTERNAL VALIDITY</th>
<th>Does this study do it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>In a well conducted RCT study...</td>
<td></td>
</tr>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question.</td>
<td>Yes ✓ Can't say □ No □</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment groups is randomised.</td>
<td>Yes □ Can't say ✓ No □ (Subjects were randomly assigned but method was not specified.)</td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used.</td>
<td>Yes □ Can't say □ No ✓ (Concealment method was poor as simply unmarked envelopes were used.)</td>
</tr>
<tr>
<td>1.4 Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>Yes □ Can't say □ No □ Not applicable ✓ (Blinding for subjects and investigators were not feasible. The investigator involved in the follow-up assessment of the wound healing outcomes might have been told by the patients who sutured them and therefore possibly knew the treatment allocation.)</td>
</tr>
<tr>
<td>1.5 The treatment and control groups are similar at the start of the trial.</td>
<td>Yes □ Can't say ✓ No □ (The composition of the patients in each group was not adequately described to determine if there were any important between-group differences.)</td>
</tr>
<tr>
<td>1.6 The only difference between groups is the treatment under investigation.</td>
<td>Yes □ Can't say ✓ No □ (There was no adequate independent description of the patients in each group.)</td>
</tr>
<tr>
<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes □ Can't say ✓ No □ (The measures used were not clearly reported to be previously validated.)</td>
</tr>
</tbody>
</table>
### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

#### 2.1 How well was the study done to minimise bias?

*Code as follows:*

- High quality (++)
- Acceptable (+)
- Unacceptable

---

#### 2.2 Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?

- No. Allocation of subjects to either group of treatment was randomized yet method was not specified and the concealment method was poor. Any important differences in the composition of subjects in each group could not be determined as information about for example, the gender, age and types of injury of subjects in each group were not provided. Discussion of power analysis was also not included to determine the essential sample size for detecting significant differences in the results, so it is not certain that overall effect is solely due to the study intervention.

---

#### 2.3 Are the results of this study directly applicable to the patient group targeted by this guideline?

- Yes

---

#### 2.4 Notes.

Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.

**Conclusions:** Patients were more significantly satisfied with the care provided by the CNS than that provided by the medical group. Patient waiting times and wound healing outcomes were found to be similar between the two groups.

However, the lack of clear randomization method, adequate concealment, comparable patient characteristics between groups and discussion of statistical power has placed possible biases on the effect of the outcomes. As both the nurses and doctors were fully informed of the study and the assessment method, one group might also put additional effort in providing the care, especially the trained nurses who were allowed to suture patients for the first time and therefore they might be more eager to perform well.
### Methodology Quality Assessment (2)


**SECTION 1: INTERNAL VALIDITY**

**In a well conducted RCT study…**

<table>
<thead>
<tr>
<th>Question</th>
<th>Does this study do it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question.</td>
<td>Yes ✓ Can't say □ No □</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment groups is randomised.</td>
<td>Yes ✓ Can't say □ No □</td>
</tr>
<tr>
<td>(Computer generated off-site allocation was used.)</td>
<td></td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used.</td>
<td>Yes ✓ Can't say □ No □</td>
</tr>
<tr>
<td>(Sealed opaque envelopes were used.)</td>
<td></td>
</tr>
<tr>
<td>1.4 Subjects and investigators are kept 'blind' about treatment allocation.</td>
<td>Yes □ Can't say □ No □</td>
</tr>
<tr>
<td>(Blinding for subjects and investigators were not feasible. The first investigator who undertook the research assessment was an emergency physician in the participating ED and therefore might have known the identity of the NP or junior doctor, and told by patients the treatment allocation.)</td>
<td>Not applicable ✓</td>
</tr>
<tr>
<td>1.5 The treatment and control groups are similar at the start of the trial.</td>
<td>Yes ✓ Can't say □ No □</td>
</tr>
<tr>
<td>1.6 The only difference between groups is the treatment under investigation.</td>
<td>Yes ✓ Can't say □ No □</td>
</tr>
<tr>
<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes ✓ Can't say □ No □</td>
</tr>
<tr>
<td>1.8 What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>In NP-led (intervention) group (n=704), 398 patients returned the follow-up questionnaires, i.e. the dropout rate was 43.5%. In junior doctor-led (control) group (n=749), 433 patients returned the follow-up questionnaires, i.e. the dropout rate was 42.2%.</td>
</tr>
<tr>
<td>1.9 All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Yes □ Can't say □ No ✓</td>
</tr>
<tr>
<td>(Intention to treat was not mentioned in the text.)</td>
<td></td>
</tr>
<tr>
<td>1.10 Where the study is carried out at more than one site, results are comparable for all sites.</td>
<td>Yes □ Can't say □ No □</td>
</tr>
<tr>
<td>(The study was carried out in an ED in the UK.)</td>
<td></td>
</tr>
</tbody>
</table>
| 2.1 | How well was the study done to minimise bias?  
*Code as follows:* | High quality (++): ✓  
Acceptable (+): □  
Unacceptable – reject 0 □  
|---|---|---|---|
| 2.2 | Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention? | Yes. Assignment of subjects to treatment groups was randomised with adequate concealment. The sample size was calculated to have 80% power to detect a significant difference in results between groups, so it is certain that the overall effect is due to the study intervention.  
| 2.3 | Are the results of this study directly applicable to the patient group targeted by this guideline? | Yes: ✓  
No: □  
| 2.4 | Notes. Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above. | Conclusion: No significant differences were found between the care of minor injuries provided by the NPs and junior doctors in relation to the clinically made important errors made at follow up. Both patient satisfaction and functional recovery as reported by patients was not significantly different between the two groups. Appropriately trained NPs can provide a level of care for minor injuries that is equal or in some ways better than that provided by doctors.  
The first investigator who undertook the research assessment was an emergency physician in the participating ED and therefore might have known the identity of the NP or junior doctor, and told by patients the treatment allocation, yet attempts were made to minimize bias by having the research examination in a separating room in the study site. The clinical and research assessment was compared about 3 months later and by this time, the documentation contained no clues of which treatment officer provided the care as the documentations had been transcribed by typists who were not involved in the study. Besides, though the dropout rates were considered to be relatively high in this study but it might possibly due to its large sample size and the ED-based study nature which usually results in poorer follow-up rates. |
**Methodology Quality Assessment (3)**


**SECTION 1: INTERNAL VALIDITY**

*In a well conducted RCT study…*  

<table>
<thead>
<tr>
<th></th>
<th>Does this study do it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>The study addresses an appropriate and clearly focused question.</td>
</tr>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
</tr>
<tr>
<td>1.4</td>
<td>Subjects and investigators are kept 'blind' about treatment allocation.</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
</tr>
<tr>
<td>1.6</td>
<td>The only difference between groups is the treatment under investigation.</td>
</tr>
<tr>
<td>1.7</td>
<td>All relevant outcomes are measured in a standard, valid and reliable way.</td>
</tr>
<tr>
<td>1.8</td>
<td>What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
</tr>
<tr>
<td>1.9</td>
<td>All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
</tr>
<tr>
<td>1.10</td>
<td>Where the study is carried out at more than one site, results are comparable for all sites.</td>
</tr>
</tbody>
</table>
**SECTION 2: OVERALL ASSESSMENT OF THE STUDY**

<table>
<thead>
<tr>
<th>2.1</th>
<th>How well was the study done to minimise bias?</th>
<th>Code as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High quality (++):</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>Acceptable (+):</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Unacceptable – reject 0:</td>
<td>□</td>
</tr>
</tbody>
</table>

| 2.2 | Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention? | No. Assignment of subjects to treatment groups was randomised yet method was not specified. Discussion of power analysis was not included. The sample size might not be large enough to detect any significant differences between results, so it is not certain that the overall effect is solely due to the study intervention. |

<table>
<thead>
<tr>
<th>2.3</th>
<th>Are the results of this study directly applicable to the patient group targeted by this guideline?</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.4</th>
<th>Notes. Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conclusion: Higher levels of patient satisfaction and clinical documentation quality with ENP-led care than SHO-led care of minor injuries with significant statistical differences were shown.</td>
</tr>
<tr>
<td></td>
<td>As both the NPs and SHOs were fully informed of the study and the assessment method, one group might put additional effort in providing the care. Missed injuries were found to be the same for both groups, yet discussion of power analysis was not included in the study. The sample size might be therefore not large enough to detect any significant differences between results.</td>
</tr>
</tbody>
</table>
### Methodological Quality Assessment (4)


#### SECTION 1: INTERNAL VALIDITY

**In a well conducted RCT study…**

<table>
<thead>
<tr>
<th>Question</th>
<th>Does this study do it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question.</td>
<td>Yes ✓ Can’t say □ No ☒</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment groups is randomised.</td>
<td>Yes ✓ Can’t say □ No ☒</td>
</tr>
<tr>
<td>(Computerized block randomization was used to allocate patients unstratified into the two groups in blocks of 20.)</td>
<td></td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used.</td>
<td>Yes ☒ Can’t say □ No ✓</td>
</tr>
<tr>
<td>(No concealment method was reported.)</td>
<td></td>
</tr>
<tr>
<td>1.4 Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>Yes ☒ Can’t say □ No ✓</td>
</tr>
<tr>
<td>(Blinding for subjects and investigators were not feasible. The surgeon who reassessed all patients to verify the diagnosis might be told by the patient about the treatment allocation or recognize the handwriting of the treatment officer in the clinical documents.)</td>
<td></td>
</tr>
<tr>
<td>1.5 The treatment and control groups are similar at the start of the trial.</td>
<td>Yes ✓ Can’t say □ No ✓</td>
</tr>
<tr>
<td>1.6 The only difference between groups is the treatment under investigation.</td>
<td>Yes ✓ Can’t say □ No ✓</td>
</tr>
<tr>
<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes ✓ Can’t say □ No ✓</td>
</tr>
<tr>
<td>1.8 What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>In SEN-led (intervention) group (n=263), 21 patients were lost to follow up, i.e. the dropout rate was 8.0%. In HO-led (control) group (n=249), 16 patients were lost to follow up, i.e. the dropout rate was 6.4%.</td>
</tr>
<tr>
<td>1.9 All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Yes ☒ Can’t say □ No ✓</td>
</tr>
<tr>
<td>(Intention to treat was not mentioned in the text.)</td>
<td></td>
</tr>
<tr>
<td>1.10 Where the study is carried out at more than one site, results are comparable for all sites.</td>
<td>Yes ☒ Can’t say □ No ✓</td>
</tr>
<tr>
<td>(The study was carried out in an ED in the Netherlands)</td>
<td></td>
</tr>
</tbody>
</table>
## SECTION 2: OVERALL ASSESSMENT OF THE STUDY

| 2.1 | How well was the study done to minimise bias?  
*Code as follows:* | High quality (+++) □  
Acceptable (+) ✓  
Unacceptable – reject 0 □ |
| 2.2 | Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention? | Yes. Assignment of subjects to treatment groups was randomised though the concealment method was not made clear. Discussion of power analysis was included to obtain sufficient power to determine the essential sample size for detecting significant differences. The sample size in the study was adequate enough to detect any significant difference, so it is certain that the overall effect is due to the study intervention. |
| 2.3 | Are the results of this study directly applicable to the patient group targeted by this guideline? | Yes ✓  
No □ |
| 2.4 | Notes. Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above. | Conclusion: SENs were at least as accurate as HOs in assessing and treating ankle/foot injuries with significantly better level of patient satisfaction and a reduction of waiting times as that of HOs.  
As both the SENs and HOs were fully informed of the study and the assessment method, one group might put additional effort in providing the care, especially the trained nurses who were allowed to treat patients for the first time and therefore they might be more eager to perform well. |
## Methodological Quality Assessment (5)


### SECTION 1: INTERNAL VALIDITY

<table>
<thead>
<tr>
<th>Question</th>
<th>Does this study do it?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In a well conducted RCT study…</strong></td>
<td></td>
</tr>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question.</td>
<td>Yes ✓ Can't say □ No □</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment groups is randomised.</td>
<td>Yes ✓ Can't say □ No □</td>
</tr>
<tr>
<td>(Computerized block randomization was used to allocate patients unstratified into the two groups in blocks of 20.)</td>
<td></td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used.</td>
<td>Yes □ Can't say □ No ✓</td>
</tr>
<tr>
<td>(No concealment method was reported.)</td>
<td></td>
</tr>
<tr>
<td>1.4 Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>Yes □ Can't say □ No □</td>
</tr>
<tr>
<td>(Blinding for subjects and investigators were not feasible. The surgeon who reassessed all patients to verify the diagnosis might be told by the patient about the treatment allocation or recognize the handwriting of the treatment officer in the clinical documents.)</td>
<td>Not applicable ✓</td>
</tr>
<tr>
<td>1.5 The treatment and control groups are similar at the start of the trial.</td>
<td>Yes ✓ Can't say □ No □</td>
</tr>
<tr>
<td>1.6 The only difference between groups is the treatment under investigation.</td>
<td>Yes ✓ Can't say □ No □</td>
</tr>
<tr>
<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes ✓ Can't say □ No □</td>
</tr>
<tr>
<td>1.8 What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>In SEN-led (intervention) group (n=263), 21 patients were lost to follow up, i.e. the dropout rate was 8.0%. In HO-led (control) group (n=249), 16 patients were lost to follow up, i.e. the dropout rate was 6.4%.</td>
</tr>
<tr>
<td>1.9 All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Yes □ Can't say □ No ✓</td>
</tr>
<tr>
<td>(Intention to treat was not mentioned in the text.)</td>
<td></td>
</tr>
<tr>
<td>1.10 Where the study is carried out at more than one site, results are comparable for all sites.</td>
<td>Yes □ Can't say □ No □</td>
</tr>
<tr>
<td>(The study was carried out in an ED in the Netherlands)</td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>How well was the study done to minimise bias?</td>
</tr>
<tr>
<td>2.2</td>
<td>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
</tr>
<tr>
<td>2.3</td>
<td>Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
</tr>
<tr>
<td>2.4</td>
<td>Notes. Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</td>
</tr>
</tbody>
</table>
Methodological Quality Assessment (6)


### SECTION 1: INTERNAL VALIDITY

*In a well conducted RCT study…*  

<table>
<thead>
<tr>
<th></th>
<th>Does this study do it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>The study addresses an appropriate and clearly focused question.</td>
</tr>
<tr>
<td>Yes</td>
<td>✓ Can’t say □ No □</td>
</tr>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
</tr>
<tr>
<td>Yes</td>
<td>✓ Can’t say □ No □</td>
</tr>
<tr>
<td></td>
<td>(Block randomization was used to allocate the subjects into the three groups with a block size of 12.)</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
</tr>
<tr>
<td>Yes</td>
<td>✓ Can’t say □ No □</td>
</tr>
<tr>
<td></td>
<td>(Sealed opaque envelopes were used.)</td>
</tr>
<tr>
<td>1.4</td>
<td>Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
</tr>
<tr>
<td>Yes</td>
<td>✓ Can’t say □ No □</td>
</tr>
<tr>
<td></td>
<td>Not applicable □</td>
</tr>
<tr>
<td></td>
<td>(Blinding for patients was impossible but the researcher was reported to be blinded to the treatment allocation and took no part in any clinical judgment for the patients.)</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
</tr>
<tr>
<td>Yes</td>
<td>✓ Can’t say □ No □</td>
</tr>
<tr>
<td>1.6</td>
<td>The only difference between groups is the treatment under investigation.</td>
</tr>
<tr>
<td>Yes</td>
<td>✓ Can’t say □ No □</td>
</tr>
<tr>
<td>1.7</td>
<td>All relevant outcomes are measured in a standard, valid and reliable way.</td>
</tr>
<tr>
<td>Yes</td>
<td>✓ Can’t say □ No □</td>
</tr>
<tr>
<td>1.8</td>
<td>What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
</tr>
<tr>
<td></td>
<td>In ENP-led (intervention) group (n=84), 11 patients were lost to follow up, i.e. the dropout rate was 13.1%.</td>
</tr>
<tr>
<td></td>
<td>In doctor-led (control) group (n=94), 26 patients were lost to follow up, i.e. the dropout rate was 27.7%.</td>
</tr>
<tr>
<td>1.9</td>
<td>All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
</tr>
<tr>
<td>Yes</td>
<td>✓ Can’t say □</td>
</tr>
<tr>
<td>No</td>
<td>□ Not applicable □</td>
</tr>
<tr>
<td></td>
<td>(The data analysis was reported to be an intention to treat analysis.)</td>
</tr>
<tr>
<td>1.10</td>
<td>Where the study is carried out at more than one site, results are comparable for all sites.</td>
</tr>
<tr>
<td>Yes</td>
<td>✓ Can’t say □</td>
</tr>
<tr>
<td>No</td>
<td>□ Not applicable ✓</td>
</tr>
<tr>
<td></td>
<td>(The study was carried out in an ED in the UK.)</td>
</tr>
<tr>
<td>Section 2: OVERALL ASSESSMENT OF THE STUDY</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>2.1</strong> How well was the study done to minimise bias?</td>
<td></td>
</tr>
<tr>
<td>Code as follows:</td>
<td></td>
</tr>
<tr>
<td>High quality (++): ✓</td>
<td></td>
</tr>
<tr>
<td>Acceptable (+): 0</td>
<td></td>
</tr>
<tr>
<td>Unacceptable – reject 0: 0</td>
<td></td>
</tr>
</tbody>
</table>

**2.2** Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?

Yes. Assignment of subjects to treatment groups was randomized with adequate concealment. The results were analysed using an intention-to-treat analysis. Discussion of power analysis was also included to obtain sufficient power to determine the essential sample size for detecting significant differences. The sample size in the study was sufficiently large enough to detect any significant differences and so it is certain that the overall effect is due to the study intervention.

**2.3** Are the results of this study directly applicable to the patient group targeted by this guideline?

Yes ✓
No 0

**2.4** Notes. Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.

Conclusion: The clinical outcomes of management of soft tissue injury provided by ENPs was equivalent to the one provided by the medical staff.

Assignment of subjects to treatment groups was randomized with adequate concealment. The results were analyzed using an intention-to-treat analysis. The study was also well-powered to have a sufficiently large enough sample size to detect any significant differences. The study did well in minimizing bias in results.
Methodological Quality Assessment (7)


**SECTION 1: INTERNAL VALIDITY**

In a well conducted RCT study…

<table>
<thead>
<tr>
<th>Number</th>
<th>Question</th>
<th>Yes</th>
<th>Can't say</th>
<th>No</th>
<th>Block randomization</th>
<th>Sealed opaque envelopes</th>
<th>Blinding for patients</th>
<th>The data analysis was reported to be an intention to treat analysis</th>
<th>The study was carried out in an ED in the UK.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>The study addresses an appropriate and clearly focused question.</td>
<td>Yes</td>
<td>✓</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
<td>Yes</td>
<td>✓</td>
<td>No</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
<td>Yes</td>
<td>✓</td>
<td>No</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.4</td>
<td>Subjects and investigators are kept 'blind' about treatment allocation.</td>
<td>Yes</td>
<td>✓</td>
<td>No</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
<td>Yes</td>
<td>✓</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.6</td>
<td>The only difference between groups is the treatment under investigation.</td>
<td>Yes</td>
<td>✓</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7</td>
<td>All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes</td>
<td>✓</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.8</td>
<td>What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>In ENP-led (intervention) group (n=84), 11 patients were lost to follow up, i.e. the dropout rate was 13.1%. In doctor-led (control) group (n=94), 26 patients were lost to follow up, i.e. the dropout rate was 27.7%.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
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<td>✓</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.10</td>
<td>Where the study is carried out at more than one site, results are comparable for all sites.</td>
<td>Yes</td>
<td>✓</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## SECTION 2: OVERALL ASSESSMENT OF THE STUDY

| 2.1 | How well was the study done to minimise bias?  
*Code as follows:* | High quality (++): ✓  
Acceptable (+): □  
Unacceptable: – reject 0 □ |
| 2.2 | Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention? | Yes. Assignment of subjects to treatment groups was randomized with adequate concealment. The results were analysed using an intention-to-treat analysis. Discussion of power analysis was also included to obtain sufficient power to determine the essential sample size for detecting significant differences. The sample size in the study was sufficiently large enough to detect any significant differences and so it is certain that the overall effect is due to the study intervention.) |
| 2.3 | Are the results of this study directly applicable to the patient group targeted by this guideline? | Yes ✓  
No □ |
| 2.4 | Notes. Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above. | Conclusion: Cost of routine care provided by ENP is likely equivalent to the one provided by doctors but there is a risk of resulting greater cost from the perspective of the hospitals, patients and society in view of substituting doctors’ care by ENPs. |
## Appendix G

### Estimated Setup Costs of Implementation (estimated *400 minor wounded patients a month)

<table>
<thead>
<tr>
<th>Activities</th>
<th>Involved Personnel</th>
<th>Hourly Salary (HKD)</th>
<th>Total Time Spent (Hours)</th>
<th>Amount (HKD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To attend a 30-hour in-house training workshop on minor wound management</td>
<td>RN (≥ 5-year AED experience) (n=3)</td>
<td>$246**</td>
<td>30 x 3 = 90</td>
<td>$246 x 90 = $22,140</td>
</tr>
<tr>
<td>To provide 30-hour training on minor wound management to eligible AED nurses</td>
<td>AED Consultant (n=1)</td>
<td>$1,218***</td>
<td>30 x 1 = 30</td>
<td>$1,218 x 30 = $36,540</td>
</tr>
<tr>
<td>To provide the led management on minor wounded patients</td>
<td>Well-trained RN (n=4)</td>
<td>$246 (i.e. the average cost per hour of patient contact)</td>
<td>400</td>
<td>$246 x 400 = $98,400</td>
</tr>
</tbody>
</table>

Subtotal = $157,080

<table>
<thead>
<tr>
<th>Estimated material costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items</td>
</tr>
<tr>
<td>✓ A4-paper-sized handouts for staff training (50 pages)</td>
</tr>
<tr>
<td>✓ A4-paper-sized EBP guideline (3 pages)</td>
</tr>
<tr>
<td>✓ A4-paper-sized consent form for patient to agree care to be led by nurses (1 page)</td>
</tr>
<tr>
<td>Item Description</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>A4-paper-sized clinical form for nurse-led assessment and treatment of minor injury (2 pages)</td>
</tr>
<tr>
<td>A4-paper-sized patient satisfaction questionnaires for evaluation (1 page)</td>
</tr>
<tr>
<td>Stationery</td>
</tr>
<tr>
<td>Computer accessories</td>
</tr>
<tr>
<td>Venue &amp; AV systems for training sessions</td>
</tr>
<tr>
<td>Medical equipment for service provision (e.g. dressing materials, stretchers, wheelchairs)</td>
</tr>
<tr>
<td>Subtotal</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Notes:
*With reference to the AED minor OT case report from 01/01/2013 to 31/12/2013 retrieved from Hospital Authority AEIS intranet, there were an average of around 400 cases required dressing and or suturing presenting to the target AED monthly.
**With reference to Hospital Authority General Pay Scale (HGPS) in 2015, estimated mean monthly salary of a senior RN (HGPS Point 25): HKD $43,383
  ➔ Monthly working hours: 176; Hourly salary: HKD $43,383/176 = HKD $246
***With reference to Hospital Authority General Pay Scale (HGPS) in 2015, estimated mean monthly salary of an AED Consultant (HGPS Point 50-51B): HKD194,905
  ➔ Monthly working hours: 160; Hourly salary: HKD $194,905/160 = HKD $1,218
Appendix H

Estimated Operational Costs of Implementation (12-month period) (estimated *400 minor wounded patients a year)

<table>
<thead>
<tr>
<th>Estimated manpower costs</th>
<th>Activities</th>
<th>Involved Personnel</th>
<th>Hourly Salary (HKD)</th>
<th>Total Time Spent (Hours)</th>
<th>Amount (HKD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To attend 1-hour refresh course</td>
<td>Well-trained RN (n=3)</td>
<td>$246</td>
<td>1 x 3 = 3</td>
<td>$738</td>
</tr>
<tr>
<td></td>
<td>To provide 1-hour refresh training</td>
<td>AED Consultant (n=1)</td>
<td>$1,218</td>
<td>1</td>
<td>$1,218</td>
</tr>
<tr>
<td></td>
<td>To provide the led management on minor wounded patients</td>
<td>Well-trained RN (n=3)</td>
<td>$246</td>
<td>400/month x 12 = 4800</td>
<td>$1,180,800</td>
</tr>
</tbody>
</table>

Subtotal = $1,182,756

<table>
<thead>
<tr>
<th>Estimated material costs</th>
<th>Items</th>
<th>Unit Price (HKD)</th>
<th>Quality</th>
<th>Amount (HKD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A4-paper-sized consent form for patient to agree care to be led by nurses (1 page)</td>
<td>$0.2</td>
<td>400/month x 12 = 4800</td>
<td>$0.2 x 1 x 400 = $80</td>
</tr>
<tr>
<td></td>
<td>A4-paper-sized clinical form for nurse-led assessment and treatment of minor injury (2 pages)</td>
<td>$0.2</td>
<td>400/month x 12 = 4800</td>
<td>$0.2 x 2 x 400 = $160</td>
</tr>
<tr>
<td></td>
<td>A4-paper-sized patient satisfaction questionnaires for evaluation (1 page)</td>
<td>$0.2</td>
<td>400/month x 12 = 4800</td>
<td>$0.2 x 1 x 400 = $80</td>
</tr>
</tbody>
</table>

Subtotal = $320

Total: $1,183,076
Appendix I

Estimated Yearly Savings

<table>
<thead>
<tr>
<th>Estimated savings</th>
<th>Item description</th>
<th>Benefit in monetary terms (HKD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction in average costs per hour of</td>
<td>Total estimated minor wounded patients attending the AED a year = 4800</td>
<td>Total average costs per hour of patient contact by a RN a year – Total average costs per hour of</td>
</tr>
<tr>
<td>patient contact by the healthcare</td>
<td>Average costs per hour of patient contact by a RN = $246</td>
<td>patient contact by a Resident = $(722-246) x 4800 = $2,284,800</td>
</tr>
<tr>
<td>provider</td>
<td>Average costs per hour of patient contact by a Resident = *$722</td>
<td></td>
</tr>
</tbody>
</table>

| Hidden / potential savings               |                                                                                  |                                                                                                 |
|-----------------------------------------|                                                                                  |                                                                                                 |
| Reduction in additional treatment for   |                                                                                  | Cannot be estimated                                                                               |
| those who leave without being seen      |                                                                                  |                                                                                                 |
| previously                              |                                                                                  |                                                                                                 |
| Reduction in time spent in waiting hall |                                                                                  | Cannot be estimated                                                                               |
| before seeing the healthcare provider    |                                                                                  |                                                                                                 |
| for consultation by minor wounded       |                                                                                  |                                                                                                 |
| patients                                |                                                                                  |                                                                                                 |
| Reduction in time spent in waiting      |                                                                                  | Cannot be estimated                                                                               |
| for treatment after consultation by      |                                                                                  |                                                                                                 |
| minor wounded patients                  |                                                                                  |                                                                                                 |
| Reduction in length of stay in AED by   |                                                                                  | Cannot be estimated                                                                               |
| minor wounded patients                  |                                                                                  |                                                                                                 |

Total = $2,284,800+
Notes:
*With reference to Hospital Authority General Pay Scale (HGPS) in 2014,
estimated mean monthly salary of senior Resident (HGPS Point 44B): HKD $115,584
  Monthly working hours: 160; Hourly salary: HKD $115,584/160 = HKD $722
Appendix J

Nurse-led Minor Wound Management Algorithm

1. Assessment

2. Diagnosis

3. Treatment options / Conditions for nurse-led treatment
   - All wound conditions outside urgent treatment → management as per specific wound type

4. Patient education for self-care
   (*Recommendation 6.0)
   - Hygiene
   - Diet
   - Exercise
   - Dressing/bandaging regimes
   - Disease process and health maintenance
   - Medication

5. Follow-up
   - Review as appropriate
   - Test results
   - Monitor progress
   - Maintenance of healed wound

Conditions for treatment by physicians
- Urgent conditions as indicated above
- Treatment outside of nurse-led scope of practice e.g. Ischemia, severe infection

3a. Non-pharmacological approaches
- Cleansing and repairs of wound
- Appropriate dressings/bandages
- Skin care and moisturizers

3b. Pharmacological agents (endorsed by physicians)
(*Recommendation 7.0)
- Anti-tetanus injection
- Antibiotics (e.g. Augmentin) for likely contaminated wounds
- Analgesics (e.g. Paracetamol)
- Topical agents (e.g. Antimicrobials) for likely contaminated wounds

Investigations – as indicated (endorsed by physicians)
(*Recommendation 7.0)
- Blood test
- Urea & Electrolytes
- Blood glucose levels
- X-Ray
- Wound swabs

Patient History
- Medical history
- Wound history: sustained > 72 hours (*Recommendation 3.0)
- Current medications
- Social and occupational history
- Activities of daily living
- Tetanus status

Physical examination
- Clinical features of wound and skin
- Presence of other wounds/lesions
- Presence of any foreign bodies
- Peripheral perfusion
- Neurological examination, e.g. tendon reflexes

Patient Concern (*Recommendation 4.0)
- Level of understanding about the injury condition
- Preferences for the treatment plan
- Ability to comprehend and follow the plan of care

!! Consider conditions for urgent referral to physicians, e.g.
- Ischemic limbs
- Serious infection e.g. wet gangrene

3. Treatment options / Conditions for nurse-led treatment
   • All wound conditions outside urgent treatment → management as per specific wound type

4. Patient education for self-care
   (*Recommendation 6.0)
   • Hygiene
   • Diet
   • Exercise
   • Dressing/bandaging regimes
   • Disease process and health maintenance
   • Medication

5. Follow-up
   • Review as appropriate
   • Test results
   • Monitor progress
   • Maintenance of healed wound

(Source: Adapted from García-Gubern, Colon-Rolon & Bond., 2010; MacLellan, Gardner & Gardner, 2002; Purcell, 2003)
## Appendix K

### Project Timeline

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Communication with stakeholders</td>
<td></td>
</tr>
<tr>
<td>In-house training to care providers</td>
<td></td>
</tr>
<tr>
<td>Ethical approval</td>
<td></td>
</tr>
<tr>
<td>Pilot testing</td>
<td></td>
</tr>
<tr>
<td>Data process for post-pilot evaluation</td>
<td></td>
</tr>
<tr>
<td>Revise practice change and EBP guideline</td>
<td></td>
</tr>
<tr>
<td>Full-scale implementation</td>
<td></td>
</tr>
<tr>
<td>Data collection</td>
<td></td>
</tr>
<tr>
<td>Data analysis</td>
<td></td>
</tr>
<tr>
<td>Evaluation (patient outcomes)</td>
<td></td>
</tr>
<tr>
<td>Evaluation (healthcare providers outcomes)</td>
<td></td>
</tr>
<tr>
<td>Evaluation (system outcomes)</td>
<td></td>
</tr>
</tbody>
</table>
Dear Colleagues,
You are kindly invited to write your views about the training workshops. All replies are anonymous. The results would help us to evaluate the training provided and so to help us improve our teaching and your learning. Thank you.

**Part (A) Overall evaluation of the training workshops**
Please ✓ the appropriate box.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I was clear about what I was expected to learn and achieve in the workshops.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>2. The workshops were organized in a way that helped me achieve its learning outcomes.</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>3. I understand about the recommendations in the EBP guideline.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>4. I was made clear about the evidences provided by the EBP guideline.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>5. The assessment methods were appropriate in relation to the learning outcomes in this training workshop.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>6. The assessment standards were made clear to me.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>7. I feel that I was competent and knowledgeable to manage patients with minor wound injuries.</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>8. Overall, the training workshops were effective in helping me to manage patients with minor wound injuries.</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Part (B) Open-ended questions about the training workshops
Write in the space below your comments about the training workshops.
9. What were the best thing(s) about the workshops?

10. What thing(s) about these workshops could be improved?
Appendix M

Patient Satisfaction Questionnaire (C-MISS-R)

急症護士診治輕微傷口服務問卷調查 (C-MISS-R)

您好，以下問卷是想瞭解您對於剛才為您診治輕微傷口的急症護士服務品質的整體評價，請您花三分鐘時間回答以下幾條簡單問題，您寶貴的意見對我們日後改善服務將有很大幫助。問卷內容僅供學術方面研究，所以資料將會保密。

▶ 請填寫以下有關資料

年齡：______
性別：男 / 女

▶ 請於適當答案的方格內加上 ✓ 號

<table>
<thead>
<tr>
<th></th>
<th>是</th>
<th>否</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 與護士會談後，您知道您的病情有多嚴重。</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>2. 與護士會談後，您對未來數星期或數月中預期的健康轉變有個很好的概念。</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>3. 關於您的病情，護士告訴了您所有您想知道的東西。</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>4. 您感到您挺能明白護士幫助您的治療計劃。</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>5. 您覺得護士真的很明白您。</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>6. 與護士會談後，您對您的問題得到開解。</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>7. 您認為護士認真地對待您的問題。</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>8. 您認為護士對您友善。</td>
<td>☐</td>
<td>☒</td>
</tr>
</tbody>
</table>

9. 其他意見:

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

多謝您完成此問卷！
## Appendix N

### Audit Form on Nurse-led Clinical Record

Please ✓ the appropriate box.

### ASSESSMENT: PRESENTING PROBLEM(S):

<table>
<thead>
<tr>
<th>1. Context and circumstances in which injury/illness occurred</th>
<th>Recorded in detail</th>
<th>Recorded without detail</th>
<th>Not recorded</th>
<th>Not appropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Relevant past medical history/co-existing problem</td>
<td>Recorded in detail</td>
<td>Recorded without detail</td>
<td>Not recorded</td>
<td>Not appropriate</td>
</tr>
<tr>
<td>3. Allergies documented</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Relevant social history (including lifestyle/risk factors e.g. smoking, home and family circumstances, occupational circumstances)</td>
<td>Recorded in detail</td>
<td>Recorded without detail</td>
<td>Not recorded</td>
<td>Not appropriate</td>
</tr>
<tr>
<td>5. Physical examination</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Correct anatomical position documented</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Uses Look, Feel, Move and neuro-vascular checking</td>
<td>Recorded in detail</td>
<td>Recorded without detail</td>
<td>Not recorded</td>
<td>Not appropriate</td>
</tr>
<tr>
<td>c. Appropriate use of abbreviation</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### INVESTIGATIONS/DIAGNOSIS:

| 1. Appropriate investigations instigated                      | Yes                | No                      |              |                 |
| 2. Diagnosis documented                                      | Yes                | No                      |              |                 |
| 3. Correct diagnosis?                                        | Yes                | No                      |              |                 |
| 4. X-Ray finding(s) documented                               | Yes                | No                      |              |                 |
| 5. Correct X-ray finding(s)?                                 | Yes                | No                      |              |                 |
**MANAGEMENT/ADVICE GIVEN:**

| 1. Plan of treatment documented, including follow-up/ referrals | Recorded in detail ☐  
Recorded without detail ☐  
Not recorded ☐ |
| --- | --- |
| 2. *Appropriate treatment plan?* | Yes ☐  
No ☐ |
| 3. Discharge advice documented | Recorded in detail ☐  
Recorded without detail ☐  
Not recorded ☐ |

* Appropriate treatment plan should include correctly disposition of patients, appropriate medication regarding to patients’ problem and appropriate specialty referral if indicated.

**Other comments:**

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

**Date:** ________________  
**Auditor:** ________________
Appendix O

Topic Guide of Focus Group Interview for Participating Nurses (post-pilot study)

1) Can you share any experience in the past pilot study?
2) Can you give some comments on the enrollment strategies/ logistics/ mode of delivery/ duration/ contents/ quality of the intervention?
3) What do you think about the proposed EBP guideline?
4) What are the problems or difficulties you encountered during subject enrollment/ the implementation of the intervention in the pilot phase?
5) What do you think about the strength and weakness of implementing the nurse-led model of minor wound management in the practicing AED?
6) How would you comment on your nursing role in implementing the innovation?
7) Do you have any comments, suggestions or recommendation pertaining to the innovation for further improvement?
8) Overall, how do you feel about the innovative nurse-led model of minor wound management?
Appendix P

Topic Guide for Semi-structured Interview for Participating Nurses
(post-full implementation)

1) Can you share any experience in the implementing the innovation?
2) What problems were encountered during the implementation of the intervention? (Please give me some examples.)
3) How would you comment on your nursing role in the innovation?
4) What is your perception of the nurse-led model for minor wound management and why?
5) Do you have any other comments or suggestions pertaining to the innovation for further improvement?
Table 1

Definition of Terms for Minor Wounds

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
</table>
| Cut                           | ■ Break incised into skin by sharp object eg knife, razor blade or glass  
  ■ Usually a clean cut  
  ■ Could be superficial or deep  
  ■ Possible damage to deeper structures                                                                 |
| Laceration                    | ■ Break due to blunt force  
  ■ Usually tissues look ragged and contused (bruised)  
  ■ Dirt and devitalised tissue increases infection risk                                                                 |
| Penetrating or puncture wound | ■ Caused by long, pointed, narrow object eg garden fork, nail, teeth  
  ■ Base of wound cannot be seen. Risk of damage to underlying structures and foreign matter at base of wound  
  ■ Tetanus and gangrene are a high risk  
  ■ If human bite, risk of HIV, hepatitis  
  ■ Antibiotics are usually given prophylactically; a patient group direction will be needed |
| Abrasion                      | ■ Graze, friction caused shearing effect to remove tissue  
  ■ Tend to be dirty with embedded material eg grit  
  ■ Infection risk and cosmetic problem from tattooing effect if not adequately cleaned |

(Source: Adopted from Purcell, 2003)
Table 2

SIGN Grading System 1999 – 2012 (Levels of Evidence)

<table>
<thead>
<tr>
<th>LEVELS OF EVIDENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1++</td>
</tr>
<tr>
<td>1+</td>
</tr>
<tr>
<td>1-</td>
</tr>
<tr>
<td>2++</td>
</tr>
<tr>
<td>2+</td>
</tr>
<tr>
<td>2-</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>
Table 3
Level of Evidence of Included Studies

<table>
<thead>
<tr>
<th>Studies</th>
<th>Design</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooper, M. A., Lindsay, G. M., Kinn, S., &amp; Swann, I. J. (2002). Evaluating Emergency Nurse Practitioner services: a randomized controlled trial. <em>Journal of Advanced Nursing</em>, 40(6), 721-730.</td>
<td>RCT</td>
<td>1+</td>
</tr>
<tr>
<td>Sakr, M., Angus, J., Perrin, J., Nixon, C., Nicholl, J., &amp; Wardrope, J.</td>
<td>RCT</td>
<td>1++</td>
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</tbody>
</table>
### Table 4
SIGN GRADING SYSTEM 1999-2012 (Grades of Recommendations)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+</td>
</tr>
<tr>
<td>✓</td>
<td>Recommended best practice based on the clinical experience of the guideline development group</td>
</tr>
</tbody>
</table>
References


Accident and Emergency Information System. (2014c). *Accident & Emergency Department minor OT case report from 01/01/2013 to 31/12/2013*. Retrieved from Hospital Authority AEIS intranet.


Blank, F. S. J., Mader, T. J., Wolfe, J., Keyes, M., Kirschner, R., & Provost, D.


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