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The SEN concept; a novel strategy for resolving Emergency Department crowding

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2007

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citation for published version (APA)

Derksen, R. J. (2007). *The SEN concept; a novel strategy for resolving Emergency Department crowding: Specialized Emergency Nurses (SENs) treating ankle and foot injuries.*

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Summary, conclusions and future prospects

Emergency Department crowding and accompanying risks/problems are becoming an increasingly large problem in the Netherlands. In other countries, like the United Kingdom and the United States, these problems already arose in the 1970s. In response, midlevel practitioners (Advanced Nurse Practitioners (ANPs) and Physician Assistants (PAs)) were developed to take over certain diagnostic tasks from physicians to reduce working pressure for ED physicians and reduce waiting times and complications. Results reported from these initiatives were good and it seemed logical to take over these developments when problems occurred in the Netherlands/ mainland Europe.

When making an inventory of the first experiences with midlevel practitioners (ANPs/PAs) in the Netherlands (**Chapter 2**), it became clear to us that the benefit of reducing physician workload while maintaining good diagnostic accuracy and patient satisfaction results is probably attainable. However, the educational programme is relatively long and expensive. Moreover, although basic medical issues are dealt with, the programmes are not aimed at preparing the trainees for specific (diagnostic) tasks. Another disadvantage concerns the loss of these practitioners for regular nursing tasks, contributing to the shortage in regular nurses. This is why an alternative is sought that maintains the benefits of ANPs and PAs and gets rid of the disadvantages: the SEN concept.

Chapter 3 presents the diagnostic accuracy results of SENs before and after attending the short, injury specific course that comprised of a radiograph interpretation session led by a radiologist specialized in trauma. The results were compared with the control group being the junior ED physicians. Before the training session, the SEN group showed a significantly lower accuracy compared to the junior physician group. After training, however, the diagnostic accuracy did not significantly differ between groups. Therefore, it was concluded

that SENs are able to accurately interpret foot and ankle radiographs after a short educational session.

Chapter 4 concerns a letter to the editor of the American Journal of Emergency Medicine concerning the article written by Fiessler et al published in May 2004 concerning the ability of ED nurses to appropriately interpret the Ottawa Ankle Rules. The methodology of assessing observer ability to clinically interpret a diagnostic tool is subject of this chapter. The results of an observational trial by the Fiessler group are presented in the article and showed good diagnostic accuracy values for the triage nurses. However, the article put forward the interesting finding of moderate interobserver agreement for the OAR between triage nurses and Emergency Physicians. The conclusion drawn by the authors that the moderate interobserver agreement (kappa) results are proof of the inability of triage nurses to autonomously interpret the OAR is contested by us in the letter. Kappa values represent the agreement between two observers of which in this study, EPs nor triage nurses can be considered the gold standard. In determining the diagnostic accuracy of the observers, the final outcome of OAR assessment should in our opinion be the radiographic proof of presence or absence of fracture (gold standard). Consequently, the advice to let triage nurses use these rules only under supervision of a physician is in our opinion not supported by the presented results.

Chapter 5 describes and discusses the results of our own prospective interobserver trial comparing the diagnostic accuracy and interobserver agreement of SENs and junior ED physicians in their clinical interpretation of ankle/foot injuries by means of the OAR/OFR. The interobserver agreement within the patient group presenting with foot pain (OFR) was $\kappa = 0.77$ (substantial agreement) and for the group presenting with ankle pain (OAR), the agreement was $\kappa = 0.41$ (moderate agreement). The sensitivity of the SEN group for detecting

fractures by means of the OAR/OFR was 0.93 (95% CI, 0.64-1.00) compared with 0.93 (95% CI, 0.64-1.00) for the HO group (P = 1.00). The specificity of SEN was 0.49 (95% CI, 0.38-0.60) compared to 0.39 (95% CI 0.29-0.50) for the HO group (P = 0.20). Therefore, we concluded that regular emergency nurses are able to accurately interpret the OAR/OFR in the Emergency Department after a short, inexpensive course.

Chapter 6 presents and discusses the results of the randomized controlled trial (RCT) performed from July 2004 to March 2005 in the ED of the VU University Medical Center. The SEN trial, as it was called, compared the diagnostic accuracy and patient satisfaction results of SENs and junior ED physicians in completely assessing and treating patients with ankle or foot injuries themselves. Sensitivity was 0.94 (95% CI, 0.78-0.93) for the SEN group compared with 0.78 (95% CI, 0.57-0.91) for the HO group (P = 0.14). The specificity was 0.94 (95% CI, 0.90-0.97) for the SEN group and 0.95 (95% CI, 0.91-0.98) for the HO group (P = 0.71). The results from the patient satisfaction questionnaire clearly revealed that patients were significantly more satisfied with the care provided by SENs than that provided by junior ED physicians. The median waiting time was 21 minutes for patients in the SEN group and 32 minutes for patients in the HO group. The resulting difference in median waiting times between groups was 9 minutes (95% CI, 5 - 13 minutes). From these results, we concluded that SENs working in our ED are capable of assessing and treating patients with ankle or foot injuries accurately. Moreover, SENs accomplish this with better patient satisfaction than do the junior ED physicians. In addition, waiting times are significantly decreased for patients with this type of injury.

Chapter 7 deals with the financial aspects of the SEN concept. Since the cost aspects are becoming increasingly more important in modern day medicine, we felt the necessity to

compare the costs and cost-effectiveness of the SEN concept to the current standard of care (junior ED physicians). To achieve this, a cost-effectiveness analysis was performed alongside the SEN trial (Chapter 6). The non-significant difference in total costs was € 33 (95% CI, - € 84 to € 155); € 186 (SD € 623) for patients treated in the SEN group and € 153 (SD € 529) in the junior ED physicians group. SEN only cost € 27 per false positive or negative and € 18 per false negative that is avoided. It is to be expected that the care delivered by SENs will eventually be less expensive than the care provided by junior ED physicians, because the costs associated with development of the short, injury specific course are once-only and do not need to be made again when future SEN groups are being educated.

In overall **conclusion**, the SEN concept leads to a decreased workload for ED physicians, increased patient satisfaction and decreased waiting times. SENs achieve this with at least equal diagnostic accuracy compared with junior ED physicians. In addition, the care provided by SENs is not more expensive than the standard care (provided by junior ED physicians) and therefore is a (cost-)effective approach in coping with ED crowding.

For the **future**, many elaborations on the SEN concept can be thought of to further develop the Specialized Emergency Nurse. Several of these ideas are being worked out as this thesis is written. First of all, a multicenter trial concerning the implementation of SENs treating ankle and foot injuries is being worked out. This is done to validate and verify the results found in our studies and to introduce the concept in other hospitals. Furthermore, a study protocol is currently being finalized that concerns the ability of SENs to assess and treat shoulder/clavicle injuries. This will again be done according to a clinical assessment protocol taught at a short injury specific course about shoulder dislocations/fractures, clavicle fractures and acromio-clavicular dislocations. Also, plans are being worked out to start an interobserver

trial comparing the accuracy of SENs and junior ED physicians when treating acute knee injuries according to the Ottawa Knee Rules after the accompanying short SEN course of knee injuries.

The general idea is to develop 5-7 different SEN courses dealing with minor injuries that are common in the ED and therefore when adding up, constitute a very large proportion of all ED presentations. SENs would then be able to assess and treat the growing quantity of patients that present with relatively minor injuries in the ED. These are also the patients that, prior to the SEN concept, had to wait the longest when the ED was crowded, because of the triage system that lets more severe injuries/conditions be assessed earlier than the generally low-urgency injuries that make up the working field of SENs.