



## Review

# Effectiveness of emergency nurses' use of the Ottawa Ankle Rules to initiate radiographic tests on improving healthcare outcomes for patients with ankle injuries: A systematic review

Jonathan Ka-Ming Ho<sup>a,\*</sup>, Janita Pak-Chun Chau<sup>b</sup>, Nancy Man-Ching Cheung<sup>c</sup><sup>a</sup> Division of Nursing and Health Studies, The Open University of Hong Kong, 30 Good Shepherd Street, Homantin, Kowloon, Hong Kong<sup>b</sup> The Nethersole School of Nursing, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong<sup>c</sup> Department of Oncology, Princess Margaret Hospital, 2-10 Princess Margaret Hospital Road, Lai Chi Kok, Kowloon, Hong Kong

## ARTICLE INFO

## Article history:

Received 22 December 2015

Received in revised form 16 August 2016

Accepted 22 August 2016

## Keywords:

Ankle

Ankle fractures

Clinical protocols

Foot

Nurses

Practice guideline

Review

Sprains and strains

## ABSTRACT

**Background:** The Ottawa Ankle Rules provide guidelines for clinicians on the recommendation of radiographic tests to verify fractures in patients with ankle injuries. The use of the Ottawa Ankle Rules by emergency nurses has been suggested to minimise unnecessary radiographic-test requests and reduce patients' length of stay in emergency departments. However, the findings of studies in this area are inconsistent.

**Design:** A systematic review was conducted to synthesise the most accurate evidence available on the extent to which emergency nurses' use of the Ottawa Ankle Rules to initiate radiographic tests improves healthcare outcomes for patients with ankle injuries.

**Data sources:** The systematic review attempted to identify all relevant published and unpublished studies in English and Chinese from databases such as Ovid MEDLINE, EMBASE, ProQuest Health and Medical Complete, EBM Reviews, SPORTDiscus, CINAHL Plus, the British Nursing Index, Scopus, the Chinese Biomedical Literature Database, China Journal Net, WanFang Data, the National Central Library Periodical Literature System, HyRead, the Digital Dissertation Consortium, MedNar and Google Scholar.

**Review methods:** Two reviewers independently assessed the eligibility of all of the studies identified during the search, based on their titles and abstracts. If a study met the criteria for inclusion, or inconclusive information was available in its title and abstract, the full text was retrieved for further analysis. The methodological quality of all of the eligible studies was assessed independently by the two reviewers.

**Results:** The search of databases and other sources yielded 1603 records. The eligibility of 17 full-text articles was assessed, and nine studies met the inclusion criteria. All nine studies were subjected to narrative analysis, and five were meta-analysed. All of the studies investigated the use of the refined Ottawa Ankle Rules. The results indicated that emergency nurses' use of the refined Ottawa Ankle Rules minimised unnecessary radiographic-test requests and reduced patients' length of stay in emergency departments. However, the use of these rules in urgent-care departments did not reduce unnecessary radiographic-test requests or patients' length of stay. The implementation of the refined Ottawa Ankle Rules by emergency nurses with different backgrounds, including nurse practitioners or general emergency nurses was found to reduce patients' length of stay in emergency departments.

**Conclusions:** The results of the systematic review suggested that a nurse-initiated radiographic test protocol should be introduced as standard practice in emergency departments.

© 2016 Elsevier Ltd. All rights reserved.

## What is already known about the topic?

- It is difficult to distinguish an ankle strain or sprain from a fracture without radiographic assistance so that radiographic tests are requested for most patients with ankle injuries,

although only a small proportion of these patients have actually sustained fractures.

- The Ottawa Ankle Rules provide guidelines for clinicians on the recommendation of radiographic tests to verify fractures in patients with ankle injuries.
- The implementation of the Ottawa Ankle Rules by emergency nurses has been shown to minimise unnecessary radiographic-test requests and reduce patients length of stay in emergency

\* Corresponding author.

E-mail addresses: [kamho@ouhk.edu.hk](mailto:kamho@ouhk.edu.hk) (J.K.-M. Ho), [janitachau@cuhk.edu.hk](mailto:janitachau@cuhk.edu.hk) (J.P.-C. Chau), [nancychingmc@yahoo.com.hk](mailto:nancychingmc@yahoo.com.hk) (N.M.-C. Cheung).

departments, but the findings of studies in this area are inconsistent.

### What this paper adds

- The implementation of the refined Ottawa Ankle Rules by emergency nurses was found to minimise unnecessary radiographic-test requests and reduce patients length of stay in emergency departments, but did not reduce unnecessary radiographic-test requests or patients length of stay in an urgent-care department.
- The implementation of the refined Ottawa Ankle Rules by emergency nurses with different backgrounds, including nurse practitioners and general emergency nurses was found to reduce patients length of stay in emergency departments.

## 1. Background

Ankle injuries are common among emergency-department patients. Approximately 15% of 117 million emergency-department patients in the United States report lower-extremity injuries (Niska et al., 2010). The ankle is the second most common area of lower-extremity injury (20%), and the most common types of ankle injury are strain and sprain (72%) (Lambers et al., 2012). It is difficult to distinguish an ankle strain or sprain from a fracture without radiographic assistance (Singh-Ranger and Marathias, 1999). In a previous study, the majority of patients with ankle injuries were found to request radiographic tests, but only 17% had actually sustained fractures (Lambers et al., 2012). Although radiographic tests are a useful means of verifying fractures in patients with ankle injuries, their use is not recommended as standard practice, as they increase patients' radiation exposure and health service expenditure (Singh-Ranger and Marathias, 1999).

Stiell et al. (1992) developed the Ottawa Ankle Rules (OARs) to guide clinicians on when to recommend radiographic tests to verify ankle fractures. According to the original OARs, an ankle radiograph series is necessary only if the patient experiences pain in the malleolar zone and any of the following criteria are met: (1) the patient is aged 55 years or above, (2) the patient is 'unable to bear his/her own weight for four steps both immediately and in the emergency department' and (3) the patient reports 'bone tenderness at the posterior edge or tip of either malleolus'. A foot radiograph series is necessary only if pain is sensed in the midfoot zone and accompanied by bone tenderness at the navicular joint, the cuboid joint or the base of the fifth metatarsal (Stiell et al., 1992). Stiell et al. (1993) refined the OARs to increase their specificity. The age criterion was removed from the ankle series decision rule, and the criterion of cuboid bone tenderness was removed from the foot series decision rule. 'Inability to bear weight for four steps both immediately and in the emergency department' was added to the foot series decision rule. The refined OARs retained the high sensitivity of the original rules in the malleolar zone (original: 1.00; refined: 1.00) and the midfoot zone (original: 0.98; refined: 1.00), and attained a greater specificity in both the malleolar zone (original: 0.39; refined: 0.49) and the midfoot zone (original: 0.70; refined: 0.79) (Stiell et al., 1993).

The OARs have been found to be widely applicable across countries and clinical settings, and are used by numerous emergency nurses and physicians. Bachmann et al. (2003) performed a systematic review of 32 studies to determine the diagnostic accuracy of the original and refined OARs for adults and children. The pooled sensitivity of the OARs was high (0.98), but their pooled specificity was low (0.32), as was their pooled

negative likelihood ratio (0.10) (Bachmann et al., 2003). Dowling et al. (2009) performed a meta-analysis of 12 studies to determine the diagnostic accuracy of the refined OARs for children. The pooled sensitivity of the OARs was high (0.99), and their pooled negative likelihood ratio was low (0.11) (Dowling et al., 2009). The results implied that there will be a significant number of false positive results although a negative OAR result may accurately rule out an ankle fracture.

The implementation of the OARs by emergency nurses has been shown to minimise unnecessary radiographic-test requests and reduce patients' length of stay in emergency departments (Allerston and Justham, 2000a,b; Gwilym et al., 2003; Lee et al., in press; Mann et al., 1998; Sorensen et al., 2012). However, the findings of studies in this area are inconsistent. A preliminary database search (covering the Joanna Briggs Institute Library of Systematic Reviews, JBI CONNECT+, Cochrane Library, MEDLINE, CINAHL, DARE and PROSPERO) indicated that no systematic reviews of the literature on this topic had been published or were in progress at the time of the study. Therefore, a systematic review was performed to determine whether the use of the OARs to initiate radiographic tests by emergency nurses is an effective means of improving healthcare outcomes for patients with ankle injuries.

## 2. Methods

### 2.1. Aim

The aim of the systematic review was to synthesise the most accurate information available on the extent to which emergency nurses' use of the OARs to initiate radiographic tests improves healthcare outcomes for patients with ankle injuries.

### 2.2. Design

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses checklist was used to identify essential components of the review.

### 2.3. Eligibility criteria

The participants of interest were patients ( $\geq 1$  year old) who visited emergency or urgent care departments to obtain treatment for blunt ankle injuries. The intervention of interest was the use of the original or refined OARs by emergency nurses. In standard practice, ankle injuries are managed without reference to the OARs. Comparisons were performed between the implementation of the OARs by emergency nurses and conventional treatment practice when studies included a control group, and between nurses with different backgrounds. The primary outcome of interest was requests for radiographic tests, with dimensions such as the proportions of radiographic-test requests, ankle fractures detected, and ankle fractures overlooked. The secondary outcomes of interest were patients' length of stay, patients' waiting times and patients' satisfaction with emergency or urgent care departments. Eligible study designs included were randomised controlled trials, quasi-experimental studies, prospective or retrospective cohort studies and case-control studies.

### 2.4. Search strategy

A three-step search strategy was developed to identify all relevant published and unpublished studies in English and Chinese. In the first step, a limited search of databases was conducted in November 2014 to identify key words in the titles and abstracts and index terms used to describe the articles. The initial

Download English Version:

<https://daneshyari.com/en/article/1075952>

Download Persian Version:

<https://daneshyari.com/article/1075952>

[Daneshyari.com](https://daneshyari.com)