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## CLINICAL PRACTICE

### Use of the Ottawa Ankle Rule by paramedics in the out-of-hospital setting

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#### Abstract

##### Objective

The Ottawa Ankle Rule (OAR) is extensively documented in the emergency department setting and has been subjected to repeated validation. However, the prehospital experience in implementing this clinical decision rule appears poorly described. The objective of this study is to identify evidence (of any level) describing the use of the OAR by paramedics.

##### Methods

A literature search was conducted of the following key electronic databases; Medline (1950 to March Week 1 2010); EMBASE (1980-Week 10 2010) and CINAHL (1981-March 2010). The keywords 'ankle injury', 'clinical decision rule', 'paramedic', 'ambulance', 'prehospital', and 'emergency care' were used to frame the search, while a prehospital and emergency care search filter was used to maximise the sensitivity of the search. A review was conducted of the reference lists accompanying each relevant article to identify other potentially relevant citations. The search criteria included published articles which were both primary research and secondary review papers, and conference abstracts of any research design. We excluded non-English articles and letters. The abstracts of all citations in the search results were reviewed and full text articles for studies of interest were retrieved for examination.

##### Results

The search yielded 98 citations, with 80 relating directly to the OAR. After reviewing the abstracts of all citations, no articles of any study design, discussing the use of the OAR by paramedics in the out-of-hospital setting were identified.

##### Conclusion

Whilst there is no published evidence describing the use of the OAR by paramedics in the prehospital setting, it is feasible that paramedics could implement the rule safely and with equivalent sensitivity and specificity to other settings. This clinical decision rule may have good utility as a triage tool that could be used to stream suitable patients into non-emergency department alternatives. Research is needed to validate the use of the OAR when used within EMS jurisdictions.

##### Keywords

*ankle injury; clinical decision rule; Ottawa ankle rule; paramedic*

## **Introduction**

Paramedics frequently respond to, and transport patients who have sustained ankle injuries in the out-of-hospital setting. In North America, acute ankle injuries account for as much as 5% of all emergency department (ED) presentations, however, while as many as 95% of ankle injuries are subjected to radiography, only about 15% of these are diagnosed as having a clinically significant fracture.<sup>1</sup>

With emergency departments experiencing record levels of presentations and ambulance jurisdictions responding to unprecedented emergency call volume, attention is increasingly being directed towards equipping ambulance paramedics with triage skills to facilitate non-emergency department care for low acuity patients.<sup>2,3</sup> The application of a clinical decision tool such as the Ottawa Ankle Rule (OAR) by paramedics would potentially enable further assessment of ankle injuries and may avoid unnecessary ED presentations if imaging is not required, thus assisting to ease the burden on EDs.

The OAR is a clinical decision rule that allows clinicians to examine an injured ankle or mid-foot and exclude the majority of clinically significant fractures.<sup>1,4,5</sup> It was created as a tool for physicians aimed at reducing the number of unnecessary x-rays in North American emergency departments, where it has repeatedly been demonstrated to have sensitivity of 97%-100%. After initially being utilised almost exclusively by emergency physicians, use of the OAR was extended to nurses as a triage tool to fast-track patients through the emergency department.<sup>6</sup> Extension of this rule beyond the ED to the prehospital setting seems a logical progression. Some emergency medical service (EMS) jurisdictions have introduced the OAR as an enhanced assessment tool, using it to triage patients as suitable for non-conveyance as part of structured non-ED care programs.<sup>7</sup> Streaming low acuity patients with isolated ankle injury who test negative to the OAR into non-transport pathways could potentially result in increased availability of frontline emergency ambulances to respond to urgent cases, while making a meaningful contribution to reducing emergency department congestion.

The OAR is extensively documented in the ED setting and has been subjected to repeated validation, however the prehospital experience in implementing this clinical decision rule appears poorly described. The aim of this study was to identify evidence (of any level) describing the use of the OAR by paramedics.

## **Methods**

A literature search was conducted using the following key electronic databases; Medline (1950 to March Week 1 2010); EMBASE (1980-Week 10 2010) and CINAHL (1981-March 2010). The keywords '*ankle injury*', '*clinical decision rule*', '*paramedic*', '*ambulance*', '*prehospital*', and '*emergency care*' were used to frame the search, while a prehospital and emergency care search filter was used to maximise the sensitivity.<sup>8</sup> A review was conducted of the reference lists accompanying each relevant article to identify other potentially relevant citations. Included published articles were, both primary research and secondary review papers, and conference abstracts of any study design. We specifically excluded non-English articles and letters.

The abstracts of all citations in the search results were reviewed and full text articles for studies of interest were retrieved for examination.

## **Results**

The search yielded 98 citations, with 80 relating directly to the OAR. There were 9 studies that addressed the use of the OAR by emergency nurses and nurse practitioners, with the remainder reporting physician use. After studying the abstracts of all citations, no articles of

any study design were identified that discussed the use of the OAR by paramedics in the out-of-hospital setting.

## Discussion

Despite the use of OAR in ambulance jurisdictions in Australia<sup>9</sup> (R. Larsen, personal communication, 17 May 2010; J. Bendall, personal communication, 17 May 2010), (Table 1) and the United Kingdom,<sup>7</sup> there is no published evidence describing the use of OAR in the out of hospital setting. There is no published evidence of the diagnostic accuracy of OAR when performed by paramedics, or its impact on paramedic decision making, or on patient outcomes. The results of the search strategy are not surprising as an absence of evidence is not uncommon in prehospital care. While prehospital research is becoming more prominent within many ambulance jurisdictions, there is still a dearth of evidence to support the majority of EMS interventions.

**Table 1: Ottawa Ankle Rule use in Australasian ambulance jurisdictions**

Ambulance Jurisdiction	Paramedic	ICP <sup>§</sup>	ECP <sup>§§</sup>
Ambulance Service of New South Wales	Yes <sup>#</sup>	Yes <sup>#</sup>	Yes
Queensland Ambulance Service	No	No	N/A
South Australian Ambulance Service	No	No	Yes
Ambulance Victoria	No	No	N/A
St John Ambulance, Western Australia	No	No	N/A
St John Ambulance, Northern Territory	No	No	N/A
Tasmanian Ambulance Service	No	No	N/A
ACT Ambulance Service	No	No	N/A
Wellington Free Ambulance Service	No	No	Yes

<sup>#</sup>*Paramedics and intensive care paramedics must have completed additional training in clinical assessment and referral to use the OAR*

<sup>§</sup>*Intensive Care Paramedic* <sup>§§</sup>*Extended Care Paramedic (or equivalent)* <sup>N/A</sup>*Not applicable*

Since its creation, validation and initial implementation by Stiell et al<sup>1,4,5</sup> in the early nineties, the diagnostic accuracy of the OAR has been validated in numerous studies in many countries, including Australia.<sup>10</sup> It has been the subject of meta-analyses in both adult and paediatric populations,<sup>11-13</sup> proving to be robust (maintaining sensitivity of 97-100%) for excluding clinically significant fractures. Despite the impressive body of evidence espousing its validity and applicability in a variety of international settings, utilisation of the OAR by emergency physicians is inconsistent, and the effect on clinical decisions are variable.<sup>14</sup> This is most likely not so much a reflection of a distrust of the evidence supporting the OAR, but perhaps an indication of the clinical comfort that comes with diagnostic imaging and radiography, paired with a reluctance to replace ingrained clinical practice with evidence based practice, and avoiding an unnecessary test for patients.

While the introduction of the OAR has been demonstrated to significantly change clinical practice in several studies by reducing the percentage of patients who receive radiography,<sup>15-17</sup> other research has shown that no change in practice has occurred despite comprehensive and sustained education, mentoring and personalised feedback.<sup>18</sup> This is an important issue to consider when exploring the use of the rule in the prehospital setting, particularly in the context of facilitating non-transport alternatives. Paramedics may ultimately be able to demonstrate application of the OAR with acceptable sensitivity, however, their confidence to use the rule and assume diagnostic accountability may influence their implementation of it, particularly given the organisational history of EMS which generally required that all patients be transported to hospital.

While the confidence of paramedics to use the OAR and make decisions based on the result is critical, the confidence of the patient appears to be equally important. A lack of confidence in the paramedic's diagnosis and explanation of the assessment might significantly influence the patient's decision to accept the advice that no radiography is required. Rosenbaum *et al* surveyed patients who had been assessed for ankle injuries and diagnosed as having no fracture after undergoing radiography.<sup>19</sup> The survey revealed that 89% of patients reported that they had wanted an x-ray and had been willing to wait up to 90 minutes in order to get one; 48% reported that they would have 'doubted' or 'very much doubted' if a nurse had told them they did not need an x-ray, while 56% reported they would have been confident in being told the same by an orthopaedic doctor. This suggests that the perception of the patient towards the attending clinician may influence the decision of a patient in relation to their health care; i.e., patients who are told by a paramedic that they are unlikely to have a fracture and therefore do not need an x-ray or conveyance to hospital, may elect to ignore the advice and request transport anyway, depending on how they value paramedics in relation to clinical ability.

In an evaluation of outcomes for patients who did not receive radiography following assessment using the OAR, Wilson *et al* reported that 25% visited another doctor for the same complaint within two weeks, and 11% sought subsequent radiography.<sup>20</sup> In the prehospital setting this could possibly translate into repeat usage of ambulance resources by patients seeking another opinion or an x-ray, thereby having a negative impact on ambulance operations. Using similar logic however, the reduction in primary transports to emergency departments may be significant enough to make this degree of patient uncertainty, and need for second opinion, small enough not to affect overall organisational benefit.

With no published prehospital evidence describing the use of the OAR by paramedics to draw from, the experience of other allied health professionals may provide some insight as to how the rule might perform in the prehospital setting. The most studied of these is nursing, which has produced a significant body of knowledge describing the use of the OAR in that context.<sup>15,21-28</sup> When used as a triage tool in the ED, emergency nurses and nurse practitioners can implement the OAR with comparable accuracy to emergency physicians.<sup>6,22,27,28</sup> However, the impact of the OAR on clinical decision making among nurses is less clear, as research into the impact on outcomes is variable. Some studies have reported significant reductions in time spent in the ED and in the number of radiographs ordered<sup>15,29</sup> while others have demonstrated little impact on outcomes.<sup>24</sup> The variability in clinical impact and use of the OAR appears to be consistent throughout the literature and is most probably generalisable to the prehospital setting when used by paramedics.

Given an apparent increase in the use of the OAR in EMS jurisdictions, prospective validation of the clinical accuracy of the rule when used by paramedics should be considered a priority. This research should include investigations into the impact of the rule on paramedic clinical

decision making in relation to patient transport disposition and consequent discrimination in the diagnosis of fractures.

### **Limitations**

This study is potentially limited by the absence of hand searching journals that may not have been listed electronically, and by the omission of non-English articles. As such, we may have missed some potentially relevant articles.

### **Conclusion**

Whilst there is no published evidence describing the use of the Ottawa Ankle Rule by paramedics in the prehospital setting, it is feasible that paramedics could implement the rule safely and with equivalent sensitivity and specificity to other settings. This clinical decision rule may have good utility as a triage tool that could be used to stream suitable patients into non-emergency department alternatives. Further research is also needed to validate the use of the Ottawa Ankle Rule when used within EMS jurisdictions.

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