

# Traumatic Ankle Pain: Adequacy of Clinical Information in X-Ray Request with Reference to the Ottawa Ankle Rule

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**Abstract**—This audit was conducted at Manchester University NHS Foundation Trust, Wythenshawe Hospital Radiology and Accident and Emergency [A&E] Department to assess the appropriateness of clinical information in X-ray requests, specifically in cases of acute ankle injuries. As per the Ottawa Ankle Rules and the recommendations of National Institute for Health and Care Excellence [NICE] and the Royal College of Radiology, we aimed to evaluate the appropriateness of referrals and the thoroughness of clinical information provided by Emergency Department [ED] clinicians for ankle radiography. Our goal was to achieve 100% compliance with these guidelines. The audit involved a comprehensive analysis spanning the period from August 2022 to January 2023, encompassing patient records, radiographic orders, and clinical assessments. Data collection included patient demographics, presenting complaints, clinical assessments, adherence to Ottawa Ankle Rules criteria, and subsequent radiography orders. Here we conducted two audit cycles, involving 38 patients in the first cycle and 86 patients in the second cycle. The data were further filtered to include all patients who were referred from the ED for an ankle X-ray with a history of acute trauma and age of more than 18 years. The key finding was that in August 2022, 60% of cases met the Ottawa Ankle Rules criteria accurately, indicating a need for improvement in adherence. However, by January 2023, there was a notable improvement, with 95% of cases accurately meeting the criteria. This significant change reflects an increased alignment with best practices for ankle radiography referrals.

**Keywords**—Ankle, injuries, Ottawa Ankle Rule, X-rays.

## I. INTRODUCTION

THE Ottawa Ankle Rules are an essential set of clinical guidelines. They are used to determine the need for X-ray imaging in patients with ankle injuries [1]. By evaluating specific criteria such as pain and tenderness at designated areas of the ankle and foot, healthcare professionals can identify individuals who are at a higher risk of having a fracture [2]. The rules state that X-rays are necessary if there is pain in the malleolar zone [inner or outer ankle] and an inability to bear weight for four steps immediately after the injury, or if there is a pain in the mid-foot zone and bone tenderness at specific locations [3]. These rules help reduce unnecessary X-rays, healthcare costs, and radiation exposure while ensuring appropriate diagnostic imaging for ankle injuries. Furthermore, the Ottawa Ankle Rules promote standardized care. They provide a systematic and evidence-based approach for evaluating ankle injuries, enabling healthcare providers across different settings to use the same criteria for assessment. This

consistency in care can help improve patient outcomes and reduce variations in practice [4], [5].

### A. Objective

The primary objective of this audit is to ensure that X-ray requests provided by ED clinicians at Manchester University NHS Foundation Trust, Wythenshawe Hospital Radiology & A&E Department, meet the stringent appropriateness criteria outlined by the NICE and the Royal College of Radiologists guidelines [1]-[2]. Specifically, we aim to assess and improve the adequacy of clinical information accompanying these requests in cases of acute ankle injuries. This involves whether the rules are consistently applied and followed in clinical practice and to provide recommendation for effectiveness of the Ottawa Ankle Rules in clinical practice.

### B. Standard

Source and strength of evidence are NICE & Royal College of Radiology [RCR] guideline. Target is 100%.

### C. Procedure

Retrospective chart reviews of 38 & 86 requests for ankle radiography were randomly selected from August 2022 to January 2023.

Inclusion criteria:

1. Age > 18 years.
2. History of acute trauma.

Exclusion criteria:

1. Age < 18.
2. Non traumatic ankle pain.

## II. ANALYSIS

### A. Data Analysis Cycle 1

A total of 38 patients, comprising 18 males and 20 females, were included. The data were collected during a one-month period in August 2022. Following the review of the requests, it was found that 15 requests did not meet the criteria, while 23 requests did. Although the Ottawa Ankle Rules are generally effective, the audit also identifies difficulties that may limit their applicability. Patients who did not fit the requirements were found to have undergone X-ray imaging in some cases. This illustrates the complexity of clinical decision-making, where a variety of variables, such as the clinical setting and the unique circumstances of each patient, are taken into account. To

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promote consistent and accurate guideline adherence, it emphasizes the value of continuing education for healthcare personnel.

As a result, a comprehensive action plan has been started to address the challenges and maximize the impact of Ottawa ankle rules on clinical practice, which included the following steps:

- To remind personnel of the Ottawa Ankle Rule and make the required requests, posters will be distributed across the A&E and radiology departments.
- All A&E clinician personnel were reminded via an additional e-mail to obtain and document in accordance with the Ottawa Ankle Rules.
- Oral presentations were given at conferences hosted in November 2022 by the Manchester Foundation Trust and oral presentation at A&E department teaching.

### B. Data Analysis Cycle 2

The second cycle took place in January 2023, data were collected over one month, 86 requests were reviewed to examine the application of the Ottawa Ankle Rules [39 male, 47 female]. Further analysis utilizing patient demographic information and X-ray findings revealed that the rules had been applied well, with the percentage of patients who fit the criterion having increased dramatically by 95% from the first cycle [82 patients out of 86 patients met the criteria].

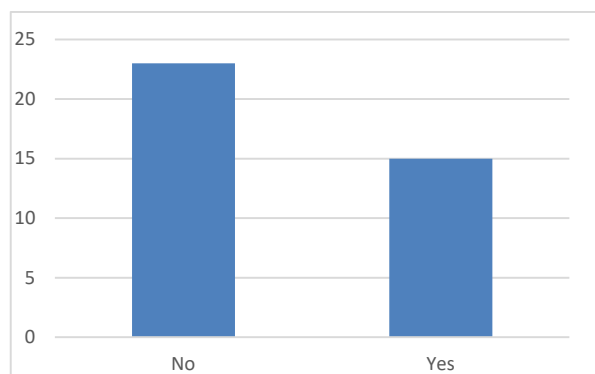


Fig. 1 The request which met or did not meet the criteria, August 2022

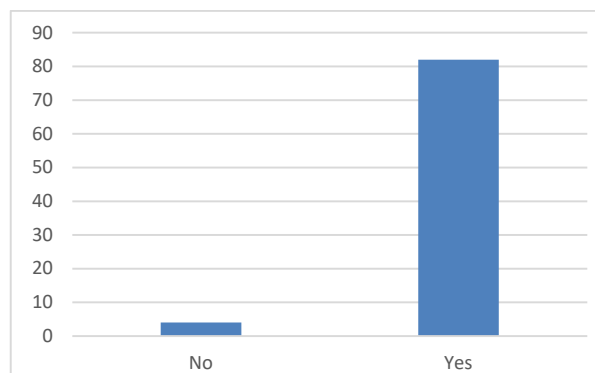


Fig. 2 The request which met or did not meet the criteria, January 2023

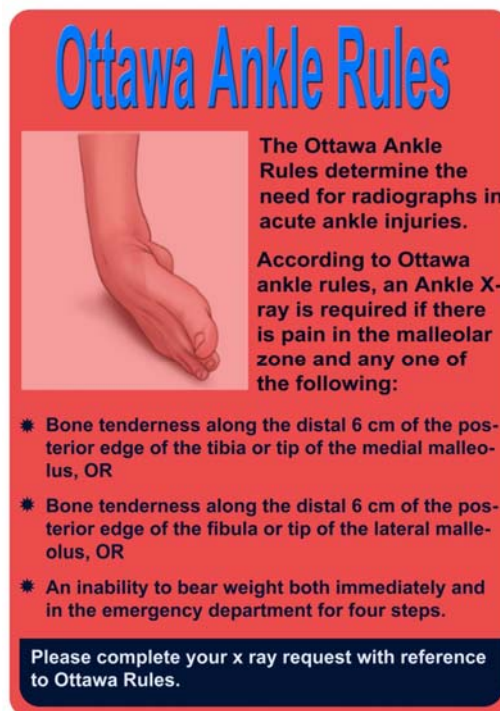


Fig. 3 Ottawa Ankle Rules [2]

### III. DISCUSSION

The finding in our studies to evaluate the Ottawa Ankle Rules supports the previous finding of the other studies, and this means the Ottawa Ankle Rules is consistently effective in guiding the need for ankle X-rays. It showed high sensitivity and specificity of the rules, indicating their accuracy in identifying ankle fractures by 88% and thus minimizing unnecessary imaging. Also, by identifying referrers with poor records of completing requests and discussing the benefit of improving clinical information and records, the percentage of the request not met the criteria dramatically fell from 39% in the first cycle to only 4% in the second cycle and this helped to improve the practice and reduce radiation exposure and optimized resource allocation. This sensitivity is a crucial aspect of fracture detection, aiding healthcare providers in delivering timely and appropriate care. The rules' application in our study aligns with previous research and emphasizes their value in guiding clinical decisions, especially in resource-constrained settings.

Overall, the finding highlights the efficacy and values of the Ottawa Ankle Rules in guiding clinical practice for ankle injuries; it supports the widespread adoption and continued use of the Ottawa Ankle Rules in ankle injuries management [6], [7]. The audit, however, also uncovered issues and constraints that need to be taken into account. There were cases where patients who did not fit the requirements got X-ray imaging, which raises the risk of needless radiation exposure and raises healthcare expenses. This emphasizes how crucial it is to train healthcare professionals consistently and to use clinical judgement while abiding by the law. These discrepancies from the recommended practices can be attributed to a variety in

interpretation, therapeutic situation, and individual assessment.

The sensitivity and specificity balance in medical guidelines is a key difficulty. The Ottawa Ankle Rules are sensitive to fracture detection, but specificity need to be increased to reduce the need for pointless imaging. This can entail building additional decision support tools that consider a wider clinical context or improving the criteria.

#### IV. RECOMMENDATION

It essential to remember the Ottawa Ankle Rules when ankle injuries are suspected, as likelihood of fracture is low, and X-ray may not be necessary in the absence of other clinical concern or patient does not meet the criteria [8].

It is always good to continuously educate our staff & professionals healthcare about the Ottawa Rules in ankle injuries [9]. To facilitate adherence to the Ottawa Ankle Rules, the integration of decision support tools within electronic health records [EHRs] should be explored. These tools can prompt clinicians to systematically assess and document tenderness points, streamlining the application of the rules. Decision support can enhance clinical workflow and serve as a real-time reminder of the guidelines, thus promoting their consistent utilization.

Implementing a system of regular audits and feedback can contribute to the continuous improvement of guideline adherence. Healthcare institutions can establish internal review processes to assess the appropriateness of X-ray orders based on the Ottawa Ankle Rules. Feedback loops can help identify patterns of overuse or underuse, guiding targeted interventions and promoting best practices.

Engaging patients in the decision-making process can contribute to informed and collaborative care. Educating patients about the Ottawa Ankle Rules and their role in diagnostic decisions can foster shared decision-making. Patients who understand the rationale behind imaging recommendations are more likely to support guideline adherence, contributing to efficient care delivery.

The Ottawa Ankle Rules provide a structured framework, but clinical judgment remains paramount. Encouraging healthcare providers to consider the broader clinical context can enhance diagnostic accuracy. Providers should be empowered to make informed decisions that reflect both the rules' criteria and their individual assessment of the patient's condition.

#### V. CONCLUSION

The Ottawa Ankle Rules have proven to be valuable clinical guidelines for determining the need for ankle x-rays in patients with ankle injuries [9]-[12]. The rules have consistently demonstrated high sensitivity in identifying ankle fractures, ensuring that the majority of fractures are correctly identified. This sensitivity helps reduce the risk of missed diagnosis and ensures appropriate diagnostic imaging when necessary.

By adhering to the Ottawa Ankle Rules, healthcare providers can significantly reduce the number of unnecessary X-rays, improve patient outcomes and enhance patient satisfaction. The rules facilitate efficient decision-making, reduce unnecessary

delays and ensure that patient receive the necessary care in a timely manner. The rules' sensitivity in detecting fractures aligns with their intended purpose and validates their significance in clinical practice [9].

The overarching of the Ottawa ankle Rules extends beyond individual patient assessments. The reduction of unnecessary X-ray imaging, as demonstrated by their application, holds the potential to alleviate the burden on radiology departments, expedite patient care, and mitigate healthcare costs. As healthcare systems globally grapple with the challenges of resource allocation, these rules present a valuable solution to streamline diagnostic processes without compromising patient safety or clinical efficacy.

In a broader context, these findings underscore the dynamic nature of clinical guidelines. While the Ottawa Ankle Rules have shown effectiveness, ongoing validation studies and adjustments are recommended to refine their applicability and scope. As medical knowledge evolves, so too must clinical tools and practices, adapting to incorporate emerging evidence and technological advancements.

In conclusion, the Ottawa Ankle Rules' significant importance in directing the assessment of ankle injuries has been highlighted by this audit of their performance in our results of 86 patients. The criteria show a well-balanced mixture of the ability to identify fractures accurately and the possibility of resource optimization. Their integration into clinical practice serves as a testament to the intersection of evidence-based medicine and pragmatic decision-making. As healthcare systems strive for efficiency, patient-centred care, and prudent resource management, the Ottawa Ankle Rules stand as an asset, offering a structured approach to enhance the quality of care delivered to patients with ankle and midfoot injuries.

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