Complete Summary

GUIDELINE TITLE

Ottawa Ankle Rules for ankle injury radiography.

BIBLIOGRAPHIC SOURCE(S)

Ottawa Ankle Rules for ankle injury radiography. Ottawa (ON): Ottawa Health Research Institute at the Ottawa Hospital; 1999 Jan . Various p. [5 references]

COMPLETE SUMMARY CONTENT

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SCOPE

DISEASE/CONDITION(S)

Foot and ankle fractures

GUIDELINE CATEGORY

Diagnosis
Evaluation

CLINICAL SPECIALTY

Emergency Medicine

INTENDED USERS

Physicians

GUIDELINE OBJECTIVE(S)

To present a clinical decision rule to aid physicians in the efficient use of radiography in the evaluation of acute ankle injuries and to safely reduce the number of radiographs ordered in adults with ankle injuries

TARGET POPULATION

Adults 18 years of age and older with acute ankle injuries

INTERVENTIONS AND PRACTICES CONSIDERED

Ottawa ankle clinical decision rules to evaluate acute ankle injuries and decide on use of radiography (i.e., ankle or foot x-ray series)

MAJOR OUTCOMES CONSIDERED

Refinement and prospective validation

- Sensitivity and specificity of the decision rules for detecting clinically significant foot and ankle fractures
- Accuracy and reliability of the physicians´ interpretation of the rules

Source:

- Decision rules for the use of radiography in acute ankle injuries. Refinement and prospective validation. JAMA 1993 Mar 3;269(9):1127-32.

Implementation of the Ottawa Ankle Rules

- Proportions of patients referred for standard ankle and foot radiographic series
- Time spent in the emergency department to evaluate acute ankle injuries, associated costs, and patient satisfaction with care

Source:

- Implementation of the Ottawa Ankle Rules. JAMA 1994 Mar 16;271(11):827-32.)

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

A search of Medline was performed.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Not stated

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Other

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Prospective Validation

Statistical Analysis and Model Refinement from Pilot Testing Study

The classification performance of the decision rules for identifying clinically significant fractures was assessed by calculating sensitivity and specificity with 95% confidence intervals (CIs). Given the binary predictive nature of the decision rules, no attempt was made to construct receiver operating characteristic curves. The accuracy and reliability of the physician´s interpretation of the rules was measured, respectively, by the percentage agreement with the actual rule (as interpreted by the investigators) and the K coefficient of interobserver agreement.

Data collected in the first stage were further analyzed in order to refine the decision rules toward the objective of a sensitivity of 1.0 for fractures with the maximum possible specificity. As in the original study, four combined variables were created by grouping inability to bear weight both immediately and in the emergency department, as well as by grouping several areas of bone tenderness. The 20 individuals and combined clinical variables were assessed for association with significant fractures in the ankle and foot radiographic series, separately, by the x^2 recursive partitioning technique to confirm the best combination of predictor variables for the ankle and foot radiographic series, respectively. These statistical models formed the basis of the refined decision rules.

Recursive partitioning was used to develop the Ottawa Ankle Rules, which identify a subgroup of patients with zero probability of having a significant fracture.

Model Validation

In the second stage, the classification performance of the refined decision rules was assessed by the calculation of sensitivity and specificity. The accuracy and reliability of the physicians´ interpretation of the decision rules was determined in the same fashion as in the first stage. Likelihood ratios and the probabilities of fractures, based on the refined decision rules, were calculated for the two stages combined.

Source:

- Decision rules for the use of radiography in acute ankle injuries. Refinement and prospective validation. JAMA 1993 Mar 3;269(9):1127-32.

Clinical Validation – Trial Implementation

Statistical Analysis

Every eligible ankle injury patient (as defined in "Study Population" section of the original guideline document) seen during the four study periods was included in the analysis. No patient was excluded during the after-intervention period because a data collection form was not completed or because of physician noncompliance with the decision rules. An x^2 analysis was used to test the null hypothesis at each hospital separately, that there was no difference in the proportion of patients undergoing ankle and foot series during the before and after periods. Ninety-five percent confidence intervals (CIs) were calculated for the relative reductions in radiography referral. The absolute difference in proportions, from the before period to the after period, of patients referred for ankle and foot radiographic series were compared between the intervention hospital and control hospital using the x^2 test for homogeneity. All P values were two tailed. Comparison of patient characteristics were tested with x^2 or Student´s t test analyses, as appropriate.

Additional comparisons apply only to those patients followed up by telephone, i.e., nonfracture cases in the after-intervention group. The mean time spent in the emergency department from registration to discharge was compared with Student´s t test for patients receiving radiography versus those not receiving radiography. Mean charges were also compared by Student´s t test and were calculated in United States dollars from the following estimated medical charges: emergency department physician visit fee ($50x1), emergency department ankle or foot radiographic series technical and professional fees ($100 x number of series), follow-up office physician visit fees ($60 x number of visits), and follow-up radiographic series fees ($100 x number of series). These medical charges were representative of figures provided to us by several United States hospitals. No attempt was made to estimate other direct or indirect medical costs. Follow-up characteristics were estimated as proportions and were compared by x^2 analysis. The classification performance of the decision rules for identifying clinically significant fractures was assessed by calculating sensitivity and specificity with 95% confidence intervals.

Use of radiography was monitored by chart review in the 12 months following the study at the intervention hospital. The posters remained in the department, and new house staff were told about the decision rules. Otherwise, study procedures, such as data collection sheets and follow-up telephone calls, were not continued during this period.

Source:

- Implementation of the Ottawa ankle rules. JAMA 1994 Mar 16;271(11):827-32.)

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not stated

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Clinical Validation-Pilot Testing
Clinical Validation-Trial Implementation Period

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Clinical Validation – Pilot Testing

To validate and refine previously derived clinical decision rules that aid the efficient use of radiography in acute ankle injuries, a survey was prospectively administered in two stages: validation and refinement of the original rules (first stage) and validation of the refined rules (second stage). A convenience sample of adults with acute ankle injuries (1,032 of 1,130 eligible patients in the first stage and 453 of 530 eligible patients in the second stage) was obtained in the emergency departments of two university hospitals. Attending emergency physicians assessed each patient for standardized clinical variables and classified the need for radiography according to the original (first stage) and the refined (second stage) decision rules. The decision rules were assessed for their ability to correctly identify the criterion standard of fractures on ankle and foot radiographic series. The original decision rules were refined by univariate and recursive partitioning analyses.

Source:

- Decision rules for the use of radiography in acute ankle injuries. Refinement and prospective validation. JAMA 1993 Mar 3;269(9):1127-32.

Clinical Validation – Trial Implementation Field

A nonrandomized, controlled trial with before-after and concurrent controls was conducted in the emergency departments of a university (intervention) hospital and a community (control) hospital for the purpose of assessing the impact on clinical practice of implementing the Ottawa ankle rules. The patient population studied included all 2,342 adults who were seen with acute ankle injuries during 5-month periods before and after the intervention. The main outcome measure was proportions of patients referred for standard ankle and foot radiographic series.

Source:

- Implementation of the Ottawa ankle rules. JAMA 1994 Mar 16;271(11):827-32.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Summarized by the National Guideline Clearinghouse (NGC)

An ankle series is only required for patients with pain in the malleolar zone

AND

- Bone tenderness at the posterior edge or tip of either the lateral or medial malleolus

  OR

- A total inability to bear weight both immediately after the injury and for four (4) steps in the emergency department

A foot x-ray series is only required if the patient has some pain in the midfoot

AND

- Bone tenderness at the base of the fifth (5th) metatarsal

  OR

- Bone tenderness at the navicular

  OR

- An inability to bear weight both immediately and in the emergency department

When assessing an ankle injury patient, the clinician has to decide whether to order an ankle series, a foot series, or both. It is generally best to begin palpation away from tender areas. For example, palpating the proximal fibula, as well as the forefoot, are neutral nonpainful areas. Next, assess swollen areas, such as, over the anterior talofibular ligament. Finally, palpate the posterior edge of the distal 6 cm of the fibula and the posterior edge of the distal medial malleolus. If the patient has no bone tenderness, then assess ability to bear weight. Ask the patient to stand up and attempt to take four (4) steps transferring weight twice onto each foot. The patient can bear weight if they can transfer weight regardless of limping.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is not specifically stated for each recommendation. These recommendations are based on research with rigorous methods and a multiphase methodological approach to derive, validate, and implement the Ottawa Ankle Rule.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Reduction in the proportion of patients referred for ankle and foot radiography. In a trial implementation study, there was a relative reduction in ankle radiography by 28% at the intervention hospital but an increase by 2% at the control hospital (P<0.001). Foot radiography was reduced by 14% at the intervention hospital but increased by 13% at the control hospital (P<0.05).

Decreased waiting times for patients, decreased medical costs, no apparent dissatisfaction among physicians or patients. In a trial implementation study, those discharged without radiography spent less time in the emergency department compared with nonfracture patients who had radiography during the after period at the intervention hospital, (80 minutes versus 116 minutes; P<0.0001), had lower estimated total medical costs for physician visits and radiography ($62 versus $173; P<0.001), but did not differ in the proportion satisfied with emergency physician care (95% versus 96%).

Sensitivity and reliability of the rule for detecting foot and ankle fractures. Prospective refinement and validation has shown the Ottawa ankle rules to be 100% sensitive for fractures and to be reliable. Likewise, in a trial implementation study, the rules were found to have sensitivities of 1.0 (95% confidence interval, 0.95 to 1.0) for detecting 74 malleolar fractures and 1.0 (95% confidence interval, 0.82 to 1.0) for detecting 19 midfoot fractures.

Sources:

- Decision rules for the use of radiography in acute ankle injuries. Refinement and prospective validation. JAMA 1993 Mar 3;269(9):1127-32.
- Implementation of the Ottawa ankle rules. JAMA 1994 Mar 16;271(11):827-32.

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

The rules may not be reliable in instances where patient assessment is difficult: intoxication, head injury, multiple painful injuries, or diminished sensation due to neurological deficit. The rules do not apply to patients younger than 18 years. Patients should always be instructed to seek follow-up if pain or ability to bear weight has not improved in 5 to 7 days.

The generalizability of findings has yet to be demonstrated. Many of the staff physicians who participated in the development and validation of the Ottawa ankle rules could be considered stakeholders who might be more motivated to comply with the protocol than other physicians.

The guideline developers acknowledge that the research design for Implementation of the Ottawa Ankle Rules incorporated features that might have artificially inflated compliance and would be impractical in everyday practice. Registration clerks added data forms to the charts of ankle injury patients, and these forms acting as cues to remind the physicians to use the rules. The physicians knew they were being studied and knew that patients would be follow up by telephone. While the telephone calls were essential to determining the outcome of patients discharged without radiography, the calls likely contributed to the high level of satisfaction voiced by the patients.

Source:

- Implementation of the Ottawa ankle rules. JAMA 1994 Mar 16;271(11):827-32.)

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

The Ottawa Ankle Rules are simple guidelines summarized on a poster or handy laminated pocket card that have been developed to aid emergency physicians in deciding when to use radiography for patients with injuries to the ankle. Each kit includes a 12" x 18" poster for placement in an emergency room for quick reference plus 10 laminated pocket cards.

The Ottawa Ankle Rules are available in hard copy, on-line (Shockwave Flash version) and off-line (.ZIP version) from the Ottawa Health Research Institute. Refer to the Ottawa Health Research Institute Web site for more information.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Ottawa Ankle Rules for ankle injury radiography. Ottawa (ON): Ottawa Health Research Institute at the Ottawa Hospital; 1999 Jan . Various p. [5 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1999

GUIDELINE DEVELOPER(S)

Ottawa Health Research Institute - Hospital/Medical Center

SOURCE(S) OF FUNDING

Ontario Ministry of Health

GUIDELINE COMMITTEE

Not stated

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Stiell IG, Greenberg GH, McKnight RD, Nair RC, McDowell I, Worthington JR, Reardon M, Stewart JP, Maloney J, Wells GA, Johns C

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

An update is not in progress at this time.

GUIDELINE AVAILABILITY

Electronic copies: Available from the Ottawa Health Research Institute Web site.

Print copies: Available from the Ottawa Health Research Institute by writing to the Clinical Epidemiology Unit C4, Loeb Health Research Institute, 1053 Carling Ave., Ottawa, ON, K1Y 4E9, Canada; or by calling 1-888-240-7002 (toll-free) or (613) 761-5499. Order forms are also available for download from the Ottawa Health Research Institute Web site.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Stiell IG, Wells GA. Methodologic standards for the development of clinical decision rules in emergency medicine. Ann Emerg Med 1999 Apr;33(4):437-47.
- Stiell IG, McDowell I, Nair RC, Aeta H, Greenberg GH, McKnight RD, Ahuja J. Use of radiology in acute ankle injuries: physicians' attitudes and practice. CMAJ 1992 Dec; 147(11):1671-8.
- Stiell IG, Greenberg GH, McKnight RD, Nair RC, McDowell I, Worthington JR. A study to develop clinical decision rules for the use of radiography in acute ankle injuries. Ann Emerg Med 1992 Apr; 21(4):384-90.
- Stiell IG, Greenberg GH, McKnight RD, Nair RC, McDowell I, Reardon M, Stewart JP, Maloney J. Decision rules for the use of radiography in acute ankle injuries. Refinement and prospective validation. JAMA 1993 Mar 3;269(9):1127-32.
- Stiell IG, McKnight RD, Greenberg GH, McDowell I, Nair RC, Wells GA, Johns C, Worthington JR. Implementation of the Ottawa ankle rules. JAMA 1994 Mar 16;271(11):827-32.
- Stiell IG, Wells GA, Laupacis A, Brison R, Verbeek R, Vandemheen K, Naylor CD. Multicentre trial to introduce the Ottawa ankle rules for use of radiography in acute ankle injuries. BMJ 1995 Sept 2;311:594-7.

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PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on October 24, 2002. The information was verified by the guideline developer on March 14, 2002.

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