



No impact from active dissemination of the Ottawa Ankle Rules: further evidence of the need for local implementation of practice guidelines

Cathy Cameron,* MHS; C. David Naylor,*†‡ MD, DPhil

Abstract

Background: Local implementation strategies are often required to promote consistent adherence to clinical guidelines, but they are time consuming and expensive. The authors tested an educational intervention designed to increase use of the Ottawa Ankle Rules, a widely publicized set of clinical guidelines previously shown to reduce the use of radiography for diagnosis of acute ankle injuries.

Methods: The study consisted of a quasi-experimental, before-and-after comparative analysis. Trained experts provided 1-hour educational sessions and supplied resource materials on the Ottawa Ankle Rules to health care professionals from 63 Ontario hospitals. Participants were asked to evaluate the intervention. The authors then compared, for periods before and after the educational sessions, the use of ankle radiography for adults with acute ankle injury in 10 hospitals that received the educational intervention and reported no ($n = 5$) or some ($n = 5$) prior use of the rules and in 5 control hospitals, which declined the educational intervention because they were already implementing the rules.

Results: Although participants gave highly positive appraisals of the Ottawa Ankle Rules and the educational sessions, there was no reduction in the use of ankle radiography for the 10 hospitals that received the educational sessions (73% before and 78% after the intervention, $p = 0.11$). In contrast, use of radiography decreased significantly, from 75% to 65%, in the 5 control hospitals ($p = 0.022$).

Interpretation: Even when a dissemination strategy is well received and involves a widely accepted clinical guideline, the impact on behaviour in clinical practice may be small. In addition to broad dissemination, an active local implementation strategy is necessary to encourage physicians to adopt clinical guidelines.

When practice guidelines are passively disseminated by publication in the clinical literature, their impact is small.¹⁻⁶ Active dissemination, by direct mailings to clinicians or through educational sessions, has variable impact.¹⁻⁸ Controlled studies indicate that knowledge-based interventions such as practice guidelines are most likely to change clinical behaviour if measures are taken at the local level to ensure “buy-in” from the practice community, to address barriers to change and to rectify relevant gaps in clinical knowledge.⁶

Such local implementation strategies are time consuming and expensive. We therefore explored the impact of a form of active dissemination sometimes called “training the trainers.” We trained physicians and other health care professionals who, in turn, trained others for site-specific implementation of a practice guideline. We used the Ottawa Ankle Rules as a test case because this set of guidelines has been well validated and widely publicized. Research has conclusively shown that these rules can help physicians to decide whether radiography of the foot or ankle is necessary after acute ankle injury.⁹⁻¹² Implementation studies in diverse settings have shown a 16% to 26% reduction in the use of ankle radiography,¹²⁻¹⁶ which has led to more efficient care¹⁷ without increases in missed fractures or any reduction in patient satisfaction.

We compared the impact of our active dissemination strategy with practice patterns in settings where local clinical leaders claimed that they were implementing the guidelines and therefore did not need the educational intervention.

Evidence

Études

From *the Institute for Clinical Evaluative Sciences, †the Division of General Internal Medicine and the Clinical Epidemiology Unit, Sunnybrook & Women’s College Health Sciences Centre, and ‡the Department of Medicine, University of Toronto, Toronto, Ont.

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Methods

We wrote to the chief executive officers or executive directors, the chiefs of staff and the emergency department administrators of 192 Ontario hospitals in March 1996, describing the Ottawa Ankle Rules (see below) and offering a presentation about them. Ninety hospitals expressed interest in receiving additional materials or a presentation. Thirty-two were not interested; 26 of these indicated that they were already implementing the rules. Eighteen hospitals were unsure about participation, and 52 did not reply.

A half-day trainer workshop was held in May 1996 for 13 physicians and 3 emergency department nurses. The trainers represented all 6 Ontario health planning regions and were familiar with the Ottawa Ankle Rules before the workshop. The trainers were given a variety of educational materials, including slides, overheads and a 13-minute instructional video developed by the Alberta Medical Association.

Between June and October 1996 the trainers conducted 56 presentations for 596 attendees from 63 hospitals in the 6 health planning regions. The number of attendees at these sessions ranged from 4 to 22 (mean 11).

Each presentation consisted of a 1-hour accredited educational session for medical staff, covering the validity and clinical application of the Ottawa Ankle Rules. Participants received posters for their emergency departments, pocket cards for clinicians, copies of an easily understood article about the rules¹⁸ and bilingual (English and French) patient information sheets.

Participants were asked to complete a 1-page evaluation form. The primary outcome measure was the proportion of patients referred for ankle radiography. We also assessed the use of foot radiography, although implementation of the Ottawa Ankle Rules has been associated with only a small reduction in this type of imaging.¹²

We audited emergency department records at 15 hospitals. The hospitals were selected on the basis of the following criteria: regional representation, ability to identify eligible cases retrospectively, sufficient emergency department volume, whether they had received the intervention and, if so, when the intervention had taken place (before Sept. 1, 1996).

The hospitals were divided into 3 groups. Group A consisted of 5 primarily smaller community hospitals that received the intervention and indicated no or only limited use of the ankle rules beforehand. Group B consisted of 5 primarily larger community hospitals that received the intervention and indicated that they were using the rules to various degrees beforehand. Group C comprised 4 larger community hospitals and 1 teaching hospital that reported using the Ottawa Ankle Rules to the extent that they did not require the intervention.

We expected the decline in the use of ankle radiography after the intervention to be lower than that observed in the implementation studies.¹²⁻¹⁶ For a postulated absolute decrease of 15% in utilization, from a baseline level at which 80% of patients with acute ankle injury underwent ankle radiography, we required at least 150 charts for each phase (before and after the intervention)

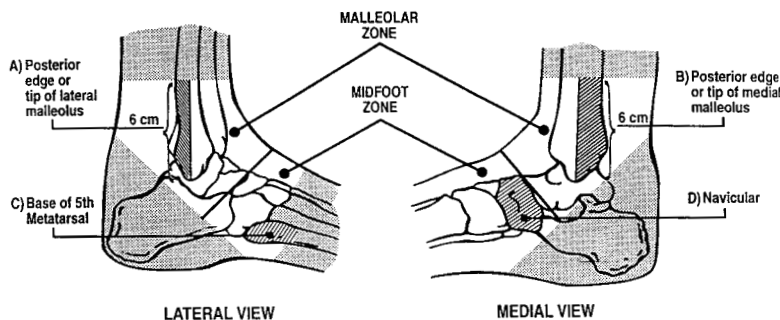
for a power of 0.90 and a one-tailed α of 0.05. Therefore, we attempted to identify a minimum of 40 eligible cases for each phase for each hospital, for a total of approximately 200 charts per phase for each of the 3 groups of 5 hospitals.

Each participating hospital was asked to identify retrospectively the charts of 60 consecutive patients, 18 years of age and older, who had presented to the emergency department with an ankle injury caused by acute blunt trauma, beginning Sept. 1, 1995, and to do the same beginning Sept. 1, 1996. An acute blunt trauma injury has been defined by Stiell and colleagues¹² as an injury occurring from any mechanism, including twisting, falling and direct blows.

The chart audit form was piloted at the Sunnybrook Health Science Centre (now the Sunnybrook & Women's College Health Sciences Centre). One of us (C.C.) audited the charts in the participating hospitals from Nov. 29, 1996, to Apr. 16, 1997. If a chart noted that the radiologist had been on call and that the patient had been instructed to return the next morning for radiography, the chart was coded as "radiograph ordered." We excluded the charts of patients who were under 18 years of age and of those for whom the assessment or decision to order radiography had obviously been confounded by other circumstances (see Results for reasons for such exclusions).

We compared proportions of patients who underwent ankle radiography for the 2 phases of the study for group A, group B,

OTTAWA ANKLE RULES for Ankle Injury Radiography



- a) An ankle x-ray series is only required if there is any pain in malleolar zone and any of these findings:
 1. bone tenderness at A
OR
 2. bone tenderness at B
OR
 3. inability to bear weight both immediately and in the emergency department
- b) A foot x-ray series is only required if there is any pain in midfoot zone and any of these findings:
 1. bone tenderness at C
OR
 2. bone tenderness at D
OR
 3. inability to bear weight both immediately and in the emergency department

Stiell IG, McKnight RD, Greenberg GH, et al. Implementation of the Ottawa Ankle Rules. *JAMA* 1994;271:827-32. Reproduced with permission from the Loeb Health Research Institute, Ottawa.



these 2 groups combined, and group C. Use of foot radiography was assessed as a secondary outcome. We used a 2-tailed Fisher's exact test, to err on the side of conservatism, notwithstanding our prior expectation of a decline in utilization. For intergroup comparisons, a 2-tailed Fisher's exact test was also used. Nonetheless, some caution is necessary in interpreting the *p* values reported here, given the heightened risks of type I error from multiple comparison.

Results

We received evaluation forms on the training sessions from 407 (68%) of the 596 participants. Of these, 138 (34%) were emergency department nurses, 113 (28%) were family physicians who also worked in an emergency department, and 97 (24%) were other health care professionals (e.g., physiotherapists, x-ray technicians and managers). In total, 289 (71%) of the respondents reported being aware of the Ottawa Ankle Rules before the workshop, although only a minority were using them consistently in their practices. Three hundred and thirty-four (82%) were confident that the rules are supported by evidence-based research, 342 (84%) thought that the session gave them the knowledge and skills necessary to apply the rules in clinical practice, and 281 (69%) indicated that it was likely or very likely that they would use the rules in their clinical setting.

A total of 830 charts for patients seen before the intervention period and 818 seen after the intervention period were audited. The patients' characteristics are presented in

Table 1. There were approximately equal numbers of ineligible cases for the 2 periods (187 and 185), which left a total of 1276 cases for the audit. Reasons for ineligibility included age less than 18 years, pregnancy, isolated injuries of the skin (e.g., superficial lacerations, abrasions or burns), referral with radiographs from outside the hospital, more than 2 painful injuries, injury that had occurred more than 10 days earlier, reassessment of an injury, intoxication, diminished sensation in the lower extremities, language barrier, gross swelling, and sensory or cognitive impairment.

There was no significant difference in the proportion of patients who were referred for ankle radiography before and after the intervention for hospitals in groups A and B combined (73% v. 78%, *p* = 0.11) (Table 2).

In the group A hospitals, where there had been no or little prior use of the Ottawa Ankle Rules, the proportion of patients referred for ankle radiography was not significantly different before and after the intervention (73% v. 75%, *p* = 0.81) (Table 2). There was also no change in the use of foot radiography (15% v. 20%, *p* = 0.27).

In the group B hospitals, where there had been some prior use of the ankle rules, the proportion of patients referred for ankle radiography increased after the intervention (73% v. 81%, *p* = 0.050), and there was no significant change in the use of foot radiography (19% v. 22%, *p* = 0.20) (Table 2).

Hospitals in group C were selected from among the

Table 1: Characteristics of patients with acute ankle injuries at 15 Ontario hospitals*

Patient characteristic	Group A	Group B	Group C	Overall
Total no. of patients	516	567	565	1648
No. (and %) female	239 (46)	263 (46)	261 (46)	763 (46)
Ineligible for impact assessment				
Total no.	164	91	117	372
No. (and %) because < 18 yr†	106 (65)	17 (19)	34 (29)	157 (42)
Eligible for impact assessment, no.	352	476	448	1276
Mean age (and range), yr	39 (18–91)	37 (18–88)	37 (18–90)	38 (18–91)

*Group A = little or no prior use of Ottawa Ankle Rules + educational intervention; group B = some prior use of Ottawa Ankle Rules + educational intervention; Group C = active local implementation of Ottawa Ankle Rules, no educational intervention.

†Although the hospitals were asked to supply charts for patients 18 years of age or older, some included charts for younger patients.

Table 2: Results of chart audit at the 3 groups of hospitals, for periods before and after the educational intervention

	Group A			Group B			Group C		
	Before, no. (and %)	After, no. (and %)	% change (and 95% CI)	Before, no. (and %)	After, no. (and %)	% change (and 95% CI)	Before, no. (and %)	After, no. (and %)	% change (and 95% CI)
Eligible cases	162	190		241	235		240	208	
Ankle radiography	119 (73)	141 (75)*	+2 (–8 to +10)	176 (73)	190 (81)	+8 (0 to +15)	181 (75)	136 (65)	–10 (–19 to –2)
Foot radiography	25 (15)	38 (20)*	+5 (–3 to +12)	45 (19)	52 (22)	+3 (–4 to +11)	46 (19)†	44 (21)	+2 (–6 to +9)
Fractures	25 (15)	25 (13)		36 (15)	36 (15)		36 (15)	34 (16)	

Note: CI = confidence interval.

*One ankle radiograph and one foot radiograph were miscoded during the chart audit; therefore, the denominator for each calculation was reduced to 189.

†One foot radiograph was miscoded during the chart audit; therefore, the denominator was reduced to 239.



hospitals that did not receive the intervention because they had reported local implementation of the Ottawa Ankle Rules. In this group there was a significant reduction in the proportion of patients referred for ankle radiography (75% v. 65%, $p = 0.022$) and no change in the use of foot radiography (19% v. 21%, $p = 0.64$) (Table 2). Use of ankle radiography in group C hospitals after the intervention period was significantly lower than in group A and B hospitals combined (65% v. 78%, $p < 0.001$).

Similar to previously published findings,^{9-16,19} the proportion of fractures was about 15% for both phases of the analysis for all 3 groups of hospitals.

Interpretation

These findings show that an active dissemination strategy for the Ottawa Ankle Rules had no impact on practice, despite the fact that a clear majority of participants in the educational intervention expressed confidence in the evidence supporting the rules, felt that they had acquired the necessary skills to use the rules clinically and expressed an intention to do so.

For the audit phase beginning Sept. 1, 1996 (after the intervention), the rate of use of ankle radiography in group A and B hospitals was 75% and 81% respectively, well above the 61% achieved in the multicentre implementation trial.¹² Group A hospitals reported no or limited local use of the rules before our initiative. The failure of a single educational session to alter use of ankle radiography is arguably consistent with the literature on guideline implementation.⁶ However, we expected a larger change for the hospitals in group B, given that there had been some local implementation of the rules already; the trainers' presentations should have reinforced the position of local users, facilitated the local emergence of advocates of the rules and catalyzed an active implementation strategy. Clearly, that did not happen.

By far the largest reduction in use of ankle radiography occurred in the control hospitals, which had declined the educational intervention on the grounds that the Ottawa Ankle Rules were being implemented locally. Indeed, the final utilization rate of 65% in 1996 for these hospitals was only slightly above the 61% achieved in a multicentre Ontario implementation trial in which an aggressive multimodal strategy was used to foster local adoption of the rules.¹²

The need for a local implementation strategy may be due in part to the nature of the Ottawa Ankle Rules. Although this clinical algorithm is simple and easy to use, it offers no direct benefit to patients, beyond a reduction in waiting time and possible avoidance of a single radiography procedure. In following the Ottawa Ankle Rules, clinicians must be prepared to forego in some cases the convenience and clinical certainty inherent in referring patients with ankle injury for radiography.

Our results reinforce the concept that an active local implementation strategy is a necessary counterpart to any broad dissemination strategy for encouraging physicians to adopt clinical guidelines.

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References

1. Lomas J. Words without action? The production, dissemination, and impact of consensus recommendations. *Annu Rev Public Health* 1991;12:41-65.
2. Wise CG, Billi JE. A model for practice guideline adaptation and implementation: empowerment of the physician. *J Qual Improv* 1995;21:465-76.
3. Grol R. Implementing guidelines in general practice care. *Qual Health Care* 1992;1:184-91.
4. Davis DA, Taylor-Vaisey A. Translating guidelines into practice. A systematic review of theoretic concepts, practical experience and research evidence in the adoption of clinical practice guidelines. *CMAJ* 1997;157(4):408-16.
5. Lomas J, Anderson GM, Domicq-Pierre K, Vayda E, Enki MW, Hannah WJ. Do practice guidelines guide practice? The effect of a consensus statement on the practice of physicians. *N Engl J Med* 1989;321:1306-11.
6. Davis DA, Thomson MA, Oxman AD, Haynes RB. Changing physician performance. A systematic review of the effect of continuing medical education strategies. *JAMA* 1995;274:700-5.
7. Davis DA, Thomson MA, Oxman AD, Haynes RB. Evidence for the effectiveness of CME. *JAMA* 1992;268:1111-7.
8. Anderson G. Implementing practice guidelines. *CMAJ* 1993;148:753-5.
9. Stiell IG, Greenberg GH, McKnight RD, Nair RC, McDowell I. A study to develop clinical decision rules for the use of radiography in acute ankle injuries. *Ann Emerg Med* 1992;21:384-90.
10. Stiell IG, Greenberg GH, McKnight RD, Nair RC, McDowell I, Reardon M, et al. Decision rules for the use of radiography in acute ankle injuries. Refinement and prospective validation. *JAMA* 1993;269:1127-32.
11. Stiell IG, McKnight RD, Greenberg GH, McDowell I, Nair RC, Wells GA, et al. Implementation of the Ottawa Ankle Rules. *JAMA* 1994;271:827-32.
12. Stiell I, Wells G, Laupacis A, Brison R, Verbeek R, Vandemheen K, et al. Multicentre trial to introduce the Ottawa Ankle Rules for use of radiography in acute ankle injuries. *BMJ* 1995;311:594-7.
13. Pigman EC, Klug RK, Sanford S, Jolly BT. Evaluation of the Ottawa clinical decision rules for the use of radiography in acute ankle and midfoot injuries in the emergency department: an independent site assessment. *Ann Emerg Med* 1994;24:41-5.
14. McBride KL. Validation of the Ottawa Ankle Rules. Experience at a community hospital. *Can Fam Physician* 1997;43:459-65.
15. Hall K, Hamilton C, Verma S, Kothari R, Storer D. Implementation of the Ottawa Ankle Rules: How safe, how effective? [abstract] *Ann Emerg Med* 1996;27(1):155.
16. Solomito AL, Singal BM, Radack M. Ankle radiography in the emergency department: prospective validation of Ottawa Ankle Rules [abstract]. *Acad Emerg Med* 1994;1(2):A64.
17. Anis AH, Stiell IG, Stewart DG, Laupacis A. Cost-effectiveness analysis of the Ottawa Ankle Rules. *Ann Emerg Med* 1995;26:422-8.
18. Stiell IG. Ottawa Ankle Rules. *Can Fam Physician* 1996;42:478-80.
19. Sujitkumar P, Hadfield JM, Yates DW. Sprain or fracture? An analysis of 2000 ankle injuries. *Arch Emerg Med* 1986;3:101-6.

Reprint requests to: Cathy Cameron, Institute for Clinical Evaluative Sciences, Rm. G-123, 2075 Bayview Ave., North York ON M4N 3M5; fax 416 480-6048; cathy.cameron@ices.on.ca