

Brief Research Report

Dan Med J 2023;70(6):A06220415

Change in orthopaedic surgeon behaviour by implementing evidence-based practice

Jens-Christian Vedel, Dennis Winge Hallager, Jeannette Østergaard Penny, Tommy Henning Jensen, Thomas Juul Sørensen & Stig Brorson

Centre for Evidence-Based Orthopaedics, Department of Orthopaedic Surgery, Zealand University Hospital, Denmark

Dan Med J 2023;70(6):06220415

ABSTRACT

INTRODUCTION. Orthopaedic practice is not always aligned with new evidence which may result in an evidence-practice gap. Our aim was to present and report the use of a new model for implementation of evidence-based practice using treatment of distal radius fractures (DRF) as an example.

METHODS. A new implementation model from the Centre for Evidence-Based Orthopaedics (CEBO) was applied. It comprises four phases: 1) baseline practice is held up against best available evidence, and barriers to change are assessed. 2) A symposium involving all stakeholders discussing best evidence is held, and agreement on a new local guideline is obtained. 3) The new guideline based on the decisions at the symposium is prepared and implemented into daily clinical practice. 4) Changes in clinical practice are recorded. We applied the model on the clinical question of whether to use open reduction and internal fixation with a locked volar plate (VLP) or closed reduction and percutaneous pinning (CRPP) in adults with DRF.

RESULTS. Prior to application of the CEBO model, only VLP was used in the department. Based on best evidence, the symposium found that a change in practice was justified. A local guideline stating CRPP as first surgical choice was implemented. If acceptable reduction could not be obtained, the procedure was converted to VLP. A year after implementation of the guideline, the rate of VLP had declined from 100% to 44%.

CONCLUSION. It is feasible to change surgeons' practice according to best evidence using the CEBO model.

FUNDING. None.

TRIAL REGISTRATION. Not relevant.

Implementation studies report that new evidence [1] and new clinical guidelines [1, 2] do not automatically lead to change in clinical practice and that not all orthopaedic surgeons are willing to change their current practice even when faced with new quality evidence suggesting that change is warranted [3, 4].

Behavioural scientist and implementation researchers have developed a conceptual framework to identify facilitators and barriers to change categorised into three essential conditions for behaviour change: opportunity (environmental context, resources and social influence), capability (knowledge and skills) and motivation (beliefs about consequences and reinforcement) [1, 5]. However, no “magic bullet” exists when it comes to “how”, and the effectiveness of strategies is context sensitive [6, 7]. Successful implementation of clinical guidelines has been reported to be more likely with active involvement from end users [2]. Systematic reviews have shown that local opinion leaders may be helpful [8, 9], and multifaceted strategies are more effective than single-stranded strategies, [9] whereas the effect of tailored interventions to address known barriers has shown ambiguous results [10].

In response to the need for further study of resource interventions, we at the Centre for Evidence-based Orthopaedics (CEBO) present the CEBO model, a model for implementation of evidence-based practice, and a report describing its use in a university hospital clinical setting using surgical treatment of dorsally displaced wrist fractures in adults as an example.

Our department provides surgical treatment for around 150 to 200 annual adult patients with wrist fractures of which most are dorsally displaced. Management with open reduction and internal fixation with locked volar plating is becoming increasingly popular compared with percutaneous pinning (**Figure 1**) [11]. However, large randomised trials have found no superiority of the more invasive procedure regarding quality of life or hand and wrist function [12-15].

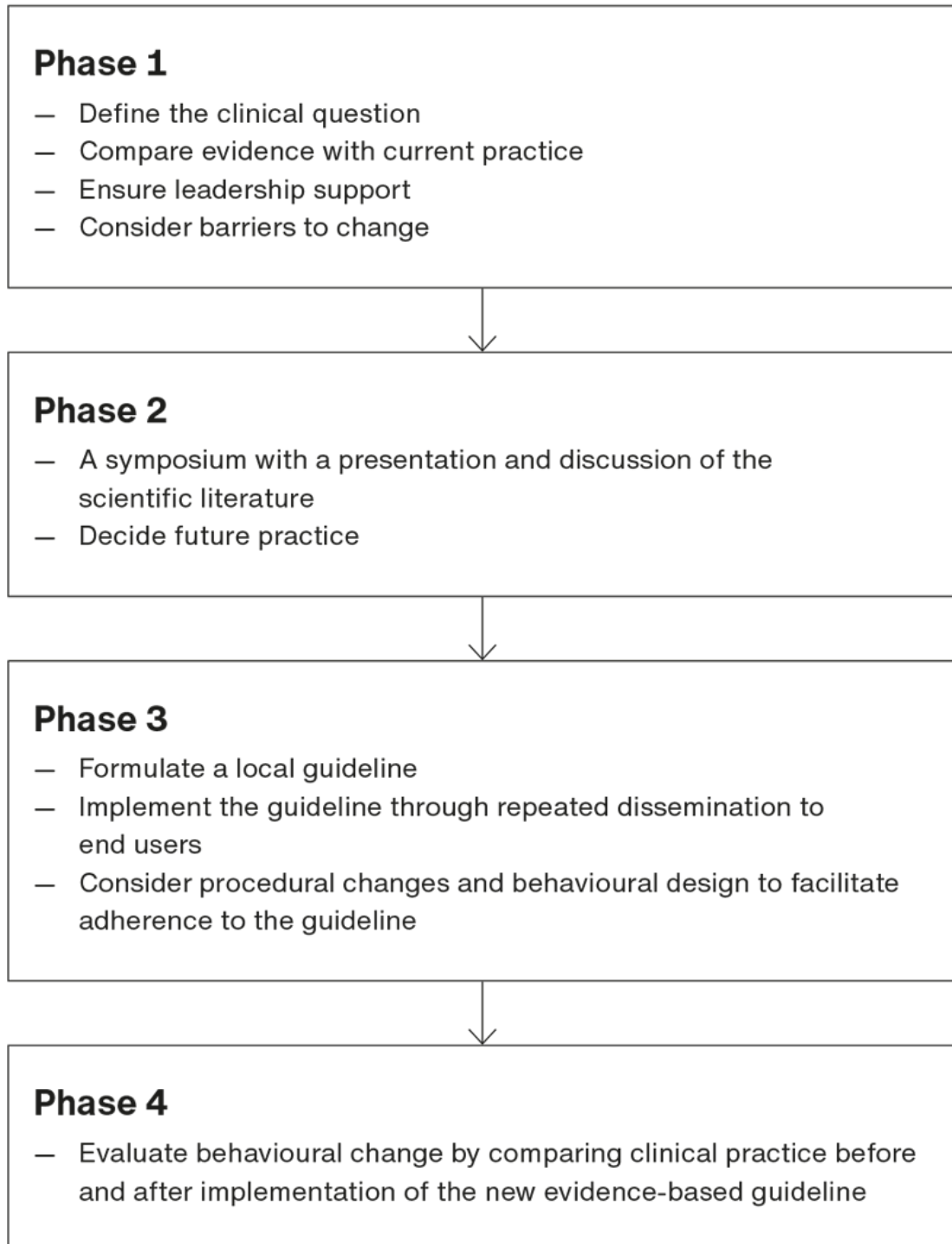
FIGURE 1 Kirschner wires for percutaneous pinning (**A**) (price c. 11 EUR) and locking plate for open reduction and internal fixation (**B**) (price c. 430 EUR).



METHODS

The CEBO implementation model was employed in four phases (Figure 2)

FIGURE 2 The Centre for Evidence-based Orthopaedics model flow chart.



Initially, in Phase 1, baseline practice was determined and held against best available evidence, thereby identifying barriers to change. To study the baseline practice of the two surgical methods, we conducted a chart review covering all procedures in our department from 1 January 2019 to 31 December 2019. The chart review revealed that fixation of distal radius fractures was achieved solely using volar locking plates. Furthermore, we found that our practice conflicted with an updated international guideline [16] and two randomised controlled trials [12-15].

The authors considered that the main barriers to a practice change were a lack of knowledge of current evidence and peer opinions, i.e. promotion of plates by influential senior surgeons.

Next, in Phase 2, with support from the head of department, all surgeons were invited to participate in a symposium during work hours to discuss the future surgical care of adults with dorsally displaced wrist fractures. The identified studies and guidelines were disseminated to all participants in advance, and participants were encouraged to identify any additional relevant resources of evidence. At the symposium, volunteering surgeons presented summaries of the evidence and our current practice. Benefits and adverse effects of the two treatments were discussed. A moderator kept the discussion within the confines of the clinical question and the evidence provided. In the conclusion, it was emphasised that evidence showed no superiority for plates with regard to quality of life and wrist function after one year. A decision on future practice was reached by show of hands using the rule of overwhelming majority among participants. Percutaneous fixation was elected as first line of treatment with an option of converting to open reduction and plating if satisfactory reduction or stability could not be obtained. Plating was also provided upon patient request.

In Phase 3, the evidence-based conclusion obtained at the symposium was integrated in a local guideline. The guideline was authored by a group of participants and presented at several morning meetings. The operating team was instructed to first provide the surgeons with pins when treating wrist fractures.

Finally, in Phase 4, we evaluated surgical practice through chart reviews from August 2020 to end of July 2021 and compared it to our practice prior to the symposium.

Trial registration: not relevant.

RESULTS

In 2019, prior to the symposium, all cases of surgically treated wrist fractures were operated with open reduction and internal fixation using a locking plate.

In the year following the symposium, surgical treatment of dorsally displaced wrist fractures with a locking plate decreased from 100% to 44% (52 of 117 cases) in favour of percutaneous pinning, which increased correspondingly from 0% to 56%.

DISCUSSION

Following the CEBO model, a substantial change in clinical practice was observed.

The CEBO model presupposes that a narrow and clearly defined clinical question can be formulated. The amount and quality of evidence needed to make a treatment recommendation will depend on the context.

The CEBO model provides a tool to incorporate the three determinants of behaviour for adaptation of evidence for clinical practice: opportunity, capability and motivation [1].

It is our opinion that support from the Head of Department was of paramount importance for creating a suitable environment to revisit practice and to provide the resources needed for active involvement of all key stakeholders. In addition, social support and active involvement from local opinion leaders including the head of department, chief of trauma unit, the professor and the senior consultants were considered essential in promoting the opportunity for behavioural change.

The CEBO model facilitates change through dissemination and an open discussion of clinical knowledge and best evidence. Another capability barrier may be a lack of skills. However, this was not considered an issue in our department as provisional pinning with one or more K-wires has long been used as an intermediate step in open reduction surgery. However, a learning curve when used as final treatment may be expected.

We consider wide agreement important in developing a sense of ownership among participants and a motivation for implementing and adhering to behavioural change. We believe that the change was retained by writing a local clinical guideline, which was disseminated and presented repeatedly to end users in the months following the symposium.

A cost analysis for the CEBO model estimates that the 1.5-hour symposium entailed the cancellation of approx. 30 outpatient visits one afternoon and payment of 30 minutes of overtime to the participating surgeons. On the other hand, the process meant reduced implant cost and duration of surgery. A total of 65 (out of 117) cases treated with K-wires instead of volar locking plate during the year following the symposium produces a total reduction of surgical duration by 32 hours (65×30 minutes). A total of 65 cases treated with K-wires instead of volar locking plate during the year following the symposium produces a cost reduction of $65 \times (430 \text{ EUR} - 11 \text{ EUR}) = 27,235 \text{ EUR}$.

CONCLUSION

We presented and tested a model for implementation of evidence-based practice in a clinical setting. A substantial change in behaviour was observed among surgeons treating dorsally displaced wrist fractures following use of the CEBO model.

Correspondence *Dennis Winge Hallager*. E-mail: dhallager@gmail.com

Accepted 22 March 2023

Conflicts of interest none. Disclosure forms provided by the authors are available with the article at ugeskriftet.dk/dmj

Cite this as *Dan Med J* 2023;70(6):A06220415

REFERENCES

1. Arroyo NA, Gessert T, Hitchcock M et al. What promotes surgeon practice change? A scoping review of innovation adoption in surgical practice. *Ann Surg*. 2021;273(3):474-82.
2. Francke AL, Smit MC, de Veer AJE et al. Factors influencing the implementation of clinical guidelines for health care professionals: a systematic meta-review. *BMC Med Inform Decis Mak*. 2008;8:38.
3. Dijkman BG, Kooistra BW, Pemberton J et al. Can orthopedic trials change practice? *Acta Orthop*. 2010;81(1):122-5.
4. Sonntag J, Landale K, Brorson S et al. Can the results of a randomized controlled trial change the treatment preferences of orthopaedic surgeons? *Bone Jt Open*. 2020;1(9):549-55.
5. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implement Sci*. 2011;6:42.
6. Cabana MD, Rand CS, Powe NR et al. Why don't physicians follow clinical practice guidelines? A framework for improvement. *JAMA*. 1999;282(15):1458-65.
7. Oxman AD, Thomson MA, Davis DA et al. No magic bullets: a systematic review of 102 trials of interventions to improve professional practice. *CMAJ*. 1995;153(10):1423-31.
8. Flodgren G, O'Brien MA, Parmelli E, Grimshaw JM. Local opinion leaders: effects on professional practice and healthcare outcomes. *Cochrane Database Syst Rev*. 2019;6(6):CD000125.
9. Boaz A, Baeza J, Fraser A, European Implementation Score Collaborative Group (EIS). Effective implementation of research into practice: an overview of systematic reviews of the health literature. *BMC Res Notes*. 2011;4:212.
10. Baker R, Camosso-Stefinovic J, Gillies C et al. Tailored interventions to address determinants of practice. *Cochrane Database Syst Rev*. 2015;2015(4):CD005470.
11. Tofte S, Gundtoft PH, Rønnegaard AB et al. How treatment of distal radius fractures in adults have changed over the years – a nationwide register study from Denmark of 276,145 fractures from 1997-2018. *DOS Congr Abstr B* 2022;Abstract no. 51.
12. Chung KC, Kim HM, Malay S et al. The Wrist and Radius Injury Surgical Trial: 12-month outcomes from a multicenter international randomized clinical trial. *Plast Reconstr Surg*. 2020;145(6):1054e-1066e.
13. Chung KC, Malay S, Shauver MJ et al. Assessment of distal radius fracture complications among adults 60 years or older: a secondary analysis of the WRIST Randomized Clinical Trial. *JAMA Netw*. 2019;2(1):e187053.
14. Costa ML, Achten J, Parsons NR et al. Percutaneous fixation with Kirschner wires versus volar locking plate fixation in adults with dorsally displaced fracture of distal radius: randomised controlled trial. *BMJ*. 2014;349:g4807.
15. Costa ML, Achten J, Rangan A et al. Percutaneous fixation with Kirschner wires versus volar locking-plate

fixation in adults with dorsally displaced fracture of distal radius: five-year follow-up of a randomized controlled trial. *Bone Joint J.* 2019;101-B(8):978-83.

16. The National Institute for Health and Care Excellence. Fractures (non-complex): assessment and management. NICE Guideline NG38. 17 February 2016. www.nice.org.uk/guidance/ng38 (25 May 2022).