A systematic review of measures for reducing injection pain during adult immunization

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CRD summary
This review of interventions to reduce injection pain during immunisation in adults concluded that there was only limited evidence that lidocaine-prilocaine, vapo-coolant spray Fluori-Methane and manual pressure reduced pain, and that jet injectors increased pain. The conclusions and recommendations for further research from this well-conducted review appear reliable.

Authors’ objectives
To evaluate the effectiveness of pain-relieving interventions for reducing pain caused by immunisation injections in adults.

Searching
MEDLINE, EMBASE, PsycINFO, CINAHL (from inception to October or December 2008) and the Cochrane Central Register of Controlled Trials (CENTRAL, third quarter 2008) were searched with no language restrictions. Search terms were reported. References from articles and reviews were also searched. Unpublished studies and those only in abstract form were excluded.

Study selection
Randomised or quasi-randomised controlled trials of interventions for reducing vaccine-related pain (including pharmacological, psychological, physical or operator-dependant techniques) compared with placebo or sham procedures, usual care or no treatment, were eligible for inclusion in the review. The outcome of interest was self-reported acute pain from the injection.

Interventions in the included trials were topical local anaesthesia, vapo-coolant spray, tactile stimulation, jet injectors, cold needles, and warmed vaccines. The vaccinations given included influenza, hepatitis A and B, diphtheria-tetanus, and unspecified travel vaccines. Pain was measured using visual analogue scales (VAS), the McGill present pain intensity questionnaire (original and modified), a verbal rating scale, and a discrete scale based on pain from previous puncture. Most scales were scored from 0 to 10, except the original McGill present pain intensity scale which was scored from 0 to 5, with a higher score indicating more pain.

The authors did not report how many reviewers performed the study selection.

Assessment of study quality
Risk of bias was assessed using the following criteria (classed as yes, no or unclear): randomisation sequence generation, allocation concealment, blinding, incomplete outcome data, selective outcome reporting, and other forms of bias.

The assessment was made by two reviewers independently.

Data extraction
Pain outcomes were extracted as they were reported by the trials, these were mostly mean and standard deviations (SD) of the pain score.

Data were extracted by two reviewers independently and compared for accuracy.

Methods of synthesis
Results were reported in a narrative summary.
Results of the review
Six trials were included in the review (n=853 participants). One trial was classed as low risk of bias, three of high risk, and two of unclear risk.

Pharmacological interventions: One trial, comparing a topical local anaesthetic cream (lidocaine-prilocaine) with a matching placebo cream for 60 to 90 minutes prior to immunization, reported significantly less pain for the injection for the anaesthetic group (mean pain score 0.95cm (SD 1.37) versus 1.85cm (SD 1.96); p=0.0014; n=60 participants), with a similar reduction for pain on needle insertion.

Physical interventions: One trial of a topical vapo-coolant spray (Fluori-Methane) given to patients who needed at least two injections, found that it was more effective than a cooled saline solution (mean pain score 2.2 (SD 1.48) versus 2.8 (SD 0.98); p<0.01; n=185 participants). Another trial of patients receiving two injections, found that 10 seconds of thumb pressure at the injection site reduced pain more than no pressure (mean pain score 1.77 (SD 1.49) versus 2.86 (SD 1.58); p<0.001; n=74 participants). Jet injectors were found to be more painful than needle and syringe, with odds ratios of more pain of 2.45 (95% CI 1.36 to 4.40; n= 304 participants) and 1.84 (95% CI 1.03 to 3.27) for the two types of jet. No significant differences were found between treatment groups for a trial comparing a warmed vaccine with one straight from the refrigerator, and another trial comparing frozen with room temperature needles.

Authors' conclusions
There was limited evidence to support the use of lidocaine-prilocaine, Fluori-Methane and manual pressure for reducing immunisation pain in adults. There was also limited evidence that jet injectors caused more pain compared with needle and syringe.

CRD commentary
This review had a clear research question and specified study inclusion criteria regarding study design, interventions and outcomes. The search covered a number of relevant databases and references were also screened. There were no language restrictions. Data extraction and validity assessment were performed in duplicate to reduce the chance of error or bias, but it was unclear whether this applied to the study selection.

Trial validity was assessed using recommended criteria and details reported in full for each trial. Given the differences between trials, the narrative presentation was appropriate.

The conclusions and recommendations for further research from this well-conducted review appear reliable.

Implications of the review for practice and research
Practice: The authors stated that topical local anaesthetics and pressure at the injection site before the injection can be recommended.

Research: The authors stated that future research should evaluate psychological interventions such as vapo-coolant sprays, aspects of needles (gauge, length) and injections (speed and body site). Studies comparing the combined effectiveness of different analgesic techniques, and those that measure patient satisfaction, are also needed.

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Bibliographic details

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.