The effect of audit and feedback on immunization delivery: a systematic review


Authors' objectives
To assess the effectiveness of audit and feedback (A&F) on immunisation delivery by health care professionals.

Searching
MEDLINE was searched from 1966 to 1998 using the following search terms: 'quality of health care', 'physician practice patterns', 'audit', 'reaudit', 'assessment', 'outcome assessment', 'feedback', 'feed-back', 'fed back', 'immunization', 'immunize', 'preventative health services', 'vaccines', immunization programs', 'vaccine', 'vaccination' and 'inoculate', as well as MeSH for individual vaccines, including measles, rubella, hepatitis B, poliomyelitis, influenza, mumps, pneumococcal infections, and diphtheria-tetanus-pertussis. The authors also back-searched the reference lists of all relevant articles for additional studies, and searched files of study collaborators for references. The search was limited to studies written in English.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs), controlled before-and-after studies (CBA), interrupted time series (ITS) and simple before-and-after studies (BA). Studies had to include A&F in at least one arm. Reviews and recommendations were excluded, as were cross-sectional and ecological studies.

Specific interventions included in the review
To be included, the study had to have studied universally recommended childhood or adult vaccines. A&F was defined as any summary of clinical performance gathered over a defined period of time and presented to the health care provider after collection. Specific interventions were: annual audit and feedback to providers (annually for 7 years); feedback reports alone (A&F) or with capitation bonus (baseline audit then 3 rounds of audit and feedback at 6-month intervals); A&F plus provider financial incentives (annually for 3 years); 'regular' performance feedback to providers (annually for 4 years); postgraduate education course involving A&F (2.5 years between baseline and follow-up); annual chart reviews and feedback to staff (annually for 7 years); control immunisation chart alone (A&F) or with postcard to patient (weekly for 15 weeks); A&F (2 years between baseline and follow-up); annual feedback with chart flowsheet and provider training (annually for 5 years); periodic feedback to physicians plus list of non-immunised patients (annually for 3 years); mean of 5.2 chart audits per year per resident with written feedback (annually for 6 years); feedback to physicians with provider reminder (form) and physician education (monthly for 1 year); A&F every 1 to 2 months with provider reminder flowsheet on patient charts (annually for 5 years); lectures, check lists, and biweekly chart-review conference with faculty (A&F) (1 influenza season); and monthly feedback (A&F), chart reminders, or both (8 months). Studies examining the effect of A&F on preventive services other than immunisation delivery were excluded.

Participants included in the review
The participants included in the individual studies were: children aged 21 to 23 months; children; preschool children; children aged 1 to 9 years; diabetics; adults aged at least 50 years; adult men; adults aged at least 65 years, at high risk (influenza) and with diabetes; medicine residents; and adults.

Outcomes assessed in the review
The outcome of interest was a provider's delivery of immunisation to patients, typically the percentage of eligible patients immunised. Specific outcomes included in the review were: diphtheria-tetanus-pertussis (DTP); oral polio vaccine (OPV); measles-mumps-rubella (MMR) (4:3:1 series completion); 4 doses of DTP, 3 of OPV, 1 of MMR, and 4 of Haemophilus influenzae type b; 1 dose of MMR; 1 dose of measles; DTP-OPV (3:3 series completion); pneumococcal immunisation; influenza immunisation; influenza and pneumococcal immunisation; tetanus-diptheria within 10 years, and pneumococcal and influenza immunisation; influenza and pneumovax immunisation.
How were decisions on the relevance of primary studies made?
The authors originally used inclusion criteria established by the Cochrane Collaboration (see Other Publications of Related Interest), but to more broadly review the research they included studies that used simple before-and-after study designs. Two reviewers independently read all identified studies, and any disagreements were resolved by discussion.

Assessment of study quality
A validated checklist developed by the Cochrane Collaboration Effective Practice and Organisation of Care Group was used to assess RCT, CBA and ITS study designs (see Other Publications of Related Interest). The criteria used for RCTs included concealment of allocation, participant follow-up proportions, blinded assessment of primary outcomes, documentation of baseline data, reliability of outcome measures, and protection of contamination among study groups. Two reviewers independently read all identified studies. The reviewers were blinded to the study's author(s) and institution, unless the text of the article presented identifying information. Any disagreements between readers were resolved by discussion.

Data extraction
The data extraction was performed using a validated checklist developed by the Cochrane Collaboration Effective Practice and Organisation of Care Group. For each study, information on study design, method of randomisation or assembly of control groups, blinding, trial participant characteristics, provider characteristics, setting and nature of the intervention(s), and results were extracted. Results were expressed as absolute percentage point changes in immunisation rates.

Methods of synthesis
How were the studies combined?
A narrative synthesis was undertaken. All results are expressed as absolute percentage point changes in immunisation rates.

How were differences between studies investigated?
Findings from studies of childhood immunisations were reviewed separately from those performed in adults.

Results of the review
Fifteen studies met the eligibility criteria: 5 RCTS, 6 ITS and 4 simple BA studies. No CBA studies were included in the review. It was not possible to calculate the number of participants included.

Childhood immunisation (5 studies: 1 RCT, 2 ITS and 2 BA). In general, the published studies assessing the impact of A&F on childhood immunisation rates demonstrate a positive association, although the number and quality of the studies identified was limited. Only 2 studies examined the effect of A&F as the sole intervention, and it is, therefore, difficult to evaluate the independent effect of A&F and the magnitude of its effect on childhood immunisation rates.

Adult immunisation (10 studies: 4 RCTs, and 6 BA or ITS). Eight of the 10 studies (3 of the 4 RCTs) reported a positive association between A&F and immunisation rates. The range of change in immunisation rates was -4 to +49%. The types of immunisation programmes studied included influenza (n=7), pneumovax (n=5) and tetanus-diptheria (n=3).

Authors' conclusions
The evidence available from published studies suggests that A&F alone may be an effective strategy for improving immunisation rates. The number of well-conducted studies is small, and the effect is variable. Additional well-designed studies are needed to identify the independent effects of A&F, optimal format and frequency of A&F, and to examine its long-term effect on provider immunisation practices and costs.
CRD commentary
The authors made a good effort to use proper systematic review methodology by applying criteria standardised by the Cochrane Collaboration. The review addressed a focused question and study selection was guided by suitable inclusion criteria. The search strategy was adequate and the search terms were reported in detail, but searches of additional databases could have been undertaken. The data were pooled in a narrative synthesis which was appropriate given the differences between the included studies. The authors state that study design precluded statistical pooling of study results, but the authors could have investigated this separately in the 5 studies judged to be of better methodological quality.

The authors conclusions follow on from the results but should be viewed with caution due to the methodological limitations outlined.

Implications of the review for practice and research
Practice: The authors state that A&F may effectively increase immunisation rates. In practices with capable data systems, our findings suggest that audit and feedback are well worth the effort.

Research: The authors state that there need to be studies identifying the optimal format and frequency of A&F, and the long-term effect of feedback on provider immunisation practices. The use of concurrent controls, using either CBA designs or randomisation approaches, is imperative and future studies should randomise providers at the practice level. Additional research is needed to determine if the intervention is effective at improving the delivery of immunisations to children and adolescents.

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Other publications of related interest

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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.