Order sets in health care: a systematic review of their effects

CRD summary
The authors concluded that findings suggested use of order sets could result in positive outcomes (guideline adherence, treatment outcomes, processes of care, efficiency) but the evidence was low quality. The cautious conclusions reflect the evidence presented and seem reliable.

Authors' objectives
To assess the effectiveness of order sets implementation on guideline adherence, processes of care, diagnosis/treatment outcomes and user efficiency.

Searching
MEDLINE, EMBASE, CINAHL and The Cochrane Library were searched for studies published between 1990 and April 2009. Search terms were reported. Bibliographies of identified papers were handsearched. Further searches were undertaken in Gartner reports and ClinicalTrials.gov. Only studies published in English were considered.

Study selection
Randomised controlled trials, non-randomised controlled trials and observational studies that evaluated the effects of order sets as the primary intervention for hospitalised patients were eligible for inclusion. Studies where order sets were included as part of a multi-faceted intervention and those with no predefined control groups were excluded. Outcome measures were: guideline adherence; processes of care; diagnosis/treatment outcomes; and user efficiency.

Most studies were conducted in the USA. Study settings varied (academic hospitals, community hospitals, tertiary care centres). Conditions targeted by the order sets included cancer, diabetes, acute coronary disease, ischaemic stroke, chest pain, pneumonia, chronic obstructive pulmonary disease, asthma and status asthmaticus, sepsis, febrile neutropenia, soft tissue infection, urinary tract infection, upper gastrointestinal bleeding and anaemia. Studies also enrolled patients who required withdrawal of life support, who received mechanical ventilation, or who required enteral or parenteral nutritional support.

Most studies evaluated paper-based order sets; two studied computerized physician order entry-embedded order sets. None of the included studies assessed electronic stand-alone order sets. The control group in all except one study consisted of patients cared for without order sets. Outcome measures varied considerably.

Two reviewers independently assessed study eligibility for inclusion. Disagreements were resolved by discussion.

Assessment of study quality
Two reviewers independently assessed study quality using the STROBE (Strengthening the Reporting of Observational studies in Epidemiology) checklist. Key quality domains assessed included: study designs, sample sizes and differences between the before and after groups.

The overall quality of evidence was graded using the GRADE (Grading of Recommendations, Assessment, Development and Evaluation) criteria. Key domains assessed included: consistency, directness and precision of evidence, as well as any study limitations and publication bias. Disagreements in the quality assessments were resolved by discussion.

Data extraction
Data were extracted largely on proportions, with effect sizes and p-values presented in some cases. The authors did not state how many reviewers abstracted data.

Methods of synthesis
Results were summarised narratively given significant differences in study populations, interventions and outcome measures.
Results of the review
Eighteen observational (before-after) studies were included (44,529 patients; range 52 to 34,554). Overall quality (based on the GRADE criteria) was rated as very low for all outcomes.

Adherence to guidelines
Overall, results suggested positive effects of order sets on adherence to guideline recommendations (such as antibiotic therapy in sepsis, optimal treatment for ischaemic stroke, cancer treatment with colony-stimulating factors) No significant differences in results were observed for different types of order sets or whether paper-based or computerized physician order entry-embedded order sets were used.

Other outcome measures
Order sets were associated with significant improvements in treatment outcomes in three studies. In the first study, bacteraemic severe sepsis order set resulted in a significant reduction in in-hospital mortality. In the second study, glycaemic control order set was associated with a significant decrease in mean blood glucose level and number of hypoglycaemia incidences, and a significant increase in the number of patients that stayed within their target blood glucose range. In the third study implementation of a nutrition order form was associated with a significant decrease in the time for patients to meet their caloric goals. Four studies found no effect of order sets on treatment outcomes.

Order sets were associated with significant improvements in a range of processes of care in eight studies (further details reported in the paper). Order sets were associated with a significant decrease in the time taken to provide appropriate care to patients in one study.

Undesirable outcomes
Two studies reported undesirable outcomes associated with the use of order sets. In the first study order sets were associated with a significant decrease in orders that were completed with a date and an unintended increase in night-time sedation orders. The second study reported a higher frequency of corticosteroid therapy orders, resulting in a significant increase in diabetic patients experiencing hyperglycaemia on the intervention unit than the control unit.

Cost information
Use of order sets resulted in a 37% reduction in the annual cost of a specific medication in one study. In another study order sets resulted in a decrease in resource use. There was no effect of order sets on costs in a further study.

Authors’ conclusions
Findings suggested that use of order sets could result in positive outcomes (guideline adherence, treatment outcomes, processes of care, efficiency) but the evidence was of low quality. Given the paucity of high quality evidence, further research on the effectiveness of order sets was needed.

CRD commentary
The review question and inclusion criteria were broadly defined. Four major electronic databases were searched for English only publications so a number of relevant papers could have been missed. Study selection and quality assessment were carried out in duplicate which minimised likely reviewer error and bias, but it was unclear whether similar procedures were used in data extraction.

Study quality was assessed using appropriate criteria; the overall quality of evidence was very low. Results were appropriately summarised narratively given significant differences in study designs, interventions and outcomes.

The authors’ cautious conclusions reflect the poor quality evidence presented.

Implications of the review for practice and research
Practice: The authors stated that order sets needed to be evaluated and updated regularly to include the most current evidence and guidelines. They further stated that treatment outcomes and adoption rates associated with order sets needed to be monitored continuously to determine the sustainability of improvements and need for modifications.
Research: The authors stated that further high quality studies (multi-centre studies with large sample sizes and concurrent controlled groups) were needed to assess the effectiveness of order sets on intended outcomes. They further stated that future studies should investigate which types of order sets were likely to yield most benefits, what outcomes were most likely to improve and predictors of greater adoption.

Funding
Ministry of Health and Long-term Care, Ontario (Canada).

Bibliographic details

DOI
10.1017/S0266462312000281

Original Paper URL
http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=8692955

Indexing Status
Subject indexing assigned by CRD

MeSH
Decision Making, Computer-Assisted; Medical Order Entry Systems; Humans; Electronic Health Records

Accession Number
12012046088

Date bibliographic record published
21/11/2012

Date abstract record published
22/03/2013

Record Status
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.