TITLE: Smart Infusion Pump use in Hospitalized Patients: Clinical Safety and Guidelines

DATE: 23 January 2014

RESEARCH QUESTIONS

1. What is the comparative clinical evidence regarding the occurrence of medication errors associated with the use of smart pumps versus traditional infusion pumps in hospitalized patients requiring intravenous medication therapy?

2. What is the clinical evidence regarding the safety of smart pump use in hospitalized patients requiring intravenous medication therapy?

3. What are the evidence-based guidelines regarding smart pump use in hospitalized patients requiring intravenous medication therapy?

KEY MESSAGE

One systematic review, five non-randomized studies, and two evidence-based guidelines were identified regarding the use of smart pumps for hospitalized patients requiring intravenous medication therapy.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2014, Issue 1), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. Methodological filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, and guidelines. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2009 and January 13, 2014. Internet links were provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.

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RESULTS

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and evidence-based guidelines.

One systematic review, five non-randomized studies, and two evidence-based guidelines were identified regarding the use of smart pumps for hospitalized patients requiring intravenous medication therapy. No health technology assessments or randomized controlled trials were identified.

Additional references of potential interest are provided in the appendix.

OVERALL SUMMARY OF FINDINGS

A systematic review, published in 2013,\(^1\) indicated that there were a relatively small number of studies found on the efficacy of smart pumps for the prevention of medical errors. It concluded that the reduction of medication errors with smart pumps was potentially greater if the pumps were integrated into a larger safety system. It also stated that implementation required considerable time, analysis of hospital-specific practices, staff education, and multidisciplinary teams, with a great deal of time needed to maintain and update the drug libraries associated with the smart pumps.

Five non-randomized studies\(^2\)\(^-\)\(^6\) addressed the benefits of smart pumps with regard to safety. One study\(^2\) compared manual changeover of vasoactive drug infusion pumps (CVIP) with automatic CVIP smart pumps. The study found that the frequency of hemodynamic incidents resulting from changeover delays was less when using the smart pumps, and nursing workload was decreased. Two studies were based in pediatric intensive care units,\(^3\)\(^,\)\(^7\) and found that smart pumps improved patient safety by intercepting potential infusion programming errors. Another study, specific to adult patient-controlled analgesia using smart pumps,\(^4\) showed a decrease in adverse events, which supported a recommendation of incorporating smart pumps for the administration of opioid therapy for adult patients. Two additional studies, one in a critical care unit\(^5\) and one in a tertiary care academic medical centre,\(^7\) demonstrated that smart pumps enabled the interception of medication errors; therefore, creating a positive impact on patient safety.

The Ontario Ministry of Health and Long-Term Care published a recommendations report on the implementation and use of smart pumps,\(^8\) based on findings from a University Health Network report.\(^8\) The key recommendations include the formation of a multi-disciplinary steering committee, standardization of drug concentrations and dosing units, development of drug libraries, integration of key systems, staff education, and monitoring.
REFERENCES SUMMARIZED

Health Technology Assessments
No literature identified.

Systematic Reviews and Meta-analyses

See: Smart pumps, p.48

Randomized Controlled Trials
No literature identified.

Non-Randomized Studies


Guidelines and Recommendations


Note: This document is based on the report in Reference #8

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APPENDIX – FURTHER INFORMATION:

Guidelines and Recommendations – consensus-based recommendations


Review Articles


Additional References


   Note: This document is based on the report in Reference #22

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