Automated dose dispensing service for primary healthcare patients: a systematic review

Sinnemaki J, Sihvo S, Isojarvi J, Blom M, Airaksinen M, Mantyla A

CRD summary
This review evaluated the impact of automated dose dispensing on appropriateness of medication use and medication safety in primary healthcare settings. The authors concluded that evidence was limited and further research was necessary to draw sound conclusions. This was a largely well-conducted review and the authors’ conclusions seem reliable.

Authors’ objectives
To evaluate the impact of automated dose dispensing on appropriateness of medication use and medication safety in primary healthcare settings.

Searching
Ten electronic databases, including MEDLINE, EMBASE and The Cochrane Library (which included the DARE), were searched for studies published from early 1995 to April 2012. Search terms were reported and the MEDLINE search strategy was presented. Finnish databases were searched. There were no language restrictions. The reference lists of included studies were searched for further articles.

Study selection
Eligible for inclusion were studies in English on automated dose dispensing (medicines machine-packed into unit-dose bags for each time of administration) conducted in primary health care or nursing homes. Studies did not have to contain a comparison group, but (where present) this could involve usual care or no automated dose dispensing. Eligible outcome measures were those related to appropriateness of medication use or medication safety. Qualitative studies and case reports were excluded.

Most included studies were register-based, carried out in Norway or Sweden and contained participants at least 65 years old residing in the community or nursing homes. The description of automated dose dispensing varied between studies. Potential inappropriate drug use was measured as changes in medication use, or on the following quality indicators: use of long-acting benzodiazepines; use of anticholinergic drugs; drug duplications; use of 10 or more drugs; use of three or more psychotropic drugs; and potential drug-drug interaction. Medication safety was measured as discrepancies related to patient medication records between general practitioner and home care services, or rate of medication administration error.

Two reviewers independently selected the studies. Disagreements were resolved by discussion and consensus.

Assessment of study quality
Study quality was assessed using the STROBE checklist, which covered the quality of reporting and an assessment of internal/external validity. Quality was considered good when more than 80% of items adequately answered, and acceptable when the result was less than 80% but more than 60%.

The authors did not state how many reviewers carried out the quality assessment.

Data extraction
Data were extracted to enable the presentation of proportions with p values, and odds ratios (OR) with 95% confidence intervals (CI).

One reviewer extracted the data. This was checked by the remaining five authors.

Methods of synthesis
A narrative synthesis was presented.

Results of the review
Seven studies (767,200 participants) were included. There were four controlled studies (755,464 participants: range 59 to 731,105). The quality of three controlled studies was good; one was acceptable. The quality of one uncontrolled study was good; two were acceptable.

**Appropriateness of medication use (three controlled studies; two uncontrolled studies):**

Higher prevalences of potential inappropriate drug use were generally found in participants using automated dose dispensing, compared to standard dispensing procedure. This included a higher risk of using anticholinergic and three or more psychotropic drugs (ORs 1.43 to 4.93, 95% CI 1.40 to 5.17; one controlled study; 731,105 participants). However, the same study showed that women using automated dose dispensing used fewer long-acting benzodiazepines and lower numbers of drug-drug interactions were observed in women and men (ORs 0.69 to 0.80, 95% CI 0.66 to 0.83). Another controlled study (24,146 participants) showed a higher risk of potential inappropriate drug use in recipients of automated dose dispensing (ORs 1.36 to 5.48, 95% CI 1.18 to 6.30). Automated dose dispensing was associated with more instances of unchanged drug regimens (OR 1.66, 95% CI 1.20 to 2.31; one controlled study; 154 participants).

**Medication safety (one controlled study; one uncontrolled study):**

Discrepancies in medication records between general practitioners and home care services were reduced by 34% (p<0.001) with automated dose dispensing (one controlled study; 59 participants).

The results of uncontrolled studies were reported in the paper.

**Cost information**

The review sought to evaluate the costs associated with automated dose dispensing in primary healthcare. Costs were not assessed in any of the included studies.

**Authors’ conclusions**

Evidence on the effects of automated dose dispensing on appropriateness and safety of medication use was limited.

**CRD commentary**

The review question and inclusion criteria were clearly reported, and several relevant data sources were searched. The review was limited to inclusion of English-language studies, and there was no apparent search for unpublished material. This means that relevant studies might have been overlooked, and publication or language biases could not be ruled out. The study selection and data extraction processes were conducted with efforts to minimise error and bias. The review process was unclear for quality assessment, although an appropriate tool was used to evaluate the studies. Study characteristics were clearly presented, and their quality (despite the study designs being traditionally less robust) was largely good. The chosen method of synthesis was appropriate given the apparent clinical variation.

Whilst the search restrictions represent a small threat to the reliability of the review, the remainder of the review was largely well conducted and the authors’ conclusions seem justified.

**Implications of the review for practice and research**

**Practice**: The authors stated that it was important to involve all parties of the medication process in the implementation of automated dose dispensing, to avoid new types of medication error.

**Research**: The authors stated that further research should use relevant study designs, methods and outcome measures to evaluate the benefits of automated dose dispensing in terms of medication safety, appropriateness of medication use and costs. This research should consider the importance of annual community-pharmacy medication reviews for the elderly prior to enrolment in an automated dose dispensing service.

**Funding**

Finnish Medicines Agency (Fimea).

**Bibliographic details**

Sinnemaki J, Sihvo S, Isojarvi J, Blom M, Airaksinen M, Mantyla A. Automated dose dispensing service for primary healthcare patients: a systematic review. Systematic Reviews 2013; 2(1):1
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.