TITLE: Multidisciplinary Medication Review in Long Term Care: A Review of the Clinical Evidence and Guidelines

DATE: 18 July 2011

CONTEXT AND POLICY ISSUES:

Long-term care (LTC) facilities, also known as nursing homes, provide services for people who need all day personal care for long periods of time because of chronic conditions or disabilities. Besides the usual personal supports in daily living such as meals, housekeeping, and medical/clinical supplies and devices, the basic services offered in LTC facilities include medical care, such as medication administration, and nursing and personal care on a 24-hour basis and access to physician and other health professionals.

Residents in LTC facilities usually have complicated medical conditions, and multiple drugs may be prescribed to this population. The residents are particularly vulnerable to inappropriate prescribing, since they are more fragile and unable to detect errors in their prescriptions and receive interventions from multiple sources. In addition, coupled with age-related changes in pharmacokinetics and pharmacodynamics, multiple drugs make the LTC residents particularly susceptible to adverse drug events, which is one of the major causes of death in this population. The medication ordering and administration processes in LTC are more complicated than those in an acute care setting because many essential steps and health care team members are external to the facility. Mistakes at any point in the entire process of medication use could cause harm to LTC residents. Studies indicate that the majority of LTC residents have had at least one medication error resulted from drug prescribing, monitoring, administration, or dispensing.

The goals of medication review are to ensure medications for a specific patient are appropriate, effective, safe, and reduce waste of health care resources via a structured and critical examination of that patient’s drugs. While physicians’ main responsibilities are to analyze and act appropriately on medical information for disease diagnosis and treatment plans development including prescribing and monitoring medications, the pharmacists are responsible for recognizing, evaluating, and reporting information related to medications, including their potential benefits and suspected adverse consequences for individual patients. Health professionals with various expertise have mutually complementary roles in addressing
medication-related issues in clinical practice. Therefore, communication and collaboration among medical professionals in medication review are important to ensure patient safety; a multidisciplinary approach involving physicians, pharmacists, nurses, and other related experts is more desirable compared to a single person review.

In a typical multidisciplinary medication review, the patient’s clinical characteristics, medication use data, and drug-related problems are discussed within the medical team when developing and evaluating a treatment plan. Follow-up meetings among health professionals after a certain period of time are arranged to discuss the results and determine whether a change in treatment is necessary.

The purpose of this review is to examine the clinical evidence regarding the role of multidisciplinary medication review processes in LTC settings.

RESEARCH QUESTIONS:

1. What is the clinical evidence regarding improved patient safety and health outcomes resulting from multidisciplinary medication review processes in long-term care settings?

2. What are the evidence-based guidelines regarding the use of multidisciplinary medication review processes in long-term care settings?

KEY MESSAGE:

Limited evidence suggests that multidisciplinary medication review may reduce inappropriate prescribing in LTC facilities, but the available evidence was not consistent and of low quality. Further research is needed to provide more compelling evidence.

METHODS:

Literature search strategy

A limited literature search was conducted on key resources including PubMed, CINAHL, The Cochrane Library (2011, Issue 6), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and an abbreviated list of major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2006 and June 17, 2011.

Selection Criteria and Methods

One reviewer screened the titles and abstracts of the retrieved citations and evaluated the full-text publications for the final article selection according to selection criteria presented in Table 1.
Table 1: Selection Criteria

<table>
<thead>
<tr>
<th>Population</th>
<th>Patients residing in long-term care facilities</th>
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<tbody>
<tr>
<td>Intervention</td>
<td>Multidisciplinary medication review that involved various members of the care team (i.e. physicians, pharmacists, nurses, and other health professionals)</td>
</tr>
<tr>
<td>Comparator</td>
<td>Usual care or standard care</td>
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</tbody>
</table>
| Outcomes                    | Q1: Clinical outcomes: mortality, rates of drug-related adverse events, rates of medical errors, change in medication use, quality of life  
Q2: Guidelines and best practices |
| Study Designs                | Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials (RCTs), non-randomized studies, and evidence-based guidelines. |

Exclusion Criteria

Studies were excluded if they did not meet the selection criteria (such as medication review conducted by a single health professional), were duplicate publications or included in a selected systematic review, or were published prior to 2006.

Critical Appraisal of Individual Studies

The quality of included systematic reviews was assessed using the Assessment of Multiple Systematic Reviews (AMSTAR) tool. RCT and non-randomized study quality were evaluated using the Downs and Black instrument. A numeric score was not calculated for each study. Instead, strengths and weakness of each study were summarized and described.

SUMMARY OF EVIDENCE:

Quantity of Research Available

The literature search yielded 178 citations. Upon screening titles and abstracts, 152 citations were excluded, and 26 potentially relevant articles were retrieved for full-text review. An additional two potentially relevant reports were identified by hand searching. Of the 28 potentially relevant reports, 24 did not meet the inclusion criteria, and thus four publications were included in this review. The study selection process is outlined in a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart (Appendix 1). Two systematic reviews and two non-randomized trials (one included a control arm, while another was a before-and-after study) met the inclusion criteria. No health technology assessments, RCTs, or evidence-based guidelines were identified.

Summary of Study Characteristics

Details of study characteristics are provided in Table 2.
Country of origin

One systematic review, prepared by Norwegian authors, included RCTs from Australia, Sweden, and Northern Ireland. Another systematic review conducted by British authors included RCTs and non-RCTs from Sweden and Australia. The non-RCTs were performed in Norway and Australia, respectively.

Patient population

All studies included residents living in LTC facilities. The mean age for patients included in the systematic reviews and one non-RCT was older than 80 years. Patients' ages were not specified in another non-RCT.

Interventions and comparators

The systematic reviews compared multidisciplinary medication reviews to usual care. A non-RCT assessed the effect of medication reviews conducted by multidisciplinary nursing home teams. Another non-RCT evaluated a multi-faceted, interdisciplinary intervention to reduce the use of benzodiazepines and antipsychotics by comparing with control nursing homes.

Outcomes measured

The systematic reviews reported outcomes related to drug uses, such as change in number of prescriptions and Medication Appropriateness Index (MAI) score. MAI is a validated measure that assesses ten criteria for medication, including indication, effectiveness, dosage, correct directions, practical directions, drug-drug interactions, drug-disease interactions, duplication, duration, and cost. One non-RCT evaluated the improvement in prescribing quality by comparing the number of drugs taken and the number of drug-related problems before and after the intervention. A second non-RCT reported changes in prescriptions related to a multi-faceted, interdisciplinary intervention for two drugs.

Systematic reviews

Forsetlund et al. performed a systematic review to investigate the effect of various interventions aimed at reducing potentially inappropriate use or prescribing of drugs in nursing homes. This was an update of a previous Norwegian systematic review published in 2010. A literature search was conducted for systematic reviews published up to 2009, and for RCTs published during the previous five years (actual search dates were not specified) to identify more recent studies that were not captured in the included systematic reviews. All searches were updated in April 2010. The interventions of interest were educational outreach initiatives/meetings, medication review, geriatric assessment and care teams, early psychiatric intervention, and activity program interventions for residents. All interventions were compared to usual practice. Quality of the included RCTs was assessed using the Cochrane Collaboration’s “Risk of Bias Table”.

Loganathan et al. conducted a systematic review to evaluate the effects of various interventions to optimise prescribing in care homes, which refer to residential, nursing, and mixed homes. Both RCTs and non-RCTs evaluating the effect of interventions on prescribing, aimed at improving appropriate prescribing or reducing inappropriate prescribing were considered for inclusion. The literature search was conducted for trials published between 1990 and April 2010. Interventions in this review were grouped into: staff education, multi-disciplinary team (MDT)
meetings that were usually chaired by the prescribing physician, medication reviews by pharmacist, and computerised clinical decision support systems. The primary outcome measure was inappropriate prescribing which was defined as 1) use of medicines that pose more risk than benefit, particularly when safer alternatives exist; 2) prescribing of an inappropriate dose or duration of drugs; 3) presence of clinically significant drug-drug and drug-disease interactions; 4) under-use of potentially beneficial medications; or 5) duplication of agents. Quality of the included studies was assessed using a modification of the Downs and Black tool.

Non-randomized studies

Davidsson et al. prospectively followed patients in a Norwegian nursing home to evaluate the change in prescribing quality before and after a multidisciplinary medication review process was adopted. In this study, a pharmacist reviewed patients’ drug lists to identify drug-related problems, discussed the review with the physician and nurse in charge, and suggested drug therapy changes. The physician held the final decision on whether such changes should be performed or not. The pharmacist reviewed patients’ charts three months later to examine if drug therapy were maintained.

Westbury et al. conducted a non-randomized controlled trial to investigate the effectiveness of a multi-faceted, interdisciplinary intervention to reduce the use of benzodiazepines and antipsychotics in nursing homes, the “RedUSe” (Reducing Use of Sedatives) project. The key strategies of the RedUSe project included two medication audit and feedback cycles, nursing staff education, and an interdisciplinary medication review for sedatives. The project was coordinated and delivered by pharmacists and were primarily targeted at nursing home staff, but physicians, residents and relatives were also involved.

Table 2: Summary of Study Characteristics

<table>
<thead>
<tr>
<th>First author, year, country</th>
<th>Patient characteristics</th>
<th>Intervention</th>
<th>Comparator</th>
<th>Clinical outcomes measured</th>
</tr>
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<tbody>
<tr>
<td>Systematic Reviews</td>
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<tr>
<td>Forsetlund, 2011, Norway</td>
<td>Elderly patients in nursing home settings. 7 RCTs examined MR (225 nursing homes with 3,212 residents) were included, while 5 RCTs examined the effect of MMR</td>
<td>MMR attended by physician, pharmacist, nurse</td>
<td>Usual care*</td>
<td>Number of prescribed drugs, number of changes in medication per resident, MAI score</td>
</tr>
<tr>
<td>Loganathan, 2011, UK</td>
<td>Residents in care home settings, age≥65. 16 trials were included, while 3 (2 RCTs, 1 non-RCT) examined the effect of MMR</td>
<td>Multidisciplinary team meetings usually chaired by prescribing physicians</td>
<td>Usual care*</td>
<td>Changes in inappropriate prescribing, number of prescriptions</td>
</tr>
<tr>
<td>Non-randomized controlled trials</td>
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<td></td>
</tr>
<tr>
<td>Davidsson, 2011, Norway</td>
<td>Residents in 1 nursing home. 93 patients were recruited, mean age 87</td>
<td>Multidisciplinary case conferences attended by pharmacist, physician and</td>
<td>Drug treatment before the intervention</td>
<td>Change in number of drugs, change in number of drug-related problems</td>
</tr>
</tbody>
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Multidisciplinary Medication Review in Long Term Care

Summary of Critical Appraisal

A summary of study strengths and limitations can be found in Table 3.

In the systematic review by Forsetlund et al., a comprehensive literature search was conducted without language restrictions. Study selection and quality assessment of the included studies were performed by two independent reviewers, although it was unclear whether data extraction was performed independently or not. Patient characteristics in individual studies were described in this review. Scientific quality of the included RCTs was considered along with the study results when drawing conclusions.

Another systematic review was based on a literature search in various databases for English-language studies from 1990 to 2010. It was unclear whether grey literature was included in the search strategy. Search and study selection were performed independently by two reviewers. It is unclear if data extraction was performed in duplicate. The authors summarized the conclusions from individual studies without providing actual data regarding trial characteristics, patient characteristics, quality of included studies, or the main findings.

The Norwegian study clearly reported objectives, outcomes and main findings. Over 90% of the patients were available in the follow-up review. The quality of this study was compromised by the small sample size.

The Australian non-RCT clearly reported objectives and outcomes, but did not describe the patient characteristics and the potential confounders in detail. No information regarding patient losses to follow-up was described. The authors recognized that low participation rate for physicians was a limitation for their studies. Because of the study design, there was no randomization or blinding.

Table 3: Summary of Critical Appraisal

<table>
<thead>
<tr>
<th>Author, Year, Country</th>
<th>Strengths</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systematic reviews</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forsetlund, 2011, Norway</td>
<td>• Literature search was based on pre-defined criteria;</td>
<td>• Searched for published literature only;</td>
</tr>
<tr>
<td></td>
<td>• No language restrictions in literature search;</td>
<td>• Unclear if data extraction was conducted by 2 independent reviewers;</td>
</tr>
<tr>
<td></td>
<td>• Study search and selection were conducted by 2 independent reviewers;</td>
<td>• Inclusion criteria for languages were restricted to Norwegian, Swedish,</td>
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<tr>
<td></td>
<td></td>
<td>Danish, Finnish, English or German.</td>
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</table>
Summary of Findings

Details of study results are provided in Table 4.

1. **What is the clinical evidence regarding improved patient safety and health outcomes resulting from multidisciplinary medication review processes in long-term care settings?**

The quality of the included RCTs in the Forsetlund review varied from low to very low. Meta-analysis was not performed in this review. The findings with respect to the use of drugs were not consistent across the included RCTs. Three studies reported that in the intervention group, more appropriate drug prescriptions were observed or fewer patients were taking psychoactive drugs, and the differences between groups were statistically significant, while two reported non-significant differences between the comparison groups in the change of drug use.

In the Loganathan review, meta-analysis was not performed due to the heterogeneity in the outcome measures. One of the included studies examined the impact of monthly MDT meetings on adherence to the 1994 Swedish Medical Product Agency prescribing guidelines. The intervention of MDT meetings significantly reduced prescribing of several psychoactive drugs. One Australian study indicated a significant improvement in appropriateness of prescribing in the intervention homes. A before-and-after study found no significant changes in medication used, cost, and mortality. The authors narratively summarized the conclusions from the included individual studies without providing actual data.

In Davidsson’s study, 93 nursing home residents were enrolled. In total, 234 drug-related problems were identified before the multidisciplinary medication review. One hundred and fifty-
one drug therapy changes were performed after the discussion within the medical team. Three months later, over 90% of these residents were available for follow-up review. The mean number of drugs used per patient and the mean number of drug-related problems decreased significantly after the introduction of medication review.

In Westbury’s controlled trial, 16, 1,591 residents were enrolled, with 898 participating in the RedUSe project, and 693 participating in the control group. There were no significant differences between the two groups regarding home characteristics or psychotropic use at baseline. From baseline to 26 weeks, there was a statistically significant reduction in the proportion of intervention home residents regularly taking benzodiazepines. There was also a significant reduction in the proportion of intervention home residents regularly taking antipsychotic. In the control group, a trend of increasing prevalence rates for benzodiazepine or antipsychotic was observed in the same study period. The difference was not statistically significant for either drug. Statistical comparisons between the intervention and control groups were not conducted.

2. What are the evidence-based guidelines regarding the use of multidisciplinary medication review processes in long-term care settings?

The literature search did not identify any evidence-based guidelines.

Table 4: Summary of Findings

<table>
<thead>
<tr>
<th>First Author, Publication Year</th>
<th>Main Study Findings</th>
<th>Authors’ Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systematic reviews</td>
<td></td>
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</tr>
<tr>
<td>Forsetlund, 2011</td>
<td>7 studies were included in this review, while 5 of them assessed the impact of MMR.</td>
<td>“Pharmacist medication review may under certain circumstances reduce inappropriate drug use, but the evidence is of low quality.”</td>
</tr>
<tr>
<td></td>
<td>3 studies found significant improvement in MAI scores in intervention group, while 2 studies stated no significant difference in number of drugs used or change scores between groups.</td>
<td></td>
</tr>
<tr>
<td>Loganathan, 2011</td>
<td>3 studies examined the impact of MMR.</td>
<td>“Results are mixed and there is no one interventional strategy that has proved to be effective.”</td>
</tr>
<tr>
<td></td>
<td>Study 1: the intervention of MDT meetings significantly reduced prescribing of several psychoactive drugs; Study 2: a significant improvement in appropriateness of prescribing in the intervention homes; Study 3: no significant changes in medication used, cost, and mortality.</td>
<td></td>
</tr>
<tr>
<td>Non-randomized trials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Davidsson, 2011</td>
<td>Mean number of drugs used/patient: from 7.4 ± 3.3 to 6.8 ± 3.5, P &lt; 0.01;</td>
<td>“Medication reviews conducted by multidisciplinary teams were effective to improve the quality of drug treatment in”</td>
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### Mean number of drug-related problems:

from $2.52 \pm 1.7$ to $1.05 \pm 1.4$, $P < 0.01$

<table>
<thead>
<tr>
<th>Study</th>
<th>% of patients taking benzodiazepine (mean ± SD):</th>
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<tr>
<td></td>
<td>Intervention: Change from baseline $31.8 \pm 8.6$ to $26.9 \pm 8.6$ at 26 weeks ($P &lt; 0.005$); Control: Change from baseline $30.4 \pm 9.6$ to $33.0 \pm 7.7$ ($P = 0.2$);</td>
</tr>
<tr>
<td>Westbury, 2010\textsuperscript{16}</td>
<td>% of patients taking antipsychotic (mean ± SD):</td>
</tr>
<tr>
<td></td>
<td>Intervention: Change from baseline $20.3 \pm 8.7$ to $18.6 \pm 8.4$ at 26 weeks ($P &lt; 0.05$); Control: Change from baseline $21.9 \pm 7.9$ to $23.9 \pm 9.3$ ($P = 0.2$);</td>
</tr>
</tbody>
</table>

"RedUSe led to a significant reduction in the proportion of residents in nursing homes taking benzodiazepines and antipsychotics."

### Limitations

Rapid reviews are based on a limited literature search and may not identify all potential relevant studies. There were no RCTs or evidence-based clinical practice guidelines identified. In addition, we did not identify any Canadian studies. The impact of multidisciplinary medication review in Canadian LTC settings is unclear. The description of multidisciplinary medication review processes varied across studies with respect to participating health professionals and length of follow-up period, which makes it difficult to compare between studies. There was no consistency in data reporting as authors used different outcome measures. The evidence regarding some clinically meaningful health outcomes such as mortality and prevalence of drug-related adverse events are scarce. The available evidence is of low quality; study results should be interpreted with caution.

### CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING:

Four studies, including two systematic reviews and two non-randomized studies, were included in this rapid review. The studies reviewed indicate that through effective collaboration, the physician, pharmacist, nurses and other health professionals may reduce the inappropriate prescribing of certain medications in LTC facilities and correspondingly improve patient health outcomes. The evidence is considered to be limited, inconsistent, and of low quality. There are no recommendations from clinical practice guidelines regarding the use of multidisciplinary medication review in LTC facilities.

In conclusion, although there is some evidence to support the effectiveness of multidisciplinary medication review for LTC residents, data from further large and well-designed studies are needed to provide more compelling evidence for the use of multidisciplinary medication review for patients in long term care.
REFERENCES:


APPENDICES:

APPENDIX 1: Selection of Included Studies

178 citations identified from electronic literature search and screened

152 citations excluded

26 potentially relevant articles retrieved for scrutiny (full text, if available)

2 potentially relevant reports retrieved from other sources (grey literature, hand search)

28 potentially relevant reports

24 reports excluded:
- irrelevant population (4)
- irrelevant intervention (7)
- other (review articles, editorials) (13)

4 reports included in review