Evaluation of a Medication Education Program for Elderly Hospital In-Patients

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To improve elderly patients’ understanding and safe usage of their medications. English-speaking hospital inpatients aged ≥65 years were recruited. They were self-medicating at home with at least 1 regular medication and had a Mini-Mental State Examination (MMSE) score of at least 20 out of 30. The patients were taught medication details on 3 consecutive days. The patients’ medication knowledge was recorded before education and again at a home visit after discharge from hospital.

Patient medication knowledge before education showed that participants knew 50% of brand names, dosage and times, 55% of medication purpose, and 15% of major side effects. At follow-up home visits, the relevant figures improved significantly to 90%, 85%, and 25%, respectively (*P* = .05). Similar improvement occurred in the 2 patient groups with an MMSE score of 20 to 24 and 25 to 30 (*P* = .03).

This simple, practical, nursing-staff-conducted program worked well in a hospital setting and resulted in improved medication knowledge, even in patients with mild cognitive impairment. (Geriatr Nurs 2006;27:184-192)

Elderly patients are frequently admitted to hospital because of medication related problems. In Australia, 2% to 4% of all hospital admissions, and up to 30% for patients aged ≥70, are medication-related. The problem persists in the community; up to 50% of elderly patients do not take their medications correctly after leaving hospital. These problems are increasing with an aging population because elderly patients have a high prevalence of medication usage given the prevalence of comorbidities. Approximately 90% of the elderly have taken medication in any 2-week period. The consequences of adverse drug events may be serious. In Australia, adverse drug events contributed to 27% of all in-hospital death and cost approximately an additional US $500 million each year.

Reasons for Incorrect Medication Usage or Noncompliance

Reasons for incorrect medication usage or noncompliance are complex and related to treatment regimes, patients, and providers. However, a number of prospective studies have shown that the majority of medication-related problems are preventable. Issues relating to treatment include polypharmacy or complex medication regimens that cause more side effects or are difficult for patients to understand. The patient issues are extensive and include lack of understanding or misinterpretation of instructions, cognitive impairment or forgetfulness (particularly with those who are taking a greater number of medication after hospitalization), poor patient-provider communication or doubtful physician competence, lack of motivation or depressive symptoms, lack of perceived benefit, high cost of medication (especially with elderly patients from lower socioeconomic groups who can least afford them), or expected high incidence of medication side effects.

Several factors have been noted as provider-specific issues. Lack of time has been identified by both physicians and pharmacists as a reason for inadequate education about drug treatments and regimens. Patient discharge information or patient transfer information between hospitals, primary health care providers (e.g., general practitioners), and specialists is often limited. This may also influence medication compliance. Another complicating issue is that same medication may be supplied using different brand names. For example, the diuretic frusemide is available to patients in two brand names (Lasix or Urex). Hospital pharmacies...
may stock 1 brand (e.g., Lasix), but the patient may obtain another brand from a local pharmacy after discharge. If health care providers do not explain the situation, the patient may mistakenly believe that the 2 different brands are 2 different medications, thus risking significant side effects.

Effectiveness of Provider Education on Patient Compliance

A cross-sectional study which examined 348 randomly selected patients aged >75 found that participants' knowledge of their medications was positively associated with compliance. Another study also found that medication education in elderly patients appears to improve compliance. Education in this study included providing verbal or written information (or both). However, whether elderly patients with lower Mini-Mental Status Examination (MMSE) scores who take a complex medication regimen will benefit from education programs to improve their medication awareness and compliance is not clear from the literature. The purpose of this study, therefore, was to assess the impact of a nursing-staff-initiated in-hospital medication education program (MEP) for elderly patients in terms of increasing medication knowledge and adherence to a medication regimen after discharge from the hospital. In addition, the impact of cognitive status was considered, and patients with a lower MMSE score (20-24) were compared with those with a higher MMSE score (25-30).

Methods

Setting

This study was done in Bankstown-Lidcombe Hospital, the 450-bed teaching hospital of the University of New South Wales. It is part of the Sydney South West Area Health Service, Sydney, Australia. The hospital has 80 aged care beds and serves a population of 165,000, of whom approximately 14.3% are aged ≥65 years. Approval was obtained from the Area Health Service Human Research Ethics Committee before commencement of the study. Informed written consent was obtained from all participants.

Sample

Patients were recruited between February 2002 and January 2003. Patients were eligible if they were admitted to geriatric wards (acute, rehabilitation and psychiatry), aged 65 or older, English-speaking, taking 1 or more regular prescription medications, living at home, managing their own medication at home, and had a MMSE score ≥20. Patients who were admitted from a nursing home or hostel were excluded, as were patients who were being discharged to a nursing home or hostel. Patients who consented but received no MEP before discharge, or were discharged before the completion of the MEP, were withdrawn from the study and excluded from the analysis.

Intervention

Standard procedures for conducting the MEP were taught to the nursing staff by a staff specialist geriatrician (a medical doctor) at in-service training sessions. Regular training sessions were conducted to include all aged care nursing staff. Each session took approximately 30 minutes. The training began with an introduction of the program background (including an overview of medication-related problems in the elderly), and the objectives and significance of this program. The role of nursing staff in this program was essential in initiating the program (including identifying suitable patients and informing the project officer for patient recruitment), maintaining contact with patients and conducting patient education sessions. Finally, the medication chart was explained to the nursing staff, with detailed instructions on how nursing staff members were to use the printed medication lists from the database as a reference for the education sessions.

A simple medication database was developed using Microsoft Access 2000. An individual chart was printed for each participant listing the following variables for each medication: medication brand name, form and strength, dose and times of administration, purpose and common side effects.

Participating patients received individual training for approximately half an hour each day over 3 to 5 consecutive days. Timing of the education sessions was scheduled to suit both the patient and the nurse and could take place at anytime during the day. Participants were in-
formed of different brand names for the same medication and the importance of taking their medications to their local doctors after discharge from hospital. At the time of discharge patients were given a discharge summary to give to their local doctors. This discharge summary contained columns for recording medications on admission, medications on discharge, and reasons for medication changes. While in the hospital, patients were encouraged to ask medication-related questions of medical, and nursing and pharmacy staff.

Data Collection

Patient Characteristic Data

Patient characteristics, comorbidities, and number of medications were collected by reviewing patients' medical records, conducted by 1 of the investigators before commencing the MEP. Participants' MMSE scores and their medication knowledge were recorded via face-to-face interviews between the participants and the investigator. About 10 days after discharge, all participants were visited at home by a registered nurse or a study investigator. Medication knowledge was reassessed at that time.

Medication Knowledge

Patients' knowledge of their medication was calculated as a percentage of recall of their medication details using the formula: percentage of recall of medication details = (number of medications with correct recall of details / total number of medications) × 100%. Knowledge items were medication brand name, number of tablets to be taken daily (dose), times of administration, purpose, and common side effects. Preintervention evaluation of medication knowledge was done in such a way that medication containers were not identified to patients as the participants do not have access to their medication containers at their hospital bedside. However, participants who normally manage their own medication at home have their medication container with them while taking medication. Therefore, posttreatment evaluation of medication knowledge in the home setting allowed participants to visualize the individual containers, although participants were not permitted to read answers directly from the containers. This assessment was developed for our MEP program and has not been previously validated.

Medication Compliance

Medication compliance was documented with the pill count method, which involved manually counting the pills remaining in each bottle and comparing the actual count with the expected count. Participants were asked about the exact date of commencing to take the medication for each particular bottle, and this was used to calculate the supposed actual remaining tablets. This was conducted at the same postdischarge home visit.

Satisfaction with MEP

On completion of the program, a satisfaction survey was administered. Participants were asked to rate the usefulness of the education program and their satisfaction with the way the program had been conducted, using a 4-point scale (very useful/very satisfied; useful/satisfied; neutral; not useful/not satisfied).

Statistical Analysis

Data were analyzed using SPSS (Statistical Package for Social Science, SPSS Inc., version 11.2). Using percentage of accuracy of recall (as defined earlier), patients' knowledge of their medication details was compared before and after the education program using the paired sample t test. In addition, participants were stratified according to their MMSE scores into 2 independent samples: stratum 1: MMSE = 20-24; stratum 2: MMSE = 25-30. Participants' medication knowledge measurements were compared between the 2 MMSE groups using an independent sample t test, both at baseline and follow-up. The rationale for dividing participants into those 2 groups was based on the Australia PBS (Schedule of Pharmaceutical Benefit) description on acetylcholinesterase inhibitor prescription where persons with an MMSE of 24 or less are eligible for a subsidized prescription.

Multiple linear regression was used to determine which variables were useful in predicting the level of medication knowledge at baseline and at follow-up, as well as the amount of improvement at follow-up. Recall of medication details at baseline, at follow-up, and the differences between baseline and follow-up were used as dependent variables. Predictive vari-
ables used in the multiple regression were age, MMSE scores, age left school, number of comorbidities, and number of medications. The models were reduced using a backward stepwise method. Final models of independent variables predicting recall of medications are summarized in Table 4 later in the article. The level of significance was set at .05 for all analyses.

Results

Eighty-six patients were recruited, with 60 participants (69.8%) completing the MEP and follow-up. Twenty-six participants (30.2%) did not complete the program for 1 of the following reasons: received no medication education because of discharge before commencing the MEP (n = 8, 13.3%), discharged to a hostel or nursing home (n = 7, 11.7%), transferred from an aged care ward to another ward (n = 4, 6.7%), refused follow-up (n = 2, 3.3%), developed delirium during hospital stay (n = 2, 3.3%), lost contact (n = 2, 3.3%), died (n = 1, 1.7%).

The mean age of participants was 78.5 years (SD 5.4; median 79.5; range 65-90), and 41 of 60 participants (68.3%) were women. Patient characteristics are reported in Table 1. At baseline, participants only knew one third or less of their medication details (Table 2). The mean

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<th>Table 1. Patient Characteristics</th>
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<td>Characteristic</td>
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<tr>
<td>Age (yrs)</td>
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<td>Age left school (yrs)</td>
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<tr>
<td>Medications at baseline</td>
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<tr>
<td>Medications at follow-up</td>
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<td>Number of comorbidities</td>
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MMSE = Mini-Mental State Examination. 
SD = standard deviation.

<table>
<thead>
<tr>
<th>Table 2. Recall of Medication Details Before and After the Education Program</th>
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<tbody>
<tr>
<td>Medication Detail</td>
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<tr>
<td>Name of medication</td>
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<tr>
<td>Dosage prescribed</td>
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<td>Times of administration</td>
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<td>Purpose of medication</td>
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<td>Common side effects</td>
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SD = standard deviation.
CI = confidence interval.
*% Recall = (number of medications with an accurate answer / total number of medication) × 100.
time to follow-up after discharge was 10 days (median 8 days). There was improvement in participants’ medication knowledge following the education program in regard to name of medication, dosage and times of medication administration, and purpose of medication ($P < .05$ for all categories; Table 2). Participants had greater difficulty remembering side effects, although awareness in this area increased over baseline ($P < .05$). Forty-two percent of participants said that they planned to take all their medications to their local doctor and pharmacist on their next visit, as opposed to only 18% at baseline ($P < .01$). Medication compliance recorded at the follow-up home visit was 93%.

At baseline, the only difference found between the 2 MMSE score groups and the medication detail recall was for “times of administration.” Participants with a lower MMSE (20-24) were less likely to know the times of administration than the higher MMSE group ($P = .025$). No other differences were found between the 2 MMSE groups at baseline or follow-up ($P = .3$; Table 3).

Multiple linear regressions showed that the number of medications prescribed was a negative predictor for the recall of medication details at baseline. At follow-up, participants’ age and education level (as indicated by age left school) were found to be negative predictors for the recall of medication details. After adjusting for age, the number of medications at follow-up was found to be a positive predictor for improvement in medication detail recall on the following variables: medication names, dosage, and times of administration. No significant predictors were found for purpose and side effects (Table 4).

From the satisfaction survey, most participants (78%) felt that the program was either very useful or useful, and 8% of participants felt that it was not useful. In addition, the majority of participants (77%) were very satisfied or satisfied with the way the program was conducted; 8% of participants were not satisfied.

Discussion

The project was undertaken to examine the feasibility, practicality, and effectiveness of introducing a MEP administered by nurses into the routine of an acute clinical setting. The program was conducted to improve the patient medication knowledge and thus their medication compliance after hospital discharge.

Improving Patients’ Recall of Medication Details and Compliance

Evaluation of this project showed that the MEP significantly improved elderly patients’ knowledge about their medication, even in those participants with a lower MMSE score of 20-24. Improvement in recall and awareness of medication details following education programs has been previously demonstrated many times in the literature. However, compared with other studies, the magnitude of im-

<table>
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<th>Medication Details</th>
<th>Baseline Mean % Recall* (SD)</th>
<th>Follow-up Mean % Recall* (SD)</th>
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<tbody>
<tr>
<td></td>
<td>MMSE 20-24 (n = 9)</td>
<td>MMSE 25-30 (n = 51)</td>
</tr>
<tr>
<td>Name of medication</td>
<td>57.7 (37.6)</td>
<td>54.1 (32.8)</td>
</tr>
<tr>
<td>Dosage prescribed</td>
<td>54.0 (37.3)</td>
<td>50.8 (34.0)</td>
</tr>
<tr>
<td>Times of administration</td>
<td>29.9 (20.9)</td>
<td>50.9 (34.6)</td>
</tr>
<tr>
<td>Purpose</td>
<td>54.9 (36.0)</td>
<td>54.3 (33.5)</td>
</tr>
<tr>
<td>Common side effects</td>
<td>11.1 (23.6)</td>
<td>16.1 (25.9)</td>
</tr>
</tbody>
</table>

*% Recall = (number of medications with an accurate answer / total number of medication) × 100%.
SD = standard deviation.
MMSE = Mini-Mental State Examination.
provement in this education program was notable. It is possible that there was some selection bias on the part of the nurses in that patients who were more acutely ill were less likely to participate and patients who appeared more likely to be interested in the program were targeted. We acknowledge that this is a descriptive study with no control groups. A randomized controlled study would be required to evaluate formally the effectiveness of such a MEP.

We believe that the 93% compliance rate found at the postdischarge visit was a significant improvement on the preadmission compliance of most patients. Unfortunately, we were unable to demonstrate this, because preadmission compliance was unknown. However, the increase in patients’ knowledge about their medications may have truly improved their compliance, a finding that has been shown by others.26,33

There are several possible explanations for the high follow-up compliance rate in our study. As previously noted, there may have been a selection bias. There was also a short follow-up period after discharge (average 10 days). It is unclear whether the compliance rate would fall over a longer period.33

Generation of a Patient Medication Chart

From a feasibility perspective, it was not difficult to produce an individualized patient medication chart listing the brand names of medications, medication form/strengths, dosage/times of administration, purpose, and common side effects.
effects (e.g., “Plavix,” “tablet/75mg,” “1 tablet at 8:00 a.m.,” “to thin the blood, to prevent heart attack and stroke,” and “bleeding, diarrhea, rash”). This chart was used as a template for the MEP and allowed all members of the nursing staff to provide consistent information to each patient. This is a practical system that reduces the reliance on pharmacy staff and is not an undue burden on nursing staff. Development of routine medication education programs delivered by aged care nursing staff is a realistic goal.

The MEP and Patients’ MMSE Scores

One of the aims of this project was to examine the relationship between MMSE scores and the MEP. It is known that poor cognitive function (as reflected by a lower MMSE score) is associated with poor compliance. It may also be associated with a reduced ability to acquire new medication knowledge or understand instructions. Therefore, we arbitrarily divided our participants into 2 subgroups according to their MMSE scores (20-24 and 25-30). We acknowledge that this is only a screening tool and not a definitive evaluation of the patients’ cognitive impairment. Although the number of participants with lower MMSE scores (20-24) in this program was small (n = 9), the results indicate that such patients may still benefit from a MEP.

Predictors of Medication Knowledge

From the multiple regression analysis, a number of factors have been identified that are associated with patients’ medication knowledge at baseline, at follow-up, or with the improvement achieved through the MEP. The results showed that the more tablets a patient has been taking, the bigger the improvement achieved through the MEP (regardless of the patient’s age; Table 4). It is not surprising that the number of medications and age of the patient were negative predictors for patient recall of medication details at baseline and follow-up. However, why a patient’s education level was also a negative predictor at the follow-up is difficult to explain. Participants with more education would be anticipated to learn more, but this is likely moderated by their MMSE. This was an exploratory analysis with a small sample size so the results may not be reliable. However, they may provide useful information for future studies developing predictive models.

Nurses as MEP Educators

One purpose of this project was to examine whether an MEP delivered by nursing staff was effective and acceptable to patients. The results indicate that nurses are in a unique position to carry out such a program, as they are in constant communication with patients. Involving key stakeholders, such as nursing unit managers, is vital to the success and sustainability of such a program. The 2 nursing unit managers, who served as coinvestigators of the project, played a vital role in the organizing of training sessions and supervision of the patient education program. They were also an ongoing inspiration to their staff and maintained staff enthusiasm for the program.

Following the completion of this program, a culture of patient medication education and safety awareness has been established in our aged care wards. We have continued medication education as part of a National Medication Safety Breakthrough Collaborative, a nationwide program conducted by the Australian Council for Safety and Quality in Health Care involving 140 hospitals across Australia. Nursing Unit Managers and their staff have played vital roles in ensuring the sustainability of this program.

Studies have also shown that the nurse-patient relationship is an important factor in influencing patient compliance and that nursing unit managers can successfully implement medication education programs. This program was well accepted by patients, as indicated by the positive feedback from the satisfaction survey. Although family members were generally not involved in this particular program, their involvement would undoubtedly be an additional resource for medication compliance after discharge.

Limitations of the Project

As previously mentioned, this was descriptive outcome-based research focused on a clinical project and was not a randomized controlled study. The positive results are worth reporting, even though the number of participants was not
large and participants acted as their own control for outcome measurements.

Differences in data collection procedures used in obtaining patient medication knowledge during the acute care stay and the follow-up home visit may partly account for the remarkable improvement in recall. At the follow-up, however, care was taken not to let participants read the container labels, so that they would have to remember the name, dosage, frequency, and side effects. The time from discharge to checking of compliance was short. Whether the high compliance rate (93%) at follow-up would persist long-term is unknown.

The program was limited to those patients who could communicate well in English. There were 2 participants from a non-English speaking background, but both had good English language skills. Additional resources (such as costs associated with interpreters and translated written information) would be required to include non-English speaking people in such a MEP. The findings of this evaluation may also have been reduced by the patient selection and exclusion criteria.

Conclusion

Nursing staff in aged care wards communicate frequently with elderly patients. With proper training, nurses can effectively deliver an MEP as part of routine practice without requiring extra hospital resources. Further study is required to determine whether such an MEP will improve medication compliance and reduce hospital readmissions related to medication errors.

References


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