PATIENT-IDENTIFIED AND CLINICIAN-IDENTIFIED MEDICATION-RELATED PROBLEMS OF THE ELDERLY

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by

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Abstract

The purpose of this study was to identify which factors were strongly related to the number of medication-related problems identified by both the patient and clinician. Factors such as the cognitive impairment, depression, physical and social status and characteristics of the medication regimen were analyzed for 31 noninstitutionalized elderly patients. Interviews were conducted in the patients' homes. The interviews included screening patients for signs of cognitive impairment and depression using two validated screening tests -- the Jacobs Cognitive Screen and the Geriatrics Depression Scale. Patients (ages 75-99 years) identified 84 medication-related problems, and in a retrospective review, clinicians identified 167 medication-related problems. A definite relationship was found between patients' cognitive impairment and the number of medication-related problems identified by both the patient and clinician. Depression was significantly related to the number of clinician-identified problems, but not to the patient-identified problems. A definite relationship was also seen between the characteristics of the medication regimen (i.e., number of medications, number of doses per day) and the number of medication-related problems identified by both the patient and clinician. This research suggests that pharmacists should consider these risk factors; cognitive impairment, depression and medication-regimen characteristics, for screening elderly patients who may develop medication-related problems.

I. Introduction

Identifying the types of medication-related problems experienced by the elderly is a complex area of geriatric research. Its complexity is due to a poor understanding of how the elderly self-administer their medications (NIH, 1982). An interdisciplinary approach is needed when studying the elderly because of the combination of medical, social and psychological issues which must be addressed.

In this study, we analyze medication-related problems identified by the patient and clinician. The first goal of our research is to determine the types and frequencies of medication-related problems identified by the elderly patient and compare these with the types and frequencies of medication-related problems identified by the clinician.

The second goal of this study is to identify factors which have a relationship to medication-related problems as identified by both the patient and the clinician. Elderly patients were asked to identify and describe medication-related problems. To find out which patient characteristics are associated with medication-related problems, characteristics such as the patient's mental and physical health status, medication regimen and social status were analyzed to determine which characteristics were strongly related to the number of medication-related problems identified.

To assist future research in this area, we developed a systematic, comprehensive list for classifying medication-related problems (Appendix A). In the listing, problems were grouped into three major categories: (1) Those inherent to the medication itself and/or its prescribing. (2) Those associated with the patient's handling and administration of

medications. (3) Those related to patient's psychosocial response to medications and medication taking.

All of the patients were interviewed in their homes. Afterwards, the interviews were reviewed by clinical pharmacists.

To understand how the study adds to the existing body of knowledge which addresses medication-related problems, it is appropriate to review existing literature describing research on medication-related problems experienced by the elderly. Our research was based on certain assumptions which were derived from previous studies done on medication-related problems. Therefore, the paper begins with a review of the literature and an outline of the theoretical framework which this study was based upon.

II. Review of the Literature and Theoretical Framework

The literature review is divided into 2 sections: 1) discussion of the nature and significance of medication-related problems of the elderly; 2) identification of factors related to medication-related problems (including cognitive impairment and depression).

A. The Nature and Significance of Medication-Related Problems of the Elderly

Typology of Medication-Related Problems - Studies suggest that the elderly encounter numerous types of medication-related problems which may be harmful to them (Shimp et al, 1985). In a study of medication-related problems in 53 noninstitutionalized elderly patients, Shimp et al (1985) identified an average of 11 potential medication-related problems for each patient. The problems were categorized as: adverse drug reactions, inappropriate drug prescribing, inappropriate self-care, in appropriate medication handling and medication interactions.

In a study of 102 elderly patients located in a skilled nursing facility, Cooper (1984) identified 14 categories of medication-related problems. The problems discovered by Cooper for institutionalized patients were similar to the ones identified by Shimp et al for noninstitutionalized patients. For example. adverse drug reactions, drug duplication, drug-drug interactions, and drug contraindications were identified. The findings by Cooper and Shimp et al reveal not only the types of medication-related problems of the elderly, but the extensive nature of the problems for both institutionalized and noninstitutionalized elderly patients.

As previously mentioned in the introduction, we developed a comprehensive list of medication-related problems which we expected to be identified. The categories used in our lists were based upon the categories described in the studies by Cooper and Shimp et al. The list includes problems brought about by the medication itself and/or its prescribing (i.e., adverse drug reactions); problems due to the patient's medication handling and or administration (i.e., inappropriate selection of OTC drugs); and the patient's psychosocial response to medications and medication taking (i.e., patient concerned about excess med. use). (Appendix A)

The psychosocial response category was the unique aspect of our list when compared to the lists by Shimp et al and Cooper. Their studies did not include this category. A psychosocial response to medication and medication-taking is described as the patient's negative attitude towards medication use and whether or not medication use disrupts their lifestyle.

To understand the significance of medication-related problems for the elderly, the following problems are discussed: adverse drug reactions, inappropriate selection of nonprescription drugs and misinterpretation of prescription label directions.

Problems brought on by the medication itself and/or its prescribing - Because of the expense and incidence, adverse drug reactions in the elderly pose a burden for the health care system. The elderly are more susceptible to adverse drug reactions than younger age groups because of physiological changes which alter drug metabolism in the elderly (Ouslander, 1981). Adverse drug reactions have accounted for one-sixth of all hospital admissions for persons over 70 (Am Fam Physician [news], 1983). Total health care dollars spent for this type of admission have been estimated to be 21 billion dollars per year (Am Fam Physician [news], 1983).

Problems due to patient's medication handling and/or administration - Inappropriate selection of nonprescription drugs may occur when the elderly attempt to self-medicate themselves for medical problems. The increased availability of nonprescription drugs makes it easier for the elderly to consume nonprescription drugs concurrently with physician-prescribed medications. This is a problem because there are some combinations which can be harmful to the patient (i.e., aspirin consumption with anticoagulants -- increases bleeding). A substantial proportion of the elderly inappropriately select nonprescription drugs. For instance, Shimp et al (1985) found that in 35 out of 53 patients studied (66%), nonprescription medications were inappropriately selected. Landress and Morck (1984) , in their survey of 317 elderly patients, discovered that 44.5% used nonprescription drugs while taking prescription medications.

This percentage suggests that there is a significant proportion of the elderly who are at risk for developing medication-related problems such as adverse drug reactions or medication interactions because of the unsupervised use of over-the-counter medications with prescription medications.

Misinterpretation of label directions can precipitate medication-related problems. This is a problem because the elderly patient may not understand the directions as written on the label, causing him to take his medications incorrectly. Lundin (1978) reported that prescription directions were often times too vague for elderly patients to comprehend. For example, "take after each meal" was confusing because it depends on the number of meals eaten per day; this, for some elderly patients, is variable. Murray et al (1986) discovered that elderly residents living in a public housing complex had difficulty reading prescription and auxiliary labels because of poor vision, print that was too small and illiteracy. Thirty-two residents out of 134 were unable to read prescription labels and 52 residents could not read auxiliary labels. Therefore, there are three reasons why the elderly may misinterpret label directions: the printed language is confusing; some patients have vision impairments; some patients are unable to read labels because of illiteracy.

The above discussion reveals the potentially serious nature of medication-related problems of the elderly and to what extent these problems occur in this group.

B. The Identification of Factors Related to Medication-Related Problems of the Elderly

Mental status - To date, little research has been conducted examining the relationship of cognitive impairment and/or depression to the frequency of medication-related problems.

Should health care professionals (i.e., nurses and pharmacists) be concerned about the cognitive functioning of the elderly patient? For the hospitalized elderly patient, Palmateer and McCartney (1985) suggested three reasons why cognitive testing of the elderly patient is necessary:

1. Cognitive capacity is essential for helping elderly patients cope with trauma (i.e., hospitalization).
2. Mild cognitive deficits in the elderly can progress to severe cognitive deficits during hospitalization because the patient is overwhelmed by the event.
3. Nurses and social workers can use the database of a patient's cognitive functioning for identifying patients who will need extra assistance after discharge (Palmateer and McCartney, pp. 6-7).

For the noninstitutionalized elderly patient, a determination of cognitive capacity is necessary for helping the patient to correctly self-administer prescription and nonprescription medications. If the elderly patient cannot perform simple additions or subtractions, then he cannot follow complex drug regimens where he would have to taper doses (Jacobs et al, 1977). If the elderly patient is having short-term memory problems, then he may not recall verbal instructions given by the pharmacist about his medications.

Cognitive impairment in the ambulatory elderly may affect their knowledge about the medications they are taking. German et al (1982) discovered that patients, 65 years and older, were less knowledgeable

about their drugs than patients under 65 years. These were hospital discharged patients who had received counseling about their drug regimens prior to discharge and a follow-up interview was done later (German et al 1982). Since the elderly patients did not prove to be any more knowledgeable about their medications after receiving counseling, perhaps there is another factor involved - cognitive impairment.

Since the ambulatory elderly are frequently not routinely screened for cognitive impairment, health care professionals (i.e. pharmacists) do not know what level of cognitive impairment is acceptable in order for the elderly patient to safely self-administer medications.

Depressive symptoms develop in the elderly because of isolation, grief, chronic illness and socioeconomic problems (Salzman and Shader, 1978). Symptoms of depression are easily masked by somatic symptoms such as pain, fatigue, constipation or appetite loss (Salzman and Shader, 1978). Somatic symptoms such as these cause elderly patients to overuse health care services when the symptoms are not treated as symptoms of depression. Borson et al (1986) found a significant relationship between depression and the overutilization of health care services. They tested 404 chronically ill males for signs of depression, whose ages ranged from 60 to 91 years and were served by a Veterans Administration Hospital. Patients who were depressed, according to the Zung Self-Rating Depression Scale, overused nonprimary care providers, emergency rooms and walk-in services. Depressed elderly patients may run the risk of becoming overmedicated if they are taking duplicate medications which they obtained from different providers in order to treat somatic symptoms. Further, overutilization of health care services due to undetected depressive symptoms might cause the elderly to accumulate multiple providers.

Depression in the elderly may affect their ability to communicate with health care providers. Brody and Kleban (1981) discovered that older patients usually refrain from telling others about their physical and mental symptoms. They interviewed patients (ages 62 to 98 years) to find out who the patients informed about their physical and mental symptoms. Their results showed that older patients tended to tell health professionals about 3 types of symptoms: chest pain, shortness of breath and unsteadiness on feet. Other symptoms such as poor appetite, memory problems or fatigue were not always communicated to health professionals (Brody and Kleban, 1981). Patients justified their behavior stating "nobody cares" or "I do not want to bother anyone."

If depression causes the elderly patient to not tell health professionals about physical and mental symptoms, then it is very likely they will not tell them about medication-related problems. On the other hand, depression may distort the elderly patient's perception of a medication-related problem (i.e. medication-taking disrupts his lifestyle).

Characteristics of the medication regimen - A definite relationship exists between the number of medications and the number of medication-related problems experienced by the elderly. Shimp et al (1985) found a significant correlation ($r = 0.77$, $p < 0.0001$) between the number of medications and the number of potential medication-related problems experienced by elderly patients. An ambulatory elderly patient with two major medical problems can receive an average of 11 different medications (NIH, 1982). Also elderly patients who feel they take too many medications (a psychosocial response) can become noncompliant with their drug therapy (Kendrick and Bayne, 1982).

Level of disability - Limited mobility or other types of disability (i.e., vision or hearing impairment) is a factor which could interfere with pharmacist-patient interaction. Atkinson et al (1978) surveyed 50 elderly patients for problems which they encountered with their medications after discharge. Limited mobility was a major problem since only 5 out of 50 patients studied were able to go to the pharmacy without assistance. Other patients depended upon someone else to go to the pharmacy for them. If ambulatory elderly patients have disabilities which cause them, under traditional mechanisms, to have little or no interaction with the pharmacist, medication-related problems may not be communicated.

The existing body of literature suggests that cognitive impairment, depression, number of medications and level of disability are factors which might be related to the existence of medication-related problems for the ambulatory elderly patient. Yet, there are other factors which should also be considered. These factors have been described in a theoretical framework which illustrates factors we believe are related to medication-related problems of the elderly.

C. Theoretical Framework

The theoretical model (Figure 1) we have constructed is based on the hypothesis that certain factors predispose the elderly to medication-related problems. These factors, categorized as patient characteristics and medication characteristics, are independent variables which predict medication-related problems.

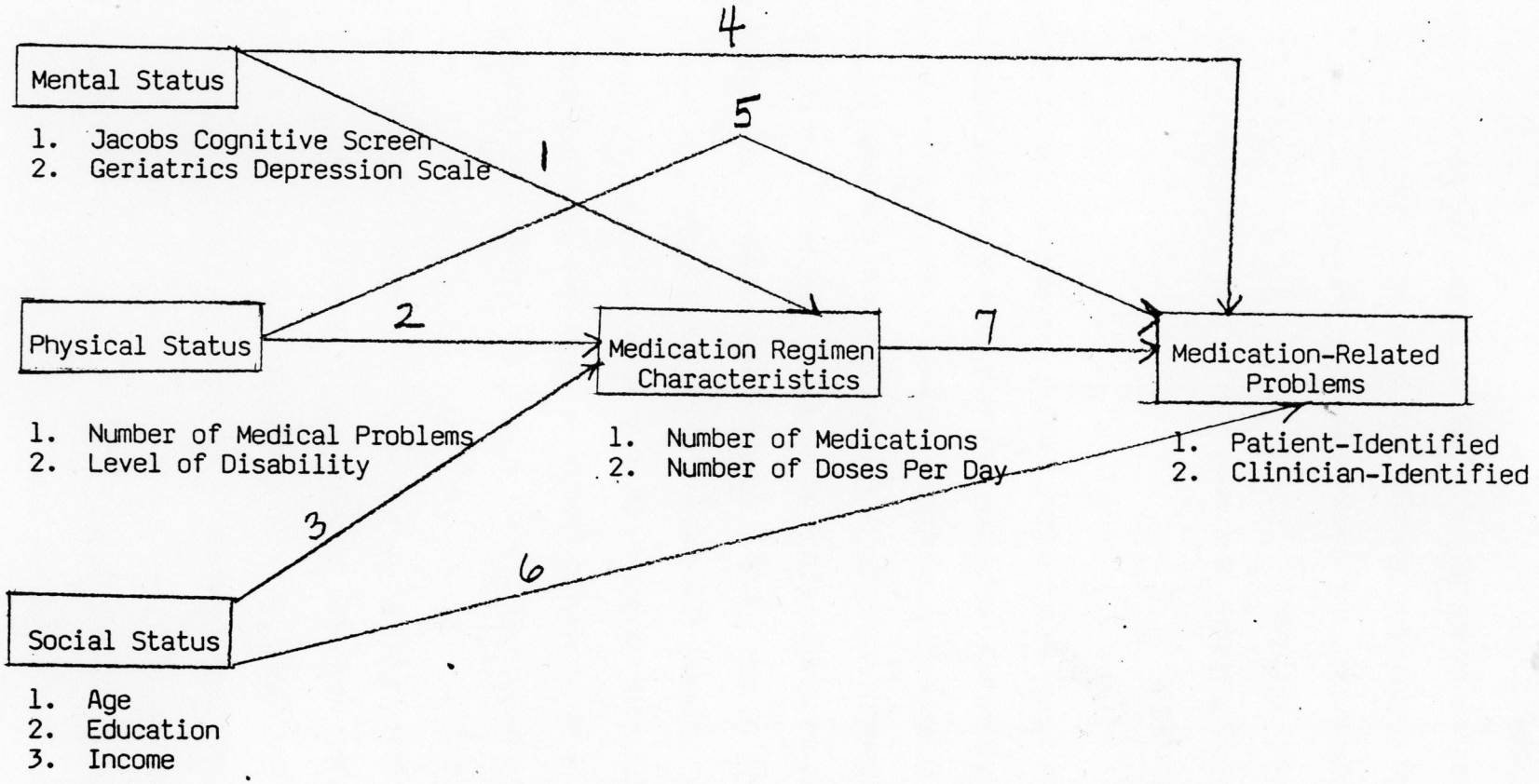
As shown by arrows 4, 5, and 6, mental status, physical status and social status may directly affect the number of medication-related problems identified by the patient and clinician.

THEORETICAL MODEL

BACKGROUND VARIABLES:
PATIENT CHARACTERISTICS:

INTERVENING VARIABLES

OUTCOME VARIABLES



Arrows 1, 2, 3, and 7 show how these same variables may indirectly affect the patient's and clinician's identification of medication-related problems through the intervening variables describing medication-regimen characteristics.

Cognitive impairment and depression are the main factors we are interested in analyzing. Our first hypothesis is that patients who are cognitively impaired and/or depressed will experience more medication-related problems than patients who are not cognitively impaired and/or depressed.

The second hypothesis is that medication regimen characteristics (i.e., number of medications, number of doses per day) and other patient characteristics (i.e. number of medical problems, level of disability, age, education, income) are factors to be considered.

Overall, all of the factors together may intensify the nature and significance of medication-related problems. Patients who are cognitively impaired, depressed, chronically ill and disabled may have difficulty managing drug regimens and administering their medications. Patients who are older, inadequately educated, and impoverished cannot afford other health services which might help to avoid medication-related problems.

III. Methods

A. Subject Selection

The following criteria were used for patient selection:

1. 75 years and older
2. Not suffering from severe cognitive deficits.
3. Living within the Madison, Wisconsin city limits.
4. Indicating an initial willingness to participate in a home interview.

We set the age criterion at 75 years and older to focus on the old-old age group. Some of these patients may live alone; thus they are responsible for managing their own medications. Further, the 75 years and older age group represent the fastest growing segment of the elderly population (Hospitals [trends], 1985). It is expected that by the year 2030, 10% of the population will be 75 years and older (Hospitals [trends], 1985).

Interviews were conducted by a geriatric-specialist pharmacist (SB), a hospital pharmacy resident (PW) and a second year undergraduate pharmacy student (MS). All of the interviews were done in the patients' homes. There were several advantages to using home interviews: (1) The interviewer could evaluate the condition of the patient's housing and observe the patient's ability to move around in that environment. (2) It offered privacy and a familiar environment so patients would talk freely. (3) It was convenient for patients who may have transportation problems.

B. Sites

We used three sites for patient recruitment: (1) University of Wisconsin Hospital and Clinics (UWHC); (2) Veteran Administration Hospital (VAH); (3) Methodist Retirement Center (MRC) - an apartment complex for the elderly. These sites were chosen:

1. To analyze medication usage and medication-related problems of patients served by different health care systems.
2. To recruit a predominantly male-patient population served by the VAH, in contrast to a predominantly female-patient population served by UWHC and MRC.

3. To recruit patients having different social backgrounds. It was anticipated there would be differences seen in living arrangements, education, occupation and income levels of the patients. Factors thought to influence patients' attitudes about taking medications and using other health-related interventions.

C. Data Collection and Measurement

An interview schedule (Appendix B) was used for data collection. The schedule was divided into three major sections: health status assessment, emotional and mental status assessment and demographic background.

Health Status Assessment -Patients were asked questions concerning current medical problems and self-perceived health status.

For each prescription medication, we recorded drug name, strength, directions, physician and pharmacy name, actual use and indication. Similar information was recorded for nonprescription drugs. From this information, the characteristics of the medication regimen were determined (i.e., number of medications, number of doses per day).

To measure patient-identifed medication-related problems, patients were asked for each specific medication to identify and describe any problems they had with taking that medication. Several additional questions assessed the patient's experience with general medication-taking problems (i.e. difficulty opening bottles, reading labels or remembering to take medications). Subsequently, patients were asked to identify any single major problem which they have experienced with taking their medications. Patients were also asked if they had problems paying for their medications. Positive responses to each of these questions were counted and the sum represents the total number of patient-identified medication- related problems.

To measure clinician-identified medication-related problems, the interview schedules were reviewed retrospectively by two clinical pharmacists. The clinical pharmacists reviewed patients' medication regimen and their experiences with using drugs, as described above. Potential medication-related problems were recorded on code sheets (Appendix A) by the clinical pharmacists. The total of clinician identified problems was determined by the sum of the coded items.

Cognitive Impairment and Depression - Cognitive impairment and depression were measured by two validated screening tests: The Jacobs Cognitive Screen (Jacobs Test) and the Geriatrics Depression Scale (GDS). (See Appendix B, Part II.) The Jacobs Test was used for detecting signs of cognitive deficit (Jacobs et al, 1977) while the GDS was used for detecting signs of depression (Yesavage et al, 1983; Weiss et al, 1986). Both tests contained 30 questions, but were scored differently. A higher score on the GDS indicated signs of depression, a lower score on the Jacobs Test indicted signs of cognitive impairment (Yesavage et al, 1983; Jacobs et al, 1977). The tests were introduced to patients in a nonthreatening manner by asking them to give their best response to each question.

We used the Jacobs Test and GDS because they were easy to administer and score. The Jacobs Test was designed to serve as a rapid screening device for patients with diminished cognitive capacity (Jacobs et al, 1977). Validation of the test was based on preliminary examination by psychiatrists and physiologic testing of patients with cognitive deficits. Patients who had been diagnosed as having cognitive deficits received low scores (<20) on the test (Jacobs et al, 1977). Physiologic testing (i.e., EEG abnormalities) confirmed the presence of cognitive

deficits (Jacobs et al, 1977). The test was given to a set of normal controls. These persons received high scores on the exam which indicated the absence of cognitive deficits (Jacobs et al, 1977).

For the GDS, the primary test of validity was based on the hypothesis that normal subjects or mildly depressed subjects would receive low scores (≤ 15) and severely depressed patients would received high scores (>15) (Yesavage et al, 1983). Validation of the GDS was done by giving the exam to a set of normal controls and to a set of clinically-diagnosed depressed patients, all over age 55 (Yesavage et al, 1983). Results showed that normal and mildly depressed patients received low scores and severely depressed patients received high scores. (Yesavage et al, 1983).

Demographic Background - Demographic information was gathered on each patient. The information consisted of age, education and income level. This portion of the interview also included personal assessment by the interviewer concerning the patient's level of disability (i.e., vision or hearing impairment, limited mobility).

D. Description of the Variables

The following is a description of the variables and how they were operationalized:

1. Number of Medical Problems - Positive responses to question no. 1 (list of medical problems) of the interview schedule plus any additional medical problems not included in the list.
2. Level of disability - Total sum of the following disabilities: vision impairment, hearing impairment and limited mobility.
   If no problem existed, the code = 0.
   If the problem was corrected, the code =1.
   If the problem was not corrected the code = 2.

3. Number of Medications - Total number of prescription and nonprescription medications taken.

4. Number of Doses per Day - count the number of doses actually taken by the patient for all medications.

5. Age - persons over 75 years.

6. Income - measured as monthly household income:

   Code

   1 = Less than $300/month

   2 = $300 - $599/month

   3 = $600 - $999/month

   4 = $1,000 - $2,499/month

   5 = $2,500 or more/month

7. Education - number of years of formal education.

IV. Results

Data from 31 patients were analyzed. Ten or 32% were white males and 21 or 67% were white females. The age range was from 75 to 99 years and 23 or 74% lived alone. Average monthly household income was between $600 - $999 per month and mean education level was 13.3 years. The description of the current sample was typical for what has been observed in other study groups (Murray et al, 1986; Shimp et al, 1985; Ostrom et al, 1985). However, the current sample was better educated and more financially stable than the average elderly population (Murray et al, 1986; Shimp et al, 1985; Ostrom et al, 1985).

Table 1. Means, Standard Deviations, and Ranges of Dependent and Independent Variables

Independent	$\bar{x}$	SD	Range
Mental Status			
Jacobs Cognitive Screen	23.6	4.19	15-29
Geriatric Depression Scale	6.80	5.67	0-22
Medication Regimen Characteristics			
Number of medications	6.26	2.36	3-11
Number of doses per day	8.97	3.91	3-18
Physical Status			
Number of Medical Problems	3.87	5.19	1-9
Level of Disability	2.19	1.40	0-5
Social Status			
Age	82.6	6.11	75-99
Education	13.3	3.71	6-18
*Income	3.25	1.03	1-5
Dependent			
Medication-related problems			
Patient-Identified	2.71	1.95	0-7
Clinician-Identified	5.38	3.75	1-13

N = 31 cases

* Coding for Income

Code

1 = less than $300/ month
2 = $300 - $599/month
3 = $600 - $999/month
4 = $1,000 - $2,499/month
5 = $2,500 or more/month

Table 1 shows the means, standard deviations and ranges for the independent and dependent variables in the theoretical model (Figure 1). The mean scores on the Jacobs Test was 23.6 and on the GDS was 6.80. Six patients demonstrated signs of cognitive impairment and 9 patients demonstrated signs of depression.

The mean number of chronic medical problems was 3.87 which agrees with what has been found in previous studies (Ascione et al, 1984; Shimp et al, 1985; Murray et al, 1986). Cardiac problems, arthritis and circulation problems were the most common problems reported. Some additional chronic disorders which were not included in the medical problem list were Parkinson's disease, epilepsy and macular degeneration.

The mean number of medications taken was 6.26 with an average of 8.97 doses per day. Fifteen patients took at least 10 to 18 doses per day.

A. Number and Types of Medication-Related Problems Identified

Table 2 describes the types and prevalence of medication-related problems as identified by the patient and clinician. The patients identified a total of 84 medication-related problems and the clinicians identified 167 medication-related problems. The clinicians identified more medication-related problems than the patients.

Patient-Identified - Difficulty in administration was a major problem identified by 18 or 58% of the patients. This problem included difficulty in reading labels, opening medication bottles. swallowing tablets and capsules and running out of papers to be used for applying nitroglycerin ointment. Eight or 26% of the patients reported difficulty in remembering to take their medications. However, the remaining 75% of the patients did

Table 2.

A Comparison of the Types and Prevalence of Patient-Identified adn Clinician-Identified Medication-Related Problems

Problems	Patient-Identified		Clinician Identified	
	No. Times Identified	% and No. of Patients with Problem	No. Times Identified	% and No. of Patients with Problem
I. Medication itself and/or its prescribing				
1 Total Patient-Identified = 15 2 Total Clinician-Identified = 54				
General	2	6.4(2)	3	6.4(2)
Medication Effects (inc. adverse drug reaction and medication side effects)	7	22 (7)	18	42 (13)
Ineffective Drug or questionable effectiveness	6	16 (5)	10	22 (7)
Inappropriate drug, dosage use or schedule	-	-	17	48 (15)
Drug Interaction (inc. drug-drug, drug-food, drug-alcohol)	-	-	4	13 (4)
Drug Duplication	-	-	2	6.4(2)

Table 2. Continued

Problems	Patient-Identified		Clinician Identified	
	No. Times Identified	% and No. of Patients with Problem	No. Times Identified	% and No. of Patients with Problem
III. Psychosocical response to medication and medication taking				
Total Patient-Identified = 13 Total Clinician-Identified = 31				
General	-	-	5	16 (5)
Excess Medication Use	3	9.6(3)	3	9.6(3)
Donesn't Like to Take	2	6.4(2)	6	19 (6)
Medication Cause Dependence/ worry/concern	2	6.4(2)	13	42 (13)
Lifestyle Concerns (inc. cost conern)	6	19 (6)	4	13 (4)

N = 31 cases
* 3 patients identified no medication-related problems
1 Total Patient-Identifed = Sum of number of times identified
2 Total clinician-Identified = Sum of number of times identified

Table 2. Continued

Problems	Patient-Identified		Clinician Identified	
	No. Times Identified	% and No. of Patients with Problem	No. Times Identified	% and No. of Patients with Problem
II. Patient's medication handling and/or administration				
Total Patient-Identified = 56, Total Clinician-Identified = 82				
General	-	-	14	42 (13)
Overuse	-	-	3	9.6(3)
Underuse	14	29 (9)	24	45 (14)
Inappropriate Dosing/ dosing times per day	-	-	6	13 (4)
Nonuse due to inability, refusal or failure to refill	5	16 (5)	2	6.4(2)
Memory or Comprehension	8	26 (8)	10	32 (10)
Difficulty in Administration (i.e. reading labels, getting bottles opened, swallowing)	29	58 (18)	10	29 (9)
Med. Storage/Mixing Meds	-	-	2	6.4(2)
Inappropriate Self-care (inc. OTC selection/use, alcohol use)	-	-	11	32 (10)

use various methods to assist in remembering to take their medications, for example, marked pill boxes, signs with medication times printed on them or a spouse of friend.

Thirteen of 42% of the patients identified problems related to the patient's psychosocial response to medications and medication-taking. Six or 19% of the patients complained that taking medications disrupted their lifestyle. Typical problems were that either their medication schedules interfered with social engagements or medication-taking interfered with travel plans. Drug costs were also cited as a problem although the patients had insurance coverage to help defray the expense.

Not all patients, however, reported experiencing medication-related problems. Nine percent or 3 out of the 31 patients indicated no medication-related problems.

Clinician-Identified Problems - The clinical pharmacists identified problems such as inappropriate drug, dosage, use or scheduling, underuse of medications, and medication effects (i.e., adverse drug reactions, drug side effects). Fifteen or 48% of the patients had a problem with inappropriate drug, dosage, use or scheduling. Fourteen or 45% of the patients underused their medications and 13 or 42% of the patients had problems due to medication effects. The clinicians also noted problems related to the patients psychosocial response to medications and medication-taking. They identified 13 or 42% of the patients felt that medications cause dependence/worry/concern and 6 or 19% of the patients did not like to take medications.

B. Correlational Analysis of Independent and Dependent Variables

Table 3. Correlations of Dependent and Independent Variables

Independent	Dependent: Patient - Identified (r)	Dependent: Clinician - Identified (r)
Mental Status		
Jacobs Cognitive Screen	-0.49**	-0.55***
Geriatric Depression Scale	0.20	0.58***
Medication Regimen Characteristics		
Number of medications	0.47**	0.37*
Number of doses per day	0.44**	0.50**
Physical Status		
Number of medical problems	0.05	-0.13
Level of disability	0.16	0.44**
Social Status		
Age	-0.37*	-0.20
Education	-0.32*	-0.28
Income	-0.32*	-0.25

N = 31 cases

* = $p < .05$
** = $p < .01$
*** = $p < .001$

Table 3 illustrates the correlations of the independent and dependent variables. A statistically significant relationship exists between cognitive impairment and patient-identifed problems ($r = -0.49$, $p<.01$) and between clinician-identified problems and cognitive impairment ($r = -0.55$, $p<.001$).

Depression was found to be significant for clinician-identifed problems ($r = 0.58$, $p<.001$). However, for patient-identified problems and depression, the relationship was not significant.

As expected, there was a definite relationship between the number of medications and patient-identified problems ($r = 0.47$, $p<.01$) and between the number of medications and clinician-identified problems ($r = 0.37$, $p<.05$). There was also a significant relationship between the number of doses per day and patient-identified problems ($r = 0.44$, $p<.01$) and the number of doses per day and clinician identified problems ($r = 0.50$, $p<.01$).

The other variables, age, education, income, number of medical problems and level of disability were not as highly statistically significant. However, these variables coupled with the other independent variables are important when assessing the older patient for medication-related problems.

Standardization of the Data - Table 4 illustrates the results obtained after standardizing the data. The data was standardized by dividing the number of patient identified problems and the number of clinician-identified problems by the total number of medications. This created 2 new variables: patient-identified problem per medication and clinician-identified problem per medication.

Table 4
Correlation of Mental Status
Scores with Standardized Dependent
Variables

Independent Variables	Patient-Identified Problem Per Med (r)	Clinician-Identified Problem Per Med (r)
Jacobs Cognitive Screen	-0.36*	-0.35*
Geriatric Depression Scale	-0.03	0.38*

N = 31 cases

* = $p < 0.05$

$$\frac{\text{Number of Patient-Identified Problems}}{\text{Number of medications}} = \text{Patient Identified Problem per med}$$

$$\frac{\text{Number of Clinician-Identified Problems}}{\text{Number of medications}} = \text{Clinician-Identified Problem per med}$$

The correlations shown in Table 3 indicates there is a weak relationship between physical status and mental status and the number of medication-related problems identified by the patient and clinician. However, medication regimen characteristics and mental status produced a significant relationship with the two dependent variables. Based on these findings, we decided to control for the number of medications and performed correlation analysis with the Jacobs Test and GDS, after standardizing the data.

Standardization of the data produced a significant relationship between cognitive impairment and patient-identified problem per med ($r = -0.36$, $p<.05$) and between cognitive impairment and and clinician-identified problem per med ($r = -0.35$, $p<.05$).

For depression, no relationship was found between patient-identifed problem per med. However, there was still a weak relationship for clinician-identified problem per med.

V. Discussion

There was a definite relationship between cognitive impairment and the number of patient-identified and clinician-identified medication-related problems. The results support our hypothesis that patients who received low scores on the Jacobs Test would experience more medication-related problems. The results also verify the presence of cognitive impairment in ambulatory elderly patients as seen in the current sample. Their cognition problems could possibly be due to hearing impairment, memory loss or difficulty performing calculations (Jacobs, et al, 1977).

Statistically, depression did not prove to be significant for patient-identified problems. However, depression was significant for clinician-identified problems.

Further, even as we controlled for the number of medications when we standardized the data, cognitive impairment and depression were still factors to be considered in the identification of medication-related problems. Depression was not significant for patient identified problems, perhaps because the current sample was not significantly depressed or depressed individuals did not verbalize their medication-related problems.

As expected, the clinicians identified more medication-related problems than the patients. The clinicians were sensitive to problems such as medication underuse, inappropriate drug, dosage or use, adverse drug reactions and side effects.

The patients were mostly sensitive to problems dealing with difficulty in administration. As expected, some of the patients expressed psychosocial problems with their medications. The recognition of psychosocial problems is probably because some patients in the current sample maintained a socially active lifestyle and functioned independently. They viewed medication-taking as an inconvenience on those occasions.

A. Expansion of the Theoretical Model

The theoretical model presented in this study illustrates the major emphasis of the research -- medication-related problems, cognitive impairment and depression. The model can be revised to look at other factors which might be important.

Expanding the characteristics of the medication-regimen to include sources of medication information, we can ask if patients who obtain drug information from physicians or pharmacists experience fewer medication-related problems than patients who obtain drug information from other sources (i.e. friends).

Another approach would be to see if there is a relationship between the variables presented under patient characteristics and the types of medications used and medication-related problems.

B. Relevance to Pharmacy

There are many factors which will cause the magnitude of medication-related problems to increase. First, the anticipated growth of the elderly population, especially the 75 years and older age group. Second, older patients will continue to use potent medications. Some of these drugs will cause serious toxic effects if not properly administered and monitored. Finally, there is a substantial percentage of the elderly living alone who are responsible for managing their own medications. A portion of that group may also be suffering from cognitive impairment and depression which may not be recognized.

Because of these factors, minimizing the frequency of medication-related problems in the elderly offers a major health challenge to geriatric pharmacy research and practice. Pharmacists acknowledge that certain social, cognitive and attitudinal factors might predispose elderly to medication-related problems.

From the findings in this research, pharmacists can focus their attention on areas which they control. Number of medications and number of doses per day are variables where pharmacists can make recommendations for changes. Age, income, education, level of disability and number of medical problems are variables which pharmacists cannot control but should be sensitive to. With physician cooperation, pharmacists can reduce the number of medications and the number of doses per day consumed by the elderly patient. With better screening standards of drug profiles,

pharmacists can identify the ambulatory elderly who have signs of cognitive impairment and/or depression, thus identifying patients who are at risk for medication-related problems.

Finally, we have become more enlightened on the types of problems perceived by the patients to be medication-related. Our research has only touched the surface of these problems indicating that further research should be directed toward understanding the elderly patient's psychosocial response to medications and medication-taking.

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APPENDIX A

Patient ID No._____ Reviewer ID_____

IDENTIFICATION OF MEDICATION-RELATED PROBLEMS

Instructions: Circle code number of each problem identified and write-in name(s) of drug(s) involved. To identify a problem not already listed, enter a problem description for one of the blank codes.

Type I: Problems brought about by the medication itself and/or its prescribing

SPECIFY DRUG NAME(S)

Medication effects

10 = General effects. . . . . _____
11 = Adverse drug reaction. . . . . _____
12 = Medication side effect . . . . . _____
13 =

14 =

Individual medication prescribing

20 = General. . . . . _____
21 = Drug allergy/relative contraindication . _____
22 = Ineffective drug or questionable effectiveness. . . . . _____
23 = Inappropriate drug . . . . . _____
24 = Lack of appropriate drug . . . . . _____
25 = Inappropriate dosage . . . . . _____
26 = Inappropriate length of use. . . . . _____
27 = Inappropriate dosing schedule. . . . . _____
28 =

29 =

Multiple or overall drug therapy

30 = General. . . . . _____
31 = Drug interaction (inc. drug-drug, drug-food, drug-alcohol). . . . . _____
32 = Drug duplication . . . . . _____
33 =

34 =

Type II: Problems due to patient's medication handling and/or administration

Medication admin. by patient

40 = General. . . . . _____
41 = Over use . . . . . _____
42 = Under use . . . . . _____
43 = Non-use due to inability, refusal or failure to refill. . . . . _____
44 = Inappropriate dosing time. . . . . _____
45 = Inappropriate # of dosing times/day. . . _____
46 = Memory or comprehension problem. . . . . _____
47 = Difficulty in administration . . . . . _____
48 =

49 =

Medication handling by patient

50 = General. . . . . .
51 = Unused Rx medications (stored) . . . . .
52 = Inappropriate medication storage . . . .
53 = Medication borrowing . . . . . .
54 = Medications "mixed" while stored, etc. .
55 =

56 =

Inappropriate self-care

60 = General. . . . . .
61 = Inappropriate OTC selection/use. . . . .
62 = Inappropriate vitamin use. . . . . .
63 = Inappropriate alcohol use. . . . . .
64 = Non-drug alternative appropriate . . . .
65 = Inappropriate use of home remedies . . .
66 =

67 =

Type III: Patient's psychosocial response to medication and medication-taking

Concern re. medications and medication-taking ("psych")

70 = General. . . . . .
71 = Pt concerned re. excess medication use .
72 = Pt doesn't like to take medication . . .
73 = Medication causes dependence on others .
74 = Medication causes worry/concern
(re. acquisition/handling/admin). . . .
75 =

76 =

Life-style concerns ("social")

80 = General. . . . . .
81 = Inconvenience-disrupts daily activities.
82 = Inconvenience: scheduling of
medication-taking is problematic. . . .
83 =

84 =

If NO medication-related problems

99 = None

Comments:

APPENDIX B

INTERVIEW SCHEDULE

Name: _____ ID # _____

I. HEALTH RELATED - My first set of questions have to do with your health and medications.

1. I am going to begin by reading a list of medical problems. Please respond if whether or not you have trouble with any of these conditions.

High blood pressure	Y	N
Arthritis or Rheumatism	Y	N
Hardening of the arteries or circulation problems	Y	N
Chronic stomach trouble	Y	N
Asthma or chronic breathing problems	Y	N
Chronic bladder trouble or kidney trouble	Y	N
Cancer or other abnormal growth	Y	N
Chronic liver problems	Y	N
Any kind of heart trouble	Y	N
(specify) _____		
Trouble sleeping or recurrent feelings of anxiety or nervousness	Y	N

2. Have you been hospitalized during the last 6 months? _____
How recently was it? _____

3. Overall, how do you view your current health status?

Excellent _____
Good _____
Fair _____
Poor _____

4. Compare your present health to your health 5 years ago. Would you say it is now:

Better _____
Worse _____
No change _____

5. Interviewer: "I have asked you to have all your medications available so that we can record them and discuss how you use them." (List meds on separate sheets, for indication ask "What do you use this for?" and for problems ask "Do you have problems with taking this medication?").

PRESCRIPTION DRUGS

Name and Strength	Sig.	M.D.	Pharmacy	Actual Use	Indication	Problem? (Y/N; describe)
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

NONPRESCRIPTION DRUGS

Name and Strength	What do you take this for?	How do you usually take it?	Problems? (Y/N; describe)
1.			
2.			
3.			
4.			
5.			
6.			

Are there any <u>other</u> nonprescription medications that you take?

6. Think of your experiences in taking your medications. In general:

   a. Do you have trouble reading the directions on the prescription label or telling the difference between your tablets? Y N
   b. Do you have trouble opening the medication bottles or, once the bottle is open, getting the pills out of the bottle? Y N
   c. Do you have trouble determining when to order refills, or once ordered, getting them from the pharmacy? Y N
   d. Do you have trouble remembering when to take your medications or understanding how the medications are to be taken? Y N
   e. When you are feeling pretty well, do you sometimes stop taking some of your medications? Y N
   f. If you start to feel worse when taking medicine, do you sometimes stop taking it? Y N
   g. In general, what is your biggest problem in taking your drugs?

   _____

   _____

   _____

7. We realize that for some people taking their medication is a burden. How much is it a burden for you?

8. When you have questions or problems with your medications, where do you seek advice? _____

   (check one)
   M.D. _____
   R.Ph. _____
   Nurse _____
   Other (specify) _____

9. a. Do you usually buy items from health food stores? Y N
   b. Do you share medicines with others or have medicines been shared with you? Y N
   c. Has your doctor of pharmacist ever given you free samples of medications? Y N

10. Do you: Drink tea or coffee _____
    Drink beer or alcoholic beverages _____
    Smoke _____

11. How many meals do you usually eat a day? _____

12. Are you on a special diet? (e.g. salt-free, low cholesterol) Y N

13. Do you prepare your meals for yourself or does someone prepare them for you? Self _____ Other _____

14. Do you have any physical activity that you do regularly? (exercise, such as walking)

15. Are there any other medical services which you use in order to maintain your health? (e.g. occupational therapy, speech therapy, physical therapy)

II. MENTAL STATUS ASSESSMENT

Jacobs Test

1. What day of the week is this? _____
2. What month? _____
3. What day of the month? _____
4. What year? _____
5. What place is this? _____
6. Repeat the numbers 8, 7, 2. _____
7. Say them backwards. _____
8. Repeat the numbers 6, 3, 7, 1. _____
9. Listen to these numbers: 6, 9, 4. Count 1 through 10 out loud, then repeat 6, 9, 4. (Help if needed. Then use numbers 5, 7, 3.) _____
10. Listen to these numbers: 8, 1, 4, 3. Count 1 through 10 out loud, then repeat 8, 1, 4, 3. _____
11. Beginning with Sunday, say the days of the week backwards. _____
12. 9 + 3 is _____
13. Add 6 (to the previous answer or "to 12"). _____
14. Take away 5 (from "18"). Repeat these words after me and remember them. I will ask for them later: HAT, CAR, TREE, TWENTY-SIX. _____
15. The opposite of fast is slow. The opposite of up is _____
16. The opposite of large is _____
17. The opposite of hard is _____
18. An orange and a banana are both fruits. Red and blue are both _____
19. A penny and a dime are both _____
20. What were those words I asked you to remember? (HAT) _____
21. (CAR) _____
22. (TREE) _____
23. (TWENTY-SIX) _____
24. Take away 7 from 100, then take away 7 from what is left and keep going: 100 - 7 is _____
25. Minus 7 _____
26. Minus 7 (write down answers; check correct subtraction of 7). _____
27. Minus 7 _____
28. Minus 7 _____
29. Minus 7 _____
30. Minus 7 _____

TOTAL CORRECT (maximum score = 30) _____

GDS TEST

1.	Are you basically satisfied with your life?	Y	N
2.	Have you dropped many of your activities and interests?	Y	N
3.	Do you feel that your life is empty?	Y	N
4.	Do you often get bored?	Y	N
5.	Are you hopeful about the future?	Y	N
6.	Are you bothered by thoughts you can't get out of your head?	Y	N
7.	Are you in good spirits most of the time?	Y	N
8.	Are you afraid that something bad is going to happen to you?	Y	N
9.	Do you feel happy most of the time?	Y	N
10.	Do you often feel helpless?	Y	N
11.	Do you often get restless and fidgety?	Y	N
12.	Do you prefer to stay at home, rather than going out and doing new things?	Y	N
13.	Do you frequently worry about the future?	Y	N
14.	Do you feel you have more problems with memory than most?	Y	N
15.	Do you think it is wonderful to be alive now?	Y	N
16.	Do you often feel downhearted and blue?	Y	N
17.	Do you feel pretty worthless the way you are now?	Y	N
18.	Do you worry a lot about the past?	Y	N
19.	Do you find life very exciting?	Y	N
20.	Is it hard for you to get started on new projects?	Y	N
21.	Do you feel full of energy?	Y	N
22.	Do you feel that your situation is hopeless?	Y	N
23.	Do you think that most people are better off than you are?	Y	N
24.	Do you frequently get upset over little things?	Y	N
25.	Do you frequently feel like crying?	Y	N
26.	Do you have trouble concentrating?	Y	N
27.	Do you enjoy getting up in the morning?	Y	N
28.	Do you prefer to avoid social gatherings?	Y	N
29.	Is it easy for you to make decisions?	Y	N
30.	Is your mind as clear as it used to be?	Y	N

III. BACKGROUND INFORMATION

1. What year were you born? _____

2. Marital status: Married _____
Widowed _____
Divorced _____
Separated _____

3. What was your major occupation before retirement? _____
_____

4. How far did you go in school? _____

5. Number of persons living in household _____

a. Number having a regular income _____

6. Is your monthly household income:

< $600 would it be:	< $300	_____	< $300
	> $300	_____	$300-$599
> $600 would it be:	< $1000	_____	$600-$999
	> $1000	_____	$1000-$2499
	↓		
would it be:	> $2500	_____	> $2500

7. Given your monthly household income, do you feel that your financial situation:

_____ Income is adequate for my need and I have few financial problems.
_____ Income is usually adequate, but sometimes I have financial problems.
_____ Income is inadequate for my needs and I often have financial problems.

8. Do you have trouble paying for your medical care? Y N

9. Do you have trouble paying for all of your medications? Y N

IV. PERSONAL ASSESSMENT

Male _____ Female _____ Race _____

Check if present: Glasses _____ Hearing Aid _____
Mobile _____ Immobile _____