Polypharmacy and Hospitalization Among Older Home Care Patients

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Background. One of the major goals of home care is the prevention of hospitalization. The objective of this study was to examine the relation between medication use (number, type, and inappropriateness) and hospitalization among home care patients older than 65 years.

Methods. A retrospective chart review of 833 discharged older home care patients was performed. These patients were consecutive discharges from a single home care agency who either (a) returned to independent self-care or care of the family (S/F Care group) or (b) were admitted to the hospital (Hospitalized group). Medication assessment within these two groups included total number of medications (prescription and nonprescription); degree of polypharmacy (percentage of patients taking 5 or more, 7 or more, and 10 or more medications); and prevalence for different types of medications, including different types of inappropriate medications. Inappropriate medications were designated according to a list that was previously developed through a modified Delphi consensus technique by a panel of 13 experts in geriatric pharmacology and has been utilized in other studies. Student’s t test was used for continuous variables and chi-square test was used for categorical variables to evaluate for differences between the S/F Care group and the Hospitalized group (p < .05). For comparisons of types of medications, p < .01 was used for significant differences, because of the high number of comparisons made.

Results. Of 833 discharges, 644 (77.3%) returned to self-care or care of the Family (S/F Care group) and 189 (22.7%) were hospitalized. The Hospitalized group, compared with the S/F Care group, was taking a higher number of medications (mean ± SD: 6.6 ± 3.9 vs 5.7 ± 3.4, p = .004), and had a higher percentage of patients taking 7 or more medications (46% vs 26%, p = .002) and 10 or more medications (21% vs 10%, p = .005), but not 5 or more medications. Only three types of medications were more commonly used among patients in the Hospitalized group than among patients in the S/F Care group: clonidine (4.2% vs 1.1%, p = .004); mineral supplements (23.8% vs 14.8%, p = .003); and metoclopramide (5.8% vs 2.0%, p = .006). The Hospitalized group had a lower percentage of patients taking inappropriate medications than did the S/F Care group (20% vs 27%, p = .040), but none of the types of inappropriate medications was used more often in either group.

Conclusions. This study shows a relationship between high levels of polypharmacy and hospitalization. Although it cannot be determined from this study whether a higher number of medications was an indicator of sicker patients at risk for hospitalization, or whether a higher number of medications might have directly led to hospitalization, polypharmacy should still be considered a marker for older home care patients for whom prevention of hospitalization is the goal.

The home care component is the fastest growing portion of the Medicare budget (1). Factors affecting this increase include the aging of the population, shorter hospital stays, and an emphasis on outpatient care. For many years, home care has been “under the gun” to prove itself, and one way it has done so is by preventing hospitalization, a high-cost, high-morbidity outcome. Many older studies on home care had difficulty showing cost-effectiveness for outcomes such as hospitalization because home care services were not “targeted.” That is, many people who received home care services may not have actually needed them, or they may have received more services than they needed given how sick they were (2). Thus, any information about home care patients who become hospitalized while receiving home care services compared with those who are not hospitalized would help this goal of targeting to prevent hospitalization (3,4). Previous studies have shown that home care patients with congestive heart failure (5), lung disease (6), and depressive symptoms (7) are at high risk for hospitalization and that focused care can reduce rates of hospital admission. This study examined the relationship between medication use (particularly polypharmacy and types of medications) and hospitalization among older home care patients.

Methods

A retrospective chart review of persons discharged from the Visiting Nurse Association (VNA) Home Care Agency (HCA) was undertaken. The year this study was performed, the VNA was one of the largest nonprofit HCAs in St. Louis. In 1994, it conducted more than 137,000 visits, and more than 70% of the agency’s patients were over 65 years of age. The population in this study was a typical home care population in that the majority of its patients were elderly, similar to the populations of other databases at that time (8).

Subjects were (a) consecutive discharges from May 24, 1994 to November 30, 1994; (b) over the age of 64; and (c) discharged because the patient had completed home care services and returned to S/F Care or had been hospitalized.
Charts of patients who changed agencies, moved, went to a nursing home, or died were not reviewed. Data on demographics (age and gender) were collected through the VNA computer database. Data on referral source (i.e., site from which patients entered home care) were unavailable from the database.

Concerning data on diagnosis, previous studies of health care utilization have usually used a small number of broad categories such as “pulmonary,” “cardiac,” “neurologic,” “diabetes,” “urologic,” “neoplastic,” and “other” (9,10). To describe the population in this study more precisely, a detailed list of diagnoses was developed by three of the authors (JF, HP, and JM) on the basis of primary ICD-9 (International Classification of Disease) diagnosis for which the patient was referred (11). Table 1 shows the diagnostic categories, and the appendix shows how these categories were developed based on the ICD-9 diagnosis.

Medications were recorded by the registered nurse (RN) who conducted the initial visit in the home when a patient began receiving home care services. RNs list all medications prescribed to the patient by the physician, and any nonprescription over-the-counter (OTC) medications the patient has been taking. This list is updated by RNs as the medications change. Thus, the list we used for data collection was the list of medications the patient was on at time of discharge from home care.

The medications were categorized by one of the authors (JF, who was blinded to discharge status of the patients) according to the product category index in the 1995 Physicians' Desk Reference (PDR; Table 2) (12). In some cases, (in order to be as descriptive as possible), if only one type of medication was listed in a particular category—for example, warfarin (but not heparin) under the category of “anticoagulants,” or nitrates under the category of “vasodilators, coronary”—then that medication was listed in the table instead of the category. Otherwise, each category listed in Table 2 can be found in the product category index of the 1995 PDR. Medications were not included in these categories if they were inappropriate medications as defined below and in Table 3.

To determine which medications were inappropriate, we used criteria previously developed through a modified Delphi consensus technique by a panel of 13 experts in geriatric pharmacology (13). The consensus panel defined inappropriate as: medications that generally should be avoided, excessive dosage of medicines, and excessive duration of treatment. The analysis here is limited to the list of 19 drugs that the consensus panel indicated should be avoided. The consensus panel criteria were originally developed for nursing home residents aged 65 and older and included methyl-dopa, propranolol, and reserpine. These were not listed in Table 3, which lists inappropriate medications, because other studies indicated controversy around this issue (14,15); but they were listed separately in Table 2, which lists prevalence of all medication use.

For calculating the total number of medications for each patient, we determined the following guidelines before the study began: (i) total number of medications included prescription and nonprescription (OTC) medications; (ii) “routine” and “as needed” medications were not differentiated; (iii) each medication that the patient was taking was counted as one. For example, if a patient was taking two different types of diuretics, each diuretic was counted as one medication. The only exceptions to this were if a patient was on more than one vitamin, then they were all counted together as one medication; and if a person was on insulin, no matter how many different types, it was counted as one medication; and (iv) pharmaceuticals not counted were all types of nasal sprays, artificial saliva formulations, topical medications, and any nutritional supplement such as a protein shake.

To compare prevalence of medication use between the Hospitalized group and the S/F Care group, we calculated prevalence as [Number of patients in each group who were taking \( x \) (where \( x \) = category of medication) \( \div \) total number of patients in that group] \( \times \) 100. For example, for preva-

### Table 1. Primary Diagnoses of Patients in Hospitalized Group and S/F Care Group

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Hospitalized Group (n = 189)</th>
<th>S/F Care Group (n = 644)</th>
<th>( p ) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cardiac</td>
<td>20 (10.6)</td>
<td>90 (14.0)</td>
<td>.227</td>
</tr>
<tr>
<td>2. Arthritis, CTD</td>
<td>9 (4.8)</td>
<td>99 (15.4)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>3. Wounds</td>
<td>25 (13.2)</td>
<td>56 (8.7)</td>
<td>.064</td>
</tr>
<tr>
<td>4. Neurological</td>
<td>16 (8.5)</td>
<td>49 (7.6)</td>
<td>.669</td>
</tr>
<tr>
<td>5. Diabetes mellitus</td>
<td>17 (9.0)</td>
<td>48 (7.5)</td>
<td>.487</td>
</tr>
<tr>
<td>6. Cancer</td>
<td>17 (9.0)</td>
<td>33 (5.1)</td>
<td>.049</td>
</tr>
<tr>
<td>7. Pulmonary</td>
<td>15 (7.9)</td>
<td>34 (5.2)</td>
<td>.172</td>
</tr>
<tr>
<td>8. Fractures, sprains</td>
<td>5 (2.6)</td>
<td>38 (5.9)</td>
<td>.075</td>
</tr>
<tr>
<td>9. Hypertension</td>
<td>3 (1.6)</td>
<td>36 (5.6)</td>
<td>.022</td>
</tr>
<tr>
<td>10. Delirium, paranoia, dementia, depression</td>
<td>11 (5.8)</td>
<td>27 (4.2)</td>
<td>.346</td>
</tr>
<tr>
<td>11. Coagulation defect, DVT, other venous thrombosis</td>
<td>11 (5.8)</td>
<td>25 (3.9)</td>
<td>.249</td>
</tr>
<tr>
<td>12. Urological</td>
<td>8 (4.2)</td>
<td>18 (2.8)</td>
<td>.318</td>
</tr>
<tr>
<td>13. Gastrointestinal</td>
<td>7 (3.7)</td>
<td>13 (2.0)</td>
<td>.183</td>
</tr>
<tr>
<td>14. Undernutrition, dehydration, malaise and fatigue</td>
<td>3 (1.6)</td>
<td>17 (2.6)</td>
<td>.406</td>
</tr>
<tr>
<td>15. Cellulitis, dermatitis, or other local skin condition</td>
<td>3 (1.6)</td>
<td>9 (1.4)</td>
<td>.847</td>
</tr>
<tr>
<td>16. Other diagnosis occurring less than 10 times in total group</td>
<td>18 (8.1)</td>
<td>52 (10.1)</td>
<td>.392</td>
</tr>
</tbody>
</table>

Notes: See appendix for the ICD-9 codes of these diagnostic categories. Values followed by a number in parentheses are number of patients and percentages of the group. S/F = returned to self-care or care of the family; CTD = connective tissue disorder; DVT = deep venous thrombosis.
lence of diuretic use, 86 patients in the hospitalized group were taking diuretics out of a total of 189 patients in that group: 86/189 = 45.5% (see Table 2). Additionally, we compared our data with data from the published literature on two separate elderly populations—nursing home patients and community dwellers. Studies that used similar methods, particularly concerning the list of inappropriate medications, were chosen for comparison (14–16).

Data Analysis

The following variables were compared between patients in the S/F Care group and the Hospitalized group: age; gender; mean total number of medications; percentage of patients taking 5 or more, 7 or more, and 10 or more medications; percentage of patients taking each type of medication; and percentage of patients taking at least one inappropriate medication. Instead of choosing an arbitrary number to define polypharmacy for home care patients, we chose three different cutoff points based on previous studies (15,17–19): 5 has been used in community-based and outpatient studies (17,18); 7 is the average number of medications taken by patients in nursing homes (15); and 10 is the number of medications at which risk of adverse drug events approaches 100% (19).

To evaluate for differences between the S/F Care group and the Hospitalized group, we used Student’s t test (two-tailed) for continuous variables and chi-square test for categorical variables (p < .05). For comparisons among types of medications, we used p < .01 for significant differences because of the high number of comparisons made (Tables 2 and 3). Statistical analyses were performed using a commercially available statistics package (Statistica, Statsoft, Tulsa, OK).

Table 2. Percentage of Prevalence of Medication Use by Group

<table>
<thead>
<tr>
<th>Category or Type of Medication</th>
<th>Hospitalized Group (n = 189)</th>
<th>S/F Care Group (n = 644)</th>
<th>All Patients (n = 833)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diuretics</td>
<td>45.5</td>
<td>36.5</td>
<td>38.5</td>
<td>.025</td>
</tr>
<tr>
<td>Salicylates</td>
<td>23.3</td>
<td>30.4</td>
<td>28.7</td>
<td>.056</td>
</tr>
<tr>
<td>H2 receptor antagonists and proton pump inhibitors</td>
<td>32.3</td>
<td>27.3</td>
<td>28.5</td>
<td>.180</td>
</tr>
<tr>
<td>Nitrates</td>
<td>23.3</td>
<td>24.1</td>
<td>23.9</td>
<td>.821</td>
</tr>
<tr>
<td>Laxatives</td>
<td>29.1</td>
<td>22.2</td>
<td>23.8</td>
<td>.050</td>
</tr>
<tr>
<td>Digoxin</td>
<td>23.3</td>
<td>23.5</td>
<td>23.4</td>
<td>.955</td>
</tr>
<tr>
<td>Calcium channel blockers</td>
<td>19.0</td>
<td>23.9</td>
<td>22.7</td>
<td>.161</td>
</tr>
<tr>
<td>ACE inhibitors</td>
<td>18.5</td>
<td>22.8</td>
<td>21.9</td>
<td>.207</td>
</tr>
<tr>
<td>Vitamins (A, B’s, C, D, folate, multivitamin)</td>
<td>24.3</td>
<td>17.7</td>
<td>19.2</td>
<td>.042</td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>18.5</td>
<td>18.3</td>
<td>18.4</td>
<td>.950</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>20.1</td>
<td>17.2</td>
<td>17.9</td>
<td>.360</td>
</tr>
<tr>
<td>Minerals and nutritional supplements (Mg2+, Ca2+, Fe, phosphorus)</td>
<td>23.8</td>
<td>14.8</td>
<td>16.8</td>
<td>.003†</td>
</tr>
<tr>
<td>Potassium</td>
<td>21.2</td>
<td>15.4</td>
<td>16.7</td>
<td>.060</td>
</tr>
<tr>
<td>Bronchodilators and steroid inhalers</td>
<td>20.4</td>
<td>15.2</td>
<td>16.3</td>
<td>.110</td>
</tr>
<tr>
<td>NSAIDS (excluding inappropriate)</td>
<td>12.7</td>
<td>15.5</td>
<td>14.8</td>
<td>.341</td>
</tr>
<tr>
<td>Warfarin</td>
<td>15.3</td>
<td>12.0</td>
<td>12.7</td>
<td>.232</td>
</tr>
<tr>
<td>Antidepressants (excluding inappropriate)</td>
<td>13.2</td>
<td>11.8</td>
<td>12.1</td>
<td>.604</td>
</tr>
<tr>
<td>Antianxiety agents (excluding inappropriate)</td>
<td>14.3</td>
<td>10.6</td>
<td>11.4</td>
<td>.156</td>
</tr>
<tr>
<td>Diabetes agents (insulin)</td>
<td>14.8</td>
<td>9.6</td>
<td>10.8</td>
<td>.044</td>
</tr>
<tr>
<td>Cough and cold preparations (decongestants/expectorants/antihistamines)</td>
<td>10.9</td>
<td>10.1</td>
<td>10.7</td>
<td>.750</td>
</tr>
<tr>
<td>Steroids, oral</td>
<td>12.2</td>
<td>8.1</td>
<td>9.0</td>
<td>.084</td>
</tr>
<tr>
<td>Diabetes agents (oral, excluding inappropriate)</td>
<td>10.1</td>
<td>8.1</td>
<td>8.5</td>
<td>.387</td>
</tr>
<tr>
<td>Thyroid preparations</td>
<td>7.9</td>
<td>7.6</td>
<td>7.7</td>
<td>.892</td>
</tr>
<tr>
<td>Beta blockers (excluding propranolol)</td>
<td>3.2</td>
<td>5.6</td>
<td>6.4</td>
<td>.185</td>
</tr>
<tr>
<td>Antipsychotic</td>
<td>7.9</td>
<td>5.4</td>
<td>6.0</td>
<td>.202</td>
</tr>
<tr>
<td>Antacids and antiflatulents</td>
<td>4.2</td>
<td>6.0</td>
<td>5.6</td>
<td>.344</td>
</tr>
<tr>
<td>Seizure disorder drugs</td>
<td>4.8</td>
<td>4.3</td>
<td>4.4</td>
<td>.769</td>
</tr>
<tr>
<td>Theophylline</td>
<td>5.3</td>
<td>4.0</td>
<td>4.3</td>
<td>.438</td>
</tr>
<tr>
<td>Parkinsonism drugs</td>
<td>5.8</td>
<td>3.7</td>
<td>4.2</td>
<td>.204</td>
</tr>
<tr>
<td>Adrenergic blockers (peripheral)</td>
<td>3.2</td>
<td>3.1</td>
<td>3.1</td>
<td>.962</td>
</tr>
<tr>
<td>Ophthalmic</td>
<td>2.1</td>
<td>3.6</td>
<td>3.0</td>
<td>.307</td>
</tr>
<tr>
<td>Metoclopramide</td>
<td>5.8</td>
<td>2.0</td>
<td>2.9</td>
<td>.006†</td>
</tr>
<tr>
<td>Urinary tract agents, antispasmodic</td>
<td>2.1</td>
<td>2.7</td>
<td>2.6</td>
<td>.646</td>
</tr>
<tr>
<td>Antiarrhythmics</td>
<td>1.1</td>
<td>2.8</td>
<td>2.4</td>
<td>.170</td>
</tr>
<tr>
<td>Vasodilators, peripheral</td>
<td>0.5</td>
<td>2.6</td>
<td>2.2</td>
<td>.079</td>
</tr>
<tr>
<td>Diarrhea medications</td>
<td>1.6</td>
<td>2.8</td>
<td>2.2</td>
<td>.540</td>
</tr>
<tr>
<td>Clonidine</td>
<td>4.2</td>
<td>1.1</td>
<td>1.8</td>
<td>.004†</td>
</tr>
<tr>
<td>Propranolol</td>
<td>0.5</td>
<td>1.6</td>
<td>1.3</td>
<td>.151</td>
</tr>
<tr>
<td>Methyldopa</td>
<td>0</td>
<td>0.3</td>
<td>0.2</td>
<td>.443</td>
</tr>
<tr>
<td>Reserpine</td>
<td>0.5</td>
<td>0.0</td>
<td>0.1</td>
<td>.065</td>
</tr>
<tr>
<td>Other categories</td>
<td></td>
<td></td>
<td></td>
<td>&lt;.25 each</td>
</tr>
</tbody>
</table>

Notes: If patient was taking two or more of the same type of medication, it was only counted once to calculate prevalence data. S/F = returned to self-care or care of the family; ACE = angiotensin converting enzyme; NSAIDS = nonsteroidal anti-inflammatory drugs.

†Because of the large number of comparisons, p value was only considered significant if value < .01.
RESULTS

Of 833 discharges from home care, 189 (22.7%) were hospitalized (Hospitalized group) and 644 (77.3%) returned to independent self-care/care of the family (S/F Care group). There were no differences between the two groups in age (77.1 ± 7.3 vs 77.9 ± 7.5, \( p = .301 \)) or percentage of women (65.1% vs 63.0%, \( p = .571 \)). Table 1 lists the primary diagnoses of patients for the whole group, in order of decreasing frequency. For the majority of diagnostic categories, the two groups did not differ. However, there was a higher percentage of patients in the S/F Care group with arthritis/connective tissue disorder and hypertension and a lower percentage of patients with cancer.

The Hospitalized group, compared with the S/F Care group, was taking a higher average number of medications (mean ± SD: 6.6 ± 3.9 vs 5.7 ± 3.4, \( p = .004 \)). The percentage of patients taking 5 or more medications did not differ between the two groups (66.1% vs 58.9%, \( p = .068 \)), but was higher in the Hospitalized group compared with the S/F Care group for 7 or more medications (46.0% vs 26.2%, \( p = .022 \)) and 10 or more medications (21.2% vs 10.0%, \( p = .005 \)).

DISCUSSION

In this retrospective study of older home care patients, we found no differences in age, gender, and primary diagnosis between the patients who were admitted to the hospital and those who returned to self-/family care. There was, however, a difference in the degree of polypharmacy between the two groups. Although on average the Hospitalized group was on only one additional medication compared with the S/F Care group, the Hospitalized group was significantly more likely to be taking 7 or more and 10 or more medications. In fact, the Hospitalized group had about twice the percentage of patients with these degrees of polypharmacy.

The types of medications seemed to be less important between the two groups. The prevalence of medication use for...
the vast majority of categories or types of medications (37
out of 40) was not different between the two groups. We
also found that no one particular type of inappropriate med-
cation was more commonly used by either group. How-
ever, the S/F Care group as a whole had a higher percentage
of patients taking at least one inappropriate medication.

The clinical significance of these findings is twofold.
First, a higher number of medications among the Hospital-
ized group could have resulted in more adverse drug events
(ADEs), drug–drug interactions, and poorer compliance,
which contributed to the hospitalization (20–24). As pre-
vious work has shown (19,20), one of the strongest factors as-
associated with ADEs is the number of drugs taken, and the
risk of ADEs approaches 100% when the number of medi-
cations reaches 10 (19,20). This study is consistent with past
findings. Because ADEs have been shown to be associ-
ated with hospital admissions (20,21), as well as excess
health care costs, longer hospital stays, and attributable
mortality (22), identifying patients at greatest risk for ADEs
has important implications.

Second, a higher number of medications could be an indi-
ator of sicker patients. Rosholm and Christensen have
shown a relationship between drug use and self-reported
health and suggest that limited drug use is a proxy for good
health (25). The present study suggests that the converse
may also be true—higher drug use is a proxy for poor
health. As noted in Table 4, the average number of medica-
tions and the percentage of inappropriate medications in-
creased from community dwellers to home care patients to
nursing home patients. This finding is consistent with the
assumption that home care patients are intermediate in their
medical needs compared with the other two groups of pa-
tients.

Thus, polypharmacy among home care patients may be
an identifiable risk factor for subsequent hospitalization that is
amenable to intervention. Future studies will need to de-
termine if a targeted intervention to reduce medications
among home care patients results in improved outcomes.

Although the results of this study provide compelling ev-
idence for further investigations concerning polypharmacy,
ADEs, and home care patients, several limitations should be
noted. First, the population studied is from a single home
care agency serving one geographic area, and the results
may not be generalizable to other agencies or locations.
Also, we did not review charts of patients who had moved
or changed agencies, who were closed to home care because
of nursing home admission, or who had died. Patients who
moved or changed agencies could not be tracked, but this
was a rare event. Prevention of nursing home admission us-
ing home care is a broad separate topic related to different
factors than those related to prevention of hospital admis-
sion (2), and thus, they were not included. Lastly, the num-
ber of patients who died during the study was 47, which was
too small for comparison.

Another limitation of the study is that the data considered
the use of prescription and nonprescription medications to-
gether, not separately. It would have been helpful to distin-
guish between these two uses, but we did not believe it was
necessary because the focus of this study, as in other studies
(14,19), was total number of medications. Interestingly, 5 of

the 10 most commonly used medications in our study are
obtainable without a prescription. Nonprescription drug use
among the elderly is sevenfold that of the general adult pop-
ulation compared with twofold for prescription drugs (20).
This gap could continue to grow; one study of 4509 elderly
individuals showed an increase in average number of drugs
per person from 1978–1979 to 1987–1988, primarily due to
use of nonprescription drugs (26). Perhaps the most appro-
priate site to discover the use of nonprescription medications
is in the home. In fact, medication lists collected in the
home have been found to be more accurate than those col-
lected in the office-based setting or those based on hospital
discharge summaries (27).

There are some discrepancies in our findings. The first is
that the diagnostic codes did not correlate with the preva-
ence of medication use. For example, patients in the S/F Care
group were more likely to have a diagnostic code for arthri-
is/connective tissue disorder, but did not have a higher prevalence of nonsteroidal anti-inflammatory drugs
described with patients in the Hospitalized group. This was most likely due to the fact that only one pri-
mary diagnostic code (the one describing the reason for the initial home care referral) was reported, whereas all pre-
scribed medications were reported. Thus, a direct compari-
son between diagnosis and medications was not possible.
Similarly, data on other potential markers of risk for hospi-
talizations, such as functional status, caregiver status, other
diagnoses, or frequency of home visits, were not collected.
Future studies on the risk of hospitalization will need to in-
clude these factors as well as polypharmacy.

Finally, we did not have data on the reason for hospital
admission among patients in the Hospitalized group, nor did
we have the referral source (i.e., referral from the hospital
vs the outpatient area). This potentially could have biased
the results, because patients already living at home who are
starting up home care services may not be as acutely ill as
patients recently discharged from the hospital. Although we
tried to recognize this limitation by using diagnostic catego-
ries that were more detailed than in previous studies on health
care utilization (9,10), severity of illness was not measured
beyond that. Nonetheless, if clinicians are looking for indi-
ces for severity of illness or predictors of hospitalization, a
higher number of medications should still be on their list.

In conclusion, the main finding of this study is that for
this group of older home care patients, the Hospitalized
group compared with the S/F Care group had a higher de-
gree of polypharmacy defined by cutoff points of 7 or more
and 10 or more medications. Whether a higher number of
medications is an indicator of sicker patients at risk for hospi-
talization, or a higher number of medications might di-
rectly lead to hospitalization, the clinical implication is that
polypharmacy should be considered a marker for older
home care patients at risk for hospitalization. If one of the
goals of home care is to prevent hospitalization, then the
clinical implications of this study are to develop interven-
tions directed at patients with polypharmacy to see if hospi-
talization rates can be reduced. The type of interventions
(e.g. reducing number of medications, or increasing home
care services to patients with polypharmacy) that work best,
remains to be seen.
Acknowledgments

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References


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Appendix

ICD-9 Codes for Diagnostic Categories in Table 1

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>ICD-9 Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cardiac</td>
<td>390.428 (excluding 401.9)</td>
</tr>
<tr>
<td>2. Arthritis, CTD</td>
<td>711.96–727.10</td>
</tr>
<tr>
<td>3. Wounds</td>
<td>454; 707–707.9; 873–893.1</td>
</tr>
<tr>
<td>4. Neurological</td>
<td>332–348.3; 434.9–436; 780.3</td>
</tr>
<tr>
<td>5. Diabetes mellitus</td>
<td>250.9–250.91</td>
</tr>
<tr>
<td>6. Cancer</td>
<td>148.9–205</td>
</tr>
<tr>
<td>7. Pulmonary</td>
<td>460–510</td>
</tr>
<tr>
<td>8. Fractures, sprains</td>
<td>733.13; 808.2–845</td>
</tr>
<tr>
<td>9. Hypertension</td>
<td>401.9</td>
</tr>
<tr>
<td>10. Delirium, paranoia, dementia, depression</td>
<td>290–319; 331</td>
</tr>
<tr>
<td>11. Coagulation defect, DVT</td>
<td>286.9; 453.8–453.9</td>
</tr>
<tr>
<td>other venous thrombosis</td>
<td>286.9; 453.8–453.9</td>
</tr>
<tr>
<td>12. Urological</td>
<td>590–599; 788.2–788.3</td>
</tr>
<tr>
<td>13. Gastrointestinal</td>
<td>550–570</td>
</tr>
<tr>
<td>14. Undernutrition, dehydration, malaise and fatigue</td>
<td>263–281.1; 458</td>
</tr>
<tr>
<td>15. Cellulitis, dermatitis, or other local skin condition</td>
<td>263–281.1; 458</td>
</tr>
</tbody>
</table>

Note: CTD = Connective tissue disease; DVT = deep venous thrombosis.