Medication Management Assessment for Older Adults in the Community

Denise Orwig, PhD, Nicole Brandt, PharmD, and Ann L. Gruber-Baldini, PhD

Purpose: The purpose of this study was to describe the Medication Management Instrument for Deficiencies in the Elderly (MedMaIDE) and to provide results of reliability and validity testing. Design and Methods: Participants were 50 older adults, aged 65 and older, who lived in the community, took at least one prescription medication, and were then self-medicating. Non-medical study staff assessed participants in their homes at baseline and 1 week, and a study pharmacist conducted pill counts at baseline and 30 days. The MedMaIDE covers three domains important for ensuring medication compliance (knowledge of medications, how to take medications, and procurement) and yields a total deficiency score. We assessed test-retest and interrater reliability. We assessed validity by comparing the MedMaIDE deficiency scores to 30-day pill count compliance. Results: The sample was mostly female (72%) and White (56%), with a mean age of 78. Participants were taking an average of 7 prescription drugs, with an average pill count compliance of 70%. The MedMaIDE had very good test-retest reliability (intraclass correlation coefficient [ICC] = 0.93) and good interrater reliability (ICC = 0.74). Internal consistency was also strong (Cronbach’s alpha = .71). Comparing the MedMaIDE to the pill count with those who were compliant (>80%) versus those that were not, the agreement was 75%. The MedMaIDE was more highly specific and predictive of compliance compared to the pill count. Implications: The MedMaIDE appears to be a reliable and valid instrument for determining if an older adult has deficiencies in managing medications.

Key Words: Medications, Compliance, Adherence, Community dwelling, Assessment

Individuals aged 65 and older are the leading consumers of medications, accounting for 34% of pharmacy expenditures in the United States (Avorn, 1990; Salom & Davis, 1995). This is most likely due to the increasing level of chronic disease conditions with age, such that 85% of individuals in this age group have at least one chronic illness and one third have three or more. A recent survey has shown that more than 40% of individuals older than age 65 use five or more medications per week, with approximately 12% using 10 or more different medications (Kaufman, Kelly, Rosenberg, Anderson, & Mitchell, 2002). Approximately 95% of the elderly population resides in the community at any one time (Lamy, 1993), leaving a large number of elders managing their own medications.

Research has long established that drugs may cause or contribute to negative adverse events, such as significant morbidity and increased costs of care, by increasing health care utilization (Atkin & Shenefield, 1995; Bates et al., 1995; Hanlon et al., 1997; Johnson & Bootman, 1995; Walker & Wynne, 1994). Researchers have identified noncompliance with a medication regimen as a preventable reason for adverse drug events; medication noncompliance is the second largest health problem in the United States in terms of resources consumed. Tafreshi, Melby, Kaback, and Nord (1999) found that 70.4% of medication-related emergency room visits assessed were judged to be mostly due to noncompliance issues. Investigators have found that drug-related admissions secondary to noncompliance occur in 6% to 28% of elderly patients (Col, Fanale, & Kronholm, 1990; Courtman & Stallings, 1995; Dartnell et al., 1996; Grymonpre, Mitenko, Sitar, Aoki, & Montgomery, 1988; Schneider, Mion, & Frengley, 1992), and the mean cost per admission associated with medication noncompliance is $2,150 (Col et al.).

Studies have reported noncompliance or nonadherence rates in the elderly population that range from...
26% to 59% (van Eijken, Tsang, Wensing, de Smet, & Grol, 2003). Medication management is a complicated process, involving selecting the right drug, ensuring that the patient can obtain it and take it correctly, and evaluating its action on the patient (Garrard, Harms, & Hanlon, 1998). One study by Ruscin and Semla (1996) showed that, in a sample of elders with an average age of 80, 22% of those who were physically dependent and one third of those who had cognitive impairment were still responsible for taking their own medications. Compounding this situation, a study by Royall, Cordes, and Polk (1997) showed that half of residents in the community they studied had trouble comprehending medication information.

Medication compliance assessments in the literature include performance-based measures (observation of medication-taking behavior, reading prescription labels, opening safety caps, removing pills, etc.; Edelberg, Shallenberger, & Wei, 1999; Fitten, Coleman, Siembieda, Yu, & Ganzell, 1995; Meyer & Schuna, 1989; Patterson et al., 2002; Raehl, Bond, Woods, Patry, & Sleeper, 2002; Ruscin & Semla, 1996), questionnaires (Bennett et al., 2001; de Klerk, van der Heijde, Landewe, van der Tempel, & van der Linden, 2003; Yamada, Sugiyama, Ashida, Ohwaki, & Fujii, 2001), home-based measures (Brown et al., 1998; Stewart, Pearson, Luke, & Horowitz, 1998; West et al., 1997), and pharmacy-type interventions (patient education, pharmacist-developed discharge plans; Ali, Laurin, Lariviere, Tremblay, & Cloutier, 2003; Al-Rashed, Wright, Roebuck, Sunter, & Chrystyn, 2002; Grant, Devita, Singer, & Meigs, 2003; Hoffman et al., 2003; Jensen, 2003; Lowe, Raynor, Purvis, Farrin, & Hudson, 2000; Nazareth et al., 2001; Sturgess, McElnay, Hughes, & Crealey, 2003). A majority of the measures are limited by either their use by clinic patients or with patients using a specific drug type, narrow coverage of compliance issues, little utility for use with an entire drug regimen, lack of validation testing, or testing outside the United States.

Currently, there is no comprehensive standardized instrument that looks at knowledge, administration, and procurement that can be used by untrained care providers, such as family members, to assess the older adult’s ability to self-medicate in the home environment. Informal care providers who assist with activities of daily living (ADLs) are often the ones who have firsthand contact with the older adult on a regular basis and are in position to identify medication management problems; yet, they may feel unable to identify such issues. Children and other relatives of aging adults provide about 80% of all care, and these informal care providers provide three times as much direct care for elders as do all nursing homes, hospitals, and other institutions combined (Perlman, 1983). Medication assistance is becoming a more prevalent aspect of caregiving (Brodaty & Green, 2002; Conn, Taylor, & Messina, 1995; Smith, Francis, Gray, Denham, & Graffy, 2003). A recent survey of long-term caregivers found that 48% of caregivers helped with medications (Donelan et al., 2002). These types of care providers are an often overlooked resource to assist with medication compliance problems among elderly adults.

The purpose of this article is to describe an assessment instrument—the Medication Management Instrument for Deficiencies in the Elderly (MedMaIDE)—and to provide results of a reliability and validity study of older adults who self-administered medications and lived independently in the Baltimore area. Nonmedically trained study staff conducted the assessments in the home environment.

Methods

**MedMaIDE**

The MedMaIDE is an assessment instrument developed by a panel of experts who have experience with and knowledge of the elderly population in community settings; it is based on observation and questionnaire. Researchers developed the MedMaIDE by significantly modifying an instrument that was being used by local agencies in Maryland. Modifications included (a) simplifying the language into lay terms and to an eighth-grade reading level so it could be used by people who were not health care professionals (e.g. family members), (b) adding items to make it more comprehensive for maximizing medication compliance in older adults living in the community, and (c) modifying the response options to allow for scoring of the items. The MedMaIDE addresses potential issues surrounding medication compliance and management issues in the home setting.

The MedMaIDE consists of 20 items covering three areas considered important for proper medication management: (a) What a person knows about the medication he or she is taking (8 items); (b) Whether a person knows how to take his or her medication (6 items); and (c) Whether a person knows how to get his or her medication from a doctor or pharmacy (6 items). A summary of these domains is shown in Appendix A. In addition to assessing the three areas, the administrator records all medications (prescription, over-the-counter, alternative therapies, etc.; see Appendix B) currently being used by the individual. The instrument is completed for the entire medication regimen and takes approximately 30 min to administer. The measure incorporates both subjective information and direct observations of medication-taking behavior.

The MedMaIDE is unique in that it was developed specifically for use in the older adult’s home by people with nonmedical backgrounds or training. Researchers have since developed a pamphlet to accompany the MedMaIDE to provide an overview of the importance of medication compliance and the assessment of it.

We tested the instrument in a convenience sample of 50 older adults (aged 65 and older) who lived in
the community and who were self-medicating. Nonmedical study staff administered the MedMaIDE to participants two times, one week apart. Nonmedical staff were trained research assistants who participated in a standardized training session. A study pharmacist conducted a baseline pill count, followed by another pill count 30 days later. In addition, we collected data on cognitive impairment using the Mini-Mental State Examination (MMSE) (Folstein, Folstein, & McHugh, 1975), ADLs (Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963), instrumental ADLs (IADLs) (Lawton & Brody, 1969), and comorbidities at both time points. We coded all drugs using the American Hospital Formulary Service coding scheme (McEvoy, 1998).

Study Population

We recruited participants from several high-rise apartment complexes in Baltimore; other participants were residents of a local retirement community. Older adults were eligible if they were aged 65 and older, lived independently, were able to understand English, took at least one prescription medication, and were not currently relying on another person to administer medications (i.e., were self-medicating). The University of Maryland, Baltimore, Institutional Review Board reviewed and approved the protocol, and we obtained informed consent from all participants or their proxies. We approached 61 older adults for participation in the study and enrolled 50 (82%).

Measures

Scoring the MedMaIDE.—Each of the three areas assessed by the MedMaIDE has a deficiency subscore that together make up a total deficiency score. Critical items (identified with an asterisk in Appendix A) have been identified within each area and are used in calculating the deficiency subscores and the total deficiency score. The noncritical items are still important for assessing overall medication management but are not included in the deficiency scores. A person must be able to answer or do each item correctly for all prescription medications in the regimen to receive a score of yes. If a person receives a score of no for a critical item, that item gets a score of 1. The administrator sums the items in each area to obtain an area deficiency subscore. The administrator then adds the three subscores together to get the total deficiency score. The maximum total deficiency score is 13. Study staff completed 1-week MedMaIDE follow-ups for 97% of the sample.

Reliability Testing.—We assessed reliability by test–retest estimates, interrater measurement, and internal consistency. Use of different raters allows for an assessment of interrater reliability by deriving an intraclass correlation coefficient (ICC). We assessed test–retest reliability on the whole sample and report it using an ICC. A different staff person interviewed a subgroup of 15 participants during one of the interviews to determine interrater reliability, which we also report using an ICC. Finally, Cronbach’s alpha coefficient assesses the degree to which the items on the MedMaIDE all measure the same underlying construct, which provides a measure of internal consistency.

Validity Testing

Pill Count Compliance.—For the purpose of this study, we used the 30-day pill count as a comparative variable (concurrent, concordant validity). We used the pill count method to measure medication compliance; research has shown this method to be reliable and valid (Botelho & Dudrak, 1992; Grymonpre, Didur, Montgomery, & Sitar, 1998; Klein, German, McPhee, Smith, & Levine, 1982; Matsui et al., 1994). It is also a cost-effective and realistic way to assess compliance of all medications in the home setting. This method involves looking at the number of pills dispensed, the date being dispensed, when the individual started taking the medication, and directions for use. We defined the compliance rate as the total number of pills taken divided by the total number of pills that should have been taken; we then multiplied this number by 100. We used the instructions on the bottle, in addition to new prescriptions or other instructions (e.g., hospital discharge records), to determine the number of pills that should have been taken. We derived the percent compliance for each individual prescription medication and then averaged them to obtain the overall compliance for the medication regimen. The optimal compliance was 100%; however, an acceptable level of compliance was greater than 80% (Botelho & Dudrak). In order to minimize the occurrence of a person throwing away pills to defeat the pill count, we told participants only that we were assessing their medications (this was approved by the University of Maryland, Baltimore, Institutional Review Board). The person counting the pills did not state explicitly that they were counting pills. During the initial visits, study staff administered the questionnaire to the older adult while a pharmacist counted and evaluated the pills and pill bottles. There were no problems using this strategy, and the pharmacist completed 30-day pill counts for 88% of the study sample.

Validity is a term used to describe how well an instrument measures what it purports to measure (e.g., how accurate is the MedMaIDE in detecting an older person’s level of deficiency in managing medications?). Ideally, we would establish validity through comparison of the MedMaIDE to a gold standard or to other instruments that measure similar constructs (in this case, pill count compliance). We also evaluated validity by comparing the MedMaIDE to ADL, IADL, and MMSE scores.
We also used correlations and response operator characteristic curves to assess validity. In addition, we assessed the unique contribution of the MedMaIDE on pill count compliance through regressions on pill counts controlling for age, gender, ADL score, and MMSE score.

Covariates.—In addition to obtaining demographic data, study staff asked questions with respect to the existence of comorbidities and hearing and vision problems. We also assessed cognitive functioning, as well as participants’ ability to perform ADLs and IADLs. The MMSE is a well-known assessment instrument used to assess the cognitive status of an individual (Folstein et al., 1975). Previous studies have examined the relationship between cognitive and functional impairment and the capacity for independent medication management and have reported that cognitive impairment is a predictor of poor compliance among older adults who are functionally independent in the community (Botelho & Dudrak, 1992; Okuno, Yanagi, & Tomura, 2001). The ADL index (Katz et al., 1963) evaluates performance in bathing, dressing, toileting, transferring, continence, and feeding. The IADL index (Lawton & Brody, 1969) evaluates more complex behaviors, such as telephoning, shopping, preparing food, keeping house, laundering, using transportation, using medicine, and managing finances. Functional impairment has been shown to affect a person’s ability to open medication containers, manipulate small pills, and get to the doctor or pharmacy for a prescription or a refill.

Table 1. Baseline Sample Characteristics (N = 50)

<table>
<thead>
<tr>
<th>Variable</th>
<th>M (SD)</th>
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<tr>
<td>Age</td>
<td>78.18 (7.21)</td>
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<td>Gender (%)</td>
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<tr>
<td>Female</td>
<td>72</td>
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<tr>
<td>Male</td>
<td>28</td>
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<tr>
<td>Race (%)</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>56</td>
</tr>
<tr>
<td>Black</td>
<td>44</td>
</tr>
<tr>
<td>Education (yrs)</td>
<td>9.38 (3.74)</td>
</tr>
<tr>
<td>Annual income ($)</td>
<td>$9,000–$12,000</td>
</tr>
<tr>
<td>Mini-Mental State Examination (range 0–30)</td>
<td>24.38 (4.37)</td>
</tr>
<tr>
<td>Comorbidities (range 0–30)</td>
<td>6.14 (2.54)</td>
</tr>
<tr>
<td>Activities of daily living (range 0–18)</td>
<td>0.94 (1.71)</td>
</tr>
<tr>
<td>Instrumental activities of daily living (range 0–8)</td>
<td>2.14 (1.57)</td>
</tr>
<tr>
<td>Number of prescription drugs</td>
<td>6.73 (3.43)</td>
</tr>
<tr>
<td>Number of over-the-counter drugs</td>
<td>2.02 (1.66)</td>
</tr>
<tr>
<td>Drug classes</td>
<td>5.04 (2.15)</td>
</tr>
<tr>
<td>Pill count compliance (≥80% acceptable)</td>
<td>70.46 (21.20)</td>
</tr>
</tbody>
</table>

Note: SD = standard deviation.

Table 2. MedMaIDE Deficiency Scores

<table>
<thead>
<tr>
<th>Deficiency Score</th>
<th>M (SD)</th>
</tr>
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<tbody>
<tr>
<td>Know (0–5)a</td>
<td>1.46 (1.54)</td>
</tr>
<tr>
<td>Take (0–3)a</td>
<td>0.10 (0.30)</td>
</tr>
<tr>
<td>Get (0–5)a</td>
<td>0.32 (0.51)</td>
</tr>
<tr>
<td>Total (0–13)b</td>
<td>1.88 (1.96)</td>
</tr>
</tbody>
</table>

Notes: MedMaIDE = Medication Management Instrument for Deficiencies in the Elderly; SD = standard deviation.

Table 3. Most Difficult Tasks

<table>
<thead>
<tr>
<th>Task</th>
<th>Unable to Do the Task (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name medications</td>
<td>48</td>
</tr>
<tr>
<td>State why he/she is taking medication</td>
<td>42</td>
</tr>
<tr>
<td>Know if there is a refill</td>
<td>30</td>
</tr>
<tr>
<td>Know time of day to take medication</td>
<td>24</td>
</tr>
</tbody>
</table>

Results

Of the 50 older adults enrolled in the study (mean age = 78), 72% were female and almost equal proportions were White (56%) and Black (44%), with a mean education of 9 years and an annual income ranging between $9,000 and $12,000 (Table 1). The average MMSE score was 23.5 (range 0–30), and participants had an average of 6 comorbidities. The sample was taking on average 7 different prescription medications and 2 over-the-counter medications concurrently. According to the 30-day pill counts, average regimen compliance was 70% (80% or greater is considered compliant), and no one was 100% compliant. Only 42% of the sample was compliant according to pill counts. The most commonly used drug groups were cardiac drugs, nonsteroidal anti-inflammatory drugs, diuretics, and miscellaneous analgesics.

The mean number of deficiencies in medication management identified by the MedMaIDE for the group was 2.0, with some participants having no deficiencies and others having as many as 7 (Table 2). As shown in Table 3, naming the medications was the most difficult task with almost 50% of the sample unable to do. Cronbach’s alpha was .71, suggesting that the items of the MedMaIDE measured the same underlying construct. As shown in Table 4, test–retest reliability was high (ICC = 0.93, SE = 0.02), and the interrater reliability was 0.74 (SE = 0.12).

In order to conduct the validity analyses, we compared the MedMaIDE total deficiency score to the 30-day pill count compliance for the regimen (Table 4). We dichotomized pill count compliance: ≥80% as compliant and <80% as noncompliant. We used receiver operating characteristic (ROC) curves to choose cut points for the MedMaIDE deficiency score and to identify the sensitivity and specificity of
the MedMaIDE. We assessed two cut points for the deficiency score of the MedMaIDE: (a) 0 as compliant and 1 or more as noncompliant, and (b) 0 or 1 as compliant and 2 or more as noncompliant. Table 4 shows the specificity and sensitivity for the two cut points. Specificity of the higher cut point was 83%, while the sensitivity was 68%. This means the MedMaIDE was able to correctly identify participants without compliance problems, and, compared to the pill count, it would identify a modest proportion of people as compliant when they were not. It is important to keep in mind that the definition of compliant with the higher cut point on the MedMaIDE was having one deficiency.

A more appropriate assessment is the predictive validity of the MedMaIDE, which is also shown in Table 4. The positive predictive value for the higher cut point was .83. There would be a higher probability compared to the pill count measure that the MedMaIDE would identify deficiencies in medication management; thus, interventions would be implemented when they would not be indicated according to the pill count. Although researchers typically consider 80% or better to be compliant with the pill count measure, it is our belief that some people with less than 20% noncompliance will benefit from interventions as identified through the MedMaIDE.

The Pearson correlation coefficient for the association between the MedMaIDE deficiency score and pill count compliance was −.52, which suggests a modest measure of concurrent validity. We anticipate that the MedMaIDE may capture more with respect to medication management than just counting pills in a 30-day period. Divergent validity was shown in lower correlations between the MedMaIDE and both the ADL (r = 0.13) and MMSE scores (r = −0.44).

In regression analyses, 27% of the variance in pill count compliance was accounted for by MedMaIDE deficiency score (p < .001), and the MedMaIDE deficiency score remained a significant predictor of compliance even when controlling for age, gender, education, MMSE, and ADLs (p = .033; see Table 5).

### Discussion

Due to the complexity of an aging population and all of the variables that affect older adults, it is no surprise that two recent review articles noted that in order to improve compliance with medication regimens in older adults living in the community, compliance must be assessed with a valid instrument as well as identifying the reasons for noncompliance. Additionally, the reviews noted that interventions that are then tailored to patients improve compliance more successfully than generalized interventions (Krueger, Felkey, & Berger, 2003; van Eijken et al., 2003). This provides strong support for the MedMaIDE’s potential to identify the reasons for noncompliance and assist with identifying appropriate individualized interventions to improve medication management.

We found the MedMaIDE to be a reliable measure of medication management based on moderate to high test–retest reliability (ICC = 0.93), internal consistency (Cronbach’s alpha = .71), and interrater reliability (ICC = 0.73) measures. Compared to a pill count compliance method, the MedMaIDE was highly specific and predictive of compliance and had additional predictive value even when controlling for functional and cognitive status. Although the MedMaIDE had lower sensitivity related to the pill count compliance measure, this is probably due to the fact that the MedMaIDE captured a broader spectrum of issues related to medication-taking behaviors. The strong relationship between the two measures does show concurrent validity. The MedMaIDE’s associations with pill count compliance were independent of the effects of age, gender, ADLs, and MMSE status.

In our sample of 50 community-dwelling, self-medicating participants who were 65 years old or older, 70% had one or more deficiencies in medication management on the MedMaIDE. The pill count found approximately 30% of the sample to be noncompliant (i.e., taking less than 80% of prescribed medications over a 30-day period), which is consistent with the literature (van Eijken et al., 2003) even in this relatively high-functioning group of older adults.

### Table 4. Reliability and Validity of the MedMaIDE

<table>
<thead>
<tr>
<th>Test</th>
<th>MedMaIDE Score (0 vs 1+)</th>
<th>MedMaIDE Score (0–1 vs 2+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>Test–retest (interclass correlation) 0.93 (0.02)</td>
<td>Interrater (intraclass correlation) 0.74 (0.12)</td>
</tr>
<tr>
<td></td>
<td>Internal consistency (.71) (Cronbach’s alpha)</td>
<td></td>
</tr>
<tr>
<td>Validity</td>
<td>Sensitivity</td>
<td>Specificity</td>
</tr>
<tr>
<td></td>
<td>80.0</td>
<td>44.4</td>
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<tr>
<td></td>
<td>68.0</td>
<td>83.3</td>
</tr>
<tr>
<td>Positive predictive value</td>
<td>.65</td>
<td>.60</td>
</tr>
<tr>
<td>Negative predictive value</td>
<td>.83</td>
<td>.66</td>
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</table>

**Notes**: MedMaIDE = Medication Management Instrument for Deficiencies in the Elderly; SE = standard error.
small study exemplifies why medication management assessment is so important. The MedMaIDE identified more cases with potential medication problems than did the pill count, cases that could eventually lead to serious adverse events if left undetected.

The study sample was small, and the data are not generalizable to all older adults living in the community. Participants were taking a higher number of medications on average than what has been reported in the literature, but they were responsible for managing these medications on their own. There was little variation in MedMaIDE deficiencies in two of the three domains. This sample was also cognitively intact, on average, yet more than half of the sample was noncompliant with their medication regimens. There could also be other potential confounding variables affecting compliance not controlled for in the regression analysis, although we did control for the five items known to be predictors. A particular strength of the study was the almost equal proportions of White and Black participants.

Another limitation may be the use of pill count compliance. Many methods are available to measure medication compliance among elders, yet there is no gold standard measurement of medication compliance, and all methods (including self-report, serial drug plasma concentration measurement, prescription refill rates, and electronic container monitoring) have potential problems (MacLaughlin et al., 2005; Rudd, Ramesh, Bryant-Kosling, & Guerrero, 1993; Waight, 1993). Frequently, the patient self-reports adherence, which calls into question the accuracy of the data; other modalities such as pillboxes, refill patterns, and electronic monitoring systems have also met with limited success. Assessing blood levels is often not practical and is considered invasive. Investigators have noted that pill counts can be unreliable for assessing compliance (either underestimating or overestimating compliance) and that they have only a moderate correlation with electronic monitoring devices (Choo et al., 1999; Grymonpre et al., 1998; MacLaughlin et al., 2005).

However, in a majority of studies, compliance assessment was conducted on only a single type of drug, because many of these modalities are not feasible when assessing an entire drug regimen with multiple medications. Therefore, we chose to use the pill count method as the gold standard because it can be applied to an entire regimen, and we tried to eliminate behavior to defeat the pill count by telling the participants only that their pills were being assessed.

Optimal use of medications in the elderly population remains elusive. The growing number of community-dwelling older adults with functional limitations is likely to further increase the demand for interventions that utilize caregivers. A study of family caregivers’ medication administration experiences reported that administration issues and concerns were consistent with the frustrations and stresses of daily hassles found in the caregiving literature (Travis, Bethea, & Winn, 2000). In one study, medication-related tasks accounted for 7.7% of the total caregiving time, yet they contributed substantially to caregivers’ stress, with 10 caregivers (32%) reporting problems directly related to medications and 6 (19%) and 16 (52%), respectively, reporting problems in managing the drug regimen currently or within the past year (Ranelli & Aversa, 1994).

Measures are needed to provide older adults and the people who care for them with the necessary tools to minimize adverse events attributable to poor medication compliance. Future studies should investigate whether the MedMaIDE has greater predictive power in preventing adverse events, such as hospital admissions. Future studies should also include a larger sample with a broader range of medication management limitations and a range of cognitive impairments. The MedMaIDE can identify medication management deficiencies surrounding administration, knowledge, and access by non-healthcare professionals, namely the caregivers. The MedMaIDE provides a vehicle for improving medication management by empowering caregivers in the assessment process; providing information on possible interventions needed to improve medication management; reducing caregiver stress and hassles; and facilitating communication between patients, their families, prescribers, and other health care providers through the use of a standardized assessment instrument.

References


Appendix A

Medication Management Instrument for Deficiencies in the Elderly (MedMaIDE)

**What a Person Knows About Their Medications**

Have the individual...

**1.** Name all the medications taken each day, including prescription and over-the-counter medications (including milk of magnesia, nutritional supplements, herbs, vitamins, Tylenol, etc.).

**2.** State the time of day that each prescription medication is to be taken.

**3.** Tell how the medications should be taken (by mouth, with water, on skin, etc.).

**4.** State why he/she is taking each medication.

**5.** State the amount of each medication to be taken at each time during the day.

6. Identify if there are problems after taking the medication (i.e., dizziness, upset stomach, constipation, loose stool, frequent urination, etc.).

**7.** Do you get medication help from anyone?
   If YES, from whom? Type of help?

**8.** What other medications do you have on hand or available (i.e., eye drops, creams, lotions, or nasal sprays that are outdated, unused or discontinued)?

**If a Person Knows How to Take Their Medications**

Ask the individual to...

**1.** Demonstrate filling a glass with water.

**2.** Remove top from medication container (vial, bubble pack, pill box, etc.).

**3.** Demonstrate counting out required number of pills into hand or cup.

**4.** Demonstrate administering the medication (e.g., put hand with medication in it to open mouth; put hand to eye for eye drops; hand to mouth for inhaler; draw up insulin; or place a topical patch).

**5.** Sip enough water to swallow medication.

Record how the medications are currently being stored.

**If a Person Knows How to Get Their Medications**

Have the individual...

**1.** Identify if a refill exists on a prescription.

**2.** Identify whom to contact to get a prescription refilled.

**3.** Explain resources to obtain the medication (can arrange transportation to pharmacy, pharmacy delivers, family picks it up, etc.).

4. After getting a new refill, do you look at the medication before you take it to make sure it is the same as the one you finished?

5. Do you have a prescription card?  
   Yes No
   Do you use your prescription card?  
   Yes No
   If YES, specify type:

6. Are there medications that you need that you cannot obtain?  
   Yes No
   If YES, ask person to explain.

If NO, it is counted as a 1 in the Deficiency Score.

**TOTAL DEFICIENCY SCORE:** (sum of three deficiency scores: maximum total score = 13)

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Appendix B

Medication Inventory

<table>
<thead>
<tr>
<th>MEDICATION NAME</th>
<th>DOSAGE</th>
<th>TIME(S) OF DAY TAKEN</th>
<th>EXPIRATION DATE</th>
<th>PHYSICIAN’S NAME/PHONE</th>
<th>PHARMACY NAME/PHONE</th>
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