Using Daily Routines to Promote Medication Adherence in Older Adults

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PURPOSE. To understand the medication routines used by older adults taking four or more medications daily.

METHOD. One hundred forty-nine community-dwelling older adults were interviewed about the individual routines, storage locations, equipment, and assistance that enabled their adherence to a medication regimen. A subsample of 84 older adults was observed completing one medication routine in their home environments.

FINDINGS. Medication habits were embedded in mealtime, wake-up, and sleep routines for 91% of the sample. Participants developed unique, individualized behaviors for taking medications that were choreographed within broader daily routines. The primary locations for storing medications were the kitchen and bathroom. Equipment used to promote adherence was primarily pillboxes or self-made adaptations. More than 50% of the entire sample required some type of assistance related to medication adherence.

IMPLICATIONS. Findings support the role of occupational therapists in collaborating with clients to develop individualized medication routines to promote medication adherence.

In the United States, more than half of adults ≥65 yr old take at least three to four medications daily to treat chronic conditions and age-related changes in physical and emotional health (National Center for Health Statistics, 2011). Proper usage of medications has been associated with improved health, increased functional status, decreased risk of falls, improved cognition, and driver safety for older adults (Classen, Mann, Wu, & Tomita, 2004; Lococo & Staplin, 2006). However, an estimated 50%–75% of all adults do not take medications properly, resulting in more than 125,000 deaths each year (Wertheimer & Santella, 2003). Occupational therapists promote medication adherence as a self-care occupation, particularly in home- and community-based settings, where individuals typically manage their own medications (American Occupational Therapy Association [AOTA], 2008). However, few occupational therapy studies have closely examined medication management for older adults in home environments. Radomski (2011) underscored the paucity of occupational therapy research dedicated specifically to strategies that promote adherence in all aspects of occupational therapy.

This study addressed one aspect of medication adherence: nonintentional medication nonadherence, also called episodic nonadherence. Nonintentional medication nonadherence refers to forgetting to take medications on a particular day at the appropriate time (Ryan & Wagner, 2003). Many studies have examined strategies to promote medication adherence, including specialized equipment, social support, improved physician communication, medication instruction redesign, and motivational interviewing. However, systematic reviews have indicated that no strategies are deemed more effective than others.
deficits may increase older adults’ difficulty in developing an individualized medication-taking plan called *intentional interventions*, which linked intention to take medications with an environmental cue. Researchers found that medication adherence was 50% greater for the group using intentional interventions than for the control group, suggesting that participants may have transferred medication adherence from a time-based task (performed according to the specific hour) to an activity-based task (performed around a regularly occurring activity or event), which has fewer cognitive demands (Park, Morrell, Frieske, & Kincaid, 1992).

Qualitative studies have recently investigated the use of daily routines in managing medications. Ryan and Wagner (2003) found that people who were HIV sero-positive took medications around established daily meals, TV shows, or hourly schedules. Ruppar and Russell (2009) and Tordoff, Simonsen, Thomson, and Norris (2010) discovered the widespread use of daily routines for managing medications among community-dwelling older adults. Tordoff, Bagge, Gray, Campbell, and Norris (2010) found that 92% of a sample of 524 older adults in Australia relied on these medication routines for adherence. Challenges in adherence rose when medication was not related to overt symptoms (i.e., high blood pressure), when routines were changed, and when manipulating packaging was difficult (opening foil packing or spilling eye drops; Granas & Bates, 2005; Roth & Ivey, 2005).

Occupational therapy investigations in medication adherence have focused primarily on difficulties in taking medications and unique interventions for adults. Wisher (1991) developed an assistive device to facilitate placing eye drops for adults with upper-extremity physical limitations. Yuen (1993) explored an individualized educational approach to improve nonadherence in a 36-yr-old woman with a brain tumor. Andiel and Liu (1995) reviewed models of working memory and suggested that deficits may increase older adults’ difficulty in developing and following a medication schedule. Baum et al. (2008) found significant functional differences in medication management among adults ages 43–75 who had sustained a mild or severe stroke compared with adults who were healthy. Pyatak (2011) found that routines were critical in a college student’s management of diabetes. Stable academic schedules increased consistency in both medication and eating habits for this young adult.

Radomski and Davis (2002) explained that *routines*, defined as clusters of semiautomatic habits, increase the efficiency of regular performances because of the minimal demand on cognitive processes, such as memory and decision making (AOTA, 2008; Radomski & Davis, 2002). Wood and Neal (2007) explained that habits embedded within routines are an automatic response to a cue (or trigger) such as being in the location in which the habit is typically performed, completing an action that precedes the (new) habit, or seeing a person who is typically present during the execution of the habit. Direct cues help create mental representations between the context and the response to promote the automatic behaviors (e.g., a person sees the pillbox and takes medications). Although the literature has substantiated the value of daily routines for medication adherence in the general population of adults, no studies have described the unique routines established by older adults and how routines are embedded in their daily lives.

**Purpose and Research Question**

The purpose of this study was to describe the medication adherence strategies used by a sample of community-dwelling older adults. Medication adherence strategies refer to the methods older adults use to remember the timing of medications, location, dosage, and the equipment or supports needed. The main research question was, “How do community-dwelling older adults taking four or more medications adhere to a daily medication regimen?”

**Method**

We used a phenomenological study design to understand the individualized components of each person’s medication-taking process. Semistructured interviews were conducted with older adults in their homes. After the interview, a subsample of older adults was observed performing one complete medication-taking routine at a particular time of the day.

**Participants**

One hundred forty-nine community-dwelling older adults were invited to participate in the study. Inclusion criteria for the study were being ≥50 yr old, speaking English,
taking four or more medications on a long-term basis, and living independently at home or in a retirement community. Similar to George et al. (2008), adults 265 yr old were targeted for the study, but those between ages 50 and 65 were not excluded.

Medication Adherence Interview
A semistructured interview was developed for the purpose of this study. The interview consisted of open-ended questions related to participants’ daily medication dosages, frequency of taking medications, cost, and self-reported adherence. Closed-ended questions addressed participant demographics related to living situation, marital status, education, and perceived health, using tick lists and ordinal-level questions. For the semistructured interview, participants were asked to describe their specific habits and routines for taking medications throughout the day, including the time, location, and decision-making process for choosing a location and how medication habits were embedded in their larger daily patterns. Participants were also asked about assistance needed for taking medications and special modifications or equipment used. Examples of interview questions were, “How do you remember when to take your medications?” and “Can you tell me about any devices you use to help take your medications?” The interview was piloted on 5 older adults before use in the study. Few changes were made in the wording on the basis of pilot study feedback.

Data Collection
Participants were recruited through personal contact with researchers using a purposive sampling approach. Graduate and upper-level occupational therapy students in pharmacology and older adult classes from spring 2010 and 2011 collected data for the study. Student researchers underwent training in interviewing techniques, observation, and writing field notes. Graduate students participated in a lecture on geriatric pharmacology, observed videotaped medication interviews, and practiced interviews on each other using member checking for validation.

Each student researcher interviewed 1 older adult for 45 min–1 hr and recorded narratives for each question on an interview sheet. For observations, students scripted one entire medication-taking process, including the time, environmental surroundings, location of medications, equipment, sequence of activities, broader daily routines, and personal assistance from others. These observations and quotes were written verbatim as field notes and then typed immediately after the session.

Data Analysis
Demographic data were analyzed using descriptive statistics. Interview responses were categorized according to the following content domains: time to take medications, pill location, equipment used, broader routine, decision-making process, and assistance needed. These categories were established a priori from a review of the literature. Narrative data from interviews were coded and entered into a spreadsheet under each domain; common themes among data were then identified. Observations were triangulated with interviews as follows: The first author (Martha J. Sanders) read field notes and checked for consistency with interview data, then content within categories was expanded as unique data emerged from the field notes. In some instances, additional themes were developed within a category. The second author (Tracy Van Oss) blindly read the field notes, verified the additional themes, and compared her findings with those of Sanders. Consensus was reached for all themes in each category (Bogdan & Biklen, 1982).

Because common responses existed among participants, we were able to identify the frequency of each theme in the coding table and analyze it quantitatively (Trochim, 2001). Findings are reported as percentages, which identified the strongest themes and most common behaviors among participants.

Qualitative Rigor
We ensured trustworthiness and dependability of information by using multiple data collection methods to gather and triangulate information. Students followed specific procedures to engage older adults in dialogue about their lived experiences, summarized the information, and then completed member checks with each informant to ensure the credibility of the data. The process of the two authors independently reviewing and then comparing findings on related content domain themes promoted confirmability of findings (Bogdan & Biklen, 1982; Creswell & Clark, 2007; Trochim, 2001).

Findings

Sample Demographics
One hundred forty-nine older adults participated in interviews, and a subsample of 84 older adults were observed completing medication habits in their home environments. The mean age of the sample was 70.42 (median = 74, range = 51–98, standard deviation = 14.97). As described in Table 1, most of the sample was retired, married or widowed, and living with a spouse or
living alone. Most participants perceived their health to be average or better. Ninety-six percent of the sample reported taking medications 100% of the time (an adherence statistic that should be interpreted cautiously because it is based on self-report). Participants reported taking a mean of 59.6 pills per week (range $528–224$), or 8.5 pills per day, a rate higher than the national average (almost 50% of older adults take three or more medications daily), possibly as a result of the inclusion criteria (National Center for Health Statistics, 2011).

### Timing and Location for Taking Medications

**Timing for Taking Medications.** Most participants (91%, $n = 136$) used activity-based methods to remember when to take medications. Older adults most commonly planned medications around mealtimes (71%, $n = 106$) and wake-up or bedtime routines (52%, $n = 77$; see Table 2 for complete findings). A 71-year-old woman who was widowed and lived with a family member stated, “I take meds with each meal of the day . . . it is so ingrained in me that neither my family nor I really worry about forgetting to take them.” A 70-year-old widowed man was observed taking medications during breakfast. He explained, “I get up in the morning, have a cup of coffee and cereal, sit on the porch, and take my medicine with OJ.” Another 78-year-old widowed man based his medication regimen around his morning wake-up activities: “I get up, brush my teeth, open my pill box, get my medications, go to the kitchen, drink OJ to help wash down the meds.”

Although few participants described time-based methods to adhere to prescribed medication times (9%, $n = 13$), they still devised environmental cues to remind them of the specific hour for medications such as an alarm clock or TV show. A 67-year-old woman explained, “I take my medication with tea at 11:30, right before Bible devotion and Guiding Light replays.” Participants’ responses illustrated the integral nature of taking medications with activities they commonly performed throughout the day.

**Location and Location Decisions.** The majority of participants stored medications in the kitchen (67%, $n = 100$) and, more specifically, the kitchen counter (57%, $n = 85$) and kitchen cabinet (12%, $n = 18$). They identified even more specific locations as “right next to the coffee maker,” “in front of the microwave,” or “next to the stove,” among others. The bathroom (20%, $n =
pillboxes with a larger font, compartments for 2 wk, and varied colors to denote days. Several participants used higher-tech equipment such as a pillbox with a timer or an audio reminder or a watch with timed vibration as a reminder. However, most had developed low-tech innovations to keep track of pills instead of commercial assists, such as an 82-yr-old woman who kept plastic cups next to the pillbox to hold daily dosages.

A limited number of modifications were used to read dosages and distinguish between medications. Of the participants, 19% \((n = 28)\) had requested large-font labels from the pharmacy or had developed their own tactile innovations such as a rubber band around the pill bottle. A 67-yr-old widowed woman stated, “I use a pillbox planner and keep my pills out on the kitchen counter so I know to take it as soon as I get up. I use the kitchen a lot and won’t forget to take them [the pills] out if I can see them.” Charts to track medication usage, although recommended by physicians, were used by <10% of participants.

**Medication Habits Embedded in Daily, Weekly, and Monthly Routines**

**Daily Routines.** Participants recalled the routines in which medication regimens were embedded without difficulty. However, the home medication observations provided detailed information about the sequence of behaviors that cued participants to take medications within the routine. These behavioral patterns enabled us to appreciate the individual nature of each person’s medication plan and how specific medication habits became contextually embedded with other daily routines.

The most common routines in which older adults embedded medications were breakfast \((64%, n = 96)\), dinner \((45%, n = 67)\), morning hygiene \((40%, n = 59)\), and evening hygiene \((33%, n = 49);\) see Table 2 for a complete list of other routines. Taking medications during these routines enabled participants to meet the dosage instructions \(\text{such as once daily}\) while eliminating the need to remember or consciously think about taking them because medication adherence had become a part of their daily routines.

A 66-yr-old retired woman illustrated the detailed and well-choreographed nature of her medication-taking sequence around breakfast, *Good Morning America* (GMA), and the local weather in an excerpt from the field notes:

She turns on her Keurig coffee maker, retrieves pills from the kitchen cabinet, and sets them on the table. “The coffee takes just 1 minute, so I just double check I have enough pills while it’s brewing.” Once coffee is ready, she pours the coffee, sits down at her kitchen...
table, watches GMA news, and takes the pills at the local weather break.

Another 67-yr-old woman, who took 42 pills weekly, took her medications during her dinner mealtime routine:

Mrs. Smith kept her medications in the center of dining room table since she takes her medications with meals . . . that way she can see them as a reminder. “I take out the pills I need for each meal when I set the table (to help me remember). I take the pills right after I finish my meal before clearing the table with a full glass of water.”

A 55-yr-old woman who took 90 pills weekly described the unique nature of some sequences and explained the specific activity that preceded taking her medications: “I do my inhaler [Flovent] right after I put my rings on and before I leave the house for work.” These passages demonstrate how integral medication habits were to particular daily routines. Each person’s routine included a specific, unique sequence of behaviors that determined the exact timing for integrating the medication-taking habit with other behaviors embedded in the routine.

**Weekly Routines.** Routines included not only daily but also monthly and weekly routines. Weekly routines included counting pills, allocating them for the week, loading pill boxes, and picking up medications from the pharmacy. Many participants noted that they loaded pillboxes on Sundays. A 70-yr-old woman stated, “Every Sunday I sort medications and put them in the pillbox. I take out the pills I need for each meal when I set the meal routines...otherwise it becomes stressful because it is hard [for me] to manage a healthy diabetes diet and the meds. I love french fries but then I have to give myself more insulin after a big dinner.

Several participants had devised special routines for travel, such as having a pillbox next to a coffee cup or next to the toothbrush to serve as a reminder when the larger routine or locations were different. Excerpts from field notes from observation of an 84-yr-old woman who took 91 pills weekly indicated her new routine for going out:

Sometimes, she forgets to take meds if she is not home for dinner; still, when she is out, if she remembers, she will place the pillbox next to her dinner plate, then take each pill out and drink water after dinner. “The only time I use a pillbox is when I go away.”

These passages demonstrate both the challenges in medication adherence and the stress involved when trying manage medications away from the typical location and typical daily schedule.

**Discussion**

This qualitative study described the medication habits and routines that 149 older adults developed for taking four or more medications daily. Most participants (91%) used activity-based methods to remember to take medications, relying on mealtime and wake-up or sleep times as the primary activities around which medications were planned. Participants embedded medication habits within broader daily routines of breakfast (64%), dinner (45%), morning hygiene (40%), and evening routines (33%). The primary locations for storing medications were the kitchen, bathroom, and bedroom. Decisions regarding where to store medications were based on proximity to meal routines (41%); morning or evening hygiene routines (19%); or simply in plain sight (41%), using location as a visual reminder. Fifty-one percent of this sample needed some type of assistance in taking medications, even though they were living independently in the community.

A 73-yr-old man with diabetes who worked part time explained his complex medication schedule and described the anxiety caused by a change in routine:

I wake up, go to the cabinet, take a morning pill, eat breakfast, and go to work. At noon, I take one Metformin with water. I come home at 7:00 p.m. and take an evening dose, eat dinner at 9:00 p.m., inject insulin, and go to bed. When I am out of my routine, I’m stressed because my medication routines are messed up. . . . Going out to eat becomes stressful because it is hard [for me] to manage a healthy diabetes diet and the meds. I love french fries but then I have to give myself more insulin after a big dinner.

Interrupted Daily and Medication Routines

Medication adherence was so integral to daily routines that when routines were disrupted, medication habits were also disrupted. Medication habits were interrupted for vacations, appointments, taking a day off work, having a late meeting, sleeping late, or even going out to dinner. One researcher described a participant’s scenario of coming home late from work: “Upon arriving home, Mr. Jones goes straight to master bath, changes his clothes for a walk, then takes meds; if [he] comes home late from work, he loses the routine and skips meds—and he’s a health care provider!”

The researcher also described the unique nature of some sequences and explained the specific activity that preceded taking her medications: “I do my inhaler [Flovent] right after I put my rings on and before I leave the house for work.” These passages demonstrate how integral medication habits were to particular daily routines. Each person’s routine included a specific, unique sequence of behaviors that determined the exact timing for integrating the medication-taking habit with other behaviors embedded in the routine.

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These passages demonstrate both the challenges in medication adherence and the stress involved when trying manage medications away from the typical location and typical daily schedule.
Observations of older adults’ routines demonstrated the unique and individual nature of each person’s medication habits and the semiautomatic sequence of activities in which the medication-taking sequence was embedded. Not only were daily routines critical for adherence, but weekly and monthly routines were also critical for filling pillboxes and ordering medications. Participants used primarily low-tech equipment to assist them, including pillboxes, charts, and a larger font for medication instructions, despite the many devices that are commercially available.

**Research Extended**

Qualitative observations enabled us to understand how the occupation of taking medications is a sequenced habit within a broad routine. In this study, preceding activities and specific locations for medications acted as direct cues for triggering the medication-taking habit (“I put my rings on and then take my medications”; “I put in the coffee filter, start the brew, and take my medications”), as proposed by Wood and Neal (2007). The results of this study extend the findings of Ryan and Wagner (2003), Ruppar and Russell (2009), and Tordoff, Bagge, et al. (2010) by specifying which routines and environmental cues were most commonly used to manage medications. This study mirrored previous findings that 91% of adults used activity-based routines to adhere to medication regimens, and when routines were upset because of life or schedule changes, medication adherence faltered (Tordoff, Bagge, et al., 2010).

**Limitations**

The limitations of this study were the use of self-report for verbal description of routines (based on memory) for participants who were not in the subsample. A further limitation was the difference in interviewing styles among graduate student researchers. Although an interview protocol was followed, some interviews may have been more in depth than others. Finally, the majority of information gathered was descriptive; thus, the findings cannot be generalized to all older adults.

**Implications for Occupational Therapy Practice**

Findings from this study indicate that medication habits need to be individually developed to promote realistic integration of new habits into existing life routines. This finding is consistent with client-centered practice. Evidence has also suggested that clients will need outside assistance with some aspect of taking medications, whether assisting in developing cues, arranging for equipment, assessing the environment, or arranging for monthly refills. These findings substantiate occupational therapy practitioners’ role in developing specific, individualized, concrete plans for integrating medications into daily routines.

Seamon (2002) encouraged practitioners to learn how to promote the acquisition of new habits for clients. Our findings suggest that occupational therapy practitioners must first collaborate with clients to identify the most realistic routine in which a medication habit can be embedded, then identify the location (or social context), and finally identify the cues that will trigger the medication habit. Discussion should include not only the built environment but also the social environment that will support the new habit. On the basis of this study’s findings and the literature, the following process for developing a medication habit is offered:

2. Document the client’s typical daily routines (AOTA, 2008).
3. Identify the specific sequence of activity in which a medication habit can realistically be embedded (Gallimore & Lopez, 2002).
4. Identify the preceding activity, specific location, and support needed for taking medications (Wood & Neal, 2007).
5. Set up the environment to support taking medications (Gallimore & Lopez, 2002; MacDonald, 2002).
6. Try out the new medication habit within the routine (MacDonald, 2002).
7. Appraise the process; make modifications if necessary (Gallimore & Lopez, 2002; MacDonald, 2002).
8. Practice the entire medication habit until automatic.

**Conclusion**

Medication habits that are embedded within daily routines help people structure their daily lives and promote adherence in order to maintain health (AOTA, 2008; Cooper, Letts, Rigby, Stewart, & Strong, 2005). Occupational therapists may promote medication adherence by developing an individualized medication routine collaboratively with clients.

We found the following patterns among the study participants:

- Older adults most commonly embedded medication habits into mealtime and sleep-wake hygiene routines.
• The most common locations for storing medications were the kitchen and bathroom.
• More than 50% of the sample needed some type of assistance with medication adherence.
• Medication habits were individually developed and uniquely choreographed within a broader daily routine.

Future research may investigate the range of behaviors in ingesting medications and, more broadly, the individualized meaning attributed to medication adherence.

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References


