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Medication Management Services Offered in U.S. Residential Care Communities

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Medication Management Services Offered in U.S. Residential Care Communities

Lisa L. Dwyer, MPH; Paula C. Carder, PhD; Lauren D. Harris-Kojetin, PhD

Abstract

Using data from the 2010 National Survey of Residential Care Facilities, this study estimated the percentage of U.S. residential care communities (RCCs) offering selected medication management services (MMS) and examined differences in prevalence by community characteristics. The most common services were central storage for medications and cueing residents, while the least common were administering injections and intravenous medications. Medication reminders, helping residents take medications, and administering drops/topical ointments and injections varied by RCC characteristics. Characteristics most commonly associated with these differences are size, purposefully built status, nursing hours, and availability of a physician or pharmacist to review medication appropriateness. Understanding these MMS variations may benefit clinicians' efforts to achieve medication adherence among RCC patients, and inform policy makers, RCC providers, and consumers.

INTRODUCTION

Medication management services (MMS), which may include receiving medications from a pharmacy, storing and administering medications, record keeping (Garrard, Cooper, & Goertz, 1997), and prescribing and dispensing medications (Center for Excellence in Assisted Living, 2008) are important to elderly, chronically ill, and/or disabled residents of residential care communities (RCCs). Needing assistance with taking medications is often cited as one of the important reasons that individuals move into RCCs (Young et al., 2008). The predominantly elderly resident population in RCCs has multiple chronic health conditions, including some degree of cognitive impairment and dementia that often requires medications for treatment and management (Rosenblatt et al., 2004; Zimmerman et al., 2007; Caffrey et al., 2012). In fact, most residents take, on average, five or more medications (Armstrong, Rhoads, & Meiling, 2001; Sloane et al., 2002). These factors support the assertions of a 1999 GAO report that maintains that medication management is a quality-of-care issue in RCCs (U.S. GAO, 1999). As these communities grow in number—as evident by the 15% increase in the number of licensed RCC beds between 2007 and 2010 (Mollica, Houser, & Ijvari, 2012)—and older persons, their families, advocates, and policy makers seek alternatives to nursing homes, this issue promises to gain increasing attention.

In 2010, there were 31,100 RCCs operating in the U.S. (Park-Lee et al., 2011). The most common type of RCC is called an assisted living community, but regulations and licensure categories vary by state and can include personal care and adult care homes, facilities, and communities; adult family and board and care homes; adult foster care; homes for the aged; and housing with service establishments (Polzer, 2013; Wiener et al., 2010).

Although many RCCs manage medications for the majority of their residents (Young et al., 2008; Hawes, Phillips, & Rose, 2000), the literature shows little information about the specific types of MMS offered by RCCs. Most studies that examine MMS in RCCs have used geographically limited samples (Young et al., 2008; Sloane et al., 2002; Carder, 2012; Gruber-Baldini, 2004; Sloane et al., 2004; Zimmerman et al., 2011). Furthermore, individual state regulations include varying definitions of MMS permitted, the types of staff allowed to administer medications, and staff training/certification requirements for administering medications (Zimmerman et al., 2011; Mitty, 2009; Stefanacci & Haimowitz, 2012). For example, 31 states permit non-nurses to administer medications, and 23 states require a licensed health care provider to administer at least some medications, with six of those states specifying licensed nurses for specific medication types or routes only, including injections (Zimmerman et al., 2011). Variations in how states regulate MMS in RCCs may result in differences in these services offered by RCCs.

Besides state regulations, RCC-level characteristics may contribute to differences in MMS offered and is the focus of this article. The conceptual approach to this analysis is informed by the Donabedian model (1980) of structure-process-outcomes, which asserts that specific organizational structures (e.g., facility type, administrative structure, ownership, staffing type) influence organizational processes (service delivery), which in turn are associated with certain outcomes. This commonly used approach for assessing quality of care based on organizational characteristics (Castle & Ferguson, 2010; Golant et al., 2010; Park et al., 2006; Rosen et al., 2006; Zimmerman et al., 2003) influenced the content of the 2010 National Survey of Residential Care Facilities (NSRCF) and the variables we selected for the analysis. The analysis will focus on only the first two components of the Donabedian model, structure and process. Outcomes that may be associated with the provision or lack of provision of MMS (e.g., adverse events, injuries, hospitalizations) are not reported in this article because our analysis did not include resident-level data.

This article will provide previously unavailable, national-level data about the variation in selected MMS offered by RCCs. Findings may have implications for state regulatory agencies, health care providers, and RCC operators and owners. These findings also can inform future development and refinement of state policies concerning the scope of MMS permitted, staff training or certification requirements, and review of medications by physicians and/or pharmacists.

Method

Study Design and Participants

This study used provider-level data from the 2010 NSRCF, which was conducted by the National Center for Health Statistics of the Centers for Disease Control and Prevention (Moss et al., 2011). The first of its kind in the U.S., the NSRCF is a national probability sample survey that collected data on 2,302 assisted living and similar residential care providers, their staffs and services, and the people they served. Collected between March and November 2010 with an overall response rate of 81%, the data were obtained through in-person interviews with RCC directors and their designated staffs; no interviews were conducted directly with residents. Data were collected on RCC characteristics, such as ownership, number of beds, staffing and services, as well as on resident characteristics, such as demographics, medical conditions, cognitive and physical functioning, and services received. Data on individual state regulations for RCC licensing were not included in this analysis.

Sample Design

The 2010 NSRCF used a stratified two-stage probability sampling design. The first stage was the selection of RCCs from the sampling frame; the data used in this analysis are from the first stage. The second stage was the selection of current residents within eligible, participating RCCs during the in-person interviews. The primary sampling strata of RCCs were defined by size (number of beds) and census region. Within these sampling strata, RCCs were sorted by metropolitan statistical area status and state; a total of 3,605 communities were systematically and randomly sampled with probability proportional to size. Interviews were completed with 2,302 RCCs. The first-stage facility response rate weighted for differential probabilities of selection was 81%, indicating the percentage of all U.S. RCCs represented in the data. More details about the sampling frame, sampling design, and data collection are available elsewhere (Wiener et al., 2010; Moss et al., 2011).

RCCs included in the 2010 NSRCF met the following criteria for survey participation: 1) they had four or more beds licensed, registered, listed, certified, or otherwise regulated by the state to provide room and board with at least two meals daily to serve an adult population; 2) they provided 24-hour care supervision seven days a week; and 3) they provided help with personal care, such as bathing, dressing, or eating, or health-related services (e.g., medication management). RCCs that served severely mentally ill or intellectually/developmentally disabled populations exclusively were excluded, as were nursing homes and hospitals unless they had a unit or wing meeting the above criteria and the residents could be separately enumerated (Wiener et al., 2010).

Analysis

Analytic Sample

All but one RCC in the overall sample of 2,302 cases were used in this analysis, resulting in 2,301 cases and representing 31,100 RCCs nationally. The excluded case had missing data for all RCC variables of interest and, therefore, was not included in this analysis.

Bivariate analyses were performed to examine if the estimates for MMS offered by RCCs differed by key community characteristics. Missing data for the

bivariate analyses ranged from 0.1% to 0.4%. Only cases with responses (i.e., not missing) for both variables of interest were included in the analyses: 2,301 cases for analyses by RCC size, chain status, ownership, dementia/Alzheimer's disease-only or related special care unit (SCU) status, registered nurse (RN) direct care hours per day per resident, licensed practical nurse/licensed vocational nurse (LPN/LVN) direct care hours per day per resident, and physician/pharmacist review for medication appropriateness; 2,299 cases for analyses by years in operation; 2,288 cases for analyses by RCC purposefully built (i.e., originally built to provide residential care services) status; and 2,297 cases for analyses by Medicaid certification status.

Variables

The 2010 NSRCF included survey items on nine MMS that reflect the process of service delivery. These services are the focus of this analysis and are described as follows: central storage (RCC provides central location where medications are stored prior to administration to residents); medication reminders (RCC staff provide medication reminders; for example, prompting residents that it is time to take medications); delivery of prepackaged unit doses (RCC staff deliver prepackaged unit doses to residents); handing medications (RCC staff help with administration of medications; for example, opening the bottle and handing residents the correct dose); helping residents take medications (RCC staff help residents take medications; for example, putting it in their mouth and handing them a glass of water); cueing residents (RCC staff provide oversight and cueing to make sure residents take their medications); as well as administering drops/topical ointments (RCC staff administer drops or topical ointments to residents), injections (RCC staff administer injections to residents), and intravenous medications (IVs) (RCC staff administer IV drugs to residents).

Each RCC respondent was asked if the RCC provided the MMS ("yes" or "no") described previously. All RCC variables included in the analysis, except years in operation, RCCs purposefully built to provide residential care services, and dementia/Alzheimer's disease-only RCC or having a related SCU to serve residents with these conditions, were selected because previous studies suggest they are associated with quality of care in RCCs or in other long-term care settings, such as nursing homes (Castle & Ferguson, 2010; Hawes & Phillips, 2007; Zimmerman et al., 2003; Zimmerman et al., 2005). Variables associated with organizational structure are RCC size (based on the number of beds in the RCC: small (4-10 beds), medium (11-25 beds), large (26 or more beds)); chain status (affiliation or management by a chain, group, or multifacility system: "yes" or "no"); ownership (for-profit, and nonprofit that includes private nonprofit and state, county, and local government); years in operation (number of years RCC has been in operation: less than 5; 5-9, 10-19, or 20 or more years); RCC purposefully built to provide residential care services (RCC originally built to provide residential care services; this is in contrast to single-family homes or other structures that were adopted to provide residential care services: "yes" or "no"); Medicaid certification (RCC is certified or registered to participate in Medicaid: "yes" or "no"); and being a dementia/Alzheimer's disease-only RCC or having a related SCU (RCC only serves adults with dementia or Alzheimer's disease or the RCC has a distinct unit, wing, or floor that is designated as a dementia or Alzheimer's disease specialty care unit: "yes" or "no").

Variables associated with RCC processes are RN direct care hours per resident per day (0 versus more than 0); LPN/LVN direct care hours per resident per day (0 versus more than 0); and physician or pharmacist review for medication appropriateness (RCC has a physician or pharmacist on staff or through a contract with an outside services provider review residents' medications for appropriateness). The variables—years in operation, RCC purposefully built to provide residential care services, and

being a dementia/Alzheimer's disease-only RCC or having a related SCU—were selected to examine if they are associated with providing MMS.

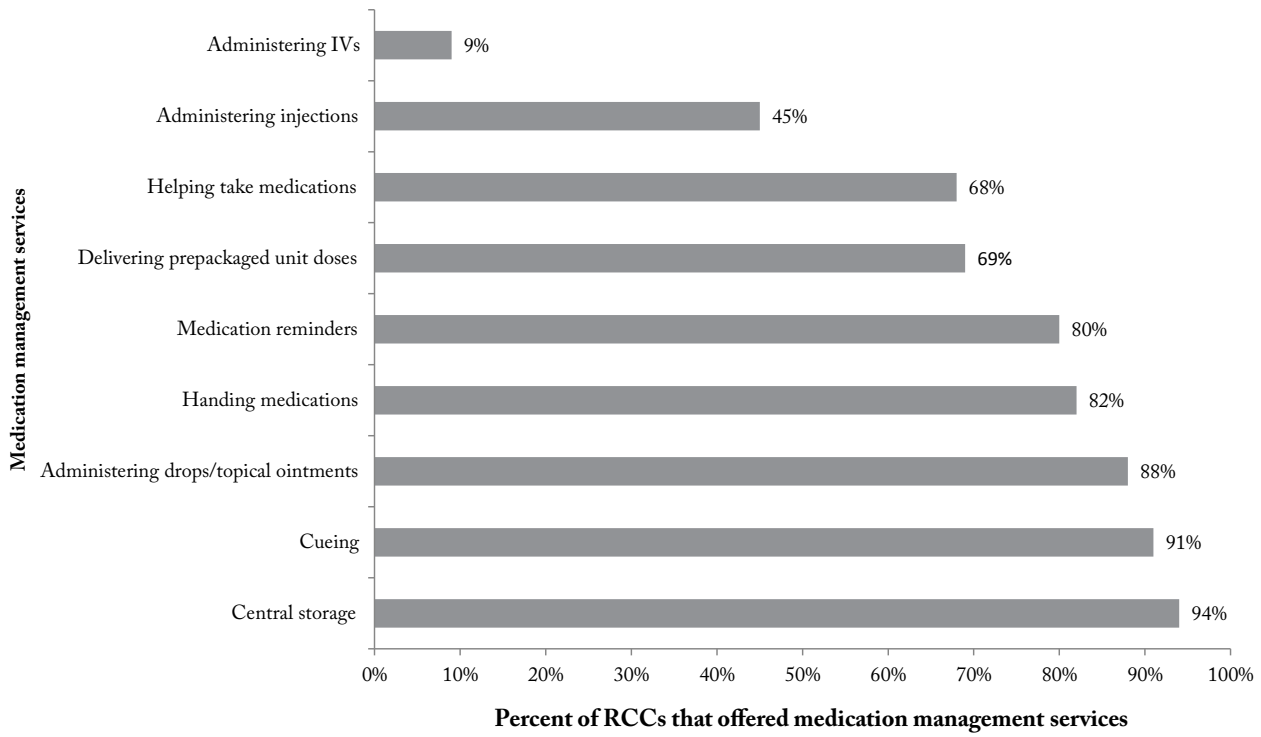
All but three of the aforementioned variables were used as originally collected in the survey. The variable dementia/Alzheimer's disease-only RCC or having a related SCU was created by combining the responses to two survey questions in the 2010 NSRCF: 1) "Does this residential care facility only serve adults with dementia or Alzheimer's disease?"; and 2) "Does this residential care facility have a distinct unit, wing, or floor that is designated as a Dementia or Alzheimer's Special Care Unit?" The responses to these questions were recoded into a single yes/no variable, where "yes" indicates that the RCC either served residents with dementia or Alzheimer's disease exclusively *or* had an SCU to care for persons with these conditions, and "no" indicates that the RCC offered neither of these.

The other two derived variables in the analyses, RN direct care hours per day per resident and LPN/LVN direct care hours per resident per day, were created by taking the total number of hours worked by RNs and LPNs/LVNs at the RCC in the last week, respectively, and dividing them by seven and then by the total number of residents in the RCC. The results were then dichotomized as 0 hours or greater than 0 hours.

Statistical Analysis

Two-tailed chi-square tests were conducted to determine if overall differences in offering these medication services existed by community character-

Exhibit 1. National Estimates of RCCs That Offered MMS by Type of Service.



istics. For *RCC size* and *years in operation*, both with three response categories, the chi-square test showed significant results; therefore, a post hoc t-test was conducted to make pair-wise comparisons between variable subcategories. A *p*-value of < .05 was considered statistically significant for all statistical tests. Analyses were performed using SAS-callable SUDAAN (Research Triangle Institute, Research Triangle Park, North Carolina), which takes into account the complex sampling design and computes accurate standard errors using the design weights. The results section highlights statistically significant findings where the point estimate difference between the comparison groups is 5% or greater. National estimates for all nine MMS are presented in **Exhibit 1**.

Exhibit 2. Percentage Distribution of RCCs by Selected Community Characteristics.

RCC characteristics	*n* = 2,301 (unweighted)	% of RCCs (weighted)
Size (number of beds)		
Small (4-10)	625	50%
Medium (11-25)	654	16%
Large (26 or more)	1,022	34%
Chain status		
Chain	974	38%
Non-chain	1327	62%
Ownership		
For-profit	1772	82%
Nonprofit	529	18%
Years in operation[a]		
< 5 years	360	21%
5-9 years	477	23%
10-19 years	884	36%
≥ 20 years	578	20%

Exhibit 2, Continued. Percentage Distribution of RCCs by Selected Community Characteristics.

RCC characteristics	*n* = 2,301 (unweighted)	% of RCCs (weighted)
Purposefully built RCC[a]		
Yes	1342	49%
No	946	51%
Medicaid certified[a]		
Yes	1121	50%
No	1176	50%
Dementia/Alzheimer's disease-only RCC or has related SCU		
Yes	485	17%
No	1816	83%
RN direct care hours per day per resident		
0 hours	1231	61%
> 0 hours	1070	39%
LPN/LVN direct care hours per day per resident		
0 hours	1331	66%
> 0 hours	970	34%
Physician/pharmacist review for medication appropriateness		
Yes	1655	68%
No	646	32%

[a]*Total number is less than 2,301 because of missing data.*

Results

RCC Characteristics

One-half of responding RCCs in the 2010 NSRCF had 4 to 10 beds, less than 20% had 11 to 25 beds, and more than one-third had 26 or more beds (**Exhibit 2**). Sixty-two percent of communities were not affiliated with a chain, and most were for-profit (82%). More than one-half of communities were in operation for 10 or more years (56%), and roughly one-half were purposefully built as an RCC rather

Exhibit 3. Weighted Percentage of RCCs Offering Selected MMS by RCC Characteristics.

RCC characteristics	Delivery of pre-packaged unit doses	Medication reminders	Handing medications	Helping take medications	Administering drops/topical ointments	Administering injections
Total (*n* = 2,301)	69%	80%	82%	68%	88%	45%
RCC size						
Small (4-10 beds)	69%	84%[a,b]	88%[a,b]	70%	86%[b]	31%[a,b]
Medium (11-25 beds)	68%	75%	78%	66%	85%[b]	52%[b]
Large (26 or more beds)	70%	78%	77%	66%	91%	62%
Chain status						
Chain	72%	79%	81%	68%	89%	51%[c]
Non-chain	68%	82%	83%	68%	87%	41%
Ownership						
For-profit	69%	80%	83%	69%[c]	87%	42%[c]
Nonprofit	70%	81%	81%	62%	90%	59%
Years in operation						
< 5 years	71%[e]	85%	84%	67%	84%	39%[d,e]
5-9 years	72%[e]	81%	82%	66%	87%	42%[e]
10-19 years	71%[e]	79%	81%	69%	89%	47%[e]
≥ 20 years	62%	78%	83%	69%	90%	53%
Purposefully built RCC						
Yes	71%	78%[c]	80%[c]	68%	90%[c]	56%[c]
No	68%	82%	84%	68%	86%	35%
Medicaid certified						
Yes	72%	81%	82%	72%[c]	91%[c]	51%[c]
No	67%	80%	83%	63%	85%	40%
Dementia/Alzheimer's disease-only RCC or has a related SCU						
Yes	77%[c]	77%	81%	75%[c]	91%	59%[c]
No	68%	81%	83%	66%	87%	42%

Exhibit 3, Continued. Weighted Percentage of RCCs Offering Selected MMS by RCC Characteristics.

RCC characteristics	Delivery of pre-packaged unit doses	Medication reminders	Handing medications	Helping take medications	Administering drops/topical ointments	Administering injections
Total (n = 2,301)	69%	80%	82%	68%	88%	45%
# RN direct care hours per day per resident						
0 hours	70%	82%[c]	86%[c]	66%[c]	85%[c]	36%[c]
> 0 hours	69%	78%	77%	70%	91%	60%
# LPN/LVN direct care hours per day per resident						
0 hours	68%	82%[c]	84%[c]	67%	86%[c]	36%[c]
> 0 hours	72%	76%	79%	69%	91%	64%
Physician/pharmacist review for medication appropriateness						
Yes	72%[c]	78%[c]	82%	71%[c]	90%[c]	53%[c]
No	65%	85%	83%	62%	83%	29%

[a]Significantly different from medium communities, p < 0.05, t-test
[b]Significantly different from large communities, p < 0.05, t-test
[c]p < 0.05, chi-square test
[d]Significantly different from communities 10–19 years old, p < 0.05, t-test
[e]Significantly different from communities 20 years or older, p < 0.05, t-test

than licensed as an RCC under a grandfather clause. Similar proportions of communities were Medicaid certified as those not certified. Seventeen percent of communities offered dementia/Alzheimer's disease-only accommodations. Sixty-one percent of RCCs had no RN direct care hours per day per resident, and 66% had no LPN/LVN direct care hours per day per resident. Sixty-eight percent of RCCs had a physician or pharmacist who reviewed residents' medications for appropriateness.

Variation in MMS, by RCC Characteristics

Nearly all RCCs (99.7%) offered one or more MMS to their residents. Seven of the nine analyzed MMS were offered in at least 68% of RCCs: helping residents take medications, delivering prepackaged unit doses, medication reminders, handing medications, administering drops/topical ointments, cueing, and central storage (**Exhibit 1**). Two services, administering of injections and administering of IVs, were offered by less than one-half of RCCs. The availability of MMS varied by RCC characteristics. In Exhibit 3, these services are organized, left to right, from having the least to the most number of RCC characteristics with significant variation. Exhibit 3 does not show results for three of the nine MMS: central storage because there was only one RCC characteristic with significant variation (i.e., ownership); cueing because there were no significant

variations among the RCC characteristics; and administering IVs because the prevalence was too low and cell sizes among the RCC characteristics were too small to provide reliable estimates. (According to NCHS policy for dissemination of estimates, if an estimate is based on 30 to 59 cases, then it is considered unreliable.)

Delivery of prepackaged unit doses was offered by 69% of RCCs and varied by three RCC characteristics. This service tended to be offered more in RCCs that were in operation for fewer than 20 years, were a dedicated dementia/Alzheimer's disease-only RCC or had a related SCU, and offered physician/pharmacist review for medication appropriateness than by their respective comparison groups.

Medication reminders and handing of medications, which had similar overall prevalences (80% and 82%, respectively), had significant variations among the same five RCC characteristics. Specifically, these MMS tended to occur in RCCs that were medium or large, were not purposefully built, reported no RN or LPN/LVN direct care hours/day/resident, and did not offer physician/pharmacist review for medication appropriateness.

Helping residents take medications, offered by 68% of RCCs, varied by five characteristics that differ somewhat from medication reminders and handing of medications. Specifically, helping residents take medications was offered in more RCCs that were for-profit, Medicaid-certified, were a dementia/Alzheimer's disease-only RCC or had a related SCU, had greater than zero RN direct care hours/day/resident, and that offered physician/pharmacist review for medication appropriateness.

Administering medications by drops or topical ointments was the most commonly offered MMS (88%), with significant variations in six RCC characteristics. Specifically, this service was offered in greater proportions of RCCs that were large, purposefully built, Medicaid certified, reported more than zero RN or LPN/LVN direct care hours/day/resident, and offered physician/pharmacist review for medication appropriateness.

Administering injections, the second least common of the MMS (45%), varied significantly in all 10 RCC characteristics examined; additionally, the magnitude of variation was greatest compared to other MMS. Specifically, this service tended to occur in RCCs that were large, chain affiliated, nonprofit, in operation for 20 or more years, Medicaid certified, were a dementia/Alzheimer's disease-only RCC or had a related SCU, were purposefully built, reported more than zero RN and LPN/LVN direct care hours/day/resident, and offered physician/pharmacist review for medication appropriateness. The percentage of large RCCs that offered administering of injections (62%) was twice that of small RCCs (31%). At least 20 percentage-point differences were observed between RCCs that were and were not purposefully built, between those with and without RN and LPN/LVN direct care hours/day/resident, and between those with and without physician/pharmacist review for medication appropriateness.

Discussion

To our knowledge, this is the first article to provide national estimates of selected MMS offered by RCCs in the U.S. The 2010 NSRCF data set permits such analysis. A large proportion of elderly and disabled individuals who live in RCCs require assistance with medications (Young et al., 2008; Stefanacci & Haimowitz, 2012), making this an important public health issue for the RCC industry. Our findings show that RCCs commonly offer a variety of MMS and that these services are distinct. While state regulations, which were not used to adjust for the observed variations in this study, may dictate what specific MMS can be offered in RCCs (Zimmerman et al., 2011; Mitty, 2009), organizational factors may account for variations in some MMS offered (Carder, Zimmerman, & Schumacher, 2009). Four key findings from this study have relevance for prac-

tice, policy, and consumer access to RCCs. First, the availability of the specific MMS examined in this analysis vary by RCC characteristics; some are fairly consistently offered (e.g., delivery of prepackaged unit doses), while others are inconsistently offered, such as administering injections. Second, the presence of health care professionals (i.e., RN, LPN/LVN, physician/pharmacist) is correlated with variability in these MMS offered. Third, small RCCs, constituting one-half of RCCs in the U.S., offer a comparable number of the MMS examined in this analysis to larger communities, with the exception of administration of injections. Fourth, RCCs that accept Medicaid payments on behalf of low-income persons offer comparable MMS to those RCCs that do not.

The significant differences in the availability of MMS by the RCC characteristics examined in this article are noteworthy. For example, administration of medications by injection varied by all the RCC characteristics studied. These findings may be partly explained by the fact that RCC residents may not require medications administered by injection or that some individuals can self-administer or receive assistance with injections from an external health care provider or family caregiver. In addition, because administration by injection may require a higher level of nursing skill or knowledge compared to other MMS, some states place restrictions on this service (Reinhard et al., 2003). The fact that administering injections is offered by less than one-half of RCCs may have implications for prospective residents' access to an RCC and to current residents' ability to age in place should they develop a condition that requires injectable medications.

The availability of medical professionals, including RNs, LPNs/LVNs, physicians and pharmacists, was correlated with variation in MMS offered. A greater percentage of RCCs with at least some RN direct care hours offered help taking medications, administering drops/topical ointments, and administering injections than RCCs with no RN direct care hours. This variation may be attributed to different state RCC regulations and/or Nurse Practice Acts that define staffing requirements and the scope of nurse practice for medication administration services (Reinhard et al., 2006).

Variations based on the availability of physician/pharmacist review were observed for all MMS but handing of medications to residents. Reviewing medications for appropriateness is an important indicator of quality and safety in RCCs (Sloane et al., 2002). We acknowledge that "medication appropriateness" (the term used in the 2010 NSRCF questionnaire) is a high bar for medication review and, in its strictest definition, may not be performed by many communities. Very few states require drug review in RCCs (Polzer, 2013); however, our findings suggest that many communities (68%) do so voluntarily. Furthermore, our results corroborate those from another study, which found that 68% of assisted living residences used a consultant pharmacist, although less than one-half of all states required such use. In this same study, 65% of residences reported having a written policy for medication review (Mitty, 2009). Despite these findings, we lack information about the way that drug review was conducted in RCCs, including frequency and outcome of review, reporting, and follow-up. Furthermore, it is uncertain whether there is an association between drug review and either the types of MMS offered or the impact on quality of care.

Generally, physician involvement in RCCs is limited. Although not a state requirement, some RCCs elect to hire a medical director on staff (Sloane et al., 2011). A recent study of 165 physicians associated with RCCs in 27 states found that physicians had more confidence in RCCs that had nurses on staff to administer medications. In addition, these physicians reported greater difficulty in ordering medications in RCCs than in nursing homes or private homes (Sloane et al., 2011). Because RCC residents may retain their own physicians, physicians and other clinicians who prescribe medications to

patients living in RCCs may benefit from knowing that not all RCCs offer the full range of MMS their patients may need, such as administering medications by injection. Questions remain about what role physicians have in managing medications for RCC residents and how physicians communicate orders with RCC providers, including consultant nurses or pharmacists.

Prior research indicates that smaller RCCs do not offer as comprehensive a range of services as larger settings do (Morgan et al., 2004); however, this study suggests that small RCCs do not differ from larger communities in the prevalence of offering two MMS (i.e., delivery of prepackaged unit doses and helping residents take their medications). Also, a greater percentage of small RCCs than large RCCs offered medication reminders and handing of medications to residents. Because small RCCs do not have the administrative or corporate pressures of larger or chain-affiliated RCCs to follow a specific medication management protocol, one study suggests that small RCCs often have a "very hands-on approach to managing medications" (Ryder et al., 2009). As a result, small RCCs may be able to provide a greater range of MMS than large RCCs, but further investigation is needed to confirm this. The availability of these MMS in small RCCs provides options for consumers who prefer smaller settings and for states seeking to offer a wide range of affordable home and community-based settings (Mollica et al., 2009).

Similar or greater proportions of Medicaid-certified RCCs offered MMS examined in this study as non-Medicaid certified RCCs. This finding is promising for low-income individuals in RCCs who require these MMS.

The percentage of older U.S. adults living with multiple comorbidities, requiring medication assistance, and choosing to live in RCCs continues to grow. The current findings suggest further implications for the RCC industry more broadly. In the current study, more than 65% of RCCs offered each of the following services examined in the 2010 NSRCF: helping residents take their medications, handing residents their medications, providing medication reminders to them, delivering prepackaged unit doses to them, administering drops and topical ointments, cueing them when it was time to take medications, and providing central storage for their medications. These findings confirm previous reports about the importance of medication administration in RCCs (Young et al., 2013). At the same time, more than two-thirds of RCCs in our study had a physician and/or pharmacist review residents' medications for appropriateness, although the literature strongly suggests the need for greater education and training among RCC staff to reduce medication errors (Zimmerman et al., 2011; Woods et al., 2010). In addition to education and training is the issue of care coordination between the prescriber and the RCC staff who administer medications and monitor resident outcomes. Provision of MMS requires effective communication between the prescriber, who is often not affiliated with the RCC, and the RCC staff. One study reports at least one medication discrepancy in the majority of medical records of residents who were discharged from a hospital to an RCC (Fitzgibbon, Lorenz, & Lach, 2013). Additionally, others have suggested more effective communication, including patient (i.e., resident) education, among the prescriber, the RCC staff, and the resident needing the medication to improve medication administration and compliance (Young et al., 2013). The findings from the current study and these points can help inform the continuing discussion about improving medication administration in RCCs.

Limitations

The survey items only asked about whether or not the RCC offered the nine MMS examined in this study. Other MMS, such as crushing pills, use of inhalants, or *pro re nata* (PRN) medications, and communicating with physicians or pharmacists about medication orders, may be important services

for RCC residents. Although the type of MMS is examined, the quality of MMS offered cannot be analyzed or inferred. Furthermore, the findings are based on a cross-sectional descriptive study design; no causal relationships should be inferred between the MMS and the RCC characteristics examined.

Conclusion

Virtually all RCCs offered MMS; however, a minority of RCCs offered injection or IV services. Although we observed variation in the specific MMS offered, the 2010 NSRCF data do not allow us to determine whether the source of variation is due to consumer needs or preferences, RCC management decisions, state regulations, or some other factors; however, the variations among RCCs in the types of MMS offered may be useful to prospective residents, family members, and their physicians as they evaluate RCC options. These findings also may inform future policy to enhance MMS offered to meet consumer needs. Finally, findings from this study can inform future research activities examining health outcomes related to MMS in RCCs.

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