Prescription drug use has increased for all Americans (Martin, 2008). This is especially true for older adults, with this group using approximately 25% of all prescription drugs (Culberson & Ziska, 2008). For many older adults, this has resulted in substantial benefit including improved quality of life and symptom management. However, with increased drug use comes the potential for misuse. Some estimates indicate the prevalence of prescription drug misuse, which includes inappropriate and harmful use of these drugs, may be problematic. For example, inappropriate and harmful use of prescription drugs among older adults may be as high as 17% (Simoni-Wastila & Yang, 2006). Others have predicted that prescription drug misuse among older adults will “rise significantly” (Martin, 2008, p. 941). Nevertheless, it is clear that little is known about prescription drug misuse in older adults, and several calls have been made to address this lack of knowledge (Culberson & Ziska, 2008). This lack of knowledge may be especially true

ABSTRACT
Prescription drug misuse among older adults includes inappropriate and harmful use of these drugs. In this study, prescription drug misuse in assisted living settings as reported by direct care workers (DCWs) was examined. Data came from DCWs in 45 assisted living settings located in Pennsylvania. A total of 944 DCWs completed a questionnaire on their opinions of prescription drug misuse. DCWs believed most assisted living residents take prescription medications. In addition, 10% of DCWs observed or had evidence that residents used unnecessarily high doses, 30% were preoccupied with the cost of prescription drugs, and 26% had problems understanding the complexity of their drug treatment regimens. Prescription drug misuse may be a problem of importance in assisted living settings. Assisted living has experienced rapid growth in capacity, yet the ability of these settings and their residents to manage prescription drugs may not have kept pace with this growth.


Potential Prescription Drug Misuse in Assisted Living
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for older adults residing in assisted living settings. In this research, prescription drug misuse in assisted living as reported by direct care workers (DCWs) was explored.

**BACKGROUND**

Some studies have examined prescription drug issues in assisted living settings. Larrat, Spore, Mor, Hiris, and Hawes (1995) identified that 88.1% of residents take at least one medication, with 23.8% taking seven or more \(N = 2,949\) residents from 10 states). In additional research using the same data, Spore, Mor, Larrat, Hawes, and Hiris (1997) found that residents had an average of 4.6 prescription drugs, but 25% had an inappropriate prescription.

More recently, an expert symposium described many challenges and concerns for medication management in assisted living, including adverse events, drug interactions, and medication errors (Center for Excellence in Assisted Living, 2008). Mitty et al. (2010) described the issues involved in DCWs administering medications to assisted living residents. This description includes the varied state and legal structures that surround this practice (Mitty et al., 2010). Using a sample of 12 facilities and 4,866 observations, Young et al. (2008) identified a 28.2% medication error rate.

Sloane, Zimmerman, Brown, Ives, and Walsh (2002) found residents \(N = 2,078\) to be taking an average of 5.8 prescription drugs, with 16% of these residents receiving an inappropriately prescribed medication. In additional analyses, Sloane et al. (2004) identified that undertreatment was also problematic. For example, for residents with osteoporosis, 51% were not receiving any treatment for the condition (Sloane et al., 2004). These authors noted that this "is a setting where medication use among older persons has not been carefully examined or well described" (Sloane et al., 2004, p. 2032). Moreover, Young et al. (2008) described medication management as "one of the top quality-of-care concerns in assisted living" (p. 1199).

Examining the potential for prescription drug misuse by older adults may be even more salient given the pervasiveness of assisted living facilities. Assisted living settings currently represent one of the most numerous institutional care settings for older adults. In the United States in 2008, an estimated 40,000 assisted living facilities were in operation and provided care for approximately 1 million older adults (Assisted Living Federation of America [ALFA], 2013).

Care and treatment in assisted living is provided primarily by DCWs. They provide at least 80% of direct resident care (Institute of Medicine, 2001). DCWs’ opinions of prescription drug misuse examined in this research included: (a) the number of prescription refills more or less than prescribed; (b) use of prescription drugs for an indication other than that prescribed by a physician; (c) concurrent use with other medications or alcohol, which may potentiate the effect(s) of the medication(s); (d) problems with medication adherence, such as skipping doses or hoarding drugs, and problems with medication costs; (e) use for inappropriate indication(s); (f) use of unnecessarily high doses; (g) use resulting in declining physical or social functioning; (h) use in risky situations; (i) continued use despite adverse personal consequences; and (j) preoccupation with attaining or using the drug. These issues were examined because they represent areas of concern that currently exist in the prescription drug misuse literature (Culberson & Ziska, 2008).

We acknowledge that this information will be limited in representing these respondents’ opinions (and not necessarily actual prescription drug misuse) and does not represent information that has proven reliability. DCWs may not know the difference between an over-the-counter drug and a prescribed drug. DCWs have no training or formal expertise in use of drugs for an indication other than prescribed; concurrent use with other medications, which could potentiate the effect; use for an inappropriate indication; use of unnecessarily high doses; and use resulting in declining function. That is, DCWs do not prescribe medications and have very little clinical training. Still, most states allow DCWs to directly help assisted living residents with medication administration (Mitty et al., 2010). Moreover, the need for assistance with medication administration (one of the instrumental activities of daily living) is a common reason for assisted living placement (ALFA, 2013). Assisted living care primarily occurs behind closed doors (i.e., the resident’s apartment). Thus, DCWs represent one of the few sources of information for prescription drug misuse. They are advantageously positioned to report an opinion on some issues for older adults under their care. Although not clinically validated, these opinions represent a granular first pass at potential for prescription drug misuse in assisted living settings.

**METHOD**

**Sample Selection**

The assisted living settings used in this research were a sample of convenience due to the location of the research team. That is, facilities in the sample came from eight counties in western Pennsylvania. The counties cover approximately 5,000 square miles, with the city of Pittsburgh as the largest city. In Pennsylvania, these facilities provide
residential beds, serving older adults and people with disabilities who require assistance beyond basic necessities of food and shelter, but not hospital or nursing home care (and exclude boarding homes, rehabilitation facilities, domiciliary care homes, and community group homes) (Pennsylvania Department of Public Welfare, n.d.a).

According to the Pennsylvania Department of Health listings, 385 facilities were in operation in this area when this study began in early 2010. A random sample representing 20% of these facilities was chosen, and of the 76 approached, 45 agreed to participate (response rate = 59%). The University Institutional Review Board approved all of the research activities described in this article.

We provided participating facilities with prepackaged mailing materials. These consisted of sealed envelopes containing the questionnaire (described below), a letter describing the study, and a postage-paid return envelope. We asked participating facilities to distribute these prepackaged materials to all DCWs, including those working full and part time and on all shifts. Reminder follow-up postcards were also given to administrators to distribute to all DCWs after 2 weeks and 6 weeks (Dillman, 1991).

**Instrument Development and Administration**

Information from DCWs working in assisted living came from a survey developed by the authors using: a review of the literature, interviews with assisted living administrators (N = 7), and interviews with DCWs (N = 10). Cognitive interviewing with DCWs (N = 15) was also used to ensure that concepts represented in the instrument were understood. Questions were developed addressing each of the 10 areas of concern in prescription drug misuse listed above. All questions were written to be easily understood by respondents, with Flesch–Kincaid scores of the items all below 11 (Kincaid, Fishburne, Rogers, & Chissom, 1975).

Other sections of the questionnaire asked for DCWs’ personal characteristics (e.g., age) and work characteristics (e.g., number of residents cared for). In addition, an administrator survey was used to determine the assisted living facility’s characteristics and practices with respect to prescription drugs.

**Data Analyses**

DCW response rates were examined to assess any bias from the questionnaire administration process used. Non-response bias was examined using both the characteristics of the assisted living facility and the DCWs. Descriptive analyses are presented for the sample of DCWs and facilities, and this information was compared with national data.

The percentage of residents identified by DCWs as taking prescription medications, over-the-counter drugs, and herbal supplements is provided. In addition, the average number of prescription medications, over-the-counter drugs, and herbal supplements taken (as estimated by the DCWs) are reported.

The questionnaire asked DCWs how many residents they were currently caring for. Then, the questionnaire asked for what percentage of these residents the prescription drug misuse item was applicable. Thus, the results are presented as the percentage of residents cared for by DCWs with the prescription drug misuse characteristics listed. This provides information on the DCWs’ opinion of whether the prescription drug misuse in question has occurred.

Descriptive information on facility practices regarding prescription drugs is also presented, as well as whether DCWs believe prescription drug misuse has influenced residents’ health. The Kappa statistic was high (0.92), indicating close agreement between DCWs in the same facility (i.e., interrater consistency). To account for the nested nature of the data (i.e., DCWs within the same facilities) generalized estimating equations (GEEs) were used. GEEs control for the correlation among observations due to the nested nature of the data (Zeger & Liang, 1992).

**RESULTS**

Table 1 presents descriptive statistics of the DCW sample, along with self-reported characteristics of the facilities in which they worked. Of the 1,755 surveys distributed by administrators, 944 were returned for a response rate of 54%. The response rate varied by facility, ranging from 46% to 78%. No facility characteristics (e.g., ownership, size) were associated with higher or lower response rates.

Characteristics of the sample of facilities and DCWs were not significantly different (t test at p = 0.05) from equivalent characteristics recorded in 2010 state data (Pennsylvania Department of Public Welfare, n.d.b). For example, DCWs were most likely to be approximately 35 years old, female, and have a high school diploma. Compared with national samples of assisted living facilities (e.g., Hawes, Phillips, Rose, Holan, and Sherman, 2003), the sample used in this research was of a smaller size (number of beds). In addition, significantly fewer minority DCWs were included in the current sample compared with the 2004 National Nursing Assistant Survey (Squillace, Remsburg, Bercovitz, Rosenoff, & Branden, 2007).

DCWs’ opinions of drugs used by assisted living residents are presented in Table 2. Most residents were re-
ported to be taking at least one prescription drug (with an average of 6.6 drugs taken). Similarly, most residents were reported by DCWs as taking over-the-counter medications (with an average of 3.8 taken).

**Table 3** presents descriptive statistics regarding prescription drug misuse. Some of the values are notable. For example, the DCWs observed or had evidence that:

- 10% of assisted living residents used unnecessarily high doses of prescription drugs.
- 30% were preoccupied with the cost of prescription drugs.
- 26% had problems with the complexity of their drug treatment regimen.

Facility practices and DCWs’ opinions of resident outcomes are presented in **Table 4**. This shows that more than half (96%) of assisted living settings collect data on residents’ prescription drug use and verify residents’ compliance with the drugs used (51%). However, DCWs (49%) believe that facilities have poor overall medication management.

**DISCUSSION**

Prescription drug misuse in older adults has long been advocated as “a priority area for attention and action” (K.A. Carlson, 1994, p. iii). This is based on the notion that prescription drug misuse has a pronounced negative effect on health, quality of life, and health care costs. However, despite the importance of prescription drug misuse in older adults, very little empirical research exists in this area; this is especially true for assisted living settings.

Despite this lack of information, several characteristics of the assisted living industry (e.g., lack of regulation) and
its residents (e.g., isolation, loneliness) could potentially lead to situations of prescription drug misuse by older adults. With these characteristics of assisted living residents as a backdrop, it may not be surprising that some potential prescription drug misuse (as reported by DCWs) was identified in this research. Ten areas of prescription drug misuse were examined. In all areas, DCWs reported that they had observed or had evidence of misuse. Moreover, some of the numbers reported by DCWs in each of these areas would appear to be significant.

On average, older adults are prescribed between two and seven medications (Jacquescoley, 2008). The current study findings indicate that these rates are higher in assisted living, with DCWs reporting an average of 6.6 prescription medications. With the addition of over-the-counter medications (averaging 3.8) and supplements/herbal medications (averaging 2.4), the quantity of drugs taken by assisted living residents is clearly high and leaves room for issues of misuse.

DCWs report that 29% of residents have problems with mixing medications and 13% have problems with mixing prescription drugs with alcohol. Although DCWs cannot prescribe medications and have limited clinical training, based on their prior experience with caregiving, they may be able to pinpoint problems with mixing medications. Moreover, they have access to (and often complete) the medication administration record. With respect to alcohol use, we have very little information in this area. Some recent research suggests alcohol use is somewhat prevalent in assisted living (Castle, Wagner, Ferguson-Rome, Smith, & Handler, 2012). Therefore, mixing prescription drugs with alcohol may be an emergent issue of concern.

<table>
<thead>
<tr>
<th>Misuse Item (Stem: For residents under your care…)</th>
<th>Observed or Have Evidence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a. Dosage used more than prescribed</td>
<td></td>
</tr>
<tr>
<td>A lot more</td>
<td>15</td>
</tr>
<tr>
<td>A little more</td>
<td>22</td>
</tr>
<tr>
<td>1b. Dosage used less than prescribed</td>
<td></td>
</tr>
<tr>
<td>A little less</td>
<td>11</td>
</tr>
<tr>
<td>A lot less</td>
<td>12</td>
</tr>
<tr>
<td>1c. Resident had a condition which you think was not treated with a prescription drug</td>
<td>21</td>
</tr>
<tr>
<td>2. Use for an indication other than prescribed by a physician</td>
<td>16</td>
</tr>
<tr>
<td>3. Concurrent use with other medications or alcohol which may potentiate the effect(s) of the medication(s)</td>
<td></td>
</tr>
<tr>
<td>Problems with other medications</td>
<td>29</td>
</tr>
<tr>
<td>Problems with alcohol</td>
<td>13</td>
</tr>
<tr>
<td>4a. Problems with medication adherence and compliance such as skipping doses or hoarding drug</td>
<td></td>
</tr>
<tr>
<td>Problems with skipping doses</td>
<td>11</td>
</tr>
<tr>
<td>Problems with hoarding drug</td>
<td>15</td>
</tr>
<tr>
<td>Problem with complexity of drug treatment</td>
<td>26</td>
</tr>
<tr>
<td>4b. Problems with costs of medications</td>
<td></td>
</tr>
<tr>
<td>Very problematic</td>
<td>26</td>
</tr>
<tr>
<td>Somewhat problematic</td>
<td>31</td>
</tr>
<tr>
<td>5. Use for inappropriate indication</td>
<td>17</td>
</tr>
<tr>
<td>6. Use of unnecessarily high doses</td>
<td>10</td>
</tr>
<tr>
<td>7. Use resulting in declining physical or social functioning</td>
<td>13</td>
</tr>
<tr>
<td>8. Use in risky situations</td>
<td>12</td>
</tr>
<tr>
<td>9. Continued use despite adverse personal consequences</td>
<td>21</td>
</tr>
<tr>
<td>10. Preoccupation with attaining or using the drug</td>
<td></td>
</tr>
<tr>
<td>Preoccupation with attaining prescription drugs</td>
<td>20</td>
</tr>
<tr>
<td>Preoccupation with using prescription drugs</td>
<td>24</td>
</tr>
<tr>
<td>Preoccupation with cost of prescription drugs</td>
<td>30</td>
</tr>
</tbody>
</table>

As reported by direct care workers (N = 944).
Medication adherence would also seem to be problematic. Skipping doses (11% of residents) and hoarding drugs (15% of residents) were reported by DCWs, in addition to residents’ having problems with the complexity of their prescription drug treatment (26% of residents). That this should occur in an institutional setting such as assisted living is perplexing. That is, assisted living settings exist, to some degree, to help with resident care. Quality assurance activities in this area by assisted living providers may be useful.

The data may provide some clues as to why the rates reported were somewhat low for levels of medication adherence. Residents may view the cost of prescription drugs as high (26% of residents, as reported by DCWs), in addition to potentially not understanding the complexity of their drug treatment regimen (26% of residents, as reported by DCWs). Further clues as to why these reported rates of adherence are somewhat low come from the items related to facility practices. Training in this area would appear deficient in many facilities, as DCWs described medication management training as poor in 52% of facilities.

Medication management training for staff may be especially important. For example, signs of potential prescription drug misuse (e.g., falls, automobile accidents, forgetfulness, high blood pressure, mood swings, speech problems, tiredness, isolation, changes in behavior) can be included in training. Currently, DCW training is minimal. Some training requirements for assisted living exist in some states, but these are almost always less stringent than the already low provisions for nursing homes (i.e., completing 75 hours of training and passing a competency examination).

The resident outcomes estimated by DCWs may also be significant. With estimated rates of prescription medication overuse (27%) and approximately 1 million older adults residing in assisted living (ALFA, 2013), this equates to potentially approximately 270,000 older adults overusing prescription drugs. A much more granular approach to examining overuse is needed. For example, using the Beers (1997) criteria to report on potentially inappropriate prescription drug use may be warranted.

Undertreatment (21%) and underuse (23%) equate to potentially approximately 210,000 undertreated residents and 230,000 underusing prescription drugs. These findings seem to verify what Sloane et al. (2004) noted, that undertreatment may be a problem of equivalent magnitude to overuse of prescription drugs. These estimated rates indicate that further research on prescription drug misuse in assisted living may be useful, as adjuvant services may be needed in this area for the protection of older adults’ health.

LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

As noted above, one limitation is that the information reported comes from DCWs and not directly from older adults in assisted living. Our findings represent the opinions of these DCWs and are presented as a first pass at potential prescription drug issues in these settings. Still, the questionnaire asked for information for which DCWs “observed or have evidence,” so an argument could be made that the estimates provided may be conservative and represent an underestimation of the potential prescription drug issues in assisted living settings. Interviews and screening of older adults should be part of a future research agenda in this area.

A number of factors can lead to prescription drug misuse including miscommunication between older adults and
health care providers, deficits in comprehension of medication instructions, forgetting to take prescriptions (i.e., nonadherence), combining medications (i.e., drug-drug interactions), and decreased disclosure of symptoms, other medications, and other abusive behaviors (e.g., alcohol abuse) (K.A. Carlson, 1994; Meyer, 2005). All of these clearly represent limitations of this research, meaning that the reasons for prescription drug misuse cannot be identified.

In addition, patterns of misuse may occur at the facility level. These may be related to management, organizational policies, or clinical capabilities. These facility-level patterns are not examined here, but some of these factors may represent fertile areas for further research. For example, identifying appropriate staffing patterns or policies could be useful in identifying best practices.

Older adults may also have contraindications for some prescription drug use, may have had adverse events associated with certain medications, and may have intolerance to others. These factors could lead to an inaccurate observance of prescription drug abuse. Other reasons that can lead to inaccurate perceptions of prescription drug abuse go beyond the older adult. These include medical decisions and family preferences. It is unlikely that DCWs answered our questionnaire taking these medical decisions and family preferences into consideration, if indeed they were aware of them.

While older adults rely on a number of prescription medications, psychoactive drugs are often seen as potentially the most problematic drugs (Meyer, 2005). They can cause problems both physically (e.g., falls) and mentally (e.g., cognitive impairment) (K.A. Carlson, 1994). The prescription medications most commonly abused by older adults are benzodiazepines and narcotics (Meyer, 2005), which are commonly used in assisted living settings. However, this represents a further limitation of this study, in that we cannot determine which drugs are used by the older adults and which are most problematic.

Some limitations can also occur in the survey process. Administrators were asked to distribute survey materials to all DCWs. However, we have no way of knowing if any bias (e.g., coercion) exists. Moreover, for some items, DCWs may have responded in a socially desirable manner, for example, indicating less problems with medication management.

States use various names for what is commonly called “assisted living.” Alternative terms include board and care, residential care, personal care, and congregate care (E.M. Carlson, 2007). Some of the services provided and regulations governing care also vary by state (Zimmerman & Sloane, 2007). Further, as others have noted, varied state and legal structures exist for the practice of DCWs administering medications to assisted living residents (Mitty, 2009; Mitty et al., 2010; Reinhard, Young, Kane, & Quinn, 2006). These state variations may influence DCWs’ opinions of potential prescription drug issues in assisted living settings. Thus, the findings presented may not be readily generalizable to other states and may not be representative of these assisted living-like settings in other states.

CONCLUSION

Although the research presented here provides granular information, and several limitations of this research are noted above, the findings nevertheless present tentative evidence that despite past research highlighting prescription drug misuse (Center for Excellence in Assisted Living, 2008; Mitty et al., 2010; Young et al., 2008), this may still be a significant concern in assisted living. Our findings show that high doses of prescription drugs, understanding of the use of these drugs, and their costs may be important issues.

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