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## Feature Article

## A nurse practitioner led protocol to address polypharmacy in long-term care



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## ABSTRACT

Polypharmacy is common in long term care facilities and frequently associated with poor outcomes. This study sought to determine if a medication management protocol completed at four month intervals by nurse practitioners (NP) could impact polypharmacy and administration times for long term care residents. The data was collected as part of a Centers for Medicare and Medicaid Services (CMS) "Initiative to Reduce Avoidable Hospitalization among Nursing Facility Residents" grant. Residents were recruited from participating long-term care facilities. NP completed a medication management protocol on admission to the program and at subsequent 4-month intervals or with an acute change in condition. A total of 2442 non-duplicated individuals were seen for at least 1 visit. Although the protocol did not result in a reduction of regularly scheduled medications, the number of scheduled medication administration times did significantly decrease. NP polypharmacy assessments and recommendations are important but were insufficient to decrease the medication burden.

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## Introduction

"Less is more," and "Too much of a good thing" are well known life quotes that can also be associated with the challenge of polypharmacy for older adults. As both age and the number of chronic diseases increase so often does the list of prescribed medications. International research has validated the phenomenon to be especially troublesome for older adults residing in nursing homes.<sup>1</sup> Strong associations with negative clinical consequences have also been noted for polypharmacy including inappropriate prescribing and medications<sup>1,2</sup> as well as medications that are not clinically indicated or are no longer affective.<sup>3</sup>

Although polypharmacy often refers to a quantity, it can also be qualitatively defined as using multiple drugs or more than are medically necessary.<sup>1,5</sup> Documented range definitions from five<sup>4</sup> to nine or more are common<sup>5–7</sup> Although the definitions may vary the outcomes are similar. In a systematic review of 48 studies, researchers noted that the total number of medications (polypharmacy) was consistently found to be the main driver for the phenomenon of inappropriate prescribing.<sup>2</sup> It is also associated with increased all-cause and potentially avoidable hospitalizations.<sup>8,9</sup>

The challenges of therapeutics in long term care is complicated by polypharmacy and the associated factors of adverse drug interactions, potentially inappropriate medications, and therapeutic

duplication.<sup>6,10–14,37</sup> Frailty, physiological changes of aging, and disease burden result in increased vulnerability and jeopardy.<sup>6,15</sup> Aggressive medical management of co-morbidities and multiple providers add to the complexity of care in this setting.<sup>16</sup>

The World Health Organization (WHO) defines an *adverse drug reaction (ADR)* as a response to a medicine which is noxious and unintended, and which occurs at doses normally used in man.<sup>17</sup> The use of 9 or more medications has been positively correlated with ADRs in older adult in nursing homes.<sup>12</sup> Polypharmacy has also been associated with an increased prevalence of drug-drug interactions and a worsening of cognitive function for residents of long term care.<sup>18</sup>

The prevalence of potentially inappropriate medications has been noted in more than one in five nursing home residents.<sup>19</sup> Nieves-Perez and colleagues<sup>20</sup> found the number of prescribed and potentially inappropriate medications to be directly correlated. Potentially inappropriate prescriptions have also been found to increase the risk of preventable medications associated hospital admissions.<sup>21</sup>

Polypharmacy affects not only the resident but also the staff processes in long term care facilities. Thomson and colleagues<sup>21</sup> found that time needed for the medication administration process in LTC was significant and increased for nurses unfamiliar with residents. The realities of polypharmacy and staffing challenges may make completing medication passes in the scheduled time periods nearly impossible.

The need to decrease the medication burden in long term care is well accepted. However, the lack of effective interventions to improve the management of medications in the situation has been a reality.<sup>22</sup> In a systematic review of 21 studies related to inappropriate

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medication, researchers concluded that the high prevalence of inappropriate medication use supports the importance for monitoring and that monitoring is endorsed by health professionals.<sup>23</sup> The importance of regular medication review and further inquiry into the risk-to-benefit ratio of prescribing in long term care have been suggested by researchers exploring the association between polypharmacy and complex medication regimens and hospitalization.<sup>24</sup> Prescriber recommendations based on interviews and medications reviews by consulting pharmacy recommendations have been found related to significant alterations in therapy including polypharmacy reductions and decreased high risk medications.<sup>25</sup>

Safe discontinuation of medication(s) requires a thorough plan.<sup>50</sup> Key steps to rational discontinuation plan include the establishing the indication for the action, identification and prioritization of meds to be stopped, and creation of a plan that includes communication and coordination with other providers and the means to monitor effects.<sup>51</sup> Researchers combined the principles of geriatric and palliative care medicine in the creation and use of a step-wise geriatric-palliative algorithm to successfully address polypharmacy.<sup>52</sup> Their interdisciplinary team were able to reduce an average of 2.8 drugs, costs, and acute care transfers without significant adverse effects.<sup>52</sup>

Haque and Zakia<sup>55</sup> demonstrated both the utility of a tool protocol and the value of an interdisciplinary team in a year long study that had positive outcomes including reducing antipsychotic use. The ARMOR (Assess, Review, Minimize, Optimize, Reassess) protocol was augmented with an interdisciplinary team that included director of nursing, a nurse manager, a social worker, an activity director, and the medical director. Noncore members included rehabilitation therapists, consultant pharmacists, dietitians, and certified nurse aides.

Nurse practitioners effectively meet the complex health care needs of older adults in long term care facilities. NPs acting as primary care providers in long-term care facilities have been shown to achieve positive outcomes including improved chronic disease care and to promote functional health and decrease polypharmacy, falls, restraint use, and transfers.<sup>26–29</sup>

The purpose of this descriptive study was to determine if a medication management protocol completed at four-month intervals by nurse practitioners would decrease polypharmacy and administration times for long term care residents.

## Material and methods

Institutional Review Board approval was obtained for secondary analysis of preserved medication management data collected from the “Enhanced Care and Coordination Project” from the Centers for Medicare & Medicaid Services’ (CMS): Initiative to Reduce Avoidable Hospitalization among Nursing Facility Residents, Grant#1E1CMS331085–03–01.

Sample: Fifteen (15) participating long-term care facilities were recruited to participate in the 4-year study. Inclusion criteria was determined by the CMS grant: 1) dual eligible Medicare-Medicaid resident; 2) living in the participating facility for > 101 days; 3) not expected to return home; 4) not expected to transition to facility providing less support. The CMS grant protocol allowed for an “opt out only” enrollment process. Residents who met the inclusion criteria were advised of the program, the process, and the opt out option. Written informed consent was not required because it was a “benefit” program with no costs and no identified risks.

Specified site facilitators provided the project director with a list of eligible residents each month. Letters of introduction/invitation to participate were provided to the resident/family/Power of Attorney and included the following information:

- Participation in the program did not require a change in health care provider, health plan enrollment, nor existing Medicare/Medicaid benefits.

- Benefits of the program included regular and emergent nurse practitioner care, collaboration, medication management, and dental hygienist care.
- The process to opt out of the program initially or at any time during the grant period.

Study Protocol. Five nurse practitioners provided routine and emergent care to study participants. Routine care included completion of the Medication Outcome Monitor (MOM),<sup>32,47</sup> a medication management protocol. The schedule started with admission to the program (program initiation or 101 days in the facility) and was repeated at 4-month intervals or with an acute change in condition. The MOM<sup>32,47</sup> is an evidence-based guideline designed to improve medication oversight and management for older adults living in long term care facilities. The MOM<sup>32,47</sup> was completed using data from the current Medication Administration Record (MAR), resident chart, Minimum Data Set (MDS), and history and physical examination. The polypharmacy section of the Medication Outcome Monitor (MOM)<sup>32,47</sup> is used to record number of medications and medication administration times.

The CMS grant required that the participating resident and primary care provider/medical director relationship not be interrupted by the study interventions. Therefore, a collaborative/consultant model was used for sharing information/suggestions between the NP and the primary care providers/medical directors for decisions regarding medication/treatment changes. Recommendations were communicated via the primary provider’s preferred communication (fax or phone call).

The data collection period began in February of 2013 and ended in September of 2016. At the conclusion of the grant, data from the Medication Outcome Monitor (MOM)<sup>32,47</sup> was de-identified and preserved for secondary analysis.

## Results

Data was securely preserved on an encrypted disk. SPSS 25 was utilized for data analysis. Descriptive and inferential statistics were generated to describe number of reviews, polypharmacy, administration schedules, and recommendations.

Nurse Practitioner Medication Reviews: The MOM<sup>32,47</sup> was completed a total of 10,448 times with a range of 1 to 13 visits on 2442 individual study participants seen for at least one visit. Only 4 individuals (0.16%) opted out of participation at any time. The nurse practitioners collaborated with 364 primary providers/medical directors.

Fourteen (14) facilities enrolled study participants from initiation (Spring, 2013) to completion of the grant period (September 2016). By mutual agreement, 1 facility participated only from the Spring of 2013 until September of 2014: 161 residents (6.6% total enrollees) complete 480 visits (4.6% total visits) with a range 1–5 visits. Table 1 presents the NP visits and completed MOM.<sup>32,47</sup> The years represent individual resident participation rather than calendar grant years. Residents were admitted to the program over the life of the grant. When residents met the inclusion criteria the initial visit was completed and they received revisits every 4 months as long as they remained eligible, did not opt out, and were in a participating facility. Years 1, 2, 3, and 4 in Tables 1, 2, and 3 represent MOM<sup>32,47</sup> completions for the individual participant regardless of whether they were admitted in the first or final years of the grant. Table 1 presents the NP visits and completed MOM.<sup>32,47</sup>

Polypharmacy The mean number of scheduled medications is presented in Tables 2. The initial average of 11.23 showed a slight upward trend until year four. The trends were not statistically significant.

Administration Times: Table 3 presents the number of scheduled administration times. The mean reduction was 0.47 visits

**Table 1**  
Nurse practitioner medication reviews.

Visits	Medication Outcome Monitor Completions
Initial	N = 2442
Year 1 – 4272 completions	
Month 4	N = 1744
Month 8	N = 1400
Month 12	N = 1128
Year 2 – 2228 completions	
Month 16	N = 910
Month 20	N = 718
Month 24	N = 600
Year 3 – 1223 completions	
Month 28	N = 497
Month 32	N = 397
Month 36	N = 329
Year 4 – 281 completions	
Month 40	N = 201
Month 44	N = 71
Month 48	N = 9

**Table 2**  
Polypharmacy: Mean scheduled medications.

Medication Outcome Monitor Completions at 4-month intervals	Scheduled meds		
	Mean Deviation	Range	Standard
Initial (n = 2420)	11.23	0 – 12	4.92
Year 1 (n = 4256)	11.29	0 – 15	5.33
Total Monthly visits 4, 8, 12			
Year 2 (n = 2220)	11.34	0 – 33	5.34
Total Monthly visits 16, 20, 24			
Year 3 (n = 1223)	11.53	0 – 32	5.36
Total Monthly visits 28, 32, 36			
Year 4 (n = 281)	10.92	0 – 25	5.04
Total Monthly visits, 40, 44, 48			

**Table 3**  
Mean daily scheduled medication administrations.

Medication Outcome Monitor Completions at 4-month intervals	Scheduled Times		
	Mean	Range	Standard Deviation
Initial (n = 2313)	3.96	0 – 12	1.54
Year 1 (n = 4091)	3.90	0 – 15	1.48
Total Monthly visits 4, 8, 12			
Year 2 (n = 2140)	3.84	0 – 15	1.94
Total Monthly visits 16, 20, 24			
Year 3 (n = 1123)	3.84	0 – 9	1.31
Total Monthly visits 28, 32, 36			
Year 4 (n = 118)	3.49	1 – 6	1.18
Total Monthly visits, 40, 44, 48			

**Table 4**  
Change recommendations to primary provider/medical director: n = 5476.

Recommendation	N	Percentage	Accepted change
No Change	3517	64.2%	NA
Decrease dose and/or med	925	16.9%	549 (59.3%)
Increase dose and/or med	437	8.0%	57 (13.0%)
Decrease med/dose and increase different med	434	7.9%	302 (69.6%)
Update Labs	163	3.0%	163 (100%)

over the study period. The ANOVA between groups resulted in a mean square of 1.153, an F value of 3.587, and a significance of 0.006.

**Table 5**  
Rationale for medication change recommendations.

1. Dose Reduction Attempt
2. Condition No Longer Present
3. Insufficient Diagnosis
4. Change Goals of Care
5. Change Medication Administration Times
6. Medication on Beers List
7. Other
8. Labs Needed

NP Change Recommendations: As a result of the completion of the MOM<sup>32,47</sup> and/or with emergent visits, the NPs recorded recommendations that are presented in Table 4. Rationale for change recommendations are presented in Table 5. Slightly less than 20% of the time (1959/10,448 times), a recommendation was communicated. Of the recorded recommendations, two-thirds were for no change. For the decreased dose/and or medication, the suggestions were accepted 59.3% of the time.

**Discussion**

As the US Population has increased, the number of Individuals needing long term care has risen.<sup>33</sup> The parallel increase of age and medication usage often results in polypharmacy especially for older adults residing in long term care facilities.

Of the 2442 unique individuals admitted to this study over the 48 month period, nine were seen at four-month intervals for 13 visits. Nearly one in three (29%) of the sample were seen only once. Because admissions continued throughout the 48 months, the exit of one facility may have contributed slightly to the decrease in participants after five visits. Additionally, there were residents that were at the end of a Medicare Part A stay and met eligibility requirements, were admitted to the program, but subsequently either went home or were dismissed to other long term care facilities for permanent residence.

*Effect of nurse practitioner protocol on polypharmacy*

*Polypharmacy*

Polypharmacy was present throughout the course of the study and higher than previous reports in similar populations.<sup>5,6,7</sup> The high percentage of residents that were seen only one or two times may have affected the impact of the intervention since developing relationships with residents, staff, and providers and understanding the context and history of complex medication regimens requires time and building of relationships. The polypharmacy statistics do not take into consideration the medications that were decreased in dose but not discontinued. The impact of multiple providers as well as the addition of medications from after hours or emergent on call providers not familiar with long term care work or individual plans of care could have impacted results. Patient and family preferences also impact changes in medication therapy in long term care.

For this study, NP use of the consultation role rather than working to the top of license in the primary provider role may have contributed to the failure to decrease polypharmacy. Pharmacists have encountered barriers to communication and mixed responses to the consulting pharmacist recommendations for medication therapy management.<sup>38,39</sup>

*Administration times*

Decreasing the number of times that medications are administered is a positive outcome for all stakeholders.<sup>21</sup> Nurses in long term care facilities are expected to pass, apply, and/or insert medications on 15–30 residents and complete the task within 1 hour of the scheduled time. With interruptions inherent in the workplace and

the complexity and vulnerability of the residents, the expectation can be difficult to meet. Success at decreasing the number of medication passes by almost a half (0.47) is significant. This task reduction has the potential to allow nurses greater time to focus on maintaining and promoting quality care. For residents, leisure and quality of life activities are not interrupted. This is also beneficial for decreasing cost of personal protective equipment. By decreasing the number of med passes, risks of COVID-19 transmissions and cost of personal protective equipment also are reduced.<sup>59</sup>

### Recommendations

During initial contacts, the NPs sought to acquaint both providers and residents with the program and to acquaint themselves with the plan of care. This, in addition to the number of individual providers and residents seen only one or two times may have contributed to the high number of “No Change” recordings.

Receipt of a response for 2 out of 3 of the actual recommendations was consistent with past pharmacy studies.<sup>38,39</sup> The phenomenon “alert fatigue” may have impacted responses to the NP recommendations in our study and to suggestions for medication changes in general. The lack of response for a third of the recommendations may have been related to the volume of communication and paperwork that primary providers receive associated with caring for older adults in long term care. Clinicians have been found to be less likely to accept alerts as they receive more of them, particularly more repeated alerts.<sup>36</sup>

After no change, the primary recommendation was to decrease the number or dose. Although the outcome of number of medications was not affected, the findings supports the potential for identifying medications that could be decreased.

Suggestions that one drug be decreased or discontinued and a different drug added or increased is consistent with the work of Kroenke and Pinholt that found that discontinuation of prescribed medication is the least likely recommendation to be followed by physicians.<sup>34</sup> Recommendations that suggested increasing or adding medications may have been related to the complex nature of this population as well as that this response category included both routine and emergent conditions such as infections. The relatively few lab updates needed could be explained by the work of the pharmacy reviews.

For providers, review of the resident’s total program of care, including medications and treatments is an expectation of the mandated 60 day periodic review process.<sup>35</sup> Medication reviews alone are not enough to decrease polypharmacy or affect other clinical outcomes.<sup>1,37</sup> A patient centered process of deprescribing directed at medication withdrawal can improve health outcomes by discontinuing one or more potentially harmful and/or unneeded medications.<sup>48,49</sup> Population-specific guidelines that emphasize functional status and quality of life over more conventional disease-focused guidelines are especially needed in long term care.<sup>40</sup>

### Interdisciplinary teams

In a review of interdisciplinary interventions, researchers found that interventions that involved PCPs and pharmacist had positive outcomes.<sup>53</sup> The contributions of pharmacists in ensuring quality medication management in nursing homes is significant.<sup>57</sup> Pharmacist review medication lists at least monthly and report any irregularities to attending physicians and director of nursing for action.<sup>35</sup> Ongoing and open communications between the consulting pharmacist and the provider, director of nursing, nursing staff, resident, and family have significant potential to decrease polypharmacy.<sup>58</sup> The value for increased efficiency and effectiveness of multidisciplinary medication reviews has been noted when the physician is in attendance.<sup>56</sup> Being able to clarify questions and execute recommendations are important. Nurse practitioners working in long term care have the knowledge

and skill sets<sup>30,31</sup> to take leading roles in this work. Additional members of interdisciplinary teams, often tailored to the specific needs of facilities and populations, include nursing,<sup>56</sup> social workers and administration.<sup>54</sup> Since nursing assistants provide most of the direct resident care in nursing homes and are often with specific residents over extended time periods,<sup>62,63</sup> selectively including them when major plans of care and/or medications are proposed may be beneficial.

Creation of an interdisciplinary virtual medication management huddle that coincides with and augments the consulting pharmacist reviews and requirements could be of benefit and help to meet both time challenges and Coronavirus 19 Guidelines<sup>61</sup> related to social distancing and personal contact. Clear guidelines of member expectations and deliverables are needed. Use of standardized tools such as the Geriatric Palliative Care Algorithm<sup>55</sup> and the ARMOR Protocol<sup>52</sup> could be of benefit.

Once prescribed, discontinuation of medications is often difficult.<sup>60</sup> Nursing and clinical staff have can have significant impact on polypharmacy. Foremost is avoiding a medication when a nonpharmacological intervention is available. They should be the initial focus for delirium<sup>41</sup> and behavioral and psychological symptoms with diagnosis of dementia.<sup>42</sup> In addition, these measures have been found to aid in decreasing falls,<sup>43</sup> improving psychosocial health and well-being,<sup>44</sup> potentially enhancing sleep,<sup>45</sup> and reducing pain and prn medications.<sup>46</sup>

### Conclusions

Although some success was made with the decrease recommendations, the lack of significant impact suggests that just as the reasons for polypharmacy are multifaceted so will efforts to address it have to be. The synergy of an inclusive interdisciplinary team, with regular and invited input from administration, providers, nurse practitioners, medical directors, consulting pharmacists, nursing, direct care staff, and support services is important. Communication and team membership need to be flexible and match the specific resident and facility profile so that improved medication management takes place. With shared goals and clear outcomes for medication management for the very frail older adults residing in long term care, decreasing polypharmacy is possible. The 5 Rights: patient, drug, dose, route, and time are as important for medication prescriptions and maintenance as for administration.

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