

Detecting Medication Order Discrepancies in Nursing Homes: How RNs and LPNs Differ

Author: [Name], D, N; Address: [Address], D(), N; License: [License], D; Contact: [Contact], D, N, FAAN; Email: [Email], D; A: [A], F: [F], D, N; M: [M], D

Medication order discrepancies pose safety risks when nursing home residents transition between health care settings. In nursing homes, both registered nurses (RNs) and licensed practical nurses (LPNs) frequently are assigned to detect medication order discrepancies, using the process of medication reconciliation. This study was undertaken to examine the extent to which licensure (RN, LPN), years of experience performing medication reconciliation, and the perceived Need for Closure were related to differences in the detection of medication order discrepancies. The Multiple Segment Factorial Vignette design was used to explore and compare nursing home nurses' detection of such discrepancies. RNs (n = 32) and LPNs (n = 70) from 12 Missouri nursing homes responded to four resident transfer vignettes embedded with medication order discrepancies. The study found that years of experience and the Need for Closure were not related to reports of discrepancies. However, RNs detected discrepancies in ongoing orders for high-risk medications significantly more often than LPNs. No significant differences existed between RNs and LPNs when identifying discrepancies in orders for low-risk medications. These findings regarding the discrepancies detected in orders for high-risk medications and those detected in orders for low-risk medications have implications for resident safety.

In a recent report by the Office of the Inspector General, 37% of adverse events, including falls, bleeding, delirium, hallucinations, and hypoglycemic episodes, experienced by skilled nursing facility residents were related to medication use. Nearly 66% of these events were considered preventable in part because of inappropriate prescribing and/or lack of monitoring by nursing home nursing staff (Levinson, 2014). Preventable adverse drug events result from errors associated with prescribing, documenting, dispensing, administering, and monitoring medications (Aspden, Wolcott, Bootman, & Cronenwett, 2007). Improved assessment or safety practices, such as medication reconciliation to assure medication orders are appropriate, can mitigate harm associated with preventable adverse events (Aspden et al., 2007; Levinson, 2014). Medication reconciliation is a complex cognitive process designed to detect and resolve medication order discrepancies when patients transition between settings by comparing a patient's current medications with those ordered upon entry to a new setting (Agency for Healthcare Research and Quality, 2015; Institute for Healthcare Improvement, 2013; The Joint Commission, 2015).

Alarming, when transitioning from another health-care setting, 70% of nursing home residents have at least one discrepancy in their medication order, which can include drug omissions, duplications, contraindications, unclear information, and changes to medication orders that require clarification at the

time of transfer (Tjia et al., 2009; The Joint Commission, 2015). During transitions, fragmented communication and missed critical information are significant factors leading to adverse events (or compromised resident safety) (Desai, Williams, Greene, Pierson, & Hansen, 2011; Levinson, 2014; Popejoy, Galambos, & Vogelsmeier, 2014).

Predicting Medication Order Discrepancies

To better understand medication reconciliation in nursing homes, Vogelsmeier and colleagues completed a previous observational study in eight Missouri nursing homes. They conducted eight focus groups with 13 registered nurses (RNs) and 28 licensed practical nurses (LPNs) and conducted individual interviews with 17 RNs in management positions. In addition, they conducted 46 observations in the eight nursing homes while 18 RNs and 15 LPNs performed medication reconciliation during resident transfers. The findings indicated that the majority of nursing homes assigned both RNs and LPNs to perform medication reconciliation and that RNs and LPNs seemed to differ in how they detected discrepancies (Vogelsmeier, 2014; Vogelsmeier, Scott-Cawiezell, & Pepper, 2011). However, because each RN and LPN encountered different resident transfer records, study findings did not allow a comparison of the two

groups, suggesting the need for additional research. Therefore, to further understand differences between RNs and LPNs, the current study presented standardized resident transfer vignettes to allow a direct comparison of RNs and LPNs.

The purpose of this article is to present quantitative findings on the extent to which licensure (RN, LPN), years of experience performing medication reconciliation, and nurses' perceived Need for Closure were related to differences in their detection of medication order discrepancies. The specific research question is: To what extent do RN and LPN characteristics of licensure (RN, LPN), years of experience performing medication reconciliation (1, 2 to 5, 6), and Need for Closure scores (high vs. low) account for differences in nurses' detection of medication order discrepancies? This study is part of a larger mixed-methods study conducted to explore and compare nursing home nurses' detection of medication order discrepancies when presented with resident transfer vignettes (scenarios). Nursing home nurses, RNs ($n = 32$) and LPNs ($n = 70$), responded to four resident transfer vignettes embedded with medication order discrepancies.

Study Design

The study used the Multiple Segment Factorial Vignette (MSFV) design to explore nurses' detection of medication order discrepancies. The MSFV method employs experimental design logic and quantitative and qualitative approaches to allow researchers to draw conclusions about how independent vignette variables affect outcome variables, such as attitudes, beliefs, judgments, and related phenomena (Ganong & Coleman, 2006). In the MSFV method, participants respond to vignettes about a hypothetical situation or a set of characters in a situation. Unlike the traditional factorial survey design method in which participants respond to single vignettes (Rossie & Nock, 1982), the MSFV method continues the same vignette (or story) over two or more segments, which allows researchers to add variables within the context of the story. Variables of interest are embedded in each vignette segment and vary systematically, which allows analysis of responses using logistic regression and other statistical procedures. In the MSFV method, the unit of analysis is based on the number of vignette segments rather than the number of participants. At the end of each segment, participants respond to a list of forced-choice questions to elicit how they would act to the situation described (Ganong & Coleman, 2006).

Development of Resident Transfer Vignettes

A pilot study was conducted to develop six resident transfer vignettes for this study. The six vignettes were developed using qualitative data from a previous observational study in which actual medication order discrepancies were identified during resident transfers to eight Missouri nursing homes (Vogelsmeier et

al., 2011). Consistent with the MSFV design, each vignette contained two segments with medication order discrepancies. In the first segment of every vignette, the medication was a high-risk medication, and the type of discrepancy was either an omission (medication not continued on the nursing home transfer orders), an addition (new medication added to the nursing home transfer orders), or a dosage change (dosage differed between settings). In the second segment, the medication was a low-risk medication, and the type of discrepancy was either an omission, an addition, or a dosage change. The patient's living setting before transfer (home or a nursing home) was introduced in the vignette background.

Figure 1 describes the first vignette, in which Mrs. A transitions to the nursing home after surgical repair of a fractured hip. In the first segment, metformin (Glucophage), a high-risk medication, was not continued (omission) on her nursing home transfer orders, although it was taken at home and in the hospital before transfer. In the second segment, psyllium (Metamucil), a low-risk medication, was added (addition) to her transfer orders as a new medication. Mrs. A lived at home before her hospital admission. The remaining five vignettes varied accordingly. Table 1 provides an overview of the distribution of discrepancies in each segment as well as variations on previous living settings.

After each vignette segment, three forced-choice questions were posed:

- Do you think a medication order discrepancy is present at transfer? (yes or no)
- How confident are you in your response? (1-not confident at all to 5-completely confident)
- Would you seek additional information to resolve the discrepancy? (yes or no)

Open-ended questions were used in the pilot to elicit the participants' insight into their responses and to assess the clarity and adequacy of the content in each vignette. Sample participant interview questions included the following:

- Do you have any additional questions about these vignettes?
- Were the questions at the end of vignette segments clear?
- What do you understand these questions to mean?
- Why did you think a discrepancy (was/was not) present in each segment?

Content validity was established by members of the research team for the six vignettes, including the vignette segments and the forced-choice questions. The six vignettes were then field-tested with three RNs and seven LPNs from four nursing homes. Through an iterative process of participant feedback from the interview questions, the six vignettes were modified to clarify content about prior settings and to add an anchor (somewhat confident) to the Likert scale for the question, "How confident are you in your response?" The vignettes were then tested for reliability using a test-retest approach with four RNs and eight LPNs from three different nursing homes. Test-retest reliability testing for the first question, "Do you think a discrepancy is present? (yes or no)" yielded high agreement ($r = 0.81$). Test-

FIGURE 1

Sa R T a V

P ~ S

Mrs. A is a 76-year-old woman who was lying at home with her husband when she fell and sustained a fractured left hip. Mrs. A's medical history includes heart failure, hypothyroidism, hypertension, diabetes, high cholesterol levels, and depression. Mrs. A was taking the following medications at home:

- Norvasc (amlodipine) 5 mg daily by mouth
- Aspirin 81 mg daily by mouth
- Apresoline (hydralazine) 25 mg twice daily by mouth
- Glucophage (metformin) 500 mg twice daily by mouth
- Lantus (insulin) 20 units daily subcutaneous
- Synthroid (levothyroxine) 125 mcg daily by mouth
- Lasix (furosemide) 40 mg daily by mouth
- K-Lor (potassium) 20 mEq daily by mouth
- Zocor (simvastatin) 20 mg at bedtime by mouth
- Zoloft (sertraline) 100 mg daily by mouth

H a l ~ a

Mrs. A was admitted to the hospital and underwent a surgical repair of her fractured left hip. She was hospitalized for 5 days and is now ready for transfer to the nursing home. According to the hospital medication administration record, Mrs. A was taking the following medications at the time of hospital discharge:

- Norvasc (amlodipine) 5 mg daily by mouth
- Aspirin 81 mg daily by mouth
- Apresoline (hydralazine) 25 mg twice daily by mouth
- Lantus (insulin) 20 units daily subcutaneous
- Glucophage (metformin) 500 mg twice daily by mouth
- Synthroid (levothyroxine) 125 mcg daily by mouth
- Lasix (furosemide) 40 mg daily by mouth
- K-Lor (potassium) 20 mEq daily by mouth
- Lovenox (enoxaparin injection) 30 mg every 12 hours subcutaneous
- Zocor (simvastatin) 20 mg at bedtime by mouth
- Morphine IV PRN for pain 2 mg every 4 hours as needed for pain
- Docosate-S 1 tablet daily by mouth

N ~ , H T a ~ l ~ a

Mrs. A has not been transferred to the nursing home. Her nursing home transfer record includes the following medication orders:

- Norvasc (amlodipine) 5 mg daily by mouth
- Apresoline (hydralazine) 25 mg twice daily by mouth
- Lantus (insulin) 20 units daily subcutaneous
- Synthroid (levothyroxine) 125 mcg by mouth
- Lasix (furosemide) 40 mg daily by mouth
- K-Lor (potassium) 20 mEq daily by mouth
- Coumadin (warfarin) 2.5 mg daily by mouth
- Zocor (simvastatin) 20 mg daily by mouth
- Zoloft (sertraline) 100 mg daily by mouth
- Metamucil (psyllium) 1 tablespoon daily (in water) by mouth
- Ultram (tramadol) 50 mg every 6 hours by mouth as needed for pain

S , ~ 1

The hospital medication administration record indicates Mrs. A had been taking Glucophage 500 mg twice daily in the hospital.

.....

A. Do you think a medication order discrepancy is present at transfer?

Yes _____ No _____

B. How confident are you in your response?

Not confident at all	Some hat confident	Completel confident
1	2 3 4	5

C. Would you seek additional information to resolve the discrepancy?

Yes _____ No _____

S , ~ 2

The nursing home transfer orders indicate Mrs. A has a medication order for Metamucil (psyllium) daily.

.....

A. Do you think a medication order discrepancy is present at transfer?

Yes _____ No _____

B. How confident are you in your response?

Not confident at all	Some hat confident	Completel confident
1	2 3 4	5

C. Would you seek additional information to resolve the discrepancy?

Yes _____ No _____

retest reliability for the second question, “How confident are you in your response? (scaled 1 to 5)” and the third question, “Would you seek additional information to resolve the discrepancy? (yes or no)” yielded lower correlations ($r = 0.50$ and $r = 0.54$, respectively). Based on participant feedback during the open-ended interview, many commented that their responses changed after the second session, thus suggesting lower test-retest corrections were a result of the second exposure to the same vignettes. In light of this, the team agreed to use the vignettes as they were originally developed.

O u t c o m e M e a s u r e m e n t

Outcomes were measured by participant responses to the three forced-choice questions included in each vignette segment. Independent variables included medication type (high-risk, low-risk), discrepancy type (omission, addition, dosage change), and the resident’s prior living setting (home, nursing home).

C o n t r o l V a r i a b l e s

Covariates included licensure (RN, LPN), years of experience performing medication reconciliation (1, 2 to 5, 6), and each participant’s Need for Closure score (high, medium, low) as measured by the Need for Closure Scale (Kruglanski & Webster, 1996; Kruglanski, Webster, & Klem, 1993). The Need for Closure Scale is a 42-item questionnaire scored on a 6-point Likert scale (1-strongly disagree to 6-strongly agree) to measure a person’s motivated tendency to come to a conclusion about a specific issue. Those with a high Need for Closure seek answers more quickly, more often coming to a conclusion without processing information thoroughly. Those with a low Need for Closure seek additional or clarifying information and consider alternative solutions before coming to a conclusion (Webster & Kruglanski, 1994). Exploratory and confirmatory factor analyses have been established for the Need for Closure Scale as well as for internal consistency (Cronbach’s alpha = .84) and test-retest reliability ($r = .8611$) (Webster, 1993).

E t h i c a l A p p r o v a l

Before the study, institutional review board (IRB) approval was received from the University of Missouri Health Sciences IRB. Verbal permission was obtained to conduct the study from each nursing home administrator and director of nursing. A waiver of documentation of consent was obtained from nurse participants because the level of risk to participants was low. Participation was voluntary for the nursing home sites and the participants from each site.

TABLE 1

S a m p l e S i z e J u s t i f i c a t i o n

Because the focus of the study was on estimating parameters rather than testing hypotheses, the sample size justification was based on obtaining reliable parameter estimates in regression analyses rather than on power considerations. The number of parameters used in the analysis and the effect of having multiple responses from each nurse were taken into consideration. The unit of analysis was based on the number of vignette segments rather than the number of nurses, and a sample size of 100 nurses each responding to four vignettes yielded 400 responses for analysis, which was determined to be adequate. Criteria for nurse participants included being an RN or LPN who self-reported performing medication reconciliation at resident transfer and who worked 8 hours or more per week in a nursing home. The researchers anticipated that 25 to 30 RNs and 65 to 70 LPNs would be recruited based on the average skill mix of RNs and LPNs reported in the recruitment sample.

The authors point out that, in planning this study, it was assumed that there would be dependencies in responses to multiple vignettes by the same nurse as reflected by the intraclass correlation (ICC). It was assumed that the ICC would be no

of the participants had a low score, 54% had a medium score, and 30% had a high score.

A total of 816 vignette segments were completed by the 102 participants (four vignettes with two segments each \times 102 nurses = 816). Each of the 102 participants were categorized according to three covariate groups: licensure, years of experience, and Need for Closure score. The number of vignettes completed within each covariate group were as follows: 1) Licensure (RN, LPN): The RN group completed 256 vignette segments and the LPN group included 560; 2) Years of experience (1, 2 to 5, 6): Those with 1 year or less of experience completed 64 vignette segments; those with 2 to 5 years of experience were 192; and those with more than 6 years of experience were 560; and 3) Need for Closure scores (low, medium, high): Those with a low Need for Closure score completed 112 vignette segments; those with a medium score were 272; and those with a high score were 432.

Table 3 displays the percentages of “yes” responses to the question, “Do you think a discrepancy is present?” Every vignette segment had some type of discrepancy. RNs thought there was a discrepancy in 62.11% of the vignette segments, whereas LPNs thought there was a discrepancy in 49.64%. RNs responded “yes” significantly more often than LPNs when the discrepancy was related to Need for Closure score. The difference was significant ($p < .001$) for Closure score. The odds ratio was 1.448 (95% CI = 1.017 to 2.074), indicating that RNs were 44.8% more likely than LPNs to respond “yes” to a discrepancy in Need for Closure score.

tional factors or RN and LPN skill mix in each of the 12 nursing home study sites. Leadership style, organizational culture of safety, skill mix ratios, and RN and LPN roles in each nursing home site as well as scopes of practice as defined by the state nurse practice act could certainly influence findings and should be considered in future studies.

Conclusion

RNs and LPNs contribute to resident safety in different ways. Despite these differences, the current nursing home paradigm is to use RNs and LPNs interchangeably. RNs provide a distinct contribution to resident care, including performing assessments and identifying risks of harm, such as high-risk medication order discrepancies during medication reconciliation. However, because RN resources are scarce in most nursing homes, future studies should include an emphasis on maximizing the contribution of the RN and LPN roles during processes such as medication reconciliation. This research could lead to the identification of education and training needs for both RNs and LPNs with an emphasis on collaboration as a means to reduce the risk of harm. Strengthening the skills of RNs and LPNs in this way could go a long way toward improving resident safety.

Journal of Nursing Regulation, Volume 6, Number 3, October 2015

Copyright © 2015 by W.B. Saunders Company
 ISSN: 1527-1624
 DOI: 10.1016/j.nurreg.2015.08.001

Werner, C. (2011). *...* (No. C2010BR-09) (p. 19).
U.S. Census Bureau. Retrieved from www.census.gov/prod/cen2010/briefs/c2010br-09.pdf

Amy Vogelsmeier, PhD, RN, is an associate professor, John