

Sigma Theta Tau International Small Grant Final Report

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Title: Nursing Staffing and State-level Dementia Training in Relation to Inappropriate Psychotropic Medication Use in Nursing Home Residents with Dementia

1. Summary of project aims

Aim 1: To examine deficiencies of care with regard to inappropriate psychotropic medication use in relation to nursing home (NH) nurse staffing. It was hypothesized that NHs with greater nurse staffing levels and higher skill-mix would have lower odds of receiving deficiency citations regarding inappropriate psychotropics use.

Aim 2: To examine deficiencies of care with regard to inappropriate psychotropic medication use in relation to state-level in-service dementia training for NH nurse staff. It was hypothesized that the presence of dementia-specific in-service training regulations for NH nurse staff would be associated with lower odds of receiving deficiencies on inappropriate antipsychotic medication use.

2. Theoretical/conceptual framework

This study was guided by Donabedian's structure-process-outcome quality of care model (Donabedian, 1972). Improvements in the structure of care should lead to improvements in clinical processes and patient care outcomes. Structure is defined as the professional and organizational factors associated with the provision of health care. Process represents all actions to provide healthcare for the patient

and outcomes are the results of care provided. With regard to staffing factors associated with healthcare, inadequate staffing levels and staff training curriculum content can increase the employee workload and adversely affect their job performance. This in turn can influence care quality.

3. Methods, procedures and sampling

3.1 Study design and data source: I used a cross-sectional design with a secondary data analysis of 2018 CASPER (Certification and Survey Provider Enhanced Reporting) data that included all US Medicare or Medicaid-certified NHs governed by federal and state regulations (N=13,318 NHs). CASPER data were obtained using a calendar year format containing information on all surveyed NHs during December 1, 2017 to December 31, 2018.

3.2 Sample: During the 13-month period, 2,796 NHs received a F-758 deficiency citation (total of 2,837 F-758 tags). Analysis was limited to NHs with F-758 citations specifically indicating inappropriate psychotropics use for residents with Alzheimer's disease or other dementias (n=1,872). NHs with F-758 citations indicating inappropriate psychotropics use for residents who had no cognitive impairment (n=794) and/or any mention of psychiatric disorders (e.g., bipolar disorder, schizophrenia) (n=130) were excluded by study design.

3.3 Measures

3.3.1 Dependent variable: The F-758 tag indicates inappropriate psychotropics medication use and is cited when a facility violates the federally regulated care standards. NHs must ensure that psychotropic medications are prescribed to treat a specific condition as indicated. Residents receiving psychotropic medications are to receive gradual dose reductions and appropriate non-pharmacological interventions,

unless they are clinically contraindicated. Furthermore, any PRN orders for psychotropic drugs should not continue beyond 14 days without clinical indications from the prescribing physician or practitioner.

3.3.2 Independent variables

Aim 1: nursing hours per resident day (HPRD) and skill-mix

Nurse staffing was measured using nursing hours per resident day (HPRD) and skill-mix (National Quality Forum, 2016). HPRD were calculated by dividing the total nursing hours for each 24-hour period, by the number of NH residents for the same 24-hour period. We calculated HPRD for each nurse staff: RN (registered nurse), LPN (licensed practical nurse), CNA (certified nursing assistant), and nurse aide, and total nursing HPRD (the number of total nursing hours worked by all nursing staff per patient day based upon each 24-hour period). Skill-mix was assessed as the percentage of nursing hours by direct care RNs divided by the total nursing hours for RNs, LPNs, CNAs, and nurse aides. Payroll-based journal (PBJ) data were used to calculate nurse staffing measures. PBJ provided daily information on the total working hours per day for each staff member along with the number of residents for the same period.

Aim 2: the presence of state-level in-service dementia training requirements

State-level in-service NH dementia training was collected from state NH staff training regulations in effect for calendar year 2017. The study focused on continuing dementia training requirements beyond the federally required annual 12 hours training for CNAs, since continuing training allows them to upgrade their knowledge and skills and learn new information. As of 2017, 27 states required in-service dementia training for NH nursing staff, of which 15 states required specific training hours (Table 1). In-service dementia training content typically included nature and

progression of dementia, symptom recognition, management of behavioral symptoms, communication techniques, assistance with activities of daily living, and appropriate activities for individuals with dementia.

3.3.3 Covariates

- NH resident-related characteristics: the proportion of residents diagnosed with dementia, depression, psychiatric disorders, and exhibiting behavioral symptoms due to mental illnesses, the proportion of residents with Medicare and Medicaid services.
- NH facility characteristics: facility size, geographic location, type of ownership, and presence of dementia special care units (SCUs).

The facility size refers to the number of certified beds and was divided into four categories: small (<50 beds), medium (50-99 beds), large (100-199 beds), and extra-large (≥ 200 beds). The geographic location was divided into small (noncore, micropolitan, and small-metro with <250,000 residents), medium (medium-metro area with $\geq 250,000$ to <1 million residents) and large (large fringe and large central cities with ≥ 1 million residents). The type of ownership was classified into for-profit, government and not-for-profit. The presence of dementia SCUs was categorized as present or absent.

3.4 Data analysis

Descriptive statistics were used to describe NH staffing, state-level dementia in-service training, resident and NH facility characteristics. Chi-Square and t-tests were used to assess differences in proportion or means of each covariate between NHs with and without F-758 deficiencies.

The occurrence of F-758 citations was assessed using a generalized linear mixed model (GLMM) with binomial distribution. Prior to use of GLMM, the intraclass

correlation (ICC) was assessed among NHs within each state using the null model, to decide whether states need to be included as random effects, in order to account for the non-independence of NHs under the same regulations (clustering). GLMM models were applied because the ICC between NHs within states (13.6%) was above the minimum allowable amount of 1%. Facility and resident-related characteristics were included in all regression analyses.

For Aim 2, stratified analyses were conducted between NHs with lower (<75th percentile of nurse staff HPRD) and higher (\geq 75th percentile) nurse staffing, and NH with and without SCUs to examine their influences on the relationships between the occurrence of F-758 tag citation and the state-level dementia in-service training regulations. Along with staff dementia training, nurse staffing levels and the presence of SCU are also important determinants of the management of behavioral symptoms and inappropriate psychotropics use in NH residents with dementia. All p-values were two-sided, and significant associations were defined as $p < .05$.

4. Summary of Findings

Descriptive analysis: About half of NHs were large or very large bed size ($n=6,642$, 49.9%), 41.4% ($n=5,502$) were in urban areas with ≥ 1 million residents, and more than half ($n=9,490$, 71.3%) were for-profit. About 14% of NHs ($n=1,873$) had dementia SCUs. The average of the proportion of NH residents with dementia was 0.45. Overall, 15.1% of NHs received a citation for inappropriate use of psychotropic medications in residents with Alzheimer's disease or other dementias (Table 2). The total nursing HPRD averaged 3.48 ± 0.88 and the average licensed nursing (RN+LPN) HPRD was 1.26 ± 0.51 for an average RN skill-mix of 0.12 ± 0.08 . About one-fifth of NHs ($n=2,963$, 22.2%) were required to provide in-service dementia training with

specific hours.

NHs that had no F-758 citations had significantly higher RN staffing HPRD ($p<.001$), CNA HPRD ($p=.015$), total nursing HPRD ($p<.001$) and RN skill-mix ($p=.003$), whereas NHs with F-578 deficiency citations had higher nurse aide HPRD ($p<.001$) (table 3). NHs with in-service dementia training with specific hours had a significantly lower percentage of F-758 tags ($p<.001$). There were no significant associations between the occurrence of F-758 citations and facility characteristics, except having a dementia SCU. There was a significantly higher percentage of F758 citations in NHs with dementia SCUs compared to those without dementia SCUs ($p=.020$). NHs with F-758 tags were significantly more likely to have residents with dementia ($p=.046$), depression ($p<.001$), psychiatric disorders ($p=.037$), or mental behaviors ($p=.008$), compared to those with no F-758 citations. NHs with F-758 tags had significantly lower proportion of residents with Medicare ($p<.001$), and significantly higher proportions of residents with Medicaid ($p=.005$).

Aim 1: Associations between nurse staffing levels and F-758 tag citation

NHs with higher RN HPRD were significantly associated with a lower odds of receiving F-758 citations (OR=0.59, 95% CI=0.47-0.73, $p<.001$) controlling for facility and resident-related characteristics (Table 4). NHs with greater RN skill-mix also were significantly associated with lower odds of F-758 citations (OR=0.14, 95% CI=0.05-0.37, $p<.001$). No significant associations between F-758 tags and LPN/CNA/nurse aide/total HPRD were noted.

Aim 2: Associations between the presence of state-level in-service dementia training and F-758 tag citation

NHs with state-level in-service training regulations with required training hours had significantly lower odds of having F-758 citations (OR=0.76, 95% CI=0.60-0.95,

p=.014) controlling for facility characteristics and resident-related characteristics (Table 5).

Table 6 shows associations between F-758 tags and the provision of state-level in-service dementia training, stratified by nurse staffing levels and the presence of dementia SCUs. The presence of in-service dementia training requirements with specific hours was inversely associated with receiving F-758 citations (OR=0.67, 95% CI=0.48-0.94, p=.019) in NHs with lower RN staffing (< 75 percentile of RN HPRD). The similar association was shown in NHs with lower CNA staffing levels (< 75 percentile of CNA HPRD) (OR=0.69, 95% CI=0.51-0.91, p=.009). The presence of in-service dementia training requirements with specific hours lowered odds of receiving F-758 citations in NHs without dementia SCUs (OR=0.57, 95% CI=0.34-0.96, p=.035).

5. Recommendations

Aim 1: This study suggested that adequate RN staffing is important in facilitating implementation of non-pharmacological interventions and reducing unnecessary use of psychotropic medications. Previous studies also found that a greater psychotropics use in NHs was significantly associated with lower RN staffing levels (Lee, Algase, & McConnell, 2014; Lucas et al., 2014; Phillips et al., 2018). The proportion of professional licensed nurse staff is also important for dementia care. Lower RN staff proportion was more related to quality of care than total nurse staffing levels (Harrington, Schnelle, McGregor, & Simmons, 2016). Prior to psychotropics use, RNs may be better trained in identifying the target behavioral symptom, ruling out acute issues such as delirium, adopting non-pharmacological strategies, and then referring for further consideration of psychotropics use compared to other

nursing staff. NH administrators and policymakers should focus on recruiting and retaining skilled RN workforce by offering advancement opportunities such as career development, providing benefits packages, rewarding good attendance, recognizing their contributions, and flexible scheduling (Hunt et al., 2012; Jarousse, 2011; Weale, Wells, & Oakman, 2017).

Aim 2: This study indicated providing continuing in-service dementia training for NH nurse staff can help reduce unnecessary psychotropics use and provide quality of behavioral dementia care. State policy makers should develop and implement dementia training requirements. Staff training is one of non-pharmacological interventions for reducing behavioral symptoms in NH residents, and serves as a primary strategy to reduce reliance on psychotropics use and promote non-pharmacological approaches (Rahman, Applebaum, Schnelle, & Simmons, 2012; Seitz et al., 2012; Spector, Orrell, & Goyder, 2013).

Greater emphasis should be placed on provision of ongoing dementia staff training in NHs with lower nurse staffing. Along with lower staffing availability, psychotropics are more likely to be administered when there is lack of knowledge on non-pharmacological approaches (Ellis et al., 2015; Lemay et al., 2013; Schnelle & Simmons, 2016; Sheehan, Hassiotis, Strydom, & Morant, 2019; Smeets et al., 2014). Lower RN staffing levels may lead to lack of professional knowledge, since RNs provide complex nursing services that requires higher levels of decision making, critical thinking, and clinical judgment (Vogelsmeier et al., 2015; Vogelsmeier et al., 2017). Lack of CNAs can directly affect quality of life in persons with dementia as they provide the most hands-on care and address their unmet needs.

Although dementia SCU staff are often specially trained in dementia care compared to their general units (Cerejeira, Lagarto, & Mukaetova-Ladinska, 2012;

Kok, Berg, & Scherder, 2013), there is an increasing need for training nursing staff in general NHs to improve their knowledge and practical skills on behavioral dementia care, given a large proportion of NH residents living with dementia. More than half of NH residents in the U.S have dementia, almost 90% of which exhibit behavioral symptoms (Kales, Gitlin, Lyketsos, & Detroit Expert Panel on Assessment and Management of Neuropsychiatric Symptoms of Dementia, 2014). All NH staff interacting with residents with dementia should be provided with meaningful, practical dementia training.

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Table 1. State-level NH in-service dementia training regulations for nursing staff across states, 2017

Requirement	States
States with no dementia training requirements	AL, AK, AZ, CA, DC, GA, ID, HI, KS, MI, MT, NC, ND, NH, NM, NY, OK, PA, SC, SD, UT, VA, WI, WY
States that require dementia training without specific training hours	- NHs all types: CO, CT (general NHs), DE, ME, MN, MO, NJ, WA - NHs with dementia SCUs only: MS, OH, RI, TN, VT
States that require dementia training with specific training hours	- NHs all types: FL (3 hours), LA (general NHs: 2 hours, NHs with dementia SCU: 5 hours), MD (2 hours), MA (4 hours), TX (general NHs: 1 hour, NHs with SCU: 4 hours), WV (general NHs: 2 hours, NHs with dementia SCU: 8 hours) - NHs with dementia SCUs only: AR (2 hours every quarter), CT (8 hours for dementia training and 2 hours in pain recognition), IL (12 hours), IN (3 hours), IA (6 hours), KY (5 hours), NE (4 hours), NV (3 hours), OR (4 hours)

Table 2. Descriptive characteristics of NHs across states (N=12,394)

Variables	n (%)	M±SD*
Presence of F-758 tags*		
No	10522 (84.9)	
Yes	1872 (15.1)	
Hours per resident day		
Registered Nurse		0.45±0.41
Licensed Practical Nurse		0.81±0.35
Certified Nursing Assistant		2.19±0.55
Nurse aide		0.03±0.09
Total all nursing staff		3.48±0.88
RN skill-mix		0.12±0.08
State-level in-service dementia training		
NHs with dementia training with specific training hours	2963 (22.2)	
NHs with in-service dementia training without specific training hours	1997 (15.0)	
NHs with no dementia training requirements	8358 (62.8)	
Facility size		
Small (<50 beds)	1544 (11.6)	
Medium (50 to 99 beds)	5132 (38.5)	
Large (100 to 199 beds)	5922 (44.5)	
Very large (≥200 beds)	720 (5.4)	
Geographic location		
Small (areas with <250,000 residents)	5066 (38.2)	
Medium (areas with ≥ 250,000 to <1 million residents)	2707 (20.4)	
Large (areas with ≥1 million residents)	5502 (41.4)	
Type of ownership		
For-profit	9490 (71.3)	
Government	860 (6.5)	
Not-for-profit	2967 (22.3)	
Dementia SCU		
No	11445 (85.9)	
Yes	1873 (14.1)	
Proportion of residents with:		
dementia		0.45±0.17
depression		0.37±0.23
psychiatric disorders		0.33±0.19
mental behavior		0.22±0.19
Medicare		0.14±0.14
Medicaid		0.60±0.24

*Deficiencies related to inappropriate psychotropics use among residents with dementia

*Mean ± Standard Deviation

Table 3. Mean or proportion differences in nurse staffing levels, state-level in-service dementia training requirements, and NH facility and resident characteristics between NHs with and without F-758 tags (N=12,394)

Variables	NHs with F758, n (%) or M \pm SD		X ² or t	p value
	No	Yes		
Hours per resident day:				
Registered Nurse	0.45 \pm 0.44	0.41 \pm 0.29	5.464	<.001
Licensed Practical Nurse	0.81 \pm 0.35	0.80 \pm 0.32	1.552	.121
Certified Nursing Assistant	2.19 \pm 0.55	2.16 \pm 0.51	2.444	.015
Nurse aide	0.03 \pm 0.09	0.04 \pm 0.11	-3.512	<.001
Total nursing staff	3.48 \pm 0.89	3.40 \pm 0.73	4.140	<.001
RN skill-mix	0.12 \pm 0.08	0.11 \pm 0.07	2.996	.003
In-service dementia training requirements			38.882	<.001
Requirements with training hours	2467 (88.5)	321 (11.5)		
Requirements with no training hours	1556 (82.6)	327 (17.4)		
No requirements	6499 (84.2)	1224 (15.8)		
Facility size				
Small	1238 (86.4)	196 (13.6)	4.943	.176
Medium	4007 (84.2)	752 (15.8)		
Large	4695 (85.0)	830 (15.0)		
Very large	582 (86.0)	95 (14.0)		
Geographic location				
Small	4023 (84.5)	739 (15.5)	2.717	.257
Medium	2178 (85.9)	358 (14.1)		
Large	4280 (84.7)	774 (15.3)		
Type of ownership				
For-Profit	7456 (84.9)	1327 (15.1)	1.814	.404
Government	679 (83.4)	135 (16.6)		
Non-For-Profit	2386 (85.3)	410 (14.7)		
Dementia SCU				
No	9045 (85.2)	1571 (14.8)	5.392	.020
Yes	1477 (83.1)	301 (16.9)		
Proportion of residents				
Dementia	0.45 \pm 0.17	0.46 \pm 0.16	-1.995	.046
Depression	0.37 \pm 0.24	0.39 \pm 0.23	-3.674	<.001
Psychiatric disorders	0.33 \pm 0.19	0.34 \pm 0.18	-2.084	.037
Mental behaviors	0.21 \pm 0.19	0.23 \pm 0.19	-2.648	.008
Medicare	0.14 \pm 0.14	0.12 \pm 0.12	4.544	<.001
Medicaid	0.59 \pm 0.24	0.61 \pm 0.22	-2.789	.005

Table 4. Association between receiving F-758 tags and nurse staffing levels in NH residents with dementia

Variables	Adjusted* Odds Ratio	95% Confidence Interval		p value
		Lower	Upper	
Registered Nurse HPRD*	0.59	0.47	0.73	<.001
Licensed Practical Nurse HPRD	1.16	0.94	1.43	.169
Certified Nursing Assistant HPRD	0.91	0.79	1.03	.139
Nurse aide HPRD	1.37	0.75	2.49	.304
Total HPRD	0.90	0.81	1.00	.053
RN Skill-mix	0.14	0.05	0.37	<.001

*All odds ratios adjusted for facility characteristics (facility size, geographic location, type of ownership and the presence of dementia special care units), and resident characteristics (the proportion of residents with dementia/depression/psychiatric disorders/mental behaviors and the proportion of residents with Medicare/Medicaid)

* HPRD: Hours per resident day

Table 5. Association between receiving F-758 tags and the presence of state-level in-service dementia training requirements in NH residents with dementia

Variables	Adjusted* Odds Ratio	95% Confidence Interval		p value
		Lower	Upper	
No requirements (ref)	1.0			
Requirements with no training hours	0.82	0.64	1.07	.139
Requirements with training hours	0.76	0.60	0.95	.014

*All odds ratios adjusted for facility characteristics (facility size, geographic location, type of ownership and the presence of dementia special care units), and resident characteristics (the proportion of residents with dementia/depression/psychiatric disorders/mental behaviors and the proportion of residents with Medicare/Medicaid)

Table 6. Association between receiving F-758 tags and the presence of state-level in-service dementia training requirements stratified by nurse staffing levels and the presence of SCUs

Variables	Adjusted* Odds Ratio	95% Confidence Interval		p value
		Lower	Upper	
NHs with lower RN HPRD*:				
No training requirements (ref)	1.0			
Requirements with no training hours	0.82	0.59	1.13	.216
Requirements with training hours	0.67	0.48	0.94	.019
NHs with lower CNA HPRD*:				
No training requirements (ref)	1.0			
Requirements with no training hours	0.90	0.67	1.20	.468
Requirements with training hours	0.69	0.51	0.91	.009
NHs without dementia SCUs:				
No training requirements (ref)	1.0			
Requirements with no training hours	0.96	0.47	1.95	.909
Requirements with training hours	0.57	0.34	0.96	.035

*NHs with <75 percentile of RN hours per resident day (HPRD)

*NHs with <75 percentile of CNA HPRD

* All odds ratios adjusted for facility characteristics (facility size, geographic location, type of ownership and the presence of dementia special care units), and resident characteristics (the proportion of residents with dementia/depression/psychiatric disorders/mental behaviors and the proportion of residents with Medicare/Medicaid)