Feature Article

Quality of care to nursing home residents with incontinence

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A R T I C L E   I N F O

Quality of care for residents with urinary incontinence (UI) living in nursing facilities was analyzed using data collected from 815 facilities for the Nursing Facility Quality Review in Texas. Overall, of the 1,560 residents, 48.4% (n = 755) experienced UI. The risk of developing UI over a ten-year-period in a nursing facility was 6%. Only 54% of residents with UI had a care plan for their incontinence. For those with a UI plan in their chart, 143 (35%) had a person entered UI plan developed based on that resident's voiding pattern and needs. Further, the creation of a UI plan of care by a RN for a person with UI was associated with a higher perceived level of health after controlling for gender, and age. Finally, the more satisfied the resident was with the response to their calls for help with voiding the more satisfied with the nursing facility.

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As the U. S. population ages with a growing variation in chronic conditions and increasing multiple morbidity,[31] more people in long-term care (LTC) nursing facilities (NF) will need skilled care. Among the most challenging limitations for people with multiple morbidity and their providers of care is incontinence. Although 50%−65% of nursing home residents have urinary incontinence (UI), many of them have a combined urinary and fecal incontinence,[23] making incontinence one of the most common conditions in LTC. Urinary and bowel care are challenging conditions to manage without adequate resources[34]; for instance, insufficient staffing resources result in poor quality care. This results in over 4 billion in expenditures due to complications of incontinence.[34,36]

Urinary incontinence care (UIC), is an indicator of NF quality; this examination of the processes of achieving quality was grounded in complexity science. Using data collected by this research team, titled the 2015 Nursing Facility Quality Review (NFQR), the associations between interpersonal and skill measures that may predict quality measures in NFs were explored. Specifically, after controlling for age, gender, diagnosis of dementia, and utilization of restraints, the following were considered.

1 What is the proportion of UI in the nursing facilities surveyed in the NFQR?

H.1. Consistent with previous studies there will be over 50% of nursing facility residents with UI.

2 What is the level of UI skill performance available among those with UI in nursing homes?

H.2. Consistent with standards of care for NF resident with UI, there will be a UI care plan in their chart for residents with documented UI.

3 What are the relationships between providers' skill performance (an RN care plan for UI in chart), UI resident−provider interactions (resident with UI satisfaction with nurse response to calls), and quality (resident perceptions of health and resident perception of satisfaction with NF), and does providers' skill performance moderate the relationship between UI resident−provider interactions and quality?

H.3. There will be positive relationships between providers' skill performance (a RN putting a care plan for UI in the chart), UI resident−provider interactions (resident with UI satisfaction with nurse response to calls) and quality (resident perceptions of health and resident perception of satisfaction with NF). Further, providers' skill performance will positively moderate the relationship between UI resident−provider interactions and quality.

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Background

The use of UI care, both skill performance and interpersonal interactions, as a predictor of NF quality may be controversial[30]; the best care in an acute care setting is not always useful in LTC settings where the attributes of quality include "all aspects of care that are important to consumers"[30](p. 63). UI care is essential to quality in NF because it can alter a NF resident's self-perception, prevent skin breakdown, and the behavioral controls imposed on the resident to manage UI can affect their overall experience in the NF. Xu and Kane[48] studied the self-reported effects of UI on quality of life among 11,621 nursing home residents, of whom 65.8% had urinary incontinence (UI), and reported a significant relationship between UI and quality of life. After correction for selection bias between those with and without UI, those with UI had significantly lower scores on dignity, autonomy, and mood than did those without UI. Overall, UI decreased the comfort and the social interactions of NF residents. The reason UI is a strong indicator of quality is that a skilled nurse following a UI care plan can reduce the detrimental impact of UI in multiple aspects of care.

Approximately 50 to 75% of the NF population have incontinence, with variations due to regional differences.[7] It is higher among women and those over 75 years of age. According to Ouslander[34] incontinence is one of the most under cared for conditions in NFs due to the burdensome aspects of urinary and bowel care. The staff may avoid or delay UI care resulting in detrimental outcomes; further, the physician may not value or understand the need for routine orders for UIC until skin breakdown is evident. This results in over 4 billion in expenditures due to complications of skin breakdown, ulcers, and falls.[34,36] Learning how to integrate UIC into the regular leisure, dining, and recreational activities of the individual is among the LTC nurses' advanced planning skillset.

The delivery of care for UI may be divided into caretakers' technical skillsets and interpersonal relationships engendered through skilled care. Nurses who provide UIC have the skills to keep a person clean and dry, without skin breakdown or infection. The interpersonal relationship based on an understanding of residents' usual activities, values, and preferences is necessary, along with the resultant skin care needed. Studies have reported barriers to nurse aides performing their roles, which includes resistance from residents and lack of knowledge (Hoben et al., 2017)[61]. This indicates that both skillset and interpersonal skills are needed for UIC within the NF but are not always present.

Quality in healthcare is commonly defined as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge"[26] (p. 4). To use such a definition to operationalize quality for NF is problematic. It lacks specificity, and it offers little guidance for improvement beyond making better use of current professional knowledge. The NF is a residential home for people, which must be considered when applying a knowledge base.

Health care relationships are those resident—provider interactions that foster positive modes of being, shared by self and others.[5] In previous decades, research on interpersonal relationships in NF were of low priority.[19] Given the residential nature of long-term care in NF, however, the study of provider—resident relationships, which occur over time as a trajectory of interpersonal care routines, is essential for understanding NF quality.

Modern attempts to improve quality through therapeutic professional relationships occur through patient-centered care (PCC)—the more subjective, relational dimensions of quality that are not assessed by most traditional skills-based quality indicators. Epstein and Street[9] describe PCC as when, "patients are known as persons in context of their own social worlds, listened to, informed, respected, and involved in their care—and their wishes are honored (but not mindlessly enacted) during their health care journey" (p. 100). Patient centeredness in NF represents a "culture change" in which the structures, roles, and processes of NF care are conceptualized, not in terms of an institutional model, but as constituting a home-like environment, that offers nursing services. Features include resident direction, homelike atmosphere, close relationships, staff empowerment, collaborative decision-making, and quality-improvement processes.[21] Even though quality improvements are associated with culture change, most research has been limited to an analysis of administrative data and has not included residents' perceptions of their care.[28] A new approach to the study of NF quality, building on improvements made through PCC, is needed.

Traditional, modern approaches to improving quality in NFs have taken an objective, acute care approach to understanding quality.[4,40] Quality improvement efforts have focused on improving state inspections results, compliance with regulations (Harrington et al., 2012[55]; Li et al., 2010;[56]), public reporting (Mukamel et al., 2008) and payment reforms.[8] Leadership has taken a traditional quality improvement approach using a linear, top-down mechanism for the improvement of specific parts of the NF system. Although necessary and not to be dismissed, these efforts do not offer staff an incentive to improve the values, beliefs, and behaviors surrounding healthcare delivery, e.g. health care delivery relationships. In previous decades, research in NFs on interpersonal relationships were of low priority.[19] Given the residential nature of LTC in NFs, which occurs overtime as a trajectory of interpersonal care routines, relational experiences when seeking to understand quality.

Theoretical framework

The theoretical approach to this problem lies in complexity science. The goals are to understand how skill performance, combined with resident—provider interactions,[15] influence quality. The skill performance is crucial to quality and indicates that having the knowledge to do the task is essential. Further, the interpersonal response to the resident's needs must be person-centered in order to create quality. Therefore, two variables influence our understanding of quality within the NF system.

In any system, processes are necessary for quality outcomes to occur (Donabedian, 1980).[54] One difference between complex systems and simple systems is that complex systems embrace both linear and non-linear processes. The outcomes, with best intensions and scientific expectations in place, can have unpredictable outcomes when dynamic systems are in operation, but can also follow simple predictable patterns toward a known attractor.[25] One difference between complex systems and simple systems is that complex systems embrace both linear and non-linear processes. Complexity science recognizes that the day-to-day work of a system like a NF takes place in the realm of complexity where elements of chaos and order are present and interact (McKelvey, 2013).[53,43]

Skill performance

Nursing skill performance and interpersonal nursing relationships are the two independent variables. Skill performance takes place between providers and residents to meet the needs of the resident. Skill performance is the task-based professional interventions drawn from an educational and licensed knowledge base. The RN has a set of skills that she or he uses to improve the health of residents. In NFs, skill performance is interpersonal, based in a social exchange between the resident and the nurse. Residents and providers interact with words and/or gestures that involve interpretation, meaning, and action for social exchange. The skill performance might increase likelihood of better health indicators, but the interpersonal interaction might not meet the resident needs. In this study, the latter skill

performance is the care plan put within the resident chart, documenting the assessment and care needed when working with a particular resident with UI. The former, interpersonal interaction is next.

Resident−provider interactions

As mentioned earlier, NF residents interpret and act purposefully to maintain the self as they interact with providers and other residents.[10,11,16] Social rituals, such as bathing, mealtime, and medication administration, provide a framework for resident−provider interactions that residents use to estimate their social worth and exchange information that contributes to their expectations about their health. When residents' perceptions of how they are touched, spoken to, and given emotional feedback are congruent with their sense of self, they feel positive about their sense of self; they enact a sustained expression of who they are and who they want to be. They thereby sense a greater quality in their NF when their nurses work to promote a positive relational experience as they provide expert UI care on a daily basis. In this study, the resident-provider interaction is the satisfaction with the response a person with UI gets when they request assistance.

Quality

Quality, an emergent concept, is the outcome variable. Emergence—macro-level patterns arising from micro-level components—is a central theme in complexity science and is well documented in the literature.[12,17,29] Theoretically, outcomes are emergent when the arrangements of the parts of a complex system offer more explanatory insight than do explanations based on the parts alone. Quality, as an emergent outcome, cannot be predicted solely from individual parts. Instead, macro-level patterns can describe the interactions of the parts, such that better descriptions can lead to better strategies for improving systems. Nursing facilities, as complex, adaptive, self-organized systems with non-linear interactions,[3,27] have various attractors or goals (e.g., profit, respect). Therefore, a study that treats quality as a predictable outcome of a single intervention (e.g., technical tasks assessed with documentation) without considering context and interaction (patient centeredness) is unable to give a balanced picture of the outcome. Quality, from our perspective, emerges in the NF from people relating with each other while completing tasks. The interaction between these two domains lead to the delivery of quality care in the NF. In the instance of UI, it is suggested that a UIC plan that meets the needs of the residents' voiding requests would foster the interpersonal relationship and lead to quality.

Design

This is a descriptive, correlational study using primary data. The findings, presented here, were a joint process between educational and government entities to improve NF quality outcomes. The longitudinal assessment of quality in nursing facilities is called The Nursing Facility Quality Review (NFQR).

Data collection and management

After IRB approval, data were collected through chart reviews, resident or family interviews, and interviews with NF leadership (facility administrators or directors of nursing) within each facility. Both chart review data and interview data were collected from each resident who agreed to talk with our data collectors. Facility level data was collected from the administrator, the Director of Nursing or a representative at each facility. The family were interviewed if they were available to the data collector in person or by phone. Detailed

discussion of the dataset can be found elsewhere.[46] The 2015 NFQR's validated random sample was collected from NFs. Each NF provided long-term clinical care to residents who needed medical care from licensed nurses and who were Medicaid-eligible.[44]

Twenty-one registered nurses (RNs) trained in data collection, provided ethical knowledge in privacy and consent. Each RN was given research-ethics certificates. They were oriented to the study with the principal investigator (PI) at a nursing facility and then sent to collect NF data from the 815 Medicaid-certified NFs across 254 counties, condensed into 11 health regions in Texas. The RNs were licensed, held liability insurance, and were experienced in geriatric care prior to their work as NFQR registered nurse data collectors (RN DC). The RN DCs received a training manual, ethics instruction, a locking briefcase, and a tablet with the Microsoft operating system that included programming for ease of collection and storage of data. The PI monitored the data collection for accuracy and trends, using repeated assessments as validity checks.[46]

Recruitment of residents

The 2015 NFQR sample consisted of 1−3 residents randomly selected at each of the 815 nursing facilities selected for chart reviews. The number of residents selected per NF was calculated relative to the size of the NF. One resident was randomly sampled when the bed capacity for the NF was at or below 50 residents; 2, when the bed capacity for the NF was between 51 and 100; and 3, when the bed capacity for the NF was between 101 and 300 residents.

Residents, who were present at the NF and willing to provide consent, answered questions, regardless of their cognitive status. Although many studies of quality exclude residents with cognitive impairment, these residents' perspectives are valuable for quality, and the institutional review board insisted they be included in a study of NF quality if they were willing. Previous research has successfully used data collected from cognitively impaired residents.[19,20] RN data collectors de-identified data before leaving the facility and the de-identification process was repeated a second time to ensure consistency of privacy.

Measures

The NFQR's measures were acquired through chart-reviews (either paper or electronic charts), resident interviews, family interviews, and facility administrators or Directors of Nursing interviews. In the following sections, the study variables are offered for consideration. First, the variables controlled for at the resident and facility level during our analyses are laid-out. Next, the predictors, and finally, the outcomes variables are offered.

Descriptive variables

Age, gender, dementia, skin breakdown, UI & restraint use

Residents. Resident-level descriptive variables in this study included age and gender, diagnosis of dementia, skin breakdown (ulcers), and utilization of restraints. **Age** and **gender** are the most frequently studied risk factors for UI in NF residents.[33] The likelihood of incontinence increases with age and dementia, but the strongest associations have been reported with impaired activities of daily living and patient restraints.[23,32] **Dementia** may reduce motivation, access, and ability to toilet.[41] The NFQR level of dementia and types of dementia in those with UI is in Table 2. The RN data collectors extracted these variables from the chart and verified each with the resident. The age, gender, dementia, skin breakdown and restraint use were collected using chart review.

Skin breakdown

Skin breakdown is associated with UI, and the delivery of UIC can result in a range of breakdowns from irritation to sores and ulcers. Cleansing skin after incontinence episodes and bathing may promote skin integrity and minimize skin breakdown.[14] This information was collected from the chart review and validated with staff and resident/family when available.

Urinary incontinence

The inability to hold urine in the body until able to void in a receptacle is urinary incontinence (UI). It is not pathological unless a pattern of loss of urine develops. Hence, for this study people were identified as UI if they had more than two notable episodes in the past two weeks. The NF staff documented in the chart when the resident was incontinent. The measures of UI and related questions can be found in Table 1. The RN DC reviewed the chart and indicated if the resident was UI.

Restraint

The RN DCs, through chart review, documented if the residents received the application of a cloth restraint either in the bed or in the chair. The use of restraint automatically necessitated that a flow sheet be in the chart, which also documented skin assessments and bathroom breaks while in use. The RN DC verified any inconsistency of documentation with the staff and resident.

Independent variables

Skill performance

The RN DC measured the *skill performance* variable by noting the documentation of a UI care plan in the NFs' electronic or paper chart. According to standards within the available literature, the standard of

Table 1
Demographic description of nursing home residents by urinary incontinence status.

Variable		Count (%[d])	Mean	SD	Range
Age[a]					
	UI	754 (48.4)	79.4	12.8	18–108
	No UI	804 (51.6)	76.4	12.9	23–106
Gender male[b]					
	UI	233 (30.9)			
	No UI	303 (37.7)			
Ethnicity[c]					
African American or Black					
	UI	125 (16.6)			
	No UI	122 (15.2)			
White, non-Hispanic					
	UI	514 (68.4)			
	No UI	535 (66.8)			
Native American					
	UI	1 (0.1)			
	No UI	0 (0)			
Asian American					
	UI	3 (0.4)			
	No UI	6 (0.8)			
Hispanic ethnicity					
	UI	100 (13.3)			
	No UI	124 (15.5)			
Other ethnicity					
	UI	11 (1.5)			
	No UI	15 (1.9)			

practice for managing UI in NF included a UI 'care plan'. This included the use of absorbent pads, as well as care tasks centered on changing soiled garments and providing skin care rather than promoting continence.[37] Behavioral strategies to promote continence included prompted voiding and scheduled toileting,[35] both considered labor intensive because they require scheduled time from direct care workers.[42] The presence of a specific continence promotion plan (UIC) documented in the residents' charts were indication of the degree of individualized care recommended for residents. It demonstrated that professional nurses assessed then intervened. The level of intervention were determined by how well the nurses assessed the type of UI and the residents' needs and matched those with plans of care.

Resident–provider interaction

The RN DC in a personal interview measured the resident-provider interactions with the resident. The variable was measured by asking the resident, on a scale from 1 to 5, if they were satisfied with the nursing response when they needed to void. Their response to our question was an overall estimate of UIC resident-provider interaction.

The ability of NF staff to meet the bathroom needs of the residents was considered an important indicator of quality. Resident–provider interactions, defined as the residents' satisfaction with staff response for toileting assistance, was an interaction appraisal. Response time, as an indicator of quality, can be found in studies of resuscitation (Rajan et al., 2016),[51] as well as in emergency services (Churpek et al., 2017).[52] Most importantly, nurses have begun to study the importance of call lights and requests for service by patients and families; finding that patients believe that nurses should prioritize their calls above other tasks.[45] They reported that answering call lights for their requests was a critical role of the nurse.[45] In this study, the resident–provider interactions were considered crucial for quality because the resident requested the interaction based on a stigmatizing situation. The nurses' response was crucial to the nurse-resident relationship.

Quality

Quality is multi-dimensional and analyzed using two perspectives pulled from our understanding of the quality in the context of UIC. The analyses assume that all care occurs within a social context and that the variables of interest emerge from the skillset and the relationship. The two variables, perceived satisfaction with the NF and self-rated health, provide insight into the emergent level of quality.

Perceived satisfaction. Measurements of perceived general satisfaction are a challenge in healthcare studies. Studies demonstrate that satisfaction is an emergent variable that results from a holistic appraisal of services provided. For instance, Bible et al.[6] reported that satisfaction with care among people seen in a spine clinic was associated with the overall treatment they received, from scheduling to parking, as well as provider interactions. Involvement by the provider and teamwork were strong indicators. Perceived satisfaction was assessed by asking the resident their satisfaction with NF care.

Perceived Health. Perceived health is a steadfast, easily measured outcome indicating levels of internalized function and vitality among older residents. It has been associated with function, quality of life, as well as mortality (Barba et al., 2011[49]; Dhaussy et al.[50], 2012).[38] The predictive value of self-rate health has been studied and supported in the elderly for three decades in various disease conditions (Montazeri, 2009).[57] The nurse asked the resident to rank their health as excellent, very good, good, fair, or poor.

Table 2
Urinary incontinence and cognitive impairment diagnosed (*n* = 523).

Cognitive impairment	Count (%)
Alzheimer's disease	178 (34.0)
Lewy body dementia	3 (0.6)
Vascular dementia	65 (12.4)
Frontotemporal dementia	1 (0.2)
Parkinson's dementia	19 (3.6)

A listing of the major study variables in Table 1 assisted with understanding of the research analyses and questions.

Sample recruitment

The nursing facilities agreed within their state Medicaid contracts to provide access to their facilities for the collection of quality data for the NFQR, which began as a legislative mandate in 2003. This is not a public use data set; the state analyzes it for the metrics that drive LTC policy at the state level. The residents of the 815 Texas NFs surveyed, because they were residing in Medicaid eligible NFs, participated in the NFQR by voluntarily providing interviews and access to chart reviews for the purpose of aggregate data reports. The residents were randomly selected based on bed assignment and asked to participate. If they refused, then a new random number was used to select a different resident.

Sample

In Table 2, a demographic overview of residents may be found. The mean age of residents with UI was 79.4 years (SD = 12.8). The long-term-care residents with UI ranged in age from 18 to 108. Those without UI were only slightly younger with a mean age of 76.4 years (SD = 12.9).

The rate of cognitive impairment in those with UI due to various types of dementia is provided in Table 3. Of note, there were 29 people with UI who had an intellectual and/or Developmental Disability (IDD), and there was one person with IDD who developed Alzheimer's disease while living in a facility. The person with IDD and Alzheimer's was not included in the UI analysis.

Analysis

The data were hierarchically structured, residents nested within NFs. For residents living in the same NF, the shared living context

Table 3
Measurement of variables.

Nursing Care based on Chart or Electronic Health Record Review

Is the resident usually continent *without needing* a toileting plan, incontinence products or a catheter?

○ [1] Yes ---skip   ○ [2] No -----continue

Have there been two or more episodes of urinary incontinence each week in the last two weeks?

○ [1] Yes   ○ [2] No

Does the resident have a terminal condition or palliative plan of care *and* declines to participate in a continence promotion plan (toileting)?

○ [1] Yes   ○ [2] No

Is a continence promotion plan (toileting plan) (prompted voiding-PV, scheduled voiding-SV or bladder retraining-BR) specifically documented as part of the resident's care plan? (NOTE: If more than one applies, answer with first answer from the list that applies to this resident)

○ [1] Yes-PV   ○ [2] Yes-SV   ○ [3] Yes-BR   ○ [4] No

Is the plan based on the resident's voiding pattern and needs?

○ [1] Yes   ○ [2] No

Does the resident refuse to follow their continence promotion plan?

○ [1] Most of the time   ○ [2] Sometimes   ○ [3] Almost never

Nursing Care Relationship Based on Interview with resident
- Do you get help to use the bathroom when you need it?
- ○ [1] Always   ○ [4] Rarely
- ○ [2] Most of the time   ○ [5] Never
- ○ [3] Sometimes   ○ [6] No answer

could have affected the outcomes measured at the level of the individual resident. If this occurred, then the data were correlated within facilities, and so standard statistical techniques, such as regression and analysis of variance, would be inappropriate. This is because those methods assume that data are independent. For the present study, the outcome variables were analyzed with regard to the shared context of the NF environment using multilevel statistical models as appropriate.

Multilevel models account for dependencies in hierarchical data and are routinely applied in many domains of social science research.[39] Maximum likelihood estimation of the models was completed using SAS version 9.4 with PROC MIXED and NLMIXED for mixed-effects models.[47] Type I error rates for statistical tests were set at .05.

Results

The sample consisted of 1,560 randomly selected residents from 815 different NFs. From this sample, approximately 48.4% (n = 755) of residents (with an estimated range of 45% to 52% based on a 95% confidence interval) were estimated to have UI. All of those identified as having UI had documentation in their charts of two or more episodes of UI for each week in the 2 weeks prior to the interview. Excluding residents without a diagnosis of dementia or any use of restraints, this estimate of the proportion of residents with UI decreased to 34.3% (95% CI: 28.7%–39.9%). These estimates were obtain using a multilevel model to address the nested data structure.

Using a multilevel logistic regression analysis, the expected likelihood of incontinence across all residents, again accounting for the clustering of residents within facilities was estimated. Women had a higher expected likelihood of incontinence relative to men (estimated gender effect = .40, SE = .13, t = 3.05, p = .0024), with an estimate of 42% of men (95% CI: 37%–47%) having UI compared to an estimate of 52% of women (95% CI: 48%–56%). Age of the residents affected the expected likelihood of UI, with the likelihood increasing with advancing age. The likelihood was estimated first using the full sample for which resident's age ranged from 18 to 108 years (estimated effect of Age on the likelihood of UI = .024 (SE = .005, t = 4.71, p < .0001), and again using a restricted sample of those age 65 and older (estimated effect of Age on the likelihood of UI = .022 (SE = .008, t = 2.73, p = .0065)). In either case, the estimated increase in the expected likelihood of UI per 10 years of age was approximately 6%.

Among residents with UI, 97 (13% of 755) were reported to have a terminal condition or palliative plan of care, and it was documented that they declined to participate in a toileting plan. For residents identified as having UI, RN data collectors reported 404 (54%) had UI care protocols documented, 175 (23%) had no documentation, and 176 (23%) stated they could not answer the question due to the lack of data available for this question. For the 404 (54%) residents with a reported continence plan documented as part of the care plan, 60 (15%) had plans of prompted voiding, 80 (20%) had plans of scheduled voiding, and 12 (3%) had plans of bladder retraining. Again for those with a continence plan, 143 (35%) had a plan based on the resident's voiding pattern and needs; it was person centered. When asked how often the resident refused to follow the UIC plan, of those with valid responses, 14 reported most of the time, 44 reported sometimes, and 82 reported almost never.

Whether a resident had an RN care plan in the chart was not related to a resident's satisfaction with nurse response to calls (estimated effect = -0.14, SE = .23, t = -0.64, p = .5285) or resident health perception (estimated effect = 0.04, SE = .25, t = 0.17, p = .8645). A resident's satisfaction with nurse response to calls was not related to resident's health perception, either with (estimated effect = - 0.13, SE = .11, t = - 1.24, p = .2211) or without controlling for whether the resident had an RN care plan in the chart (estimated effect = - 0.14, SE = .23, t = - 0.64,

p = .5285). Finally, having an RN care plan in the chart did not moderate the relationship between resident's satisfaction with nurse response to calls and resident perceived level of health (estimated effect = - 0.09, SE = 0.23, t = - 0.42, p = .6788).

Of the residents with UI who provided valid responses to both satisfaction with nurse response to calls and satisfaction with the NF (n = 306), whether residents had RN care plans in the chart was not related to residents' satisfaction with the NF (estimated effect = 0.28, SE = .22, t = 1.27, p = .2126). Resident's satisfaction with nurse response to calls was, however, related to resident's satisfaction with the NF, both with (estimated effect = 0.33, SE = .09, t = 3.53, p = .0011) or without controlling for whether the resident had an RN care plan in the chart (estimated effect = 0.34, SE = .09, t = 3.57, p = .0386).

Next, having RN care plans in the chart moderated the relationships between residents' satisfaction with nurse responses to calls and residents' satisfaction with the NF (estimated effect = 0.40, SE = 0.19, t = 2.15, p = .0386). A post hoc examination of the moderating effect showed that resident's satisfaction with nurse response to calls and satisfaction with the NF was positive and statistically significant only for those who had an RN UIC plan in the chart (estimated effect = 0.58, SE = 0.17, t = 3.34, p = .0011). This relationship was not statistically significant for those without an RN UIC plan in the chart (estimated effect = 0.20, SE = 0.13, t = 1.55, p = .1457). Further, resident satisfaction with the NF was positively related to resident perceived health (estimated effect = 0.23, SE = .10, t = 2.35, p = .0243), controlling for covariates, satisfaction with staff response to calls and whether the resident had an RN care plan in the chart.

For those with UI and a documented number of ulcers (n = 315), whether residents had RN UIC plans in the chart was not related to the number of residents' ulcers (estimated effect = -.29, SE = .39, t = -0.73, p = .4645). Residents' satisfaction with nurse response to calls was, however, related to the number of ulcers for the residents, both with (estimated effect = 0.40, SE = .14, t = 2.79, p = .0058) or without, controlling for whether the residents had RN UIC plans in the chart (estimated effect = 0.39, SE = .14, t = 2.76, p = .0062).

Finally, having an RN UIC plan in the chart did not moderate the relationships between residents' satisfaction with nurses response to calls and number of ulcers for the residents (estimated effect = 019, SE = 0.29, t = 0.65, p = .5138).

Discussion

The emergence of quality through an understanding of the person-centered needs of the resident with UI using complexity science was studied. Quality, in the context of UI, is a matter of providing both skill and relational support. The NFQR residents with UI living in NFs reported higher levels of satisfaction with their NF when they also reported higher levels of satisfaction with staff response times when calling for assistance with voiding, but this was true only for those residents who had an RN UIC plan in the chart. Residents with UI had lower documented counts of ulcers when they also reported higher levels of satisfaction with staff response times when calling for voiding assistance. Residents with UI did not necessarily report higher levels of perceived health in conjunction with reported higher levels of satisfaction with staff response times when calling for assistance with voiding; this was true regardless of whether the resident had an RN UIC in place.

The nursing staff reported that more than 50% of residents had more than two episodes of UI in the weeks prior to this survey. Without including residents with a dementia-related diagnosis, which included those with earlier onset diagnoses, there remains a 34% estimate of UI. Twenty-three percent of the sample with UI did not receive any care plan related documentation, inferring that education and person-centered care with training for UI did not take place for some residents. An important finding of this study was that satisfaction with how

responsive their staff were to their calls for assistance with voiding was related to the residents' satisfaction toward their facility and that resident satisfaction with the NF was positively related to resident perceived health. Thus, it was demonstrated that how NF level interventions were done during routine care made a difference. Further studies are needed to understand the impact of how nursing interactions drive quality and possibly saves money.

Our study findings support the theoretical work put forth within complexity science. Working to understand, using complex non-linear models, the quality that emerges in nursing homes across 11 different health regions containing 254 counties in Texas is not a simple study. In other words, although certain skills may help to reduce UI-related accidents and skin breakdown, residents who were reported to have UI perceived higher satisfaction with the NF if the nursing staff had a plan in place to address their UI. This implies that the nurse sat down to create a person-centered plan of care surrounding UI. This plan dictates the type of care that staff provide for this disabling condition. According to complexity science, quality emerges out of both skillsets and interactions, which is exactly the findings here.

There is no doubt from our data that response to the voiding needs of the resident was important. Satisfaction with response had a direct effect on the perception of satisfaction with the NF. This relationship was moderated by the RN care plan, making that relationship stronger. The resident with UI satisfaction with the NF was also associated with their perceived health. The importance of response time in relation to quality may be an understudied aspect of nursing care. Tzeng's[45] assertion that it the response to call for help was essential for the role of nurse as perceived by the client, resident or patient was supported by this study.

Of significance, the residents' perceptions of satisfaction with the facility was related to satisfaction with the response to their voiding patterns. This was a simple linear, predictable association. In the context of complexity science, this was an attractor.[25] One potential way to improve satisfaction with a facility may be to improve this interaction; nurse aids may need training on ways to improve responsiveness, based on the residents' professional nursing care plan. There was evidence in the literature that the nurse–resident relationship is important; however, it may be that this interaction needs further study in the context of UI and the sequela of problem documented that occur if skin breakdown follows poor care (Ouslander, 2003).[59] It also leads the way to theoretically testing other interactions that might improve satisfaction with the NF.

The RN in the residential NF setting was important for the assessment and intervention of disabling effects of UI. The importance of responding when the person needs to void, but also when a RN UIC plan is in place, can have a strong impact on the residents' satisfaction with the NF. Having ulcers was also an important aspect of LTC quality. In fact, when residents had ulcers, having a UIC plan in place was no longer a moderator. Perhaps, the role of the UIC plan changed. This is something that needs further exploration.

Regardless, the UIC plan was important for the relationship between NF satisfaction and satisfaction with the response to calls for voiding when the residents had UI. Having a plan in place to address a limitation may encourage other positive behaviors, too, which requires further analysis. For instance, it may encourage socialization and autonomy. In a study by Hwang et al.[18] residents reported that they did not like to bother nurse aides with their need to void. This may be something certain cultural groups, such as those in the study who were from Taiwan, may be more sensitive to. Hence, this study needs repeating with greater cultural and ethnic diversity.

It is important for families, providers, researchers, policy analysts and policy makers to know what constitutes quality. For families, understanding the level of NF quality that they can expect may inform their decisions about placement. In some regions, for example, institutional culture may not keep up with the pace of current standards for care and

health system reforms, so the quality of nursing facilities may be inadequate for the needs and illnesses of elders and people with disabilities (Institute of Medicine, 2001).[58] What leads some NFs to provide better care than others is of particular importance to policy makers who are trying to use data to drive future policies and regulations. An understanding of quality between those who measure and report it and those who have the power to change it (Mor et al., 2003)[60] is crucial. Working together across silos has never been so important.

In nursing, regardless of the work role, the social contract between nurse and resident is important. The feeling that a nurse will respond when called is a basic social contract between the nurse in academia, policy, and the NF and her/his care recipient. Nurses at all levels needed to answer their concerns.

These findings support the view that it is more than a skillsets that lends itself to the emergence of quality. Systems like NFs have structures, and quality outcomes result from the relationships between parts.[22,29] Few professional RNs practice at the resident's side.[1,2] When quality is defined as an aggregate of constructs like skill performance, the importance of those who perform the skill may be lost. This research supported the need for NFs to invest resources in developing and improving interactions that support team work between nurses and nurses' aides, who work together to care for residents in developing both the UIC plans and answering the residents' calls.

Age-related genitourinary changes make the likelihood of UI a growing problem for women in NFs; it increased by 6% for every 10 years of age regardless if the analysis was started at age 18 or 65. Starting an educational plan to accommodate and possibly forestall the UI experiences of men and women could improve the quality of NFs. This includes professional care plans written in combination with knowledge of gender-specific knowledge of aging and UI.

There were limitations to this study. In prior research, county-level variables associated with NF quality included the percentage of the elderly population ($\geq$65 years), NF competition using the Herfindahl index, and urban versus rural location.[3,13,24] Neoclassical economic theory reports that increased demand for services yield higher quality as facilities compete for residents[4]; the Herfindahl index measures competition in the local market. Such considerations were not included in this analysis.

In this paper, NF quality was studied through the lens of a complex, non-linear system embedded within the LTC community guided by complexity science. The emergence of quality was not a linear process dependent on one UI protocol or skill. Building on interactionist perspectives on how people relate to each other was necessary when assessing quality as well as knowledge of what worked to treat a condition. Ensuring that our most vulnerable elders and people with disabilities are cared for in the best possible manner depends on ensuring that nursing knowledge in nursing facilities relies on a culture of care within relational interactions. This is nursing's social contract with society.

Acknowledgement

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.gerinurse.2018.09.009.

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