eprints@whiterose.ac.uk
https://eprints.whiterose.ac.uk/

The Relationship Between Registered Nurses and Nursing Home Quality: An Integrative Review

(2008-2014)

Mary Ellen Dellefield, PhD, RN, Research Nurse Scientist, VA San Diego Healthcare System, (VASDHS),San Diego, California

Corresponding author: Mary Ellen Dellefield, VASDHS, 3652 Christine Street, San Diego CA 92117

E-mail: Mary.dellefield@va.gov

Nickolas G. Castle, PhD, Professor, University of Pittsburgh, Pennsylvania

Katherine S. McGilton,, PhD, RN, Associate Professor, Lawrence S. Bloomberg Faculty of Nursing,University of Toronto, Canada

Karen Spilsbury, PhD, RN, Professor, University of York, Heslington, York, United Kingdom

Implementation of the Affordable Care Act (ACA) has generated renewed interest in the quality and costs of healthcare provided to Medicare and Medicaid beneficiaries in skilled nursing facilities (SNFs), commonly referred to as nursing homes (NHs). NH care is expensive; it is second only to acute hospital care for inpatient Medicare costs (Office of Inspector General [OIG], 2014). The increased focus on costs of care accrued by Medicare beneficiaries in NHs presents a valuable opportunity for registered nurses (RNs) to further demonstrate quantitatively the value they add to the capacity of the NH nursing skill mix to provide cost effective and efficient quality care. Paraprofessionals (i.e. nursing assistants (NAs), certified nursing assistants (CNAs), restorative nursing assistants (RNAs), and licensed vocational/practical nurses [LVNs/LPNs]) have provided the majority of direct care to NH residents since 1965 (Institute of Medicine [IOM], 1996). RNs increase the skill mix of this workforce. Skill mix refers to differences in education and licensure among nursing staff. It is unclear as to the benefits of this increase in skill mix with respect to costs and quality.

This integrative review is unique in that the RN is the sole focus of the review. By virtue of education and training, the RN has been identified as a key contributor to NH quality (IOM, 2004; Castle and Anderson, 2011). Researchers have reported a positive relationship between RN involvement in decision-making and better clinical outcomes (Anderson and McDaniel, 1992; 1998;1999). This is significant because effective care planning is based on the quality of clinical decision making (Centers for Medicare and Medicaid [CMS], 2013). Skills in care plan development, care planning, and coordination of care with interdisciplinary team members are codified as core RN competencies within RN state practice acts in the United States (US) (American Nurses Association [ANA], 2010).

No prior review has examined the RN as a key contributor to the NH; yet research highlights the multifaceted role of the RN in NHs and their positive impact on residents, relatives, and staff (Heath, 2010). Our review of research findings is made in an effort to advance the evidence-base supporting the proposition that RNs add value to NH residents' experiences both directly

through the level of RN staffing and indirectly through the clinical leadership they provide to members of the nursing skill mix.

Background

Over the past 18 years, three IOM (Institute of Medicine) reports have focused on nursing home quality. The 1986 report contained recommendations for fundamental changes in the federal government's oversight of NH care. Although specific RN staffing levels or nursing skill mix ratios were not proposed, the essential responsibility of professional and competent NH management, (e.g. Director of Nursing (DON), to create a positive work environment was emphasized (IOM, 1986). Toles and Anderson's 2011 review of studies summarizing the evidence-base for a relationship-oriented management practice in NHs provides recent empirical support of this original recommendation (Toles and Anderson, 2011).

While the complexity of factors influencing achievement of quality services in NHs was acknowledged in the 1996 IOM report, *Nursing Staff in Hospitals and Nursing Homes: Is It Adequate?* specific recommendations for RN staffing were made. Committee members recommended that, by the year 2000, Congress would require: a 24-hour presence of RN coverage; the use of geriatric nurse specialists and geriatric nurse practitioners hired in leadership and direct care positions; a more structured approach to training of NAs; and greater emphasis placed on the educational preparation of new DONs (IOM, 1996).

Similar RN staffing recommendations were made in the 2004 IOM report, *Keeping Patients Safe: Transforming the Work Environment of Nurses*. The authors recommended: greater input of direct care nursing staff into operational decisions (e.g. nurse staffing levels, skill mix, a re-design of work processes, and work flow to promote safety outcomes); study of factors contributing to nursing turnover; the 24 hour presence of at least one RN within a NH at all times; and implementation of staffing levels recommended in the Department of Health and

Human Services (DHHS) report to Congress, Appropriateness of Minimum Nurse Staffing

Ratios in Nursing Homes-Phase II Final Report (IOM, 2004).

However, few IOM report recommendations, or those of the issue paper, *Nurses*

Involvement in Nursing Home Culture Change: Overcoming Barriers, Advancing Opportunities,

sponsored by the Hartford Institute for Geriatric Nursing and the Commonwealth Fund, have

become federal law, with one exception (Harrington et al. 2000). Since the passage of the

Nursing Home Reform Act (NHRA) included in the 1987 Omnibus Budget Reconciliation Act

(OBRA), a RN has been required to either conduct or coordinate the completion of the Resident

Assessment Instrument (RAI).

Currently, federal requirements for RN staffing in NHs remain low, despite resident acuity

and complexity having substantially increased (Hirdes, Mitchell, Maxwell and White, 2011). A

facility is required to employ a RN as a DON. At least one RN must be on duty for no fewer than

8 hours per day, 7 days a week. In facilities with fewer than 60 residents, the DON may serve as

the one RN on duty. Consequently, no requirement exists for facilities of 100 beds or more to

employ an assistant DON or director of education. On evening and night shifts either an RN, or

licensed practical nurse or vocational nurse (LPN or LVN) is required (IOM, 2004). The national

average of RN hours per resident day (HPRD) in 2014 was 0.47 HPRD; the national average of

direct care staff hours per patient day in 2014 was 3.73 HPRD (American Healthcare

Association [AHCA], 2014). These figures are in stark contrast to RN staffing in hospitals

reported to be over 10 hours per patient in a 24 hour period (Welton, 2007).

In the past 8 years, 10 literature or systematic reviews addressing extant NH quality and all

nursing staffing levels and practices have been published (Bostick, Rantz, Klesner, and Riggs,

2006; Collier and Harrington, 2008; Castle, 2008; Bryan et al. 2010; Spilsbury, Hweitt, Stirk, and

Bowman, 2011; Streak, 2011; Shin and Bae, 2012; Hodgkinson, Haesler, Nay, O'Donnell and

McAuliffe, 2011; Dongjuan, Kane and Shamliyan, 2013; Backhaus, Verbeek, vanRossum, Capetuti, and Hamers, 2014). Findings have ranged from " a proven association between higher total staffing levels (especially licensed staff) and improved quality of care " (Bostick, et al. 2006, p.366) to "no consistent evidence found for a positive relationship between staffing and quality of care" (Backaus et al. 2014, p 383). This disparity is largely based on reviewers differing assessments of the scientific rigor of the studies reviewed (Castle, 2008; Spilbury et al. 2011).

Method

Search Strategy

Combinations of key terms were used including: registered nurse, nursing home, quality, nursing skill mix, RN scope of practice, quality of life, quality of care, deficiency citations, nurse staffing, work environment, and Minimum Data Set (MDS). Research studies and literature published in English between 2008 and 2014 were searched. The advanced practice nurse was excluded as a key term because the focus of this review is on the relationship of RNs practicing in the roles of DON, charge nurse, supervisor, MDS RN coordinator, clinical RN and NH quality. While there is evidence that use of advanced practice nurses (APNs) has been associated with improved quality (e.g. reduction in avoidable re-hospitalizations from NHs to acute hospitals), we believe that it is important to focus on the RN staff infrastructure that exists in the majority of NHs (Boyd et al. 2014).

Searches included several databases: Cochrane Library, CINAHL, Pub med, PsychINFO, Ovid, Google Scholar, and grey literature (e.g. government websites, reports, and texts). A total of 16,000 references were identified through database searching. Thirty one records were identified in the grey literature. Duplicate citations were removed; the remaining 1,300 citations were reviewed and cross checked with references used in selected literature reviews/systematic

reviews (e.g. Castle, 2008; Collier and Harrington, 2008; Spilsbury et al. 2011; and Backus et al. 2014). Any study previously cited in a review was removed from the search list to avoid duplication in reporting study findings. 175 full abstracts were reviewed, of which 133 full articles were printed. Sixty-six full texts were removed for a range of reasons (e.g. tool development, not including and/or reporting RN staffing levels, RN sample size, the individual numbers of RN and LPN/LVNs included in 'licensed nurses' as a study variable, or failure to report RN-specific findings). Sixty-seven studies remained and were included in the review. This process is shown in Figure 1.

Characteristics of Studies Reviewed

The 67 studies reviewed used various types of designs: cross-sectional (n=33); mixed methods (n=3); longitudinal (n=13), qualitative (n=10); descriptive (n=6); and cohort (n=2) designs. NHs or aged-care facilities representing six nations were included: US (n=60); Canada (n=4); United Kingdom (n=2); Germany (n=1); Norway (n=1); and Sweden (n=1). The unit of analysis used in studies included nursing home administrators, RN roles (i.e. DON, RN MDS coordinator, charge or supervisory RN, and clinical RN), residents, NHs, and observational units (e.g. surveys, quarterly MDS assessments). Sample sizes varied widely including ranges of NHs sampled (1 to 11,611); residents (1,376 to 692,875); nursing home administrators (419 to 2,900); RNs employed in various roles (16 to 1,048); observational units (4476 to 148,900); and 50 RN and LPN/LVN state practice acts and scopes of practice. In comparison with previously published reviews, there was an increase in the number of studies reviewed that focused on the impact of state and federal policies on minimal nurse staffing standards and RN staffing (n=8); used longitudinal designs (n=13); qualitative and mixed methods (n=12); included the work environment or organizational culture as variables (n=6); and non-US NHs (n=5).

Variables and Measures of Quality Indicators and Work Environment

Most variables and measures of quality indicators, were similar to those used in earlier reviews as shown in Tables 2 – 9. They included structural and process quality indicators; resident and employee outcomes; case mix, facility, and market variables; and the

impact of policy changes (e.g. changes in federal or state minimum staffing levels and reimbursement rates). In recent years, researchers have included variables measuring the work environment and safety culture as shown in Table 5.

Data Sources

Data sources used were similar to those used in earlier literature reviews and systematic studies as shown in Table 10. They included the Area Resource Files (ARF) (n=15); MDS data other than quality indicators or quality measures (n=13); On-line Survey Certification and Reporting [OSCAR] (n=33); primary data (e.g. surveys, focus groups, interviews, direct observation, field notes) (n=32); quality indicators or measures from Nursing Home Compare (NHC) (n=10); Automated Certification and Licensing Administrative Information Management Systems (ACLAIMS) (n=1); or other sources as shown in Table 10.

Results

Conceptual Frameworks

Conceptual frameworks used to provide support for hypothesized relationships among key concepts and constructs related to RNs and NH quality were diverse. Donabedian's quality framework (Donabedian,1992)., complexity theory (Corazzini et al. 2014),, and Castle and Engberg's conceptual model (Castle and Engberg, 2008),were most frequently used as shown in Table 1. These frameworks reflect the complexity of factors influencing subjective and objective definitions and measurement of NH quality. These include factors such as: nurse staffing level, nurse skill mix, ownership (e.g. structural), perceptions of team work, mutual respect, and open communication (e.g. process), and prevalence of pressure ulcers, urinary tract infections, falls, and deficiency citations (e.g. outcomes).

Structural Quality Indicators

Structural indicators of quality are stable characteristics, such as nurse staffing levels, resident clinical conditions, and facility demographics, such as ownership and size. Structural

measures used to study the association of RNs and quality in NHs varied, as shown in Table 2 (i.e. agency RNs, RN staffing hours; nursing skill mix; professional jurisdiction; and RN retention intrinsic and extrinsic factors). Some resident characteristics were measured using case mix or acuity measures as shown in Table 6. Measurements for facility characteristics are shown in Table 7.

RN staffing hours. RN staffing continued to be measured in a variety of ways, with RN hours per resident day (HPRD) being the most frequently used (19 studies). Castle and Engberg (2008a; 2008b) and Castle (2009) measured agency RN use as shown in Table 2.

 Nursing skill mix. Nursing skill mix was measured in 11 different ways as shown in Table 2. The two most frequently used measures were 'number of RNs' and the ratio of RNs to the sum of LPNs/LVNs and NA staff.

Process Quality Indicators

Process quality indicators are used to measure how care, or nursing work, is performed to produce experiences for residents and NH staff. Care processes used will differ based on resident characteristics, acuity, length of stay, and types and numbers of nursing staff included in the nursing skill mix. Care processes may be of a technical and directly observable nature, or of an interpersonal nature that requires both qualitative and quantitative methods to measure comprehensively. Measurement of relationships between RNs and their team members, or RNs and resident relationships, despite their profound influence on residents' quality of care, are not as easily measured (Spilsbury et al. 2011; McGilton et al. 2012). Because of this, they are not frequently included in studies, as shown in Table 3.

 Outcome Quality Indicators

The most frequently used outcome measured were those contained in government databases, including deficiency citations of various types (n=18) from the Online

Survey and Certification and Reporting System (OSCAR) database, long-stay (n=25 studies) and short-stay quality measures derived from MDS data (9), other MDS derived measures (n=4 studies), and incidence or prevalence of pressure ulcers (n=5 studies). Employee outcomes measured included turnover (n=7), retention (n=6), and RN intention to leave (n=1), intention to stay (n=1), and job satisfaction (n=1). Other outcome measures were derived from primary data (i.e. data observed or collected directly) (n=5), or Medicare databases (n=5).

Other Characteristics Associated with NH Quality

The relationship of RNs and NH quality is complex, in part because many other macro- and micro-system level variables exert an influence, as shown in Tables 5-9. Examples included case-mix characteristics of residents, some of which are mutable or immutable, facility-level factors, market characteristics, the impact of legislative changes in NH staffing levels, state Medicaid rates, Medicare reimbursement rates, and geographic locations of facilities.

Findings of the Relationship between RNs and NH Quality

In studies using quantitative methods, higher RN staffing was associated with better resident care quality where the following indicators were examined: fewer pressure ulcers, better quality measures (QMs), lower restraint use, decreased probability of hospitalization, fewer deficiencies citations, decreased mortality, and decreased incidence of urinary tract infections (UTIs). Higher RN staffing was associated with better employee outcomes where lower NA and RN turnover were examined.

In NHs having a higher RN ratio to other nursing staff, the higher professional skill mix was associated with lower restraint use, perceived risk of malpractice losses, fewer dually eligible Medicare beneficiaries discharged to SNFs, licensed nurses spending more time with residents, and NHs with high Medicaid census. Less DON turnover was positively associated with lower levels of education, higher job satisfaction, lower nursing staff turnover, and increased NH occupancy. As shown in Table 5, studies that examined the relationship between a better work environment, care processes, and outcomes, the following indicators were used: lower pressure

ulcer rate, lower restraint use, having an administrator with a consensus leadership style, higher hierarchical values held in the NH, lowers intent to leave, higher job satisfaction, and NHs with higher capacity for RN jurisdiction. Findings reported from studies using qualitative methods described RNs as negatively influenced by unsupportive work environments, poor leadership, low levels of teamwork and clinical leadership, poor communication, difficult relationships between members of the nursing skill mix, and greater organizational emphasis on compliance rather than quality.

The impact of changes in reimbursement rates and minimum staffing requirements on RN staffing, skill mix, and care quality were mixed, as shown in Table 9. For example, Mukamel and colleagues (2012) found a positive impact of anticipated changes in reimbursement rates and RN staffing levels. In contrast, others found negative or insignificant impacts. For example, Feng (2008) reported that changes in state Medicaid rates and case-mix reimbursement in 48 states were associated with decreased RN HPRD. In another study Feng and colleagues (Feng et al. 2010) found and no wage pass-through effect for RN HPRD. Chen and Grabowski (2014) reported that, although fewer RNs were fired relative to NAs, no significant changes in Quality Measures (QMs) (i.e. Medicare-defined measures of the quality of care), other than contractures, and a reduction in severe deficiencies with minimum staffing regulations in California and Ohio were found.

Discussion

Prior reviews identified several limitations in the research literature, including concern about data quality and accuracy, lack of standardized measurements of variables, a need for larger sample sizes, greater use of mixed methods and longitudinal designs, greater focus on nursing skill mix, and employee outcomes. While issues remain about data quality and lack of standardization of measurements, our review shows that progress has been made in increasing

the number of studies using larger sample sizes, qualitative and mixed methods, longitudinal designs, and measurement of the work environment and safety culture.

Most of the studies included in this review consistently reported that higher RN staffing and higher ratios of RNs in the nursing skill mix are related to better NH quality. The strongest evidence supporting a causal relationship between higher RN staffing levels, higher RN ratios within the nursing skill mix, and quality indicators is found in several longitudinal studies (Konetzka, Stearns and Park, 2008; Kim, Harrington and Greene, 2009; Castle and Anderson, 2011; Castle et al. 2011; Castle et al. 2014; Lin 2014, and the cohort study findings of Spector, et al. 2013. Given that a controlled experiment on RN HPRD and outcomes is not feasible or ethical, alternative methods must be found to more rigorously determine the causality of the relationship between increased RN staffing and increased NH quality. For example, Lin (2014) used the method of instrumental variables (IV) to estimate a causal relationship between increased RN HPRD and quality. IV is used to address measurement problems, including omitted variable bias, measurement error, simultaneity or reverse causality (Staiger and Stock, 1997). He noted that no significant relationships were found between the RN HPRD and quality outcomes when the more common ordinary least squares (OLS) regression model was used.

Some study findings were unexpected, and provide evidence of the challenges gerontological nurse educators and leaders face in increasing the skills of RNs currently working in NHs. For example, Castle and Engberg (2008a; 2008b) found that increased use of agency RNs was been associated with higher quality, as shown in Table 10. They suggested that the clinical skill level of the agency RNs may be higher than that of the regular RNs included in the study sample. DONs with higher levels of education were found to have shorter tenure (Decker and Castle, 2009).

Taken together, these findings suggest that the RNs practicing in NHs may be less well prepared clinically. This is consistent with the fact that most RNs and DONs practicing in NHs

have only an associate degree or diploma level education (IOM, 2004). The need for DONs and more RNs practicing in NHs to have a baccalaureate education is clear (Siegel et al. 2012). While the potential is there for RNs to have a significant impact on the quality of NH care, the NH tends to be a less attractive career choice than other practice settings to many RNs. The nature of the nursing skill mix used, and its implications for RN practice, may contribute to this.

Gerontological nurse leaders and educations are therefore challenged to find ways to serve as educational resources to NHs. Evidence based best practices known to enhance NH RN staff competencies (Bourbonneiere and Strumpf, 2008) exist. Promising programs include peer mentoring, training to develop DON's coaching and person-centered management skills, better orientation programs, and advanced practice nurse consultant visits to NHs (McGilton, Heath, Chu, Bostrom, Mueller, Boscard et al 2012).

However, given that no federal requirement exists for RNs to have specialized education in gerontological nursing upon hire and throughout their NH employment, it is likely that concerns about cost will restrict the NH industry from widely embracing such programs. As initially highlighted, NH care is expensive; second only to acute hospital care for inpatient Medicare costs (OIG, 2014). Therefore, concerns about the costs of employing more highly skilled RNs and DONs that have the potential to positively influence members of the nursing skill mix will continue to influence NH industry hiring practices. Findings from studies that measured the impact of minimum state staffing requirements and changes in Medicaid and reimbursement rates demonstrate this.

Future Research

Legislation has recently been passed that should greatly enhance the quality of CMS NH data often used by NH researchers. A provision in the recently signed Improving Post Acute Care Transformation Act of 2014 (IMPACT) has the potential to greatly improve the accuracy of the reporting of nurse staffing levels, skill mix, and turnover data in NHs. CMS is to have

implemented quarterly electronic reporting of NH staffing information by the end of fiscal year 2016 that is auditable (http://phinational.org).

Studies that build on the work of researchers who have used conceptual frameworks that mirror the complexity of the NH practice environment are recommended. Examples of these include the adaptive leadership framework derived from complexity theory (Corazzini et al. 2014), Castle and Engberg's framework (Castle and Engberg, 2008), and Donabedian's quality framework (Donabedian,1992). For example, Corazzini and colleagues have used complexity theory to describe how adaptive leadership and technical practices are needed in the increasingly complex and dynamic NH practice environment if greater NH quality is to be achieved (Corazzini et al. 2014). Adaptive leadership, an approach believed to foster work environments supportive of person-centered care, emphasizes flexibility, rather than rigidity, in providing care that is responsive to resident preferences and values. Adaptive leadership, based on complexity theory, is a promising framework to use for further research of clinical supervision that is person-centered. Finally, researchers need to increase the use of economic frameworks to study the benefits of increasing the number and qualifications of RNs working in NHs with respect to costs and quality.

Continued use of mixed methods to study RN NH work is recommended. This approach increases our ability to more fully understand the directly observable and unobservable cognitive work of the RN, members of the nursing skill mix (IOM, 2004), and their interactions with one another that likely differ as RN staffing levels and the composition of the nursing skill mix varies. For example, a mixed methods approach is ideal for better understanding the mechanisms by which RNs add value to the nursing skill mix and enhance the resident's NH experience.

Two important mechanisms are nursing surveillance, or patient monitoring and coaching/ person-centered supervision and management. Surveillance is defined as the ongoing

acquisition, interpretation, and synthesis of clinical data for clinical decision-making (IOM, 2004). It is different from assessment in that it is an intervention that occurs over time, rather than a single point in time. Framed another way, surveillance involves visible and invisible care activities of the RN, or any nursing staff (IOM, 2004). Resident surveillance is used in providing both direct (i.e. nursing assessment, physical care, administration of treatments, and psychological care) and indirect care (i.e. documentation, supervision, management and other activities performed away from residents but on their behalf to coordinate and manage the care experience and environment (Dellefield, Harrington and Kelly, 2012).

Given the likelihood that the RN presence in NHs will continue to be relatively limited, and most care will be provided by paraprofessionals, greater understanding of how nursing care delivery systems may increase their surveillance capacity is recommended. This is an urgent need given that poor resident monitoring was cited as one of the three practices responsible for the preventable adverse events studied in the 2014 OIG report on Medicare beneficiaries.

Conclusion

Conducting research on the relationship of RNs and NH quality must continue, in spite of the persistent methodological challenges presented to researchers. For both the advancement of nursing as an applied science and the benefit of society at large, nursing researchers are challenged to better demonstrate how the increased presence of a RN on each shift has the potential to enhance the cost effectiveness, efficiency, and quality of NHs. Nurse faculty and leaders are challenged to find ways that help nursing students recognize that RN practice in a NH is complex, challenging, and a setting in which NH residents will benefit on both an individual and system-level from their presence.

References

Alexander G. L. (2008). An analysis of nursing home quality measures and staffing. *Quality Management in Health Care*, *17*(3), 242-251.

American Health Care Association (AHCA) (June 2014). *Trends in nursing facility characteristics.* AHCA.

American Nurses Association. (2010).*Nursing: scope and standards of practice (2nd Ed.).* Silver Spring: American Nurses Association.

Anderson RA & McDaniel RR. (1992). The implication of environmental turbulence for nursing-unit design in effective nursing homes. *Nursing Economics*, *10*, 117-25.

Anderson RA & McDaniel RR. (1998). Intensity of registered nurse participation in nursing home decision making. *The Gerontologist*. *38*, 90-100.

Anderson RA & McDaniel RR. (1999). RN participation in organizational decision making and improvements in resident outcomes. *Health Care Management Review*, *24,* 7-16.

Arnetz, J.E., Zhdanova L.S., Elsouhag D., Lichtenberg P., Luborsky M.R. & Arnetz B.B. (2011). Organizational climate determinants of resident safety culture in nursing homes. *The Gerontologist, 51*(6), 739-749.

Backhaus R., Verbeek H., Rossum E.V., Capezuti E., Hamers J.P.H. (2014). Nurse staffing impact on quality of care in nursing homes: a systematic review of longitudinal studies. *Journal of the American Medical Directors Association, 15*(6), 383-393.

Bakerjian D. (2008). Care of nursing home residents by advanced practice nurses: a review of the literature. *Research in Gerontological Nursing*, *1*(3), 177-186.

Banaszak-Holl J., Castle N.G., Lin M.K., Shrivastwa N. & Spreitzer G. (2013). The role of organizational culture in retaining workforce. *The Gerontologist,* PMID: 24218146.

Bourbonniere M and Strumpf NE. (2008). Enhancing geriatric nursing competencies for RNs in nursing homes. *Research in Gerontological Nursing*, 1(3), 171-175.

Burger S.G., Kantor, B., Mezey, M., Mitty, E., Kluger, M., Algase, D. et al. (2009). Issue Paper: Nurses involvement in nursing home culture change: overcoming barriers, advancing opportunities. *Hartford Institute for Geriatric Nursing, New York University College of Nursing.*

Bostick J.E., Rantz M.J., Flesner M.K., Riggs C.J. (2006). Systematic review of studies of staffing and quality in nursing homes. *The Journal of the American Medical Association, 7*(6), 366-376.

Bowblis J.R. (2011). Staffing ratios and quality: an analysis of minimum direct care staffing requirements for nursing homes. *Health Services Research, 46*(5), 1495-1515.

Bryan S., Murphy J.M., Doyle-Waters M.M., Kuramoto L., Ayas N., Baumbusch J. et al. (2010). *A systematic review of research evidence on: (a) 24-hour registered nurse availability in long-*

term care, and (b) the relationship between nurse staffing and quality in long-term care. Saskatchewan: Canadian Institutes for health Research.

Castle N.G. (2008). Nursing home caregiver staffing levels and quality of care: a literature review. *Journal of Applied Gerontology, 27*(4), 375-405.

Castle N.G. (2008). State differences and facility differences in nursing home staff turnover. *Journal of Applied Gerontology, 27*(5), 609-630.

Castle N.G. (2009). Use of agency staff in nursing homes. *Research in Genontological Nursing*, *2*(3), 192-201.

Castle N.G. (2011). The influence of consistent assignment on nursing home deficiency citations. *The Gerontologist, 51*(60), 750-760.

Castle N.G. & Anderson R.A. (2011). Caregiver staffing in nursing homes and their influence on quality of care: using dynamic panel estimation methods. *Medical Care, 49*(6), 545-552.

Castle N.G. & Engberg J. (2008). Further examination of the influence of caregiver staffing levels on nursing home quality. *The Gerontologist, 48*(4), 464-476.

Castle N.G., Engberg J., Mendeloff J., Burns R. (2009). A national view of workplace injuries in nursing homes. *Health Care Management Review, 34*(1), 92-103.

Castle N., Wagner L., Ferguson J., & Handler S. (2014). Hand hygiene deficiency citations in nursing homes. *Journal of Applied Gerontology, 33*(1), 24-50.

Castle N.G., Wagner L.M., Ferguson-Rome J., Men A., Handler S.M. (2011). Nursing home deficiency citations for infection control. *American Journal of Infection Control. 39*(40), 263-269.

Castle N.G. & Engberg J.B. (2008). The influence of agency staffing on quality of care in nursing homes. *Journal of Aging & Social Policy, 20*(4), 437-457.

Centers for Medicare and Medicaid. Resident Assessment Instrument Version 3.0 Manual. Washington DC: U.S. Government Printing Office; May 2013.

Chen M.M .& Grabowski D.C. (2014). Intended and unintended consequences of minimum staffing standards for nursing homes. *Health Economics*. DOI: 10.1002/hec.3063.

Choi J., Flynn L., Aiken L.H. (2011). Nursing practice environment and registered nurses' job satisfaction in nursing homes. *The Gerontologist, 52*(4), 484-492.

Collier and Harrington (2008). Staffing characteristics, turnover rates, and quality of resident care in nursing facilities. *Research in Genontological Nursing (1)*3, 157-170.

Colon-Emeric C.S., Plowman D., Bailey D., Corazzini K., Utley-Smith Q., Ammarell N., Toles M., & Anderson R. (2010). Regulation and mindful resident care in nursing homes. *Qualitative Health Research, 20*(9),1283-1294

Compas C., Hopkins K.A., Townsley E. (2008). Best practices in implementing and sustaining quality fo care: a review of the quality improvement literature. *Research in Genontological Nursing*.

Corazzini K.N., Anderson R.A., Mueller C., Thorpe J.M., & McConnell E.S. (2012). Jurisdiction over nursing care systems in nursing homes: latent class analysis*. Nursing Research, 61*(1), 28-38.

Corazzini K.N., Anderson R.A., Mueller C., Thorpe J.M., McConnell E.S. (2013). Licensed practical nurse scope of practice and quality of nursing home care. *Nursing Research, 62*(50), 315-324.

Corazzini K.N., Anderson R.A., Rapp C.G., Mueller C., McConnell E.S., Lekan D. (2010). Delegation in long-term care: scope of practice or job description? *The Online Journal of Issues in Nursing*, May.

Corazzini K., Twersky J., White H.K., Buhr G.T., McConnell E.S., Weiner M., & Colon-Emeric C.S. (2014). Implementing culture change in nursing homes: an adaptive leadership framework. *The Gerontologist.* PMID: 24451896.

Day L., Anderson R.A., Mueller C., Hunt-McKinney, Porter K., Corazzini K.N. (2013). Data collection and assessment in nursing homes: practice, regulation, and education. *The Director*. Winter/Spring, 29-33.

Decker F.H. (2008). Outcomes and length of medicare nursing home stays: the role of registered nurses and physical therapists. *American Journal of Medical Quality, 23*(6), 465-474.

Decker F.J. & Castle N.G. (2009). The relationship of education level to the job tenure of nursing home administrators and directors of nursing. *Health Care management Review, 34*(2), 152-160

Dellefield M.E. (2008). The work of the RN minimum data set coordinator in its organizational context. *Research in Gerontological Nursing, 1*(1), 42-51.

Dellefield M.E., Harrington, Kelly A. (2012). Observing how RNs use clinical time in a nursing home: a pilot study. *Geriatric Nursing, 33*(4), 256-263.

Dongjuan M., Kane R.L., Shamliyan T.A. (2013). Effect of nursing home characteristics on residents' quality of life: A systematic review. *Archives of Gerontology and Geriatrics, 57,* 127-142.

Donoghue C. & Castle N.G. (2009). Leadership styles of nursing home administrators and their association with staff turnover. *The Gerontologist, 49*(2), 166-174.

Feng Z., Grabowski D.C., Intrator O., Zinn J. & Mor V. (2008). Medicaid payment rates, case-mix reimbursement, and nursing home staffing 1996-2004. *Medical Care, 46*(10), 33-40.

Feng Z., Lee Y.S., Kuo S., Intrator O., Foster A., Mor V. (2010). Do Medicaid wage pass-through payments increase nursing home staffing. *Health Services Research, 43(3),* 728-746.

Flynn L., Liang Y., Dickson G.L., Aiken L.H. (2010). Effects of nursing practice environments on quality outcomes in nursing homes. *Journal of the American Geriatrics Society, 58,* 2401-2406.

Flynn M. & McKeown M. (2009). Nurse staffing levels revisited: a consideration of key issues in nurse staffing levels and skill mix research. *Journal of Nursing Management, 17*, 759-766.

Graverholt B., Forsetlund L., Jamtved G. (2014). Reducing hospital admission from nursing homes: a systematic review*. BMC Health Services Research*, doi: 10.1186/1472-6963-14-36.

Harrington C., Choiniere J., Goldmann M., Jacobsen F.F., Lloyd L., McGregor M., Stematopoulos V., & Szebehely M. (2012). Nursing homes staffing standards and staffing levels in six countries. *Journal of Nursing Scholarship, 44*(10), 88-98.

Harrington C., Olney B., Carrillo H. & Kang, T. (2012). Nurse staffing and deficiencies in the largest for-profit nursing home chains and chains owned by private equity companies. *Health Services Research, 47* (1) Part 1, 106-128.

Harvath T.A., Swafford K., Smith K., Volpin M., White D., & Young H.A. (2008). Enhancing nursing leadership in long-term care: a review of the literature. *Research in Gerontological Nursing, 1*(3), 187-196.

Havig A.K., Skogstad A., Kjekshus L.E., Romoren T.I. (2011). Leadership, staffing, and quality of care in nursing homes. *BMC Health Services Research*, 11, 327.

Heath H. (2010). Outcomes from the work of registered nurses working with older people in UK care homes. *International Journal of Older People Nursing*, 5(2): 116-127.

Hirdes J. P, Mitchell L., Maxwell C.J. White N. (2011). Beyond the 'iron lungs of gerontology': using evidence to shape the future of nursing homes in Canada. Canadian *Journal of Aging*, *30*(3), 371-390.

Hodgkinson B, Haesler E.J., Nay R., O'Donnell M.H., McAuliffe L.P. (2011). *Effectiveness of staffing models in residential, subactue, extended aged care settings on patient and staf outcomes (review).* The Cochrane Library*, Issue 6.*

Horn S.D. (2008). The business case for nursing in long-term care. *Policy, Politics & Nursing Practice, 9*(2), 88-93.

Hunt S., Corazzinni K. & Anderson R.A. (2012). Top nurse-management staffing collapse and care quality in nursing homes. *Journal of Applied Gerontology, 33* (1), 51-74.

Hunt S.R., Probst J.C. ,Haddock K.S., Moran R., Baker S.L., Anderson R.A., Corazzini K. (2012). Registered nurse retention strategies in nursing homes: a tow factor perspective*. Health Care Management Review, 37(*93), 246-256.

Institute of Medicine (1986). *Improving the Quality of Care in Nursing Homes.* Washington, D.C.: National Academy Press.

Institute of Medicine, Committee on the Adequacy of Nurse Staffing in Hospitals and Nursing Homes (1996). *Nursing Staff in Hospitals and Nursing Homes: Is It Adequate?* Washington, D.C.: National Academy Press.

Institute of Medicine. (2004). *Keeping Patients Safe: Transforming the Work Environment of Nurses.* Washington, D.C.: National Academy Press.

Kash B.A., Naufal G.S., Dagher R.K., Johnson C.E. (2010). Individual factors associated with intentions to leave among directors of nursing in nursing homes*. Health Care Management Review, 35*(3), 246-255.

Kim H., Harrington C., & Greene W.H. (2009). Registered nurse staffing mix and quality of care in nursing homes: a longitudinal analysis. *The Gerontologist, 49*(10), 81-90.

Kim H., Kovner C., Harrington C., Greene W. & Mezey M. (2009). A panel data analysis of the relationships of nursing home staffing levels and standards to regulatory deficiencies. *Journal of Gerontology: Social Sciences, 64B*(2), 269-278.

King B.J., Gilmore-Bykovskyi A.L., Roiland R.A., Polnaszek B.E., Bowers, B.J., & Kind A.J.H. (2013). The consequences of poor communication during transitions from hospital to skilled nursing facility: a qualitative study. *JAGS*, 61, 1095-1102.

Konetzka R.T., Park J., Ellis R. & Abbo E. (2013). Malpractice litigation and nursing home quality of care. *Health Services Research,48*(6), Part 1,1920-1938.

Konetzka R.T., Stearns S.C. & Park J. (2008). The staffing-outcomes relationship in nursing homes. *Health Services Research, 43*(3),1025-1042.

Lee H.Y., Blegen M.A. & Harrington C. (2014). The effects of RN staffing hours on nursing home quality: a two-stage model. *International Journal of Nursing Studies,* 51, 409-417.

Lerner N.B. (2013). The relationship between nursing staff levels, skill mix, and deficiencies in maryland nursing homes. *The Health Care Manager, 32*(2), 123-128.

McGilton K.S., Bowers B., Mckenzie-Green B., Boxcart V. & Brown M. (2009). How do charge nurses view their roles in long-term care? *Journal of Applied Gerontology, 28*(6), 723-742.

McGilton K.S. Heath, H., Chu, C.H. Bostrom, A.M., Mueller, C., Boscart, V.M., McKenzie-Green, B., Moghabghab, R., and Bowers, B. (2012). Moving the agenda forward: a person-centered framework in long-term care. *International Journal of Older People Nursing,* 7(4), 303-309.

Mukamel D.B., Kang T., Collier E., & Harrington C. (2012). The relationship of California's Medicaid reimbursement system to nurse staffing levels. *Medical Care, 50*(10), 836-842.

Munyisia E.N., Yu P. & Hailey D. (2011). How nursing staff spend their time on activities in a nursing homes. *Journal of Advanced Nursing,* 1908-1917.

Park J. & Stearns S.C. (2009). Effects of state minimum staffing standards on nursing home staffing and quality of care. *Health Services Research*, 44(1), 56-78

PHI: Quality Care Through Quality Jobs. Http://phinational.org/topic/nursing-homes. Retrieved October 1, 2014.

Office of the Inspector General (February 2014). *Adverse events in skilled nursing facilities: national incidence among medicare beneficiaries.* Department of Health and Human Services,OEI-06-11-00370.

Rahman M., Grabowski D.C., Gozalo P.L., Thomas K.S., & Mor V. (2014). Are dual eligible admitted to poorer quality skilled nursing facilities? *Health Services Research, 49*(3), 798-815.

Seblega B.K., Zhang N.H., Unruh L.Y., Breen G.M., Paek S.C., & Wan T.T.H. (2010). Changes in nursing home staffing levels, 1997-2007. *Medical Care Research Review, 67*(2), 232-246.

Siegel E.O., Anderson R., Calkin J., Chu C., Corrazini K., Dellefield M.E., et al. (2012). Supporting and promotingpersonhood in long term care settings: contextual factors. *International Journal of Older People Nursing, 7*(4), 295-302.

Shin, Juh Hyun. (2008) "Relationship between nursing staffing and quality of life in Iowa nursing homes. PhD (Doctor of Philosophy) thesis, University of Iowa. http://ir.uiowa.edu/etd/18.

Shin J.H., Park T. & Huh I. (2014). Nursing staffing and quality of life in western New York nursing homes. *Western Journal of Nursing Research*. 36, 789-805.

Shin J.H. & Sung-Heui B. (2012). Nursing staffing, quality of care, and quality of life in US nursing homes 1996-2011: An integrative review. *Journal of Gerontological Nursing, 38*(12)*, 46-53.

Shippee T.P., Hong H., Henning-Smith C., Kane R.L. (2014). Longitudinal changes in nursing home resident-reported quality of life: the role of facility characteristics. *Research on Aging*. DOI: 10.1177/01640275l4545975.

Siegel E.O., Young H.M., Leo M.C. & Santillan V. (2012). Managing up, down, and across the nursing home: roles and responsibilities of directors of nursing. *Policy, Politics Nursing Practice, 13*(4), 214-223.

Siegel E.O., Young H.A., Mitchell, P.H. & Shannon S.E. (2008). Nurse preparation and organizational support for supervision of unlicensed assistive personnel in nursing homes: a qualitative exploration. *The Gerontologist, 48*(4), 453-463.

Spector W.D., Limcangco R., Williams C., Rhodes W., & Hurd D. (2013). Potentially avoidable hospitalizations for elderly long-stay residents in nursing homes. *Medical Care, 51*(8), 673-681.

Spilsbury K., Hewitt C., Stirk L., Bowman C. (2011). The relationship between nurse staffing and quality of care in nursing homes: a systematic review. *International Journal of Nursing Studies*, 48, 732-750.

Staiger D. & Stock JH. (1997). Instrumental variables regression with weak instruments. *Econometrica, 65* (3), 557-586.

Streak J. (2011). Staffing models in aged care: a systematic review. Joanna Briggs Institute.

Temkin-Greener H., Cai S., Zheng N.T., Zhao H., Mukamel D.B. (2012). Nursing home work environment and risk of pressure ulcers and incontinence. *Health Services Research, 47*(3), Part l: 1179-1200.

Thomas K.S., Hyer K., Castle N.G., Branch L.G., Andel R. & Weech-Maldonado R. (2012). Patient safety culture and the association with safe resident care in nursing homes. *The Gerontologist, 52*(6), 802-811.

Toles M. & Anderson R.A. (2011). State of the science: relationship-oriented management practices in nursing homes. *Nursing Outlook*, 59, 221-227.

Tong P.K. (2011). The effects of California minimum nurse staffing laws on nurse labor and patient mortality in skilled nursing facilities. *Health Economics.* 20, 802-816.

Towsley G.L., Beck S.L., Dudley W.N., Pepper G.A. (2011). Staffing levels in rural nursing homes. *Research in Gerontological Nursing*, *4*(3), 1-14.

Trivedi T.K,. DeSalvo T., Lee L., Palumbo A., Moll A., Curns A., Hall, A.J., Manish P., Parashar U.D., & Lopman B.A. (2012). Hospitalizations and mortality associated with norovirus outbreaks in nursing homes, 2009-2010. *Journal of the American Medical Association, 308*(16), 1668-1675.

Troyer J.L. & Sause W. (2013). Association between traditional nursing home quality measures and two sources of nursing home complaints. *Health Services Research, 48*(4), 1256-1278.

Wagner L.M., McDonald S.M., Castle N.G. Nursing home deficiency citations for physical restraints and restrictive side rails. *Western Journal of Nursing Research, 35*(50), 546-565.

Welton J. Mandatory hospital nurse to patient staffing ratios: Time to take a different approach. Online J Issues Nurs. 2007;12. Accessed October 10, 2014. http:www.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicas/OJIN/Tableof Contents/Volume122007/No3DSept07/MandatoryNursetoPatientRatios.html

Xu D., Kane R.L., & Shamliyan T.A. (2013). Effect of nursing home characteristics on residents' quality of life: a systematic review. *Archives of Gerontology and Geriatrics*, 57, 127-142.

Zhang N.J., Unruh L., Wan Tomas T.H. (2013). 31(6): 289-297. Gaps in nursing staffing and nursing home resident needs. *Nursing Economic, 31*(6), 289-297.

Zhao M. & Haley D.R. (2011). Nursing home quality, staffing, and malpractice paid losses. *Journal of Health Care Finance. 38*(1), 1-10.

Zheng N.T. & Temkin-Greener H. (2010). End-of-life care in nursing homes: the importance of CNA staff communication. *Journal of the American Medical Directors Association, 9,*494-499.

Figure 1. Integrated Review identification, Screening, Eligibility Flow Chart