

Running Head: NURSE STAFFING AND QUALITY CARE IN LONG-TERM CARE

**Nurse Staffing and Quality Care in Long-term Care Nursing Facilities:
Differences in Rural and Urban Settings**

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Abstract

Public and congressional concern induced the Institute of Medicine (1996) to recommend increasing registered nurse (RN) staffing levels in nursing homes (NHs) to improve quality of care. The purpose of this study was to answer the question, *does the relationship between nurse staffing in long term care nursing facilities and bladder and bowel incontinence for low risk nursing home residents differ by nursing facilities located in rural and urban settings?* This study used a secondary database that included aggregate data of all 615 NHs in Minnesota, South and North Dakota including nurse staffing levels, facility descriptives, and the quality measure (QM), prevalence of bladder and bowel incontinence in low risk NH residents. Ninety-four facilities reported on the QM (64 rural, 30 urban). The analysis showed no statistically significant results. Further study using the *Framework for Nurse Staffing in Long-term Care Facilities* (Mueller, 2000) is warranted including the additional independent variables of resident acuity, case mix, supervision of staff, education of staff, management practices, organization of nursing care, and staff retention and turnover. Combinations of these variables may reveal stronger relationships between nurse staffing in long-term care nursing facilities and bladder and bowel incontinence for low risk nursing home residents located in rural and urban settings.

Chapter I

Introduction

Background

For over forty years there have been concerns about the quality of care for residents residing in long-term care facilities (Centers for Medicare & Medicaid (CMS), 2001a, 2001b, 2004; Harrington, 2004; Harrington, Carillo, Wellin, & Burdin, 2003; Institute of Medicine (IOM), 1996, 2001; Karon, Sainfort, & Zimmerman, 1999; Karon & Zimmerman, 1998; Kayser-Jones, 1989; Kayser-Jones, Schell, Porter, Barbaccia, & Shaw, 1999; Maas, Buckwalter, & Specht, 1996; Spector & Mukamel, 1998; Zimmerman, Karon, Arling, Clark, Collins, Ross, et al., 1995). Quality care issues identified as serious issues in long-term care facilities (LTCFs) include the high use of physical restraints (Castle, 2002; Graber & Sloane, 1995), high prevalence of pressure ulcers (CMS, 2001c; Hendrix & Foreman, 2001), disturbing behaviors (Kolanowski, Hurwitz, Taylor, Evans, & Strumpf, 1994), unintended weight loss (CMS, 2001c; Kayser-Jones, 1989; Kayser-Jones et al., 1999), and urinary incontinence (Lekan-Rutledge & Colling, 2003; Cain & Mueller, 2002; Mukamel, Watson, Hongdao, & Spector, 2003; Schnelle, Alessi, Al-Samarrai, Beck, & Ouslander, 2002; Schnelle, Cadogan, Yoshii, Al-Samarrai, Osterweil, Bates-Jensen et al., 2003). Quality issues in LTCF are related to a variety of factors, however, the adequacy of nurse staffing has been identified as the primary factor (Aaronson, Zinn, & Rosko, 1994; Bliesmer, Smayling, Kane, & Shannon, 1998; CMS, 2001a, 2001b; Cohen & Spector, 1996; Harrington, Zimmerman, Karon, Robinson, & Beutel, 2000; IOM, 1986, 1996, 2001; Kayser-Jones et al, 1999; Munroe, 1990). Not only is nurse staffing adequacy defined by the number of

nursing staff available to meet the needs of residents, it is also defined by the type of nursing staff to meet those needs: licensed nurses (registered nurses [RNs] and practical nurses [LPNs]) and unlicensed nursing staff (nursing assistants [NAs]) (CMS, 2001a, 2001b; IOM, 1996, 2001; Maas et al., 1996; Mueller, 2000, 2004).

There is a growing body of research demonstrating that nurse staffing is associated with quality care in LTCFs (CMS, 2001a; Harrington, Zimmerman et al., 2000; Harrington & Swan, 2003; Hendrix & Foreman, 2001; IOM, 2001). A number of studies found positive associations between quality outcomes for LTCF residents and registered nurse (RN) staffing, in particular (CMS, 2001a, c; Harrington, Carillo, et al., 2003; Harrington, Zimmerman et al., 2000; Hendrix & Foreman, 2001; IOM 1996, 2001). In spite of this evidence and the public concern for quality care in LTCF, nurse staffing requirements for LTCFs are minimal. Presently, the Centers for Medicare and Medicaid (CMS) requires nursing homes (NHs) to have licensed nurse coverage 24 hours a day, 7 days a week and 8 of those hours the licensed nurse must be a RN (OBRA, 1987). States can require additional staffing standards and while many states have additional staffing requirements, they are minimal. Only nine states require that LTCF have a RN 24 hours a day, 7 days a week (Harrington et al., 2003). NHs can also apply for waivers and thereby have less than the federally mandated RN staff coverage if they are in a rural setting and have one RN who is on duty 40 hours per week. A NH may also be granted a waiver if there is a shortage of nursing personnel in their location and they can document that there will be no risk to their NH residents (Harrington, Carillo et al., 2003).

The Institute of Medicine (IOM) has convened several committees to address the quality of care in LTCF (IOM, 1986, 1996, 2001). The first IOM report (1986) served as

the impetus for significant reform in the minimum standards for NHs. The *Nursing Home Reform Act*, which was part of the Omnibus Budget Reconciliation Act of 1987, addressed a number of quality of care (QOC) issues including the requirement of a comprehensive resident assessment, restraint reduction, nursing assistant training, and nurse staffing. While the *Nursing Home Reform Act* did not fully address the IOM recommendations for nurse staffing, it did require 24 hour licensed nurse staffing seven days a week (OBRA, 1987). However, the IOM report differed in that it recommended 24 hour RN staffing seven days a week (IOM, 1986). After the 1986 IOM report, the following 1996 IOM report continued to recommend increased staffing requirements for LTCFs. These recommendations included an increase in the number of hours per resident day of direct nursing care, minimum levels for skill mix of staff, and it again ratified the 1986 IOM report's call for increased RN staffing to the 24-hour presence of a registered nurse. As well, the IOM called for development of appropriate education, training and competency standards for long-term care staff. In response to this report, Congress directed CMS to study the appropriateness of minimum staffing ratios for LTCFs (IOM, 1996).

The ensuing CMS (2001d) study looked at eight staffing issues in seventeen nursing facilities in Ohio, Colorado, and Texas. The eight staffing issues were: staffing levels on different shifts and different units, short staffing, staff working double shifts, utilization of contract staff, supervision and management of nursing staff, staff expertise (knowledge and skills), and staff development and continuing education. Facilities included those with different staffing levels, urban and rural locations, profit and non-profit ownership, and hospital based as well as freestanding settings. The study found that

most NHs had hiring needs but that those in rural areas either did not or had much fewer than those not located in rural areas. Those facilities that had attractive benefit packages for their nursing employees also retained staff. The study found that QOC was reduced by not having adequate supervision or management of staff, not having enough staff to meet the needs of residents, and staffing without the appropriate skill mix. The areas of care that were most affected were preventive care measures such as toileting, assistance with meals, repositioning and personal care such as mouth care (CMS, 2001d).

Harrington, Carillo et al. (2003) prepared a report on *Nursing Facilities, Staffing, Residents, and Facility Deficiencies, 1996 through 2002*. In facilities with Medicaid only or Medicare and/or Medicaid Beds (Titles 19 and 18/19), the total nursing HPRD increased from 3.1 to 3.4 from 1996 to 2002. This rise in HPRD was caused mostly by an increase in unlicensed staff. In facilities that had Medicare only beds (Title 18) the total HPRD (all nursing staff combined) was 7.4 in 1996 and dropped to 6.8 HPRD by 2002. In Medicaid only facilities (Title 19), the total nursing HPRD was 2.9 in 1996 and rose to 3.3 HPRD in 2002. The average total nursing hours for all licensed nursing facilities was 2.9 HPRD in 1996 and increased to 3.3 HPRD or 8.3 minutes per hour per resident over a 24 hour period in 2002. This included 1.4 HPRD of licensed nursing time, or only 3.5 minutes per hour in a 24-hour period (Harrington, Carillo et al, 2003). Recommended minimum staffing levels of all types combined (RN, LPN, and NA) for U.S. NHs is 4.55 HPRD or 11.4 minutes per hour in a 24-hour period (Harrington, Carillo et al., 2003). NHs provide an average of 3.6 (HPRD) of direct care to residents, including RNs, LPNs, NAs and DON time combined in 2003. Most of this is provided by NAs who are caring

for an average of 11 residents each workday. RNs are responsible for an average of 34 residents each day (Harrington, 2004).

Harrington et al.(2003) reported that residents have lower mortality rates, improved nutritional status, better physical and cognitive functioning, lower rates of urinary tract infections, lower incidences of pressure ulcers, fewer admissions and transfers to acute care hospitals, and fewer deficiencies if the nursing facility provides more nursing HPRD. In her review of the literature on staffing standards in NHs, Wells (2004) stated that NH staffing in the U.S. is “erratic” and that residents can receive from 8 minutes (HPRD) to 3.5 (HPRD) of direct care depending on the NH and level of staffing and other variables such as education, case mix and staff mix.

While the issue of NH staffing and quality care continues to be a concern for all NHs in the U.S., demographic data indicates that it may be even more of a concern for LTCF in rural communities. The US Department of Health and Human services (DHHS, 2003) reported that there is a discrepancy in the access to health care for those who live in rural areas as compared to those who live in urban areas. The population is older in rural areas of the country. Many of the elderly live alone. There is reduced access to health care resources and social supports in rural areas. The steepest urban-rural gradient in the elderly population is in the Midwest and the South (National Center for Health Statistics, 2001). Rural dwellers are more likely to have chronic illnesses and conditions and a higher incidence of cigarette smoking. Those who live in rural areas are more likely to have decreased dental care and more tooth loss and have less access to a primary care physician or nurse practitioner. Residents of rural counties have lower incomes than those

in urban counties and are more likely to be underinsured or uninsured (Larson, Machlin, Nixon, & Zodet, 2001).

The decreased population density of rural areas is one of the reasons that rural elders are admitted to NHs for care because community services are not available for them to maintain their existence and well-being in their own homes (National Rural Health Association, 2005; Heady & Byrd, 2002). Transportation limitations can reduce the mobility of older persons in the rural setting and make it difficult to receive or to go to resources that would provide health care or personal assistance (Heady & Byrd, 2002; Larson, et al., 2001).

This study focuses on the three Midwest states of Minnesota, North Dakota, and South Dakota. These states are contiguous and have similarities in their geography, settlement patterns, culture, agriculture, and industry. They have a larger proportion of their population residing in rural areas compared to the total population of the U.S. as shown in Table 1.

Table 1.

Population of the United States, Minnesota, North Dakota, and South Dakota

	Total Population	% Rural	% Urban
United States	281,421,906	21	79
Minnesota	4,919,479	29	71
North Dakota	642,200	44	56
South Dakota	754,844	48	52

(U.S.Census Bureau, 2000)

At the present time, North Dakota has 83 NHs, South Dakota has 112 NHs and Minnesota has 420 NHs. Twenty and one/half percent of North Dakota's NHs are urban (located in centers with a population of or greater than 30,000) and 79.5% are in rural areas. NHs in South Dakota are 12.5% urban and 87.5% rural. Minnesota has the greatest number of urban NHs of these three states at 33% urban (located in centers with a population of or greater than 30,000 or within the seven county metropolitan area of Minneapolis/St. Paul) and 67% are in the rural setting.

The states of Minnesota, North Dakota and South Dakota abide by the federal requirements for licensed nursing staff. Minnesota requires a minimum of 2.0 nursing HPRD (Minnesota Statute, 2004, 144A.04). North Dakota and South Dakota do not have any additional staffing requirements beyond the federal requirements.

Quality indicators for long-term care facilities.

Until recently, there has not been a standard measure for QOC in NHs. Through the *Nursing Home Reform Act*, all U.S. LTCFs are required to use the Resident Assessment Instrument (RAI). The RAI consists of the Minimum Data Set (MDS), which is a standardized resident assessment tool, and Resident Assessment Protocols (RAPs). The RAPs are used as a clinical investigative tool to determine the scope and nature of a clinical problem that was triggered by assessment items on the MDS. Using the items on the MDS, a series of quality indicators (QIs) or quality measures (QMs) were developed (Zimmerman, 1995) that indicate prevalence and incidence rates of common clinical and functional conditions experienced by nursing homes residents. There are 24 QIs and four are risk adjusted resulting in 28 QIs (Center for Health Systems Research & Analysis [CHRSA], 1999). Table 2 provides a list of the QIs. Some of the QIs are included in a

public reporting system on the CMS Nursing Home Compare website enabling the public to view a facility's prevalence/incidence rates of QIs.

Table 2.

Quality Indicators: Nursing Homes

Domain	Quality Indicator	Indicator	Adjustment
Accidents	Incidence of new fractures.	Outcome	No
	Prevalence of falls	Outcome	No
Behavioral and emotional patterns	Prevalence of behavioral symptoms affecting others	Outcome	Yes
	Prevalence of symptoms of depression.	Outcome	No
	Prevalence of symptoms of depression without antidepressant therapy.	Both	No
	Use of 9 or more different medications	Process	No
Cognitive patterns	Incidence of cognitive impairment	Outcome	No
Elimination and Continence	Prevalence of bladder or bowel incontinence.	Both	Yes
	Prevalence of occasional or frequent bladder or bowel incontinence without a toileting plan.	Outcome	No
	Prevalence of indwelling catheters	Process	No
	Prevalence of fecal impaction	Outcome	No

Infection control	Prevalence of urinary tract infections	Outcome	No
	Prevalence of antibiotic or anti-infective use	Process	No
Nutrition and eating	Prevalence of weight loss	Outcome	No
	Prevalence of tube feeding	Process	No
	Prevalence of dehydration	Outcome	No
Physical functioning	Prevalence of bedfast residents	Outcome	No
	Incidence of decline in late-loss activities of daily living	Outcome	No
	Incidence of decline in ROM.	Outcome	No
Psychotropic drug use	Prevalence of antipsychotic use in the absence of psychotic and related conditions	Process	Yes
	Prevalence of antianxiety/hypnotic use.	Process	No
	Prevalence of hypnotic drug use more than two times in last week.	Process	No
Quality of life	Prevalence of daily physical restraints	Process	No
	Prevalence of little or no activity	Outcome	No
Skin care	Prevalence of stage 1-4 pressure ulcers	Outcome	Yes

(CHSRA, 1999).

For the purposes of this study, one QI has been selected to examine the relationship of nurse staffing and quality care in LTCFs. This QI is the *percent (or prevalence) of low-risk residents who are incontinent of bladder and bowel*. A low risk

resident is one who is coded H1a and H1b = 3 or 4 on their MDS. A code of zero means that the resident is continent and able to have full control of bladder and bowels. Successful maintenance of retraining measures for continence is included in a code of zero. A code of one means that they are “usually continent” and bladder incontinent episodes occur only once or fewer times per week and bowel incontinent episodes occur less than once per week. A code of two means that the resident is “occasionally incontinent, or bladder incontinence occurs once or twice a week but not daily and bowel incontinence occurs once per week (CMS, 2002). A code of 3 means, “Frequently incontinent – bladder incontinent episodes tend to occur daily, but some controls is present (e.g. on day shift); bowel incontinent episodes occur two to three times per week.” (CMS, 2002). Code 4 means, “incontinent - has inadequate control. Bladder incontinent episodes occur multiple times daily; bowel incontinent is all (or almost all) of the time.” (CMS, 2002). This QI is one of the chronic care QMs collected regularly and included on the CMS public website. The look back time for the assessment of incontinence is 14 days.

While urinary incontinence (UI) as a QI has received a fair amount of attention in the literature, bowel incontinence is not so extensively considered. One study states that fecal incontinence (FI) is present in 47% of the NH population in Wisconsin, noting that FI and UI often coexist (Nelson, Furner, & Jesudason, 1998). The quality of life of persons with fecal incontinence is poor and those with this condition become isolated (Rothbarth, et al., 2001). Constipation care in NHs is very costly in staff and supplies (Frank, et al., 2002). The associated risks for FI identified by Johanson, Irizarry, and Doughty (1997) included diarrhea, dementia, restricted mobility, and male gender.

Dementia was the most dominant risk factor for FI. Those who were immobile or confined to a wheel chair were at risk of FI as they were unable to make it to the bathroom when feeling the urge to defecate. Consistent toileting assistance has been shown to improve the prevalence of UI and FI in the 50% or more NH residents with this expensive, debilitating, and humiliating condition (Schnelle & Leung, 2004).

Estimations of UI prevalence in NH populations range from 50% to 65% and frequently co-exist with FI (Schnelle & Leung, 2004). There are four main types of UI: stress, urge, overflow and mixed and one additional type of incontinence called, functional incontinence.

- Stress incontinence is an involuntary leaking of urine that occurs when abdominal pressure is increased and stresses the urethral sphincter muscle.
- Urge incontinence is a sudden strong, uncontrollable need to urinate.
- Overflow incontinence occurs when the bladder cannot hold the quantity of urine produced – it can be the result of diabetes, pelvic trauma, and extensive pelvic surgery, injuries to the spinal cord, shingles, MS, or polio.
- Mixed incontinence is stress incontinence mixed with overactive bladder. Symptoms of overactive bladder are urinating more than eight times in a 24-hour period (urinary frequency), a strong and sudden desire to urinate (urinary urgency), and, if the urge cannot be controlled, urge urinary incontinence.
- Functional incontinence is incontinence of the above kinds but is related to loss of cognitive function or physical abilities that make a person unable to respond to the need to eliminate (Prather, 2004; Schnelle & Leung, 2004).

There is an extensive body of research that has been synthesized by the Agency for Healthcare Research and Quality (AHRQ) to provide evidence-based guidelines for the assessment and management of UI for NH residents (AHRQ, 2005). The AHRQ mission is, “to improve the quality, safety, efficiency and effectiveness of health care for all Americans.” (AHRQ, 2005). Evidence based practice guidelines are available on many phenomena that nurses encounter in caring for people. These are made available through AHRQ to transfer research into best practice. Astute NH administrators and nursing leaders will utilize these best practice guidelines and improve the direct care that NH residents receive by educating and directing their staff on best practices based on research.

Purpose of the Study

Scant formal information on the comparison of quality measures and nurse staffing in LTCF from the rural to urban settings exists. The purpose of this research study using an existing database is to examine the relationship between nurse staffing in long-term care facilities and one quality measure (low risk bladder/bowel incontinence) to determine if there are differences for nursing facilities located in rural and urban settings. This examination may highlight further areas for continued research on rural and urban nursing home issues.

Significance of the Study for Nursing

No one has previously compared rural/urban settings on quality indicators and nurse staffing. The significance of this study for nursing will be to improve the knowledge base on nurse staffing in rural and urban nursing homes. If there is a difference in rural and urban nursing homes on the quality indicator and it is significantly

related to staffing this could have implications for state staffing standards. Improving the care practices of bladder and bowel incontinence in low risk nursing home residents could also be a potential outcome of this study. Nurse administrators in long-term care may find it useful for the education of staff, communication with staff, allocation of staff, and for recruitment and retention of nursing home personnel. It may also provide information for nurses to use to influence policy makers regarding the distribution of resources to nursing homes and to consider the difference in resources that may be required by urban and rural long-term care facilities and residents.

Research Question

The research question for this study is as follows: *Does the relationship between nurse staffing in long term care nursing facilities and bladder and bowel incontinence for low risk nursing home residents differ by nursing facilities located in rural and urban settings?*

Definition of variables

Bowel incontinence

The ability to self-regulate bladder and bowel elimination (CHSRA, 1999).

Bladder incontinence

The ability to self-regulate bladder and bowel elimination (CHSRA, 1999).

Low risk residents for bladder and bowel incontinence

As a CMS QM, low risk residents for bladder and bowel incontinence are defined from selected items on the MDS. Residents' MDS data are aggregated to the facility level to calculate a prevalence rate for the QM. The formula for calculating this rate is as follows:

Numerator: residents who are incontinent of bowel as coded on the MDS (H1a, H1b = 3 or 4) and residents who are incontinent of bladder. A code of three means, “Frequently incontinent – bladder incontinent episodes tend to occur daily, but some controls is present (e.g. on day shift); bowel incontinent episodes occur two to three times per week.” (Center for Health Services Research [CHSR], 2002). Code 4 means, “incontinent - has inadequate control. Bladder incontinent episodes occur multiple times daily; bowel incontinent is all (or almost all) of the time.” (CHSR, 2002).

Denominator: all residents with target MDS assessment who do not qualify as high risk. A high-risk resident would have the following items coded on the MDS: severe cognitive impairment and totally dependent in mobility. The admission MDS assessment is not included in calculating the quality measure. In addition, residents who have the following coded on their MDS are not included in the calculation: those who are comatose, those who have an indwelling urinary catheter, and those who have an ostomy (CHSR, 2002).

Nurse staffing

For the purposes of this study, nurse staffing includes those nursing staff providing direct resident care, specifically RNs, LPNs, and NAs. It excludes nurses serving in administrative positions (e.g. Director of Nursing). The definitions for these three types of nursing staff are as follows:

Registered Nurse: a person registered as a professional nurse by State statute. A RN may work independently within the legal scope of their practice or under the delegation of a physician or advanced practice nurse. A RN may be a staff nurse, charge

nurse, director of nursing, or serve in some other supervisory capacity. A RN may delegate nursing duties to a LPN, or a NA. The RN is required by law to assess the needs of residents.

Licensed Practical Nurse: a person licensed as a practical nurse by State statute. A LPN performs simple acts in the care of convalescent, sub acute or chronically ill patients; or provides care to acutely ill patients under the specific direction of a RN, physician, podiatrist, or dentist.

Certified Nurse Aide: an unlicensed person who has completed required State training and competency testing in the skills needed to work as a NA. A certified nurse aide provides nursing care that assists the residents with activities of daily living.

Urban setting

In this study, all NHs in a center with a population greater than 30,000 are designated urban. In addition, all those facilities that are within the seven county metropolitan area of Minneapolis – St. Paul are urban. There are two types of urban areas as defined by the U.S. Census (2000). One is *urban cluster*, which is a densely populated territory with less than 50,000 population but more than 2,500 persons. The other is called an *urbanized area* that has a central populated place. The adjacent area will have at least 1,000 people per square mile of land area, and all together, the center and the adjacent area will have 50,000 or more of population.

Rural setting

In this study, all NHs in a center with a population less than 30,000 or outside the seven county metropolitan area of Minneapolis – St. Paul are rural. The U.S. Census (2000) states that *rural* are any population, housing area, or territory that is not classified as urban (as above).

Long-term care nursing facility: a NH that meets the requirements for Medicaid certification as defined in 1919(a) of the Federal Social Security Act (CHSRA, 2003).

Conceptual Framework

A Framework for Nurse Staffing in Long-term Care Facilities (Mueller, 2000), will be used to guide this study. This framework was developed to guide nurse administrators when analyzing and evaluating the unique staffing needs for residents in LTCFs. It considers the combination of resident needs and the complexity of care required: staff availability, skill, education, and experience. The conceptual framework proposes that the facility's standards of care and philosophy of care guide the way in which the residents' needs are determined (Mueller, 2000). Once the required nursing care resources have been determined, the resources are allocated through resident care assignments and the work schedule of the nursing staff. The necessary nursing resources identified to meet the needs of residents may also influence the type of nursing staff that is recruited for employment. Following allocation of nursing staff, a system of care delivery is used to provide the nursing services to residents according to their needs. This process is followed to achieve QOC for the residents, while conforming to the standards and philosophy of care for the facility. A variety of contextual factors can influence the identification of residents' needs and meeting those needs through the determination of

required nursing resources. Some examples of contextual factors include geographic setting (urban or rural settings), the demographics of the community (availability of appropriate nursing staff to hire and combine for best education and skill mix), monetary resources (private pay, insurance, Medicare or Medicaid), and the acuity of the NH residents.

This study specifically tests the relationship of the following components of the Nurse Staffing Framework: number and type of nursing staff, the contextual factors of rural and urban settings of nursing facilities, and a selected QM.

Chapter II

Literature Review

Quality of care for nursing home residents has been of concern for decades. Public concern induced the Institute of Medicine (IOM) to produce a report called *Improving the Quality of Care in Nursing Homes* (1986). This led to the creation of the Nursing Home Reform Act, a part of the federal Omnibus Reconciliation Act (OBRA) of 1987. The *Nursing Home Reform Act* required the provision of “nursing services and specialized rehabilitative services to attain or maintain the highest practicable physical, mental, and psychosocial well-being of each resident”. The IOM report *Nurse Staffing in Hospitals and Nursing Homes* concluded that quality in nursing homes was related to nurse staffing.

The purpose of this study was to use a quality indicator, namely, *the prevalence of bladder and bowel incontinence* to examine the differences in the relationships in quality of care and nurse staffing between urban and rural nursing homes (NHs) in three states, Minnesota, North Dakota, and South Dakota. All Medicaid and Medicare certified nursing homes in these states conduct assessments on residents using a federally mandated assessment tool called the Minimum Data Set (MDS). The first year the MDS was used in nursing facilities was 1990. The 31 quality indicators (QIs), which are defined from items on the MDS, are used by nursing facilities to benchmark the quality with other facilities (Table 2). Some of the QIs are included on a public database sponsored by the Centers for Medicare and Medicaid Services (CMS). Quality is measured in various ways. QIs are a beginning point in the evaluation of QOC. There are both process and outcome QIs. Process indicators illuminate what occurs between health

professionals and the residents who receive their care. Outcome indicators represent the results of the processes of care as expressed in the physical, emotional, or psychological well being of the resident. Some residents may be at higher risk for an outcome regardless of the nursing care they receive and so some QIs have a risk adjustment. For example, *prevalence of bladder/bowel incontinence* is an outcome QI that is adjusted according to residents who are at high risk or low risk for the QI.

The number, skill level, education, experience and management of nursing personnel are variables that can affect both process and outcome indicators. Nurse staffing has been linked to quality outcomes in NHs in four studies using data collected prior to the Omnibus Reconciliation Act of 1987 (Aaronson, Zinn, & Rosko, 1994; Bliesmer, Smayling, Kane, & Shannon, 1998; Cohen & Spector, 1996; Munroe, 1990). These studies indicated that the professional mix and number of nursing staff were related to better outcomes for NH residents.

This literature review was limited to studies that used data that were collected 1990 or later. The rationale for this choice was to examine the literature that has been published since OBRA 1987 has been in effect. The literature search used the databases, Cumulative Index to Nursing and Allied Health (CINAHL) and Medline, the Computer Retrieval of Information on Scientific Projects (CRISP), and review of references in pertinent research reports. The subject terms used for the search were: NHs, long-term care facilities (LTCFs), urban areas, rural areas, aged, quality of health care, QIs, quality assurance, quality of nursing care, clinical indicators, nursing outcomes, nursing staff, nursing manpower, personnel staffing and scheduling, urinary incontinence (UI), and fecal incontinence (FI). Studies that were specific to nurse staffing in NHs; QOC and

nurse staffing in NHs; clinical indicators of QOC and nurse staffing in NHs; UI, FI and nurse staffing in NHs; and rural and urban NHs were included in the review for this paper.

The literature review resulted in 23 studies that provided information on nurse staffing and QOC in NHs. No studies examined the differences in staffing and QIs between rural and urban LTCFs. Four of the 24 studies were qualitative studies. Only one study in the literature search was found that examined nurse staffing and outcomes using incontinence as a QI.

Nurse staffing and state survey deficiencies in long- term care facilities.

The *Nursing Home Reform Act* (1987) required all U.S. LTCFs licensed by CMS to use the Resident Assessment Instrument (RAI). The RAI consists of the MDS (which is a standardized resident assessment tool) and Resident Assessment Protocols (RAPs). The RAPs are used as a clinical investigative tool to determine the scope and nature of a clinical problem that was triggered by assessment items on the MDS. NHs are responsible for collecting and reporting this data to the State survey agencies. The State survey agencies enter the data into the On-line Survey Certification and Reporting (OSCAR) database available to the public at www.medicare.gov . It is updated monthly. The OSCAR database provides information on regular surveys (every 9 to 12 months) and complaint surveys, staffing levels, number and types of residents, facility ownership, and QIs/quality measures (QMs) scores for each facility. All QIs/QMs and staffing data are aggregated to the nursing facility. Residents are not individually identified. The public can easily access information on a NH's QOC performance and how it compares to all other NHs in a State or throughout the U.S.

The OSCAR data were used for the following two studies that found a relationship between nurse staffing and the use of restraints. Graber and Sloane (1995) examined how facility variations in the structure and process of delivering care influenced the receipt of a survey deficiency related to the use of physical restraints. This study was conducted in 195 skilled and intermediate care nursing homes in North Carolina in 1991, the first year after OBRA was in effect. Nurse staffing was examined as a structure variable and the proportion of restrained residents was considered a process variable. Restraint survey deficiencies served as the dependent variable. The ratio of licensed practical nurse (LPN) and nursing assistant (NA) staff to residents in the facility (controlling for facility disability mix) was a significant predictor of overall restraint use. Higher levels of LPN and NA staffing were associated with lower proportions of restrained residents.

Castle (2002) examined national data from the OSCAR database for the years of 1996 to 1999 to examine the organizational and resident characteristics of 14,042 U.S. nursing homes (NHs) associated with persistent poor quality in the use of physical restraints. Persistent poor quality in the use of physical restraints in NHs was negatively associated with higher staffing levels of caregivers. Higher nurse staffing was associated with fewer facilities with persistent deficiencies in the use of restraints. These findings were particularly true for RNs. For facilities with full time equivalents (FTE) NAs/100 beds in the fourth quartile (more Medicaid residents), deficiencies were 17% more likely than those in the first quartile were.

Four studies examined the relationship between staffing and other types of state survey deficiencies. Johnson-Pawlson and Infeld (1996) investigated the relationship

between nurse staffing and QOC, as measured by an overall deficiency index in 198 nursing facilities in Maryland (23,343 residents). The OSCAR database was used and data were collected for the period of October 1, 1991 to September 30, 1992. Information on deficiencies, staffing, case mix, ownership, and payer mix was analyzed.

Total nursing staff ratio was significantly related to the overall deficiency index and the QOC deficiency index. More deficiencies occurred in NHs that staffed at or near the level required by federal requirements than occurred in facilities that staffed beyond these requirements. A significant relationship in the undesired direction was found between the ratio of RNs and resident rights deficiencies.

A 2000 study by Harrington, Zimmerman, Karon, Robinson, and Beutel investigated the relationship between different types of NH staffing and NH deficiencies. The data were obtained from the OSCAR database for all certified NHs in the United States for the period of July 1, 1995 to June 30, 1996. The dependent variables were QOC related deficiencies; quality of life (QOL) related deficiencies, and other deficiencies. Nurse staffing data were measured as RN, LPN, NA, administrative and total nursing hours per resident day (HPRD).

The analysis of resident characteristics identified that 50% of residents had UI, 42% had dementia, 26 % had some behavioral symptoms, 18.6% were depressed, and 6.5% had decubitus ulcers. Residents with more incontinence were housed in facilities with greater total deficiencies, higher QOL deficiencies, and higher QOC deficiencies.

A significant relationship between RN staffing levels and both QOC ($p < 0.01$) and total deficiencies (QOC, QOL, and other) ($p < 0.05$) was found, but not for QOL related deficiencies. Facilities with fewer RNs and fewer NAs were more likely to receive QOC

related deficiencies. LPN/LVN hours did not show a relationship to deficiencies. Low NA hours were associated with total care deficiencies ($p < 0.01$), QOC deficiencies ($p < 0.05$) and QOL deficiencies ($p < 0.01$).

When case mix, facility characteristics and other variables were controlled for in the analysis, staffing hours and resident characteristics explained only a small portion of the variation in deficiencies (less than 1%). More Medicaid residents, larger facilities, increased numbers of residents that had UI, behavioral problems or pressure sores, and for-profit nursing homes were all associated with higher numbers of deficiencies.

The United States General Accounting Office (GAO) (2002) conducted a study that examined the association of staffing and expenses with quality for 1,163 freestanding NHs in the states of Washington, Ohio, and Mississippi for the year 1999. Staffing data were obtained from state cost reports. Deficiencies, obtained from the OSCAR database, included the following: physical restraints, abuse, QOL, dignity, pressure sores, indwelling catheters, treatment of incontinence, nutrition, dehydration, unnecessary drugs, antipsychotic drugs, and nursing staff.

Nursing hours were analyzed for NAs, LPNs, and RNs. In two of the states (Washington and Ohio), more nursing HPRD decreased quality problems in NHs. This was particularly true of NA HPRD. Conversely, in Mississippi, there were more deficiencies in NHs with higher nursing HPRD.

Mosely and Jones (2003) examined RN staffing and state survey deficiencies in 28 Nevada NHs. The purpose was to examine if RN HPRD and RN/LPN staff mix influenced the number and type of deficiencies in free standing NHs with more than 50 beds each, using the OSCAR data for 1994. Four resident care deficiency measures were

used: QOC, QOL, resident behavior and facility practices, and resident assessments. In addition, a total deficiencies variable was used that was composed of the sum of the four resident deficiency variables. The four resident deficiency variables represented 84% of total possible survey deficiencies. Deficiencies were weighted for scope and severity using the demographics of the NHs. NHs with less RN to LPN hours had more total deficiencies and more resident assessment deficiencies.

All of the studies that examined nurse staffing and state survey deficiencies in LTCFs analyzed secondary data from the OSCAR database. There are concerns regarding the data in OSCAR. NHs are responsible for reporting the nurse staffing data to the State survey agencies that then enter it into the OSCAR database. The State NH inspectors review the data during annual inspections, but it is not audited for accuracy. A NH that does not receive a deficiency means the facility has met the minimal standards only. It does not mean that the facility provides exceptional nursing care. Comparing states with each other on QMs can be difficult because of the variability in application of standards in the different states.

Only two of the studies used the same QM (restraint use). Graber and Sloane (1995) analyzed data on restraint deficiencies for NHs in one state only (North Carolina, N=195) while Castle (2002) examined the deficiencies on restraint use for all U.S. NHs (N=14,042). The remainder of the studies used a variety of ways to define the deficiency variable/s under examination.

Johnson-Pawlson and Infeld (1996) examined deficiencies in one state's NHs (N=198), as did Mosely and Jones (2003) (N=28), while the GAO (2002) examined three state's NHs (N=1,163). Harrington et al. (2000) examined all U.S. NHs. While the

studies in the literature review that examined nurse staffing and state survey deficiencies in LTCFs provided results that are similar in that NH deficiencies increased when nurse staffing was low, they must be interpreted with caution. The large variation in NH sample size and the range of states and deficiencies being examined limit the generalizability of the findings.

Nurse staffing and quality indicators/measures in long-term care facilities.

A number of characteristics of residents (clinical and functional) and facility characteristics (resources, administrative, and setting) were identified that could reveal specific differences in QOC and were reliable and valid. The prevalence and incidence rates of common clinical and functional conditions experienced by NH residents are reported as QMs. These 28 QIs or QMs (24 QMs with four risk adjustments) were originally developed by Zimmerman (1995). An additional QM (percent of residents who lose too much weight) has since been added (CMS, 2004). The QMs are used to benchmark individual NHs against all other NHs in the database and against QOC standards and regulations.

Anderson, Hsieh, and Su (1998) identified patterns of resource allocation that related to selected QMs for all Texas nursing homes (N=494). Staffing data were obtained from the Texas Medicaid Nursing Facility Cost Reports for 1990. Data for the QMs were obtained from the Client Assessment, Review and Evaluation form that was a precursor to the MDS.

Quality of nursing care was measured with eleven prevalence QMs: verbal aggression, physical aggression, disruptive behavior, restraint (geriatric-chair, wrist-mitten, and vest-belt), contracture, pressure ulcer, dehydration, urinary tract infection

(UTI), and fracture in the prior three months. Case mix adjustment was done for all subjects. Results indicated more RN staffing ($p=0.009$) and NHs that spent more dollars per resident day ($p=0.007$) had better average quality outcomes. LPN and NA staffing levels did not significantly affect quality outcomes in this model. NHs with the greatest improvement in outcomes had higher RN FTEs per 60 beds, a larger percentage of RNs in the staff mix and more RN HPRD. In addition, the NHs with the most improvement in outcomes had less LVN HPRD, lower percentage of LVNs in the staff mix and fewer LVN FTEs per 60 beds.

The CMS conducted a congressionally mandated study to determine the appropriateness of minimum nurse staffing ratios in NHs (CMS, 2001 a, b, c, d). The CMS approached this congressional mandate in two phases and had a series of studies for each phase. Phase II provided three studies appropriate for this literature review.

One study analyzed 54 NHs in 17 states to examine the relationship between QIs/QMs and nurse staffing to determine a threshold of nurse staffing that was associated with quality (CMS, 2001c). QMs used in this analysis were *significant weight loss* and residents being *unclean and/or ungroomed*. Staffing levels were examined at the 25th percentile (lowest quartile for staffing) and QMs were examined at the top 50th percentile (for quality problems). RN, LPN, and NA HPRD were similar in contributing to significant weight loss. When licensed nurse staffing was analyzed, facilities showed five times more likelihood of significant weight loss in residents if they were staffed below 1.11 HPRD for combined RN and LPN staffing. When residents being *unclean and/or ungroomed* were analyzed a significant result ($p<0.003$) was revealed for NHs that

staffed below the average for RN HPRD. NHs that staffed at this level were eight times more likely to have residents that were unkempt.

Another study analyzed data from the MDS (July 1995 to June 1998) and Medicaid cost reports for the states of New York and Ohio (CMS, 2001c). The purpose was to examine associations between QMs and NH staffing levels. The sample included all long stay NH residents (90-day stays or more). The final 1997 sample included the aggregated data from 519 New York NHs and 728 Ohio NHs. The QMs were incident pressure ulcers (Stage 2-4), functional improvement, and resisting care improvement. Nurse staffing variables were NA, LPN, RN, and licensed nurse staffing.

In New York and Ohio, when RN staffing was below 0.109 HPRD, NHs were nearly 2½ times more likely to be in the lowest decile (poor outcomes) for incidence of pressure ulcers. When LPN staffing was below 0.77 HPRD, NHs were nearly five times more likely to be in the lowest decile (poor outcomes) for incidence of pressure ulcers. In Ohio but not New York, there was 2.58 times more likelihood of being in the lowest decile (poor outcomes) for functional improvement for NHs that were in the lowest decile for RN staffing. A low LPN, RN and total licensed level of staffing were related to increased rates of resisting care improvement.

Another Phase II study analyzed data collected in 1999 from Medicaid cost reports and the MDS for ten states (CMS 2001c). The purpose was to examine the relationships between NH staffing levels, QMs, and other staffing variables (wages, turnover and retention). The sample included residents aggregated to the facility level, short-stay (N=3,632 NHs) and long-stay (N=5,294 NHs). Short-stay QMs were congestive heart failure, electrolyte imbalance, respiratory infection, sepsis, and urinary

tract infection. Long-stay QMs were functional improvement, incident pressure ulcers, resisting care improvement, skin trauma, and weight loss.

The study indicated that a NH could decline to the poorest outcomes (10%) for a QM below a certain staffing threshold. The staffing levels above which no further detectable resident benefits could be detected were also identified and reported. These staffing thresholds for short-stay residents were NAs 2.4 HPRD, RNs 0.55 HPRD, licensed nurse staffing (RN and LPN combined) 1.05 HPRD, for a total nurse staffing time of 3.45 HPRD. The staffing thresholds for long-stay residents were NAs 2.78 HPRD, RNs 0.75 HPRD; licensed nurse staffing (RN and LPN combined), 1.3 HPRD, for a total nurse staffing time of 4.08 HPRD.

Nursing Home Quality, Cost, Staffing, and Staff Mix was the title of a study by Rantz et al. (2004). The purpose of the study was to examine the 443 certified NHs in Missouri that had 30 or more beds by these factors: processes of care, organizational attributes, cost of care, and nurse staffing level. NHs were divided into groups with good, average and poor resident outcomes based on MDS QIs reported to the state. A random sample of 10 facilities from each of the three outcome groups was selected over four phases of the analysis, with 92 NHs agreeing to participate in the study. There were no significant differences in nurse staffing HPRD across groups. Staff mix did not differ between the homes and RN salaries were similar. Twenty three percent of NHs in the good outcome group was in rural locations while only 15% of the poorer outcome group was in a rural location.

The findings of the studies in this section must also be viewed with caution because of the differences in study designs, differences in data sources, differences in

sizes of the samples (from 92 – 494 NHs), as well as range of States in the study (one to 17 States). Four of the studies particularly supported that more RN staffing improved QMs. Two of the studies found that more nursing staff was related to better outcomes for residents. One study found that there were no significant differences in nurse staffing HPRD and staff mix between good, average, and poor resident outcomes NHs. One study had a higher rate of good outcomes in rural NHs than in urban NHs.

Nurse staffing and specific quality indicators in long-term care facilities.

A group of studies examined the relationship of nurse staffing to the outcomes of nursing care for selected quality measures. These QMs included disturbing behaviors, food intake of residents, pressure sores, and UI. Two of these studies analyzed data to identify the most appropriate nurse staffing level and staffing mix to improve outcomes.

Kolanowski, Hurwitz, Taylor, Evans, and Strumpf (1994) used existing data from a clinical trial in three nonprofit NHs in the Philadelphia area. These facilities had 586 residents. The purpose of the study was to explore the effects of disturbing behaviors in institutionalized elders and identify related environmental (staff mix and ratio of licensed nursing personnel to unlicensed personnel) and personal characteristics of the resident. Findings showed that residents had significantly fewer agitated behaviors and there was significantly less use of restraints when licensed nursing staff was greater. Staff mix was significant ($R^2 = 0.0353$) at explaining the variance in the model.

Simmons, Osterweil, and Schnelle (2001) examined the relationship of mealtime staffing needs for NH residents by determining how many residents were responsive to feeding assistance and how much staff time was required to provide feeding assistance for these residents. The sample included 74 residents in three facilities in one state. To be

included, the participants had to be non-Medicare, long stay residents who had a poor intake at meals (less than 75%) that was unrelated to oral or gastric disease and not requiring a feeding tube. Trained research staff conducted direct observations of meal times and took pictures of patients' trays before and after meals to measure total percent of food and fluid intake. Trained NAs provided a 2-day trial of feeding assistance and the time spent feeding residents was recorded. Thirty-seven of the residents showed little or no improvement in their average total percentage intake (<10%), while 37 did improve intake significantly with the feeding assistance intervention. Eighteen of the "responsive" participants received a second intervention of feeding assistance in groups of three. Four of these residents returned to a poor intake in this group feeding intervention. Assistance time to feed residents varied from nine (the usual NH care) to 38 minutes (the feeding assistance intervention) per resident, per meal.

Hendrix (2001) conducted the only study that examined the staffing level and mix of staff (RNs, LPNs, and NAs) that would be optimal for reducing the prevalence and severity of decubitus ulcers in NH residents. The data for all U.S. NHs (12,128) in 1994 using the Area Resource File and the 1994 OSCAR data were analyzed. The dependent variable was the cost of decubitus ulcers and the independent variables were the costs of RNs, LPNs, and NAs per resident. Other independent variables included: for-profit and not-for profit status of NHs, case mix, size and occupancy rate, chain affiliation, hospital based, Medicaid, urban/rural designation, hospital and NH beds, and population size.

Results indicated that the number of RNs and NAs were positively associated with decreased decubitus costs. Those facilities that experienced decreased costs on the care of decubitus ulcers spent more on RN and NA staffing. The greater level of RN

staffing provided a higher level of nursing expertise and knowledge. LPNs were not an indicator of improved outcomes in that increased facility spending on LPN staffing increased decubitus costs. Annual costs of supplying LPNs was positively associated ($p=0.000$) with higher costs of decubitus ulcers. The costs for RNs were described as paying for expertise and the costs of paying for NAs as paying for nursing intensity, but that the costs for LPNs was neither.

The optimal nurse staffing was found by calculating the dollar amount spent per resident per year on RNs and NAs that would minimize the cost to the facility of pressure ulcers. Optimal RN staffing was calculated to be one RN to 12 residents and optimal NA staffing was calculated to be one NA to eight residents. Out of 12,128 nursing homes, only four had the optimal staffing and only 326 were found to be within 50% of the optimal level to improve this QI. The study found that NHs that spend “scarce resources” on LPNs made a choice not to increase the hires of RNs and NAs.

Bates-Jensen, Schnelle, Alessi, Al-Samarrai, and Levy-Storms (2004) examined the amount of time spent in bed during the day by residents and the relationship to nurse staffing in a cross-sectional study of 882 nursing home residents in 34 NHs in California. NHs were divided into two groups. Group 1 NHs had 748 participants in 28 NHs and a mean total licensed and non-licensed nurse staffing of 3.1 +/- 0.3 HPRD (the low-staffed homes). Group 2 NHs had 136 participants in six NHs with a mean total licensed and non-licensed nurse staffing of 4.8 +/- 1.1 HPRD (the high-staffed homes). Residents were divided into 3 groups based on time observed in bed during the day (>50%, 21-50%, and 0-20%). After controlling for resident functional characteristics, nurse staffing was the strongest predictor ($p=0.042$) of in bed times, that is, staffing below the 90th percentile of

NHs strongly predicted time spent in bed. Spending greater than 50% of time in bed during the daytime was significantly associated with increased daytime sleeping, less social engagement, and consuming less food and fluids during mealtimes.

Schnelle, Simmons, et al. (2004) compared two groups of NHs (N=21) on QOC as measured by 27 care processes delivered by NAs and licensed nurses. Data were obtained from staffing data reported to the State of California in 1999 by NH administrators. NHs were divided into 3 groups: Group 1 was in the lowest quartile (25th percentile) for nurse staffing, Group 2 was in the upper quartile (75th percentile) for nurse staffing, and Group 3 were those NHs in the upper decile (90th percentile) for nurse staffing. Four major domains headed the 16 care processes that were implemented by NAs: exercise and repositioning, incontinence care, feeding assistance, and out of bed and social engagement.

Findings included that NHs in the 91st percentile (Group 3) and above for staffing performed significantly better than Group 1 and 2 NHs on 12 of the 16 care processes provided by NAs. Residents in Group 3 homes spent more time out of bed during the day, were engaged more frequently, received better feeding and toileting assistance, were repositioned more frequently, and showed more physical movement patterns during the day that could reflect activity. No NHs reported that licensed nurses had documented a trial of toileting assistance for incontinent residents. RN HPRD did not meet the minimum level (0.75 HPRD per CMS, 2001; 1.15 HPRD per expert panel (Kovner, Mezey, & Harrington, 2000) in any of the NHs.

The studies in this section used samples that included one State to all U.S. states and three NHs to 12,128 NHs. Because these studies utilized a variety of data, sources

and study designs, findings should be considered with caution. All of the studies provided findings that showed a significant relationship between improvements in the QM with higher nurse staffing. Two of the studies found a particularly significant relationship between licensed nurse staffing and quality outcomes, while one study had a significant result for greater RN staffing, improved outcomes and reduced costs of the QM. Optimal RN staffing to reduce costs of decubitus ulcers in NH residents was found to be one RN to twelve residents.

Nurse staffing and urinary and bowel incontinence in long-term care facilities.

Studies have demonstrated that specific toileting interventions improve continence status for NH residents and that UI has sensitivity and specificity as an outcome of QOC (Mukamel, Watson, Hongdao & Spector, 2003; Ouslander, Schnelle, et al., 1995; Ouslander, Simmons et al, 1996; Schnelle, Alessi et al., 2002). Two studies examined incontinence interventions and nurse staffing and were included in the literature review.

Schnelle, Alessi et al. (2002) conducted a randomized controlled trial of prompted voiding (PV) and exercise over 8 months in 256 long-stay, incontinent residents in three for profit NHs and one non-profit NH in California. The purpose of the study was to address the IOM's recommendation for more research that would investigate the staff resources (time and mix) that were needed to meet certain care processes and desired outcomes of care.

This study used a protocol called Functional Incidental Training (FIT). FIT included care processes that promoted increased activity and were included in incontinence care in this program. Subjects were included if they were not terminally ill,

did not require post-acute skilled nursing care, had UI, were catheter free, and were able to follow a simple command to move the hand.

Those residents receiving the intervention were treated for 32 weeks. The intervention included being checked for wetness and FI every 1 hour at baseline for 2 days and then every 2 hours for 5 days of the week during the day shift (8 AM to 4:30 PM). At each check, the residents were offered fluids and then prompted to go to the toilet and were changed if they were wet. After the incontinence care, the residents were encouraged to walk, do repeat sit-to-stands from their chairs and once daily given upper body resistance exercises. Fluids were offered again at completion of each episode of care. The FIT Assessments of outcomes were done on a blinded basis and carried out 3 times during the study period of 8 months. Research staff tracked the time required to provide the intervention including the time it took staff to locate the resident in the facility.

Findings included a statistically significant difference in urinary and fecal incontinence frequency and in urine and fecal toileting ratios between the intervention and the control groups. Incontinent residents who received the FIT intervention had a large improvement in achieving a continent state (good outcome). It was calculated that one NA would be physically taxed and time challenged to provide this level of QOC (the FIT intervention) with a caseload of only five residents (two or three of which would be expected to be eligible for the intervention) on a day shift from 7 AM to 3 PM. Ninety two percent of NHs staffed below the level of five residents to one NA on the day shift.

Schnelle, Cadogan, et al. (2003) used a cross sectional study to evaluate 779 residents in 30 NHs in southern California for the years 2000 to 2001. The purpose of the

study was to examine if the highest quartile NHs (poor outcomes) and the lowest quartile NHs (good outcomes) for the QIs, *prevalence of incontinence* and *prevalence of incontinence without a toileting plan*, showed differences in the QOC based on nine incontinence care processes. The medical records (20 individual charts per facility) were reviewed to collect information on whether residents had been assessed for a 3 to 5 day trial of a scheduled toileting plan. Resident interviews were conducted for those participants who were rated as H1a or H1b: two, three, or four (occasionally incontinent, frequently incontinent, or incontinent) on the MDS incontinence items. Data were collected on the recall of frequency of assists to toilet, preference in frequency of assists to toilet, timeliness of assistance, and discomfort in asking for assistance from staff. Nurse staffing in all facilities were 7-9 residents to one nurse aide on the day shift and 10 – 13 residents to one nurse aide on the evening shift (standard industry staffing).

Findings included significant results for the lower quartile (good outcome) NHs and the upper quartile (poor outcome) NHs on the differences between residents who had an MDS rating as incontinent and those who were documented on the MDS as having a toileting plan. There was no difference between lower quartile and upper quartile homes on the number of assists to the toilet that residents reported, however, there was a difference between the groups on the frequency that nursing staff documented that residents had received toileting assistance. No incontinent residents had evidence in their charts that they had received an assessment for a 3 to 5 day toileting trial (best practice), and there was no documentation of a response to a toileting trial in any NHs.

These two studies indicated that NH residents who were on a toileting plan or a PV schedule were significantly more continent than residents who did not receive these

nursing interventions. It was determined that one NA would have difficulty providing this QOC to residents at a ratio of one NA to five residents. Staffing levels at the industry standard were too low to provide the amount of time that was necessary to provide care that would result in improved outcomes for residents who suffered from incontinence. Differences in the two studies may limit the generalizability of the findings. One of the studies used primary data for analysis in a blinded study with an intervention and control group among 256 NH subjects in 4 NHs over an 8 month study period, while the other used existing medical records and a cross sectional study design studying 779 NH residents in 30 NHs over a one year period. Both occurred in California.

Qualitative studies on nurse staffing and quality of care in long-term care facilities.

Four qualitative studies met the specifications of the literature review. One study collected data in an anthropological method over a 23-month period and examined the effects of staffing, supervision, and education on QOC at mealtime (Kayser-Jones & Schell, 1997). Anthropological field methods were used to investigate the impact of adequate staffing and supervision on resident dehydration in another study. The data were collected from October 1, 1993 to October 1, 1995 (Kayser-Jones, Schell, Porter, Barbaccia, & Shaw, 1999). Identifying environmental and organizational factors that influenced and contributed to end of life care in NHs was the purpose of the fourth study. Data were collected from January 1999 to June 2001 and qualitative methods were used for analysis (Kayser-Jones, Schell, Lyons et al., 2003). Bowers, Esmond, and Jacobson (2000) explored the relationship between staffing and QOC from the viewpoint of NAs. Data were collected over 24 months and the grounded theory method was used for analysis. The studies collected data using participant observation, in-depth interviews,

and event analysis. The study of staffing and dehydration also collected data using bedside dysphagia screening, mental and functional analysis, chart review, and assessment of family or advocate involvement in care (Kayser-Jones, Schell, Porter, et al., 1999).

Low nurse staffing levels were related to poor outcomes. These studies underscored that there was not enough RN staffing to provide adequate assessment of dehydration and quality hydration care, palliative care at the end of life, or best practice in incontinence care. There were also not enough RNs to supervise the too few NAs to provide QOC in mealtime assistance (Bowers, et al., 2000; Kayser-Jones & Schell, 1997; Kayser-Jones, Schell, Lyons et al., 2003; Kayser-Jones, Schell, Porter et al., 1999). Bowers et al. (2000) found that NAs identified toileting as one of the care routines that was dropped first when short staffed. "Residents who had once been seen as 'continent unless you make [them] wait too long' soon were more likely to be described as incontinent." (p. 60).

Three of these qualitative studies were designed using similar methods for data collection and analysis. The number of NH residents (35 & 58), physicians (36 & 36), nursing staff (66 & 50), and families (52 & 50) that were interviewed were similar in two of the studies. One of these studies focused on 117 NH residents receiving end of life care and the other focused on 100 NH residents who had a poor oral intake. The third study used purposive sampling of 40 residents selected from a larger sample of 100 NH residents. One study collected data in three NHs while two collected data in two NHs. All of the studies indicated that inadequate staffing was a major factor in QOC (Kayser-Jones & Schell, 1997; Kayser-Jones, Schell, Lyons et al., 2003; Kayser-Jones, Schell, Porter et

al., 1999). Thirty-eight NAs from six NHs were interviewed and the ensuing analysis identified that NAs viewed relationships with residents as the primary indicator of QOC and that low staffing decreased the time required to maintain and nurture these relationships (Bowers, et al., 2000).

Findings common to the four qualitative studies were that NAs felt that familiarity with residents was the most beneficial outcome of consistent and adequate staffing. This improved the QOC because NAs could spend the time to individualize care to resident preferences. Adequate staffing could be defined as a process variable rather than a structural variable because it identified the relational perspective that NAs have of quality. NAs viewed QOC as the caring relationships they have with residents and this was a consistent finding across the four studies. When short staffed, NAs bundled routine care tasks together in an efficient way for expedient delivery. This bundling reduced resident/NA interaction and depersonalized care.

Nurse Staffing in Rural and Urban Long-Term Care Facilities.

There were no studies that examined the differences in nurse staffing and QOC between rural and urban NHs in the literature search. Only one study looked at rural and urban location as a variable (Hendrix, 2001). There was a large negative impact on pressure sores if the facility was located in a rural setting ($p= 0.000$) meaning that there were fewer pressure sores in residents in rural NHs. NHs located in rural counties had significantly less costs for decubitus ulcers. The CMS Phase II (2001) study stated that the few NHs that had few or no hiring needs were located in rural areas or provided attractive benefits to their staff. Rantz et. al. (2003) found a trend for good outcomes that

avored the rural setting. Twenty three percent of NHs in the group with better outcomes was in rural locations while only 15% of the poor outcome group was in a rural location.

Harrington, Carillo, et al. (2003) and Harrington and Swan (2003) found that being in a rural area, part of a multi-facility chain, and size did not predict total staffing hours. Facilities with less Medicaid residents and more Medicare residents had significantly higher staffing hours. Some socio-demographic factors had an effect on staffing. Rural facilities were negatively associated with ADL dependency of residents (residents were more physically able to care for themselves). Rural NHs also have a lower total nursing turnover rate ($p=0.05$). RN hours and total nursing hours were higher in the rural setting. There were lower number of beds per NH, occupancy rates were stable, county per capita income was lower, and there were fewer African Americans in the population in rural counties. Harrington suggested facilities were able to recruit and retain nursing personnel in low-income areas and this was reflected in higher total staffing hours in areas with lower personal income per capita. Rural facilities were defined as those in non-metropolitan areas with a population density of less than 250 persons/sq. miles that have no incorporated community with a population greater than 50,000.

Conclusion

In reviewing these studies, it was found that 22 of the 23 studies in the literature review supported that nurse staffing improved the QOC in NHs. Greater RN and NA staffing in particular, in the appropriate ratio and numbers, were the two primary staffing variables that were related to better quality outcomes. Quality was measured using a

variety of methods (quantitative and qualitative), examining various QMs, alone or in differing combinations, and during various periods.

One of the studies provided results that only a small portion of the variation in deficiencies was explained by staffing hours and resident characteristics and one of the studies did not find a relationship between staffing levels and QOC in NHs. Three of the studies provided some unexpected results, namely that increased RN staffing was correlated with increased resident rights violations in Maryland. In Mississippi higher nursing HPRD was correlated with greater NH deficiencies, in spite of having 25% more nursing HPRD in the highest spending homes than the lowest. More QOL deficiencies were correlated with higher RN HPRD in Nevada. Even though these studies provided these unexpected results, they also supported that greater nursing HPRD significantly improved quality outcomes. Several of the studies also found that LPN staffing did not improve quality outcomes.

One study provided the most efficient staffing level that would result in the best resident outcomes for decubitus ulcers (one RN: 12 residents and 1 NA: eight residents) (Hendrix, 2001). A CMS, 2001 study detected the staffing levels above which no further detectable resident benefits could be identified (2.78 HPRD for NAs, 0.75 HPRD for RNs, and 1.3 HPRD for licensed nurses). There is a mandated minimum required amount of staff (one RN on duty for 8 consecutive hours per day, 7 days per week and a charge nurse who may be either an RN or LPN/LVN must be on duty 24 hours per day, 7 days per week, which converts to 0.30 HPRD of required licensed nursing time [Harrington, 2003]). NH operators may feel that if they meet this minimum, they comply with standards and provide appropriate care to residents. Federal and state regulations do not

encourage operators to explore optimal staffing levels for best outcomes. A difficulty in studies that include a number of states is that it can be difficult to compare states with each other on QMs because of the variability in application of standards in the different states.

The purpose of this study was to begin to fill the gap in knowledge on the differences in relationships between staffing and QOC between rural and urban NHs. Urinary and fecal incontinence are one of the primary reasons that elders are admitted to LTCFs in both urban and rural settings. At least 50% of NH residents are incontinent. Resident response to continence care has been demonstrated to indicate adequate nurse staffing and nursing care (Mukamel, Watson, Hongdao & Spector, 2003; Ouslander, Schnelle, et al., 1995; Ouslander, Simmons et al, 1996; Schnelle, Alessi et al., 2002; Schnelle, Cadogan, et al., 2003). No research studies have used a QM to evaluate if there is a difference between rural and urban NH settings in the relationships between levels of nurse staffing and QOC. OSCAR contains data on both nursing staff and QMs at the aggregate level for all certified NHs. This study will use the OSCAR database to examine the QM of prevalence of UI and FI in the NH population in rural and urban NHs in Minnesota, North Dakota and South Dakota and the relationship of this QM to nurse staffing in rural and urban settings.

Chapter III

Methodology

The purpose of this study was to examine if there was a difference in relationships between nurse staffing and the quality indicator (QI), prevalence of bladder or bowel incontinence in low risk nursing home residents between rural and urban settings. A Framework for Nurse Staffing in Long-term Care Facilities (Mueller, 2000) was used to guide this study and was described in the Introduction. This Chapter will describe the methods used to conduct the study.

Research Design

This study used a non-experimental, descriptive, correlation research design. Secondary data were analyzed in this study.

Sample

All Centers for Medicare and Medicaid (CMS) certified nursing homes (NHs) for the states of Minnesota, North Dakota, and South Dakota for the reporting period dated January 16, 2004 were considered for inclusion in the sample. NHs that were certified by CMS in January 2004 numbered 415 in Minnesota, 112 in South Dakota, and 83 in North Dakota. Prevalence of bladder or bowel incontinence in low risk NH residents is a QI that is reported for long-stay NH residents. All NHs that submitted data for this QI for each of the three states in this reporting period were included in the sample (N=94). Five hundred and sixteen NHs either did not report on the QI or reported the QI was, "Not Available- The number of residents is too small to report. Call the facility to discuss this quality measure" (CMS, 2004).

The prevalence rates for urinary and bowel incontinence (low risk) for each nursing facility were collected from the public On-line Survey Certification and Reporting (OSCAR) database, which is available at The Official U.S. Government Site for People With Medicare called Nursing Home Compare (www.medicare.gov). This is a public database made available by the CMS so consumers may investigate and compare NH quality and characteristics.

As a requirement to receive Medicare and Medicaid payment, all facilities must adhere to a set of federal and state minimum standards as outlined by the CMS and each state's department that regulates NHs. To ensure that facilities are meeting these standards, onsite surveys are conducted in each facility by the state's NH regulatory agency every 9-15 months. At the time of the survey, each facility provides staffing data for the two-week period associated with the onsite survey. The staffing data are entered into the OSCAR database along with the results of the facility's onsite survey. The staffing data are also available in the public database, Nursing Home Compare. The CMS also reports data about the quality of facilities on the Nursing Home Compare website. The quality data are from the MDS assessments that are completed on the residents in the facility. The MDS data are electronically submitted to the state agency responsible for such data and then subsequently submitted to the CMS. For this study, the QI prevalence of bladder and bowel incontinence for residents who are low risk was abstracted from the Nursing Home Compare website for each facility for which this was reported.

Zip codes for the 94 NHs reporting on the QI were compared with those from the United States ZIP code lookup at <http://zip4.usps.com/zip4/welcome.jsp>, those of the seven county metropolitan area of Minneapolis-St. Paul, and other larger cities to classify

NHs as urban or rural. In this study, all NHs in a center with a population greater than 30,000 were designated urban. In addition, all those facilities that were within the seven county metropolitan area of Minneapolis-St. Paul were designated urban. All NHs in a center with a population less than 30,000 or outside the seven county metropolitan area of Minneapolis-St. Paul were designated rural. Rural nursing homes were coded one and urban nursing homes were coded two. In summary, the data and data source for each facility in the sample that were used for this study are listed in Table 3.

Table 3.

Data and Data Sources	
Variable	Data Source
RN HPRD	OSCAR
LPN HPRD	OSCAR
NA HPRD	OSCAR
Total Licensed Nursing HPRD	OSCAR
Total Nursing HPRD	OSCAR
Percent of low risk residents with bladder or bowel incontinence	MDS as reported in aggregate for the facility on the Nursing Home Compare website
Number of residents in each facility	OSCAR
Total number of certified beds	OSCAR
Type of ownership	OSCAR
Hospital affiliation	OSCAR
CMS provider numbers	OSCAR
Medicaid participation	OSCAR
U.S. Zip Codes	U.S. ZIP code database at http://zip4.usps.com/zip4/welcome.jsp

Analysis

A data file was created to include all the variables of interest. The Statistical Package for the Social Sciences (SPSS) version 12.0 was used for data analysis. Descriptive statistics were calculated for all facilities, rural only facilities, and urban only facilities. The following variables were analyzed: the prevalence of bladder or bowel incontinence in low risk nursing home residents, total nursing HPRD, RN HPRD, LPN HPRD, NA HPRD, licensed nurse HPRD, number of residents, total number of certified beds, hospital affiliation, and type of ownership (for profit, nonprofit, chain, church based, or government). The distribution of NHs reporting on the QI in both rural and urban settings was normal.

Correlations and descriptive statistics were used to answer the research question. The prevalence of bladder or bowel incontinence in low risk nursing home residents was the dependent variable and all others were independent variables.

Chapter IV

Results

This chapter will present the analysis of the data that were collected to answer the research question, *Does the relationship between nurse staffing in long-term care nursing facilities and bladder and bowel incontinence for low risk nursing home residents differ by nursing facilities located in rural and urban settings?* The data for this study came from the On-line Survey Certification and Reporting (OSCAR) database, which is available at *The Official U.S. Government Site for People with Medicare* called *Nursing Home Compare*. As a requirement to receive Medicare and Medicaid payment, all facilities must adhere to a set of federal and state minimum standards as outlined by the CMS and each state's department that regulates NHs. To ensure that facilities are meeting these standards, onsite surveys are conducted in each facility by the state's NH regulatory agency every 9-15 months. At the time of the survey, each facility provides staffing data for the two-week period associated with the onsite survey. The staffing data are entered into the OSCAR database along with the results of the facility's onsite survey.

The CMS also reports data regarding the quality of facilities on the Nursing Home Compare website. The quality data are from the Minimum Data Set (MDS) assessments that are completed on the residents in each facility. The MDS data are electronically submitted to the state agency responsible for such data and then subsequently submitted to the CMS. The data for the quality indicators (QIs) are posted on the CMS Nursing Home Compare website. The prevalence rates for the QIs on the website are calculated from the MDS data submitted by nursing facilities on each of the residents at admission, quarterly and annually. All QI and staffing data are aggregated to

the nursing facility level. This database does not identify any residents. Nursing facilities are identified by name and location. Descriptive statistics and correlations were used to analyze the data.

Descriptive Results

Nursing Homes

The descriptive statistics for rural and urban NHs are presented in Table 4. Ninety-nine percent of all NHs in the sample participated in Medicaid. More than half of all rural and urban facilities were operated by multichain organizations. The majority of all facilities were operated by non-profit organizations (62.7%). More rural facilities were part of non-profit church related organizations than were urban facilities. More urban facilities were operated by non-profit corporations than were rural facilities. There were nearly 10% greater numbers of for-profit corporations among rural facilities than urban facilities. There was nearly 10% greater ownership by multichain organizations in the urban setting than the rural setting. Urban facilities had a greater mean number of residents than did rural facilities. There were no significant differences between rural and urban facilities on these any of these characteristics.

Table 4.

Characteristics of Rural and Urban NHs in Minnesota, South and North Dakota.

	Total (N=94)	Rural(N=64)	Urban (N=30)
Medicaid participation	93 (99%)	64 (100%)	29 (96.7%)
Govt., city	5 (5.3%)	4 (6.3%)	1 (3.3%)
Govt., county	3 (3.2%)	2 (3.1%)	1 (3.3%)
Govt. & district hosp.	2 (2.1%)	2 (3.1%)	0
Multichain org.	53 (56.4%)	34 (53.1%)	19 (63.3%)
Hospital org.	16 (17%)	10 (15.6%)	6 (20%)
For profit, corp.	25 (26.6%)	19 (29.7%)	6 (20%)
Non-profit, corp.	38 (40.4%)	20 (31.3%)	18 (60%)
Non-profit, church	19 (20.2%)	15 (23.4%)	4 (13.3%)
Non-profit, other	2 (2.1%)	2 (3.1%)	0
Total residents	8528	4877	3651
Mean residents	90.72 (SD, 59.3)	76.2 (SD, 34.5)	121.7 (SD, 85.8)
Range of residents	16-461	24 – 185	16 – 461
Total cert. beds	8239	5735	2504
Mean cert. beds	87.6 (SD, 44.3)	89.6 (SD, 44.5)	83.5 (SD, 45.0)
Range of cert. beds	12-222	12-222	30-208

Nurse Staffing

Table 5 presents descriptive statistics for nurse staffing. The mean HPRD for total nurse staffing for all facilities was 3.54. Urban NHs exceeded rural NHs in total HPRD. Urban facilities had higher total nursing, RN, LPN, and licensed nursing HPRD than rural

facilities, but rural facilities had higher NA HPRD than urban facilities. There were no statistically significant differences between rural and urban NHs in total, RN, LPN, NA, or licensed nurse staffing.

Of total HPRD in rural and urban settings combined, RN staffing was 16.4%, LPNs were 19.5%, NAs were 64.4% and licensed nurse staffing was 35.6%. In the rural setting alone, RNs accounted for 15.8% of total HPRD, LPNs accounted for 18.1%, NAs accounted for 66.1%, and licensed nurse staffing accounted for 33.9%. In the urban setting alone, RNS accounted for 17.4% of total HPRD, LPNs accounted for 21.8%, NAs accounted for 60.8%, and licensed nurse staffing accounted for 9.2%.

Table 5.

Nurse staffing of rural and urban NHs in Minnesota, South and North Dakota by HPRD.

HPRD	Total			Rural only			Urban only		
	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range
Total	3.54	0.92	1.18-10.13	3.48	0.69	1.18-5.01	3.67	1.29	2.54-10.13
RN	0.58	0.36	0.23-3.61	0.55	0.18	0.24-1.22	0.63	0.59	0.2-3.6
LPN	0.69	0.42	0.00-3.84	0.63	0.30	0.00-2.01	0.8	0.6	0.32-3.84
NA	2.28	0.58	0.00-3.64	2.3	0.65	0.00-3.64	2.23	0.42	1.00-3.04
Licensed	1.26	0.71	0.57-7.45	1.18	0.34	0.57-3.19	1.44	1.16	0.87-7.45

Prevalence of Bladder and Bowel Incontinence in Low Risk NH Residents

The mean prevalence rate for bladder and bowel incontinence in low risk NH residents in all facilities was 46.03% (SD 12.79). The prevalence rates for this quality measure were 44.25% (SD 13.3) in rural NHs and 49.83% (SD 10.3) in urban NHs.

Relationship between nurse staffing and the prevalence of bladder and bowel incontinence in low risk residents.

Pearson correlation was used to examine the relationships between the dependent variable (prevalence of bladder and bowel incontinence in low risk residents) and the independent variables: RN HPRD, LPN HPRD, NA HPRD, total nursing HPRD, and licensed nursing HPRD. The results are presented in Table 6. There were no statistically significant relationships between the nurse staffing variables and the prevalence rates for all facilities. The relationship between the prevalence of incontinence and the RN HPRD in the rural setting approached significance ($p=0.051$), but it was in the undesired direction. The lack of statistically significant relationships between nurse staffing and the QM precluded examining the difference in those relationships between rural and urban settings.

Table 6.

Relationship between nurse staffing and the prevalence of bladder and bowel
incontinence in low risk NH residents.

HPRD	<u>Prevalence</u>		
	All facilities (N=94)	Rural (N=64)	Urban (N=30)
Total	0.019	-0.055	0.075
Sig. (2 tailed)	0.855	0.669	0.694
RN	0.126	0.245	0.036
Sig. (2 tailed)	0.225	0.051	0.851
LPN	-0.032	-0.112	-0.037
Sig. (2 tailed)	0.76	0.38	0.847
NA	-0.025	-0.075	0.236
Sig. (2 tailed)	0.809	0.555	0.21
Licensed	0.045	0.033	-0.001
Sig. (2 tailed)	0.665	0.798	0.996

Summary

Analysis of data from the OSCAR database were used to answer the research question, *Does the relationship between nurse staffing in long-term care nursing facilities and bladder and bowel incontinence for low risk nursing home residents differ by nursing facilities located in rural and urban settings?* Rural and urban NHs in Minnesota, South and North Dakota were analyzed, including NH characteristics and nurse staffing (total nursing, RN, LPN, NA, and licensed nursing) HPRD.

Ninety-nine percent of all facilities participated in Medicaid. Non-profit organizations operated 62.7% of all facilities and multichain organizations owned 56.4% of all facilities. More urban facilities were part of non-profit corporations and more facilities that are rural were part of non-profit church related organizations. There were a greater number of for-profit corporations among rural facilities than urban facilities. Rural facilities had a lower average number of residents than urban facilities.

The mean total nurse staffing for all facilities was 3.54 HPRD. The mean total nurse staffing in the rural setting was 3.48 HPRD and in the urban setting total nurse staffing was 3.67 HPRD. Urban facilities had higher total nursing, RN, LPN, and licensed nursing HPRD than rural facilities, but rural facilities had higher NA HPRD than urban facilities. There were no statistically significant relationships for NH characteristics or for any of the nurse staffing variables.

The mean prevalence rate for bladder and bowel incontinence in low risk NH residents was 46.03% in all facilities, 44.25% in rural NHs and 49.83% in urban NHs. There were no statistically significant relationships between nurse staffing and the quality measure prevalence of bladder and bowel incontinence in low risk NH residents in this study. Further analysis of differences between rural and urban NH settings was not required due to the lack of statistically significant results between the independent variable of nurse staffing and the dependent QM variable.

Chapter V

Discussion

Nurse staffing and quality of care in long-term care facilities have been an increasing concern in the United States over the past four decades. The Institute of Medicine (1996) recommended increasing registered nurse (RN) staffing levels in nursing homes (NHs) because a growing body of knowledge supported the premise that higher RN staffing levels in NHs improved the quality of care (QOC) to residents. While the issue of NH staffing and QOC continues to be a concern for all NHs in the U.S., it may be even more of a concern for long-term care facilities (LTCFs) in rural communities. The population is older in rural areas of the country and there is a discrepancy in the access to health care for those who live in rural areas as compared to those who live in urban areas. The purpose of this study was to analyze the relationship between nurse staffing in long-term care nursing facilities and bladder and bowel incontinence for low risk NH residents to see if they differed by nursing facilities located in rural and urban settings.

The Official U.S. Government Site for People with Medicare called Nursing Home Compare (www.medicare.gov) contains a public database called the On-line Survey Certification and Reporting database (OSCAR). All U.S. LTCFs licensed by the Centers for Medicaid and Medicare (CMS), collect and report data on staffing levels, number and types of residents, facility ownership, quality indicators (QIs)/quality measures (QMs) scores, and complaint surveys for each facility. State survey agencies report the data to OSCAR at the time of regular NH surveys (every 9 to 12 months) and

OSCAR is updated monthly. All QIs/QMs and staffing data are aggregated to the nursing facility. Residents are not individually identified.

The QM used for the analysis of staffing levels was the *prevalence of bladder and bowel incontinence for low risk nursing home residents*. Nurse staffing data (HPRD for RN, LPN, NA, total and licensed nursing) were extracted for all NHs that reported data for the QM in Minnesota, South and North Dakota. The NH characteristics and the nurse staffing and QM data were analyzed. This study specifically tested the relationship of the following components of the Nurse Staffing Framework (Mueller, 2001): number and type of nursing staff, the contextual factors of rural and urban settings of nursing facilities, and a selected QM. This chapter discusses the findings.

Rural and urban nursing homes.

This study found that there were no statistically significant differences between the rural and urban sample on numbers of residents, number of certified beds, type of ownership, Medicaid participation, and multichain or hospital affiliation.

Nurse staffing in rural and urban settings.

This study found that rural and urban NHs staffed below the (CMS, 2001) recommended thresholds of 4.08 total nursing HPRD. Rural and urban NHs staffed below the recommended CMS thresholds for RN and NA staffing. Rural NHs were below the threshold for licensed nurse staffing but urban NHs were above the threshold for licensed nurse staffing. This study found that rural facilities had greater NA HPRD as a portion of total nurse staffing and greater RN HPRD as a portion of licensed nurse staffing than urban facilities. There were no statistically significant differences between rural and urban facilities for any nurse staffing variables.

Prevalence of bladder and bowel incontinence in low risk nursing home residents.

The mean prevalence rate for bladder and bowel incontinence in low risk NH residents in all facilities was 46.03%. The prevalence rate for this QM was 44.25% in rural NHs and 49.83% in urban NHs and there was no statistically significant difference. The prevalence rates for incontinence in low risk NH residents in this study are unacceptable. Recent studies have indicated that appropriate NA staffing, education and a high level of leadership by RNs will significantly reduce the prevalence of incontinence in low risk NH residents (Schnelle, Alessi, Simmons, Al-Samarrai, et al., 2002; Schnelle, Cadogan, Yoshii, Al-Samarrai et al., 2003).). It is possible that the lack of these factors contributed to the high prevalence rate of low-risk incontinence. A possible explanation . A possible explanation for why rural NHs had a 5.58% lower prevalence rate for the low risk incontinence QM is that there were more NAs in the rural NH nurse staffing mix. Nursing assistants provide the largest proportion of direct care to nursing home residents.

Higher levels of RNs in licensed nurse staffing have been shown to increase QOC (CMS, 2001; Hendrix & Foreman, 2001; Kolanowski, Hurwitz, Taylor, Evans, & Strumpf, 1994; Schnelle, Alessi et al., 2002) However, the only relationship that approached significance ($p=0.051$) was between the prevalence of incontinence and RN HPRD in the rural setting, and it was in the undesired direction. While this finding is disconcerting as it indicates that more RN staffing is related to high incontinence for low risk residents, it may be a factor of not controlling for the acuity or case mix of residents. Facilities with residents have more intense care needs may also staff with more RNs.

Relationship between nurse staffing and the prevalence of bladder and bowel incontinence in low risk residents.

There were no significant relationships between staffing and prevalence rates of incontinence in low risk NH residents in the total sample, the rural sample, or the urban one. Further analysis of differences in rural and urban long-term care facilities were precluded by the lack of statistical significance in any of the results.

Limitations, implications and indications for future research.

The limitations of this study were the source of the data (OSCAR database), the NH sample size (N=94) from only three Midwestern states, and the brief length of time (one reporting period) that was analyzed. A larger sample and data collected over a longer period would provide a more consistent picture of NH staffing and QMs than the very limited period and sample comprising the data used in this study. Case mix and acuity of residents were not controlled for in this study and this may have limited the significance of the results. QOC may also be a reflection of other variables or combinations of variables, such as supervision of staff, education of staff, management practices, and organization of nursing care, and staff retention and turnover (Mueller, 2001). These variables were not included in this study.

Other limitations in this study were that staffing data for OSCAR are collected for the two-week period prior to a survey inspection. NHs may anticipate a survey and increase staffing levels at these times. OSCAR data are collected independently by NHs and reported to State agencies without audit. State survey agencies inspect NHs on a regular basis; however, there can be under reporting of violations that inspectors might miss or missing data in what NHs report. These data must be interpreted with caution.

Further study may have implications for NH staffing policies. Studies have found that licensed staff mix, greater RN staffing, greater total nurse staffing and a lower proportion of residents to NA improve the QOC that residents receive (CMS, 2001; Hendrix & Foreman, 2001; Kolanowski, Hurwitz, Taylor, Evans, & Strumpf, 1994; Schnelle, Alessi, Simmons, Al-Samarrai, Beck, & Ouslander, 2002). The present study did not include case mix or acuity as variables. It also did not include supervision of staff, education of staff, management practices, organization of nursing care, and staff retention and turnover as variables. One study found that there were more deficiencies with higher nursing HPRD (U.S. General Accounting Office [GAO], 2002). Rantz, Hicks, Grando, Petroski, et al. (2004) found that nurse staffing HPRD and staff mix did not differ between good, average, and poor outcome groups in a study of processes of care and nurse staffing levels. Rantz, et al. (2004) found that a qualitative component of the study showed strong differences between the good and poor outcome groups on leadership factors. There was a relationship between good outcome NHs with longer employment of the director of nursing and more committee processes for quality improvement.

Several studies have found that improved outcomes favored the rural setting when they included rural/urban as a variable (Hendrix & Forman, 2001; Rantz et al., 2003). Hendrix & Foreman (2001) found that LPNs did not improve the QOC in NHs related to decubitus ulcers and that only four out of 12,128 NHs had the optimal staffing to improve that QM. Schnelle, Alessi et al. (2002) found a significant improvement in urinary and fecal incontinence in NH residents who received a prompted voiding intervention. It was calculated that NAs would have difficulty providing this level of care with NA staffing at the level of one NA: 5 residents and that ninety-two percent of NHs staffed below this

level. It was also found that two to three of the five residents would be eligible for a prompted voiding schedule. Schnelle, Cadogan et al. (2003) found that residents who were documented as having a toileting plan were significantly less incontinent than those who were not on a toileting plan. No incontinent residents in their sample had received a documented 3-5 day toileting trial of a prompted voiding intervention.

Recommendations for policy.

Nurse administrators in long-term care may find further study on this phenomenon helpful for the education, communication, allocation, and recruitment and retention of nursing home personnel. Further study may also provide information for nurses to use to influence policy makers regarding the distribution of resources that may be required by urban and rural long-term care facilities and residents. A Framework for Nurse Staffing in Long-term Care Facilities (Mueller, 2000), was used to guide this study. This framework was useful in guiding the analysis of data on the combination of resident needs (QM), nurse staffing levels, and the contextual factors of rural and urban setting. It would be beneficial for any further study on nurse staffing and QOC.

Recommendations for further study.

A larger national sample, covering many reporting periods would increase the power of the study and the generalizability of the findings. The OSCAR database has been considered by the Centers for Medicare and Medicaid Services to be useful and generally reliable at the aggregate level of data (GAO, 2002). It would be an appropriate database for a larger study on the differences in nurse staffing between rural and urban NH facilities using the prevalence of bladder and bowel incontinence in low risk NH

residents as the dependent variable. This would be the least expensive method of continued study on this phenomenon.

Including measures to control for resident acuity and case mix may improve the value of the findings. The Nurse Staffing Framework also includes other factors that influence QOC. Further study should include the variables of supervision of staff, education of staff, management practices, organization of nursing care, and staff retention and turnover. There may be particular combinations of these variables that would reveal stronger relationships between nurse staffing in long-term care nursing facilities and bladder and bowel incontinence for low risk nursing home residents located in rural and urban settings.

Another study design that would be very expensive but provide strong results would be a blinded, randomized, controlled trial of various nurse staffing levels and nurse staffing combinations, with a trial of education on incontinence care for nursing staff, and interventions for incontinence provided to incontinent residents.

Conclusions

The relationship between nurse staffing and the QM were not statistically significant and therefore further analysis on differences between the rural and urban settings was not done. The prevalence of bladder and bowel incontinence was unacceptably high in both the rural and urban NH settings. Particular combinations of nurse staffing variables may influence the QM. Further research to analyze the relationship between nurse staffing and bladder and bowel incontinence in low risk NH residents to see if they differ by nursing facilities located in rural and urban settings may be merited using a study strengthened in power, depth and breadth.

References

- Aaronson, W., Zinn, J., & Rosko, M. (1994). Do for-profit and not-for-profit nursing homes behave differently? *The Gerontologist*, 34(6), 775-786.
- Agency for Healthcare Research and Quality. (2005). Quality assessment. Retrieved June 6, 2005 from <http://www.ahrq.gov/qual/>
- Anderson, R., Hsieh, P., & Su, H. (1998). Resource allocation and resident outcomes in nursing homes: Comparison between the best and worst. *Research in Nursing and Health*, 21, 297-313.
- Bates-Jensen, B., Schnelle, J., Alessi, C., Al-Samarrai, N., et al. (2003). The effects of staffing on in-bed times of nursing home residents. *Journal of the American Geriatrics Society*, 52(6), 931-938.
- Blegen, M. (2001). Health care challenges beyond 2001: Nurse staffing for quality of care. 34th Annual Communicating Nursing Research Conference-15th Annual WIN Assembly, 34(9), 3-16.
- Bliesmer, M., Smayling, M., Kane, R. L., & Shannon, I. (1998). The relationship between nurse staffing levels and nursing home outcomes. *Journal of Aging and Health*, 10(3), 351-371.
- Bowers, B., & Becker, M. (1992). Nurse's aides in nursing homes: The relationship between organization and quality. *The Gerontologist*, 32(3), 360-366.
- Bowers, B., Esmond, S., & Jacobson, N. (2000). The relationship between staffing and quality in long-term care facilities: Exploring the views of nurse aides. *Journal of Nursing Care Quality*, 14(4), 55-64.

- Braun, B. (1991). The effect of nursing home quality on patient outcome. *Journal of the American Geriatrics Society*, 39, 329-338.
- Burgio, L., Fisher, S., Fairchild, J., Scilley, K., et al. (2004). Quality of care in the nursing home: Effects of staff assignment and work shift. *The Gerontologist*, 44(3), 368 - 377.
- Cain, H. & Mueller, C. (2001). Quality improvement efforts in Minnesota nursing facilities. *Journal of Nursing Care Quality*, 15(3), 1-6.
- Castle, N. (2002). Nursing homes with persistent deficiency citations for physical restraint use. *Medical Care*, 40, 868-878.
- Center for Health Services Research. (2002). Outcome and information assessment set (OASIS-B1). UCHSC, Denver: Colorado. Retrieved June 6, 2005 from <http://www.cms.hhs.gov/oasis/fu.pdf>.
- Center for Health Systems Research & Analysis. (1999). *Quality indicators: Nursing homes*. Retrieved August 21, 2004 from http://www.chsra.wisc.edu/CHSRA/PIP_ORYX_LTC/OI_Matrix/qi_matrix_6.3_2_page_quarterly_without_section_u.pdf
- Centers for Medicare and Medicaid. (2001a). Case studies of nursing facility staffing issues and quality of care, *Appropriateness of minimum staffing ratios in nursing homes. Report to Congress: Phase II Final*. Baltimore: Centers for Medicare and Medicaid Services.

- Centers for Medicare and Medicaid. (2001b). Data sources of nursing home staffing analysis: Assessment of OSCAR compared to Medicaid cost reports, *Appropriateness of minimum nurse staffing ratios in nursing homes: Report to Congress: Phase I*. Baltimore: Centers for Medicare and Medicaid Services.
- Centers for Medicare and Medicaid. (2001c). The relationship between nurse staffing levels and quality of nursing home care, *Appropriateness of minimum staffing ratios in nursing homes. Report to Congress: Phase II Final* (pp. 2.1-2.26, 10.1-10.19, 11.1-11.13). Baltimore: Centers for Medicare and Medicaid Services.
- Centers for Medicare and Medicaid. (2001d). Review of selected research on nursing home staffing and resident outcomes, *Appropriateness of minimum nurse staffing ratios in nursing homes: Report to Congress: Phase I* (pp. 6.1-6.31). Baltimore: Centers for Medicare and Medicaid Services.
- Centers for Medicare and Medicaid. (2002). Nursing Home Compare: Collecting and updating nursing home data. Retrieved June 6, 2005 from <http://www.medicare.gov/NHCompare/Static/Related/DataCollection.asp?dest=N AV|Home|DataDetails|DataCollection#TabTop>
- Centers for Medicare and Medicaid. (2004). Medicare and Medicaid Programs; requirements for long term care facilities; nursing services; posting of nurse staffing information. *Federal Register*, 69(39), 9282-9286.
- Cherry, R. (1991). Agents of nursing home quality of care: Ombudsmen and staff ratios revisited. *The Gerontologist*, 31(3), 302-308.
- Cohen, J., & Spector, W. (1996). The effect of Medicaid reimbursement on quality of care in nursing homes. *Journal of Health Economics*, 15, 23-48.

- Colling, J., Ouslander, J., Hadley, B., Eisch, J., et al. (1992). The effects of patterned urge-response toileting (PURT) on urinary incontinence among nursing home residents. *The American Geriatrics Society*, 40, 135-141.
- Committee on Government Reform. (2002, February). *HHS 'Nursing Home Compare' website has major flaws* (U.S. House of Representatives). Retrieved May 15, 2004 from www.house.gov/reform/min
- Donabedian, A. (1980 – 1985). Explorations in quality assessment and monitoring (Vols. 1-3). Ann Arbor, Michigan: Health Administration Press.
- Donabedian, A. (1986). Criteria and standards for quality assessment and monitoring. *Quality Review Bulletin*, 12(3), 99-108.
- Frank, L., Schmier, J., Kleinman, L., Siddique, R., et al. (2002). Time and economic cost of constipation care in nursing homes. *Journal of the American Medical Directors Association*, 3(4), 215-223.
- Frantz, R., Xakellis, G., Harvey, P., & Lewis, A. (2003). Implementing an incontinence management protocol in long-term care: Clinical outcomes and costs. *Journal of Gerontological Nursing*, 29(8), 46-53.
- Graber, D., & Sloane, P. (1995). Nursing home survey deficiencies for physical restraint use. *Medical Care*, 24, 1051-1063.
- Harrington, C. (2004). Saving lives through quality of care: A blueprint for elder justice. *Alzheimer's Care Quarterly*, 5(1), 24-38.
- Harrington, C., Carillo, H. Wellin, V. & Burdin, A. (2003). Nursing facilities, staffing residents, and facility deficiencies 1996 through 2002. *National Citizens' Coalition for Nursing Home Reform*. Washington, D.C.: NCCNHR.

- Harrington, C. & Swan, J. (2003). Nursing home staffing, turnover, and case mix. *Medical Care Research and Review*, 60(3), 366-392.
- Harrington, C., Zimmerman, D., Karon, S., Robinson, et al. (2000). Nursing home staffing and its relationship to deficiencies. *Journal of Gerontology*, 55B(5), S278-S287.
- Heady, H. & Byrd, R. (2002). A delicate balance: The economics of rural health care delivery. *JAMA*, 287(1), 110.
- Hendrix, T. & Foreman, S. (2001). Optimal long-term care nurse-staffing levels. *Nursing Economics*, 19(4), 164-194.
- Hollinger-Smith, L. & Ortigara, A. (2004). Changing culture: Creating a long-term impact for a quality long-term care workforce. *Alzheimer's Care Quarterly*, 5(1), 60-70.
- Institute of Medicine. (1996). Staffing and quality of care in nursing homes. . In G.S. Wunderlich, Sloan, F.A., & Davis, C.K. (Eds.), *Nursing staff in hospitals and nursing homes: Is it adequate?* (pp. 128-168). Washington, D.C.: National Academy Press
- Institute of Medicine. (2001). *Improving the quality of long-term care*. Retrieved May 2, 2004 from the National Academy of Sciences website at www.nap.edu
- Johanson, J., Irizarry, F., & Doughty, A. (1997). Risk factors for fecal incontinence in a nursing home population. *Journal of Clinical Gastroenterology*, 24(3), 156-160.
- Johnson-Pawlson, J., & Infeld, D. (1996). Nurse staffing and quality of care in nursing facilities. *Journal of Gerontological Nursing*, 22(8), 36-45.

- Karon, S., Sainfort, F., & Zimmerman, D. (1999). Stability of nursing home quality indicators over time. *Medical Care*, 37(6), 570-579.
- Karon, S. & Zimmerman, D. (1998). Nursing home quality indicators and quality improvement initiatives. *Topics in health information management*, 18 (4), 46-58.
- Kayser-Jones, J. (1989). The environment and quality of care in long-term institutions. In National League for Nursing, *Indices of quality in long-term care* (pp. 87-107). New York: NLN.
- Kayser-Jones, J., & Schell, E. (1997). The effect of staffing on the quality of care at mealtime. *Nursing Outlook*, 45, 64-72.
- Kayser-Jones, J., Schell, E., Lyons, W., Kris, A., Chan, J., & Beard, R. (2003). Factors that influence end-of-life care in nursing homes: The physical environment, inadequate staffing, and lack of supervision. *The Gerontologist*, 43(Special Issue II), 76-84.
- Kayser-Jones, J., Schell, E., Porter, C., Barbaccia, J., et al. (1999). Factors contributing to dehydration in nursing homes: Inadequate staffing and lack of professional supervision. *Journal of the American Geriatrics Society*, 47(10), 1187-1194.
- Kolanowski, A., Hurwitz, S., Taylor, L., Evans, L., et al. (1994). Contextual factors associated with disturbing behaviors in institutionalized elders. *Nursing Research*, 43(2), 73-79.
- Kovner, C., Mezey, M., Harrington, C. (2000). Research priorities for staffing, case mix, and quality of care in U.S. nursing homes. *Journal of Nursing Scholarship*, 32(I), 77-80.

- Larson, S., Machlin, S., Nixon, A., & Zodet, M. (2001). *Chartbook #13: Health care in urban and rural areas, combined years 1998-2000*. Agency for Healthcare Research and Quality. Retrieved August 8, 2004 from <http://www.meps.ahrq.gov/papers/cb13/cb13.htm>
- Lekan-Rutledge, D. & Colling, J. (2003). Urinary incontinence in the frail elderly: Even when it's too late to prevent a problem, you can still slow its progress. *American Journal of Nursing*, 103(supplement), 36-46.
- Linn, M., Gurel, L., & Linn, B. (1977). Patient outcome as a measure of quality of nursing home care. *American Journal of Public Health*, 67(4), 337-342.
- Maas, M., Buckwalter, K., & Specht, J. (1996). Nursing staff and quality of care in nursing homes. In G.S. Wunderlich, Sloan, F.A., & Davis, C.K. (Eds.), *Nursing staff in hospitals and nursing homes: Is it adequate?* (pp. 361-425). Washington, D.C.: National Academy Press.
- Miller, N. & Saunders, W. (1993). Overview. *Health Care Financing Review*, 14(4), 1-4.
- Minnesota Statutes. (2004). 144A.04 Qualifications for license. Retrieved October 8, 2004 from <http://www.revisor.leg.state.mn.us/stats/144A/04.html>
- Minnesota Counties and Regions. Retrieved October 3, 2004 from <http://dir.yahoo.com/Regional/USStates/Minnesota/CountiesandRegions/>
- Morbidity and Mortality Weekly. *Public health and aging: Trends in aging-United States and worldwide*. Retrieved Aug.8, 2004 from <http://www.cdc.gov/mmwr/>
- Mosely, C., & Jones, L. (2003). Registered nurse staffing and OBRA deficiencies in Nevada nursing facilities. *Journal of Gerontological Nursing*, 29(3), 44-50.

- Mueller, C. (2000). The RUG-III case mix classification system for long-term care nursing facilities: Is it adequate for nurse staffing? *Journal of Nursing Administration, 30*(11), 535-543.
- Mueller, C. (2000). A framework for nurse staffing long-term care facilities. *Geriatric Nursing, 21*(5), 262-267.
- Mueller, C. (2002). Comprehensive management of urinary incontinence through quality improvement efforts. *Geriatric Nursing, 23*(2), 82-87.
- Mueller, C. (2002). Nurse staffing in long-term care facilities. *JONA, 32*(12), 640-647.
- Mueller, C. & Karon, S. (2004). ANA nurse sensitive quality indicators for long-term care facilities. *Journal of Nursing Care Quality, 19*(1), 39-47.
- Mukamel, D., Watson, N., Hongdao, M., & Spector, W. (2003). Development of a risk-adjusted urinary incontinence outcome measure of quality for nursing homes. *Medical Care, 41*(4), 467-478.
- Munroe, D. (1990). The influence of registered nurse staffing on the quality of nursing home care. *Research in Nursing and Health, 13*, 263-270.
- National Center for Health Statistics. (2001). *Health, United States, 2001 with urban and rural health chartbook*. (Library of Congress Catalog Number 76-641496). Washington, DC: U.S. Government Printing Office.
- National Citizens' Coalition for Nursing Home Reform (2001). *The nurse staffing crisis in nursing homes: Consensus statement of the campaign for quality care*. Retrieved September 20, 2004 from http://www.nccnhr.org/govpolicy/51_162_701.cfm

- National Rural Health Association. (2005) Retrieved June 9, 2005 from <http://www.nrharural.org/>
- Nelson, R., Furner, S., & Jesudason, V. (1998). Fecal incontinence in Wisconsin nursing homes: Prevalence and associations. *Diseases of the Colon and Rectum*, 41(10), 1226-1229.
- Nursing Home Quality Initiative. *Snapshot definitions of NHQI quality measures*. Retrieved Aug.8, 2004 from <http://www.cms.hhs.gov/quality/nhqi/Snapshot.pdf>
- Nyman, J. (1988). Improving the quality of nursing home outcomes: Are adequacy or incentive-oriented policies more effective? *Medical Care*, 26, 1158-1172.
- Omnibus Budget Reconciliation Act, Section C: Nursing Home Reform (1987).
- Ouslander, J., Schnelle, J., Uman, G., Fingold, S., et al. (1995). Predictors of successful prompted voiding among incontinent nursing home residents. *The Journal of the American Medical Association*, 273(17), 1366-1370.
- Ouslander, J. Simmons, S., Schnelle, J., Uman, G., et al. (1996). Effects of prompted voiding on fecal continence among nursing home residents. *Journal of the American Geriatrics Society*, 44(4), 424-428.
- Phillips, C., Zimmerman, D., Bernabei, R., & Jonsson, P. (1997). Using the resident assessment instrument for quality enhancement in nursing homes. *Age and Ageing*, 26(2), 77-81.
- Prather, C. M. (2004). Physiologic variables that predict the outcome of treatment for fecal incontinence. *Gastroenterology*, 126, S135-S140.

- Rantz, M., Hicks, L., Grando, V., Petroski, G., et al. (2003). Nursing home quality, cost, staffing and staff-mix. *The Gerontologist*, 44(1), 24-38.
- Rothbarth, J., Bemelman, W., Meijerink, W., Stiggelbout, et al. (2001). What is the impact of fecal incontinence on quality of life? *Diseases of the Colon & Rectum*, 44(1), 67-71.
- Schnelle, J., Alessi, C., Simmons, S., Al-Samarrai, N., et al. (2002). Translating clinical research into practice: A randomized controlled trial of exercise and incontinence care with nursing home residents. *Journal of American Geriatrics Society*, 50, 1476-1483.
- Schnelle, J., Cadogan, M., Yoshii, J., Al-Samarrai, N., et al. (2003). The minimum data set urinary incontinence quality indicators: Do they reflect differences in care processes related to incontinence? *Medical Care*, 41(8), 909-922.
- Schnelle, J., Cruise, P., Alessi, C., Al-Samarrai, N., et al. (1998). Individualizing nighttime incontinence care in nursing home residents. *Nursing Research*, 47(4), 197-204.
- Schnelle, J. & Leung, F. (2004). Urinary and fecal incontinence in nursing homes. *Gastroenterology*, 126(1), Supplement.
- Schnelle, J., Simmons, S., Harrington, C., Cadogan, M., et al. (2004). Relationship of nursing home staffing to quality of care. *Health Services Research*, 39(2), 225-250.
- Schnelle, J., Simmons, S., Harrington, C., Cadogan, M., et al. (2002). *Nursing home staffing information: Does it reflect differences in quality of care.* (99-5041A).
Prepared for California HealthCare Foundation, Los Angeles.

- Sgadari, A., Topinkova, E., Bjornson, J., & Bernabei, R. (1997). Urinary incontinence in nursing home residents: a cross-national comparison. *Age and Ageing*, 26(2), 49-54.
- Shih, Y., Hartzema, A., & Tolleson-Rinehart. (2003). Labor costs associated with incontinence in long-term care facilities. *Adult Urology*, 62(3), 442-446.
- Simmons, S., Osterweil, D., & Schnelle, J. (2001). Improving food intake in nursing home residents with feeding assistance: A staffing analysis. *Journal of Gerontology: Medical Sciences*, 56A (12), M790-M794.
- Spector, W., & Mukamel, D. (1998). Using outcomes to make inferences about nursing home quality. *Evaluation & The Health Professions*, 21(3), 291-315.
- U.S.Census Bureau. (2000). *Factfinder*. Retrieved August 29, 2004 from http://factfinder.census.gov/jsp/table/QueryError.jsp?_lang=en&_st_id=query_ba d_file&_ts=111873546488
- U.S. Census Bureau. *State and national population projections*. Retrieved August 9, 2004 from <http://www.census.gov>
- U.S. Department of Health and Human Services. (2003). National healthcare disparities report. Retrieved June 6, 2005 from <http://www.ahrq.gov/qual/nhdr03/nhdrsum03.htm>
- U.S.GAO. (2002). *Nursing homes: Quality of care more related to staffing than spending* (GAO-02-431R). Washington, D.C.: GAO.

- University of North Carolina Chapel Hill School of Nursing, Penn Center for
Continence and Pelvic Health, American Journal of Nursing and Center for
Professional Development, University of Pennsylvania School of Nursing. (2003).
The state of the science on urinary incontinence. *American Journal of Nursing*,
103 (3), 45-49.
- Wells, J. (2004). The case for minimum nurse staffing standards in nursing homes: A
review of the literature. *Alzheimer's Care Quarterly*, 5(1), 39-51.
- Ya-Chen, T., Hartzema, A., & Tolleson - Rinehart, S. (2003). Labor costs associated with
incontinence in long-term care facilities. *Adult Urology*, 62(3)442-446.
- Zimmerman, D., Karon, S., Arling, G., Clark, B. et al. (1995).
Development and testing of nursing home quality indicators. *Health Care
Financing Review*, 16(4), 107-127.