

Residential care quality:

A review of the literature on nurse and personal care staffing and quality of care

**Prepared for:
Nursing Directorate
British Columbia Ministry of Health**

**Prepared by:
Janice M. Murphy, PhD**

November 2006

ACKNOWLEDGEMENTS

Funding for this project was received from the British Columbia Ministry of Health Services, Nursing Directorate through the 2004-05 Nursing Strategies.

This project supports the Canadian Nursing Advisory Committee (CNAC) Recommendations #3 and #45 – to increase knowledge of nurse to resident ratios as it relates to nurse and resident outcomes in residential settings. Additionally, because all three nursing groups are represented in residential care, this project supports CNAC Recommendation #19 - to develop additional support for nurse collaboration (Registered Nurse, Registered Psychiatric Nurse, Licensed Practical Nurse and Resident Care Aides).

An advisory committee consisting of union, clinical, and health authority representatives has expertly guided this project.

Advisory Committee Members:

Marcy Cohen, Research and Policy Planner, HEU (Project Coordinator)
Anne Cooke, Director, Patient Care - Prince George Regional Hospital
Nancy Czigany, Hospital Employees' Union
Dr. Martha Donnelly, Geriatrician, Vancouver Coastal Health Authority & UBC
Anne Earthy, Clinical Nurse Specialist Queens Park, Fraser Health Authority
Karen Jewell, Health Employers Association of BC
Dr. Margaret McGregor, Family Physician, UBC
Doreen Plouffe, Hospital Employees' Union
Linda Rose, Vancouver Coastal Health Authority, Residential Care
Linda Pipe, BC Nurses Union
Patricia Wejr, BC Nurses Union

The report was prepared by Janice M. Murphy, PhD.

Table of Contents

ACKNOWLEDGEMENTS	2
LIST OF TABLES	5
EXECUTIVE SUMMARY	6
INTRODUCTION	9
METHODS	9
INCLUSION CRITERIA.....	10
SEARCH STRATEGY.....	12
CONCEPTUAL FRAMEWORK.....	13
SEARCH RESULTS.....	17
THE RELATIONSHIP BETWEEN NURSE AND PERSONAL CARE STAFFING AND RESIDENT QUALITY OF CARE	18
(1) OUTCOME QUALITY OF CARE MEASURES: MINIMUM LEVELS OF NURSE AND PERSONAL CARE STAFFING REQUIRED TO AVOID ADVERSE OUTCOMES.....	20
(2) OUTCOME QUALITY OF CARE INDICATORS: LEVELS OF LICENSED NURSE AND PERSONAL CARE STAFFING REQUIRED TO IMPROVE QUALITY OF CARE OUTCOMES.....	23
(3) PROCESS QUALITY INDICATORS: THE IMPACT OF STAFFING LEVELS AND MIX ON RESIDENT QUALITY OF CARE.....	25
SUMMARY.....	31
ORGANIZATIONAL AND MANAGERIAL CHARACTERISTICS AND THEIR IMPACT ON NURSE AND PERSONAL CARE STAFFING AND QUALITY OF CARE	33
(1) ORGANIZATIONAL AND MANAGERIAL CHARACTERISTICS INFLUENCING QUALITY OF CARE.....	34
(2) THE IMPACT OF NURSE STAFFING RETENTION AND TURNOVER ON QUALITY OF CARE.....	35
(3) THE IMPACT OF ORGANIZATIONAL AND MANAGERIAL FACTORS ON NURSE AND PERSONAL CARE STAFFING RETENTION AND TURNOVER.....	38
(4) ORGANIZATIONAL AND MANAGERIAL FACTORS AND JOB SATISFACTION.....	41
SUMMARY.....	43
DISCUSSION	45
SUGGESTIONS FOR FURTHER DISCUSSION AND RESEARCH.....	45
APPENDIX I: TERMS AND DEFINITIONS	47
APPENDIX II: RESEARCH AND PUBLICATIONS REVIEWED AND NOT INCLUDED	51

APPENDIX III. SUMMARY OF RESEARCH ON THE RELATIONSHIP BETWEEN NURSE AND PATIENT CARE STAFFING LEVELS AND RESIDENT QUALITY OF CARE AND/OR QUALITY OF LIFE	61
APPENDIX IV: SUMMARY OF RESEARCH ON THE RELATIONSHIP BETWEEN ORGANIZATIONAL CHARACTERISTICS, JOB SATISFACTION, NURSE STAFFING TURNOVER AND/OR RETENTION AND RESIDENT QUALITY OF CARE	71
REFERENCES	82

List of Tables

TABLE 1. RESEARCH LITERATURE INCLUSION CRITERIA	10
TABLE 2. DATABASES SEARCHED	12
TABLE 3. KEY WORD SEARCH TERMS	12
TABLE 4. RISK ADJUSTMENT FACTORS	13
TABLE 5. QUALITY OF CARE AND LIFE INDICATORS	15
TABLE 6. WORK LIFE QUALITY INDICATORS	16
TABLE 7. LITERATURE EXAMINING NURSE AND PERSONAL CARE STAFFING AND RESIDENT QUALITY OF CARE	18
TABLE 8. SUMMARY OF NURSE AND PERSONAL CARE STAFFING LEVELS RECOMMENDED IN THE LITERATURE FOR RESIDENT QUALITY OF CARE	32
TABLE 9. LITERATURE EXAMINING MANAGERIAL AND ORGANIZATIONAL CHARACTERISTICS AND THEIR IMPACT ON NURSE AND PERSONAL CARE STAFFING AND QUALITY OF CARE	33

Executive Summary

Introduction

This project was funded by the Nursing Directorate to support the implementation of BC priority recommendations in the 2005 Canadian Nursing Advisory Committee (CNAC) Report. This report responds to recommendations #3 and #45 – to increase knowledge of nurse to resident ratios as it relates to nurse and resident outcomes in residential settings.

Additionally, because all three nursing groups are represented in residential care, this project supports CNAC Recommendation #19 – to develop additional support for nurse collaboration (Registered Nurse, Registered Psychiatric Nurse, Licensed Practical Nurse and Resident Care Aides).

The report reviews the research evidence available that defines and quantifies the contribution of nurse and personal care staffing to resident outcomes. In conjunction, research on the impact of organizational characteristics on staffing retention is reviewed.

Purpose of the Project

The purpose of this project was to prepare a report based on a review of national and international academic literature on:

- Residential care staffing levels and staff mix in residential care and the relationship between staffing levels and mix and the quality care for residents; and on
- Staff retention and recruitment issues in residential care and the relationship between staff retention and recruitment and quality care for residents.

Scope of the Project

This report only focuses on nurse (RN, RPN, and LPN) and care aide (CA) staffing in residential care.

Because of the very limited research in Canada we were forced to rely heavily on America research and although registered psychiatric nurses are an important part of the BC nursing family, none of the research reviewed specifically studied RPNs. While the research findings are not directly transferable, we can nonetheless learn a lot about what should be considered in monitoring facilities to determine staffing that is adequate to both avoid adverse outcomes and to support quality improvements.

Discussion

The research clearly establishes that there is a relationship between overall staffing levels and quality of residential care measured in terms of a number of different care-related indicators. It also suggests that each member of the patient care team (e.g. RN, LPN, CA) contributes to the quality of care, in both different and in some cases, similar ways. Additionally, the research indicates that minimum levels of staffing are required to avoid some adverse outcomes. In turn, the research demonstrates that organizational structure and managerial practices are associated with job satisfaction, staffing turnover and retention and quality of care. Several findings are discussed in this report that are worthy of further research and consideration by stakeholders involved in the provision of residential care.

The Advisory Committee and Next Steps

An advisory committee consisting of union, clinical, and health authority representatives has expertly guided and supported this project (see *Acknowledgements* on page 2). The advisory committee collaboratively established the criteria and scope of the literature review, reviewed and edited the report and provided suggestions for further discussion and research.

To continue the discussions initiated in this report and to further develop the policy analysis that emerges from it, this report will be forwarded to both the Nursing Directorate and to the new multi-stakeholder provincial Residential Care Policy Committee. As part of these processes consultations will be conducted with additional stakeholders; such as residential care affiliate employers, the Ministry of Health and the Medical Health Officers responsible for residential care licensing.

Suggestions for Further Discussion and Research

1. Quality of Care

Discussion and review of what clinical practices, skill mixes, staffing, training and education contribute to and promote best practices and the collection of meaningful measurements of care and staffing standards that will result in better outcomes for residents and consistency of client care.

Review, refine and/or develop quality indicators for residents including physical health and well-being indicators as well as quality of life indicators (i.e. indicators that measure social and spiritual aspects of care and that promote resident dignity and respect).

Discussion and review of the communication pathways and processes needed to coordinate the groups that collect and utilize indicators to promote standardized measurements of quality of care as well as standardized methodology for collecting and analyzing indicators.

Discussion of clinical research activities that may be undertaken to inform best practices and staffing policies, including but not limited to, research on quality measurements, work loads, and cost-analysis of staffing levels required for optimal care.

2. Staffing and Managerial Factors

Development of residential care leadership that has a working knowledge of gerontology, is well versed in licensing and health care policies and demonstrates positive relationship and team building skills.

Development of clinical team leaders who have knowledge and experience working with older persons and people with disabilities (and where appropriate have certification in Gerontology) and who demonstrate leadership skills.

Development of positive, respectful, effective resident care teams that include RNs/RPNs and LPN's in leadership roles and that recognize the central role played by Care Aides in the provision of direct resident care.

Support for and development of managerial practices that promote the meaningful inclusion of members of the patient care and nursing team in the planning and delivery of care.

Discussion of support required for development of a learning environment and for the provision of accessible continuing education programs for all categories of staff.

Development of team environments that encourage support and debriefing following episodes of agitation and excessive behaviours.

3. Organizational Factors

Discussion of the support needed to promote a residential care environment that is elder friendly and supports safe work places.

Discussion of appropriate staffing and other resources (e.g. lifts, bladder scanners, blanket warmers, etc.) needed to maintain best practices.

Discussion and review of the provision of allied health professionals and support services sufficient to provide physical activities as well as social engagement opportunities to make life meaningful.

Discussion of the support needed to ensure that documentation occurs to advance consistent care that is individualized to the client.

Introduction

This report reviews the research evidence available that defines and quantifies the contribution of nurse and personal care staffing to resident outcomes.¹ In conjunction, research on the impact of organizational characteristics on staffing retention is reviewed.

The purpose of this project was to prepare a report based on a review of national and international academic literature on:

- Residential care² staffing levels and staff mix in residential care and the relationship between staffing levels and the quality care for residents; and on
- Staff retention and recruitment issues in residential care and the relationship between staff retention and recruitment and quality care for residents.

Methods

A classification framework was used to systematically identify relevant research literature regarding residential care staffing and quality of care. This framework was determined and

¹ This report contains information regarding nursing staff in residential care staff including certified nursing assistants, directors of nursing, registered nurses, and licensed/registered practical nurses. Although registered psychiatric nurses are an important part of the BC nursing family, they have not been intentionally excluded from this review, but none of the research reviewed specifically studied RPNs.

² Throughout the literature, there are various names for residential long term care for seniors, including “nursing homes”, “long term care”, “residential care”, “long-stay homes” and “homes for the aged.” In British Columbia we have shifted from terms such as: “long term care”; “intermediate care”; and “extended care”; to “residential care” and “complex care.” For the purposes of this paper, the term “residential care” or “residential care facilities” will be used to refer to all types of long term residential care facilities for seniors.

Definitions of other terms used in this report are provided in Appendix I.

The following acronyms and abbreviations are used in this report:

AOR	adjusted odds ratio
CAs	care aides (BC term for CNAs)
CNAs	certified nursing assistants
DONs	directors of nursing
FTE	full time equivalent (i.e. a full time staffing position – working 35 hours/week)
hprd	hours per resident day (referring to hours of nursing care per resident per day)
LPNs	licensed/registered practical nurses
RNs	registered nurses
RNPs	registered nurse practitioners
RPNs	registered psychiatric nurses

agreed upon by the advisory committee and included criteria regarding the age, source, scope, focus, subjects, and methodology of the research (see Table 1).

Inclusion Criteria

Table 1. Research Literature Inclusion Criteria

CRITERIA	RATIONALE
Studies conducted 1995 onwards	To review findings relevant to current practice and care.
English language research from Canada, United Kingdom, United States, Europe, Australia, and New Zealand	Because the vast majority of research linking staffing and quality of care has been conducted in other countries (primarily the United States) it is important to examine the literature from other countries. However, caution must be used in interpreting the findings because of possible differences in residential care delivery, care levels and definition of job duties between Canada and other countries. This review was limited to English literature because of the language abilities of the reviewer.
Research attempting to evaluate the impact of nursing practice on resident quality of care	To focus on studies which have investigated the contribution of nursing to resident quality of care (measured by resident outcomes). Because the entire “family” of nursing may be found in BC residential care facilities, studies including RNPs, RNs, RPNs, LPNs, and/or CAs were searched.
Research attempting to evaluate the impact of work environment on nurse and patient care staff retention and recruitment	To focus on studies which have investigated the contribution of the work environment to staff retention and/or turnover. This area of research is important because retention of nursing staff is problematic in residential care facilities and quality of care has been associated with continuity of care, which is related to retention.
Research conducted in residential care (or related terms: long-term care, extended care, facility care, chronic care, skilled nursing care)	The transferability of research from other settings, such as acute care/hospitals, rehabilitation centres, retirement centres, and/or assisted living facilities may be limited due to differences in care levels.

Table 1. Research Literature Inclusion Criteria Continued

CRITERIA	RATIONALE
Research focusing on care of seniors (children's residential care and adult group homes excluded)	Not feasible to include these settings with the time available for the project.
Studies published in peer-reviewed journals (unidentified studies, newsletter articles, newspaper articles, etc have not been included)	To focus on the most credible data sources. Nonetheless, literature which falls into a "grey" area, that is it is not from a peer reviewed source may, provide useful information. Government agencies, policy institutes and research units have released numerous reports that are not included in journals, but may provide credible, comprehensive and current information on valuable research findings. Two studies that would be considered "grey literature" were included in this review: one, a report produced for the British Columbia Nursing Directorate that was based on the opinions of BC clinical and occupational health and safety experts (MacCourt, 2004); two, a report from a conference of national United States experts including leading nurse researchers, educators, administrators, economists and others, who conducted a comprehensive analysis of previous studies and United States data on nursing home staffing levels (Harrington, <i>et al.</i> , 2000).

Due to limited resources and the stated focus of this project, the scope of this literature review was limited in several ways including:

- It did not examine alternative care approaches such as Eden Care, Person-Centred Care, etc.
- It did not investigate the use of multi-skilled workers; however, it does include a review of studies that research the relationship between resident quality of care and staff mix and skills that go beyond traditional nursing roles – such as front line staff possessing additional skills in rehabilitation or recreation.
- It did not specifically examine staffing research on task orientation versus relationship orientation – however, research studies examining quality of care and staffing and/or staff retention and recruitment may include research on organizational characteristics – including task versus relationship organizational structure – and if so this information was included in the discussion of organizational characteristics.

Search Strategy

Several searches were conducted between May and December 2005; first using MEDLINE and then CINAHL, Pub Med and other databases that were possible sources of information (see Table 2). In addition, research studies were referred by advisory committee members up until May 2006.

Table 2. Databases searched

Medline
Cumulative Index to Nursing and Allied Health Literatures (CINAHL)
Pub Med
Science Direct
The Cochrane Library Wiley Interscience
Academic Search Premier
PsycINFO

Key words used for searches were identified and agreed to by the Advisory Committee (see Table 3).

Table 3. Key word search terms

quality of care	long term care
resident outcome	nursing homes
quality	residential care
autonomy	homes for the aged
nurse staffing	retention
nursing	recruitment
staffing	job satisfaction

Reference lists of all the relevant articles were also searched for additional pertinent studies.

Conceptual Framework

The research literature was reviewed and summarized according to the risk-adjustment strategies used, the quality measured (of care as well as work environment), and the empirical research methods used.

1) Risk Adjustment Factors

The level of risk adjustment specificity employed in a research design is critical (Hillmer *et al.*, 2005). *“Inadequate risk-adjustment may lead to erroneous identification of association between certain environments and higher quality problems when the true cause is difference in underlying patient risk for adverse events”* (Hillmer *et al.*, p. 142). Hillmer *et al.* argue that while demographic characteristics are essential, detailed clinical diagnoses information, level of functioning, amount of nursing time per resident and the type of medications prescribed (i.e. psychoactive) are more important measures of underlying risk. The risk adjustment methods that were searched for in this review were: consideration of the sample population’s demographic characteristics, clinical information, level of functioning, and the number and /or type of medications prescribed (see Table 4).

Table 4. Risk Adjustment Factors

-
- Demographics
 - Clinical Information
 - Level of Function
 - Medication
-

2. Quality Measures

Quality was the second dimension used to summarize the literature and Donabedian’s (1966; 1988) framework was applied for this purpose. Donabedian’s framework, which has been widely applied by researchers (Anderson *et al.*, 1998; Bliesmer *et al.*, 1998; Dyck, 2004; Hillmer *et al.*, 2005; Rantz *et al.*, 1996; Rantz *et al.*, 1999; Wunderlich & Kohler, 2001), includes three interconnecting elements: structure, process and outcome.

***Structure-specific indicators** of quality refer to institutional characteristics such as the amount and nature of the staff and other facilities available to the health service. The most common example of a structure quality indicator is staffing. **Process quality indicators** refer to what is done to and for the patient. For example, the inappropriate use of restraints, catheters, and psychoactive drugs are process quality indicators of nursing home care. **Outcome-specific indicators** of quality are the end result, that is, what actually happens to the patient. Examples of these outcome quality indicators include the development of pressure ulcers, frequency of falls, and mortality rates. The interrelationship of structure and process, as well as individual patient characteristics, dictates the final outcome. There is often no direct or obvious relationship between structure and process and the eventual outcome. However, it is implied in Donabedian’s*

framework that when good structural inputs are in place, better outcomes will be produced. (emphasis added, Hillmer *et al.*, 2005, p. 141)

Hutt *et al.* clarifies that quality measures reflecting the prevalence of conditions, for example, rates of indwelling catheters, prevalence of pressure ulcers and restraints, “cannot be linked to quality of care in the nursing home; rather they reflect admission of a more complex case mix. However, incidence of these events (e.g. new pressure ulcers, new indwelling catheters, new restraints) [are] all considered as possible quality measures” (Hutt *et al.*, 2000, p. 10-3).

Quality of residential care has also been described as multidimensional, stemming from the combination of services provided. Dyck (2004) identifies the two dimensions of quality as quality of care and quality of life. Quality of care refers to the more technical aspects of care as described in Donabedian’s framework (i.e. use of restraints, prevalence of pressure ulcers). In comparison, quality of life refers to issues such as residents’ opportunities for choice and autonomy. For the purposes of this review, the list of quality of care and life indicators searched for is summarized in Table 5.³

³ Several US studies used combined process and outcome quality indicators as measured by audits of deficiencies according to federal nursing home certification regulations.

Table 5. Quality of Care and Life Indicators (*starred indicators were used by the studies included in this report)

STRUCTURAL QUALITY INDICATORS
Care aide, LPN and RN/RPN turnover*
Administrator turnover*
Specified staffing mix (ratio of RN/RPN and/or LPN, and/or CA, to total nursing staff)*
Specified staffing levels (hours per resident day [hprd] of RN/RPN, LPN, CA)*
Specified skills/training
PROCESS QUALITY INDICATORS
Use of restraints*
Rate of cathertization*
Rate of tube feeding
Use of psychoactive drugs*
Provision of eating assistance*
Percentage of residents who are, or are not toileted*
Provision and/or rate of repositioning*
Provision of walk assists*
OUTCOME QUALITY INDICATORS
Incidence of pressure (decubitus) ulcers (PU)*
Frequency of falls*
Frequency of fractures*
Rate of mortality
Incidence of infections (includes urinary tract infections – UTIs)*
Frequency of hospitalizations*
Level of functional abilities (activities of daily living – ADLs)*
Amount of time in bed*
Incidence of incontinence*
Incidence of dehydration*
Amount of food intake*
Weight changes*
Incidences of contractures*
Frequency of agitation and excessive behaviours*
QUALITY OF LIFE OUTCOME INDICATORS
Frequency and/or quality of social engagement*
Frequency of exercise*
Opportunities for choice*
Opportunities for autonomy
Frequency of purposeful and meaningful activities
Frequency of family engagement
Frequency of use of volunteers
Rate of satisfaction with care

In addition to summarizing the research according to quality of care and life for residents of residential care facilities, indicators of a quality work environment were also reviewed. The nursing staffs work life quality indicators considered are listed in Table 6.

Table 6. Work Life Quality Indicators

QUALITY OF NURSING STAFF WORK LIFE INDICATORS	
Opportunities for work autonomy and integration	
Intensity of workload	
Rate of burnout	
Rate of job dissatisfaction or satisfaction	
Leadership	
Organizational characteristics	
Rate of staff turnover (this is also a quality of care structural indicator)	
Wages and benefits	

3. Empirical Research Methods

The research methodology of the studies reviewed was the third dimension analyzed in the summary of the research literature. Although none of the studies employed “the gold-standard randomized controlled trial” (Hillmer *et al.*, 2005, p. 141) several other methods were used. The methods found included retrospective or prospective longitudinal designs and cross-sectional designs. Longitudinal studies, research that looks at the same group over time, are the most costly but are required to measure causal effects. Cross-sectional designs are like a snapshot, providing a glimpse of a sample of people at one point in time, and while they are easier to conduct, they are potentially only able to identify associations between variables, not true causal effects. The majority of studies could also be described as observational studies, not interventional studies. Noninterventional studies can only show associations that reflect assumptions about causality, unlike randomized controlled trials, which can demonstrate causality with more certainty.

Prospective studies are preferred over retrospective designs because their designs can better account for potentially confounding factors. However, most of the longitudinal study designs reviewed were retrospective, relying upon secondary data and as Hillmer *et al.* argue, “retrospective designs are able only to use the data that were available from the specified data source and may involve considerable biases from unmeasured factors that may affect the likelihood of observed quality differences” (Hillmer *et al.*, 2005, p. 141). Thus the date (or age) and source of data of the studies (primary or secondary) was also considered. Details on the data sample, source and study design of the research included in the review are provided in Appendix 3 (relevant to the first section on staffing and quality of care) and in Appendix 4 (relevant to the second section on organizational characteristics and staff retention and recruitment).

Search Results

Over 200 articles and publications were short-listed for review and 34 met the criteria for inclusion in this report (see Tables 7 and 9 and Appendices 2 and 3). The remaining publications (see Appendix 2), while relevant to the review, did not meet the criteria for inclusion in this report. The literature found was published primarily in the United States, but also in Canada, England, Australia, New Zealand and Hong Kong. However, the vast majority of studies found in the search were published in the US. Although RPNs are an important part of the nursing family in British Columbia, the research reviewed did not identify RPNs – only RNs, LPNs and CAs.

The literature related to nurse and personal care staffing and quality of care was evaluated on the basis of a combination of three factors: 1) risk adjustment factors, 2) the quality outcomes and/or processes measured and 3) the research methodology. While none of the studies represented the “gold standard” on all three factors, the studies selected for inclusion in this report were the best of all the studies reviewed. Some of the studies included were strengthened by the use of three or more risk adjustment factors, others were strengthened by the use of more reliable and valid quality indicators, for example, the use of incidence rates versus prevalence rates of pressure ulcers. Still others were strengthened by the application of more rigorous research methods such as the use of primary data and a prospective versus retrospective research design.

Many of the US studies were excluded from this review because of a severe weakness in the reliability of the data source related to staffing.⁴ Other studies were excluded because they used quality measures that could not necessarily be attributed to staffing (e.g. prevalence versus incidence of pressure ulcers) or because of other weaknesses in the methodology used.

Of the publications reviewed in detail, 17 of the studies are included in the first section discussing staffing and quality of care. Nineteen publications regarding the relationship between organizational characteristics and quality of care and retention and turnover met the criteria for inclusion and are discussed in the second section of this report.⁵

⁴ The U.S. Health Care Financing Administration’s On-line Survey Certification and Reporting System (OSCAR) data base is composed of information collected by state licensure and certification agencies as part of the Medicare and/or Medicaid certification process. This data base includes most residential care facilities in the US (Castle & Engberg, 2005). The OSCAR data are based on information of staffing levels in the past 2 weeks that is self-reported by facilities on an annual basis. OSCAR staffing measures are not audited, and there is currently no mechanism to ensure the accuracy of the data. Frequently used for staffing data, White found that the correlation between staffing figures from OSCAR and payroll data was relatively low (Pearson coefficient was 0.43, and the Spearman (rank) correlation was 0.52) (White, 2000, p. 37). The OSCAR data has been found to be particularly inaccurate with respect to reported care aide staffing (Pearson coefficient was 0.36 and the Spearman correlation was 0.46). The application of a series of decision rules (see Appendix I – OSCAR for more information) has been found to increase the reliability of the OSCAR data.

⁵ Two of the studies discussed in the second section, Bowers (2000) and Kramer and Fish (2001), are also discussed in the first section; hence a total of 34 (17 and 17) research studies are reviewed in this report.

The Relationship between Nurse and Personal Care Staffing and Resident Quality of Care

The literature reviewed in this section points to a clear relationship between nurse and personal care staffing levels (RNs, LPNs and CAs) and quality of residential care. It supports the argument that both the level of staffing and the staff mix are positively related to quality of care. The research varies in its approach to studying quality of care and staffing. Some studies examine nurse and personal care staffing levels required to avoid residents suffering from potentially preventable adverse outcomes (e.g. development of pressure ulcers) and/or staffing levels needed to improve quality of care outcomes (e.g. improvement in functional abilities). Other studies focus on process quality of care factors and staffing levels, such as the amount of care aide time required to appropriately assist a resident who needs help to eat. In addition to the above-mentioned indicators, a few studies also examined quality of life outcome indicators, such as frequency and/or quality of social engagement.

Fifteen of the studies are included in this section discussing staffing and quality of care because they met the criteria for inclusion related to risk adjustment, research methodology and/or quality measures used (see Table 7). In addition, two reports are included in this section that fall into the “grey” area, but were nonetheless considered important. The first is based on the expert opinions of British Columbian clinical, and occupational health and safety experts and provides a valuable local perspective (MacCourt, 2004), while the second is based on the opinions of U.S. experts and is highly cited in the related literature (Harrington *et al.*, 2000). (See Appendix 3 for details on these and the other studies.)

Table 7. Literature examining nurse and personal care staffing and resident quality of care

Researcher (year; country)	Data Source		Study Design		Risk Adjustment	Quality of Care Measurement
	Primary	Secondary	Cross-Sectional	Longitudinal		
Bates Jensen et al. (2004; US)	*	*	*		2	Time-in-bed, social engagement; food intake
Bowers et al. (2000; US)	*			*	n/a	Social engagement, choice, toileting
Dorr et al. (2005; US)		*		*	3	PU, UTI, hospitalization
Dyck (2004; US)		*	*		4	Weight loss, dehydration
Engst et al. (2004; Canada)	*	*		*	0	Agitation & excessive behaviour
Horn et al. (2005; US)	*	*		*	4	PU, ADL, UTI
Hutt et al. (2000; US)		*		*	2	PU, ADL
Kayser-Jones & Schell (1997; US)	*			*	2	Eating assistance, time-in-bed
Kramer et al. (2000; US)		*		*	2	hospitalizations
Kramer & Fish (2001; US)		*		*	3	ADL, PU, weight loss
Rantz et al. (2004; US)	*	*	*		2	Eating, walking, & toileting assistance
Schnelle et al. (2001; US)		*	*		2	Eating, exercise, ADL, & toileting assistance
Schnelle et al. (2004; US)	*	*	*		2	PU; eating, exercise, repositioning & toileting assistance; time-in-bed; social engagement
Simmons et al. (2001; US)	*	*	*		4	Food intake
Zhang et al. (2006; US)		*	*		2	PU, catheterization, physical restraint
Harrington et al. (2000; US)		*	*		n/a	Overall quality of care in US residential care facilities
MacCourt (2004; Canada)	*	*	*		n/a	Agitation & excessive behaviour

As Table 7 shows, 15 of the 17 studies on staffing and quality of care are based on data from the United States while two are Canadian. Primary data was used in 9 of the studies and secondary data was used in 15 studies (some studies used both primary and secondary data). Of these studies, 2 used the preferred prospective longitudinal research design (Bowers *et al.*, 2000; Engst *et al.*, 2004), 3 used the next best preferred - a cross-sectional experimental design (Bates-Jensen *et al.*, 2004; Rantz & Zwygart-Stauffacher, 2004; Simmons *et al.*, 2001), 6 used a retrospective longitudinal research design, 5 a cross-sectional design, and one was a simulation study.

With regards to adjustments for risk factors, 3 of the studies applied all four risk adjustment factors, 2 applied three risk adjustment factors, and 8 applied two risk factors. One study (Engst *et al.*, 2004) did not control for risk factors but was included because the study was conducted at a single site in a BC extended care facility, with set admission criteria familiar to those working in BC residential care. In three studies, risk adjustment factors were not applicable, in the first because the study was a qualitative survey of care aides' observations of quality of care (Bowers *et al.*, 2000) and in the second and third instances, because they were based on experts' opinions (the experts included nurse clinicians, researchers, educators, health economists, residential care administrators, occupational health and safety experts and others) (Harrington *et al.*, 2000; MacCourt, 2004).

A wide variety of quality measures were used including outcome measures such as: improvements in functional ability, incidence of weight loss, incidence of pressure ulcers, time socially engaged, observed food intake, incidence of agitation, incidence of hospitalization for select causes. Three of the above 14 studies also measured process quality indicators such as time spent providing eating, ambulation and/or toileting assistance and three studies included measures of quality of life.

All 3 factors – methodology, risk adjustment and quality measures – have been considered in this review and only the most rigorous and applicable studies have been selected. Although they may theoretically score differently on each individual factor, Simmons *et al.* (2001), Horn (2005), Bates-Jensen (2004), Rantz (2004), Engst *et al.* (2004), and Kramer and Fish (2001) could be argued to be the strongest studies when all three factors are considered together. Appendix 3 provides detailed information on the data sample, data source, study design, number of risk adjustment factors, quality measures used, findings and the limitations and strengths of each of the studies reviewed in this section.

(1) Outcome Quality of Care Measures: Minimum Levels of Nurse and Personal Care Staffing Required to Avoid Adverse Outcomes

The first group of studies to be discussed (Dyck, 2004; Horn *et al.*, 2005; Hutt *et al.*, 2000; Kramer *et al.*, 2000; Zhang *et al.*, 2006) have examined the minimum levels of nurse and personal care staff required to avoid adverse outcomes amongst residential care residents. Adverse outcomes refer to such events as hospitalizations for preventable reasons or the development of pressure ulcers. For example, pressure ulcers are often preventable by frequently changing residents' positions in their bed and chairs.

Kramer *et al.*'s (2000) findings strongly support the existence of associations between specific minimum staffing levels – for RNs, LPNs and Care Aides – and quality of care. Kramer *et al.* researched the association between nurse staffing levels and quality of care in 1,786 U.S. residential care facilities. Quality of care was measured by hospitalization for selected causes⁶. For RNs, Kramer *et al.* identified that a minimum RN staffing level was needed to avoid hospitalizations for sepsis and UTI (0.14 hprd⁷).

In the same study, Kramer *et al.* (2000) found that a minimum level of LPNs staffing was needed to avoid hospital admissions due to electrolyte imbalances (0.53 hprd⁸) and due to UTI and sepsis (0.63 hprd⁹). In addition, a combined minimum level of RN and LPN staffing below 0.76 hprd was strongly associated with the likelihood of hospitalization on all 5 quality indicators¹⁰.

Minimum RN, LPN and care aide staffing levels are needed to **avoid hospital admissions**.

With regards to staffing levels of care aides, Kramer *et al.* (2000), found that for 4 of the 5 quality measures¹¹, care aide staffing below 2.04 to 2.06 hprd was associated with a 4-fold increase in the likelihood of high hospitalization rates¹². Kramer *et al.*'s findings are strengthened by the use of Medicaid Cost Reports for staffing levels (considered the “Gold Standard” by White (2001)).

⁶ Congestive heart failure [CHF], electrolyte imbalance, respiratory infection, urinary tract infections [UTI] and sepsis

⁷ 0.14 RN hprd to avoid Sepsis: AOR=2.74; p=0.004; and UTI: AOR=2.36, p=0.012

⁸ p<0.001

⁹ p<0.001

¹⁰ AOR = 5.08, P<0.001

¹¹ Electrolyte imbalance, respiratory infection, UTI, and sepsis

¹² p<0.001

Low RN & LPN staffing associated with being in worst 10% of facilities on **pressure ulcer** incidences and **functional** improvements

In another study of 519 New York and 728 Ohio residential care facilities, Hutt et al. (2000) demonstrated that there was a relationship between lower staffing levels and the likelihood of poor outcomes for residents. Hutt et al. found different thresholds of nursing staff were associated with incremental increases in quality and different skill levels of staff. For example, the facilities with less than 0.77 hours of LPN staffing per resident day were almost 5 times more likely to be grouped in the “worst 10% of facilities” with regards to incidence rates of pressure ulcers¹³. Similarly, a facility with less than 0.109 hours of RN staffing per resident day were two and a half times more likely to be in the “worst 10% of facilities” with regards to incidence rates of pressure ulcers¹⁴.

In Ohio, but not in New York, Hutt et al. found that facilities in the lowest RN staffing decile (below 0.25 hprd) were 2.58 times as likely to be in the worst decile of facilities for functional improvement¹⁵. In Ohio, low LPN, RN, and total licensed staffing levels¹⁶ were associated with lower rates of improvement in the number of residents who resisted care^{17,18}.

Hutt et al.’s study recognized that staffing may not have “a linear relationship with quality.” As a result their “design included the use of continuous staffing and quality measures categorized into deciles and thresholds where staffing relationships might be most apparent” (pg. 10-3).

Similarly, Zhang et al. (2006) concluded that staffing levels in residential care facilities are positively correlated with quality of care and that logistic regressions appeared to fit the data better than linear ones. In their review of staffing and quality of care indicators¹⁹ of 14,113 US residential care facilities, Zhang et al. examined the minimum thresholds of RN, LPN and care aide staffing needed to achieve 50%, 75%, and 90% levels of quality²⁰. The researchers argue

¹³ LPN Adjusted Odds Ratio (AOR)=4.97; p=0.008

¹⁴ RN AOR=2.49; p=0.037

¹⁵ p=0.014

¹⁶ LPN below 0.47 hprd; RN below 0.21 hprd; and total licensed (RN plus LPN) below 0.89 hprd

¹⁷ LPN AOR=1.88, p=.054; RN AOR=3.08, p=.003; RN+LPN AOR=1.81, p=.061

¹⁸ “Change in resisting assistance with ADLs is a way to measure the personal relationship between residents and staff. ...Residents describe the importance of gentleness, personal engagement, not being rushed and feeling respected. Aides report that they value having time to promote physical comfort, not make residents wait or rush, and share treats or personal stories. We reasoned that over time residents who initially resist assistance with ADLs out of fear or confusion should gradually become more accepting of care if well-trained and supervised staff are available to permit development of personal rapport. Improvement is defined as not resisting assistance with ADLs at the second assessment if resistance had been noted at the first...” (Hutt et al., 2000, pg. 10-7)

¹⁹ The quality measures used by Zhang et al. (2006) were incidence of pressure ulcers, catheterization and physical restraint.

²⁰ A simulation process applied threshold criteria to a logistic regression model by running repeated iterations of increments of each staffing category regressed logistically against the quality index, which was formed from measures of incidence of indwelling catheters, pressure sores, and physical restraints. For a model in which quality was at the median (50th percentile) — a “50 percent quality” model — quality levels greater than the median were coded as “1” and the rest as “0”. The “75 percent quality” and “90 percent quality” levels were coded similarly. (Zhang et al., 2006, pg. 81)

that minimum nurse staffing points can be ascertained. The results showed that as quality standards were raised, minimum staffing requirements surged with the 75% quality ranking requiring much more staffing for all categories than the 50% ranking. The minimum thresholds of RN time to achieve 50%, 75%, and 90% quality levels were identified as 0.31, 1.83, and 3.3 hours per resident per day, respectively. However, the minimum staffing levels could not be statistically determined for care aide and LPN categories. In other words, Zhang's study found that the relationship between quality and staffing levels was best represented by an "S"²¹ curve whereby the initial stage of improvement in quality care is exponential; then, as staffing arises, the improvement in quality slows, and at some point, improvement stops. The researchers suggest that further research is needed to determine actual staffing standards to achieve optimum cost and quality and that future studies should assess minimum staffing at points between 50% and 75% levels of quality.

In a retrospective study of data collected as part of the National Pressure Ulcer Long-Term Study (NPULS) Horn et al. (2005) analyzed data on 1,376 residents of 82 residential care facilities who did not have any pressure ulcers but who were at risk of developing them. After controlling for severity of illness, new admission status, study duration, and other patient, facility, and treatment variables, Horn et al. found strong and consistent associations between the average time nurse and personal care staff provided and quality of care.

Significant relationships were found with increased RN, LPN and Care Aide staffing resulting in lower pressure ulcer incidence. Residents receiving 30 to 40 minutes of RN direct care per day were 84% less likely to develop a pressure ulcer than were those in the reference group who received fewer than 10 minutes of RN direct care per day.²² Residents who received 45 or more

Pressure ulcer development associated with RN, LPN and Care Aide time.

minutes of LPN time were 42% less likely to develop pressure ulcers.²³ When care aide time was 2.25 hours or more per day²⁴, only 16% of residents developed pressure ulcers; when care aide time was 2 to 2.24 hours per day²⁵, 23% of residents developed pressure ulcers and when CA time was less than 2 hours per day²⁶, 32% of residents developed pressure ulcers.²⁷ In other words, those residents who received 2.25 or more hours of CA time were 41% less likely to develop PU than those receiving less than 2.25 hours CA time per day²⁸.

Horn et al. also found that residents who received 30 to 40 minutes of RN direct care per day were 42% less likely to experience deterioration in

RN staffing levels associated with residents' ability to perform ADLs

²¹ "S" curve refers to "sigmoid curve"

²² The odds ratio (OR) of pressure development was 0.16 ($p < 0.001$) when RN time was 30-40 minutes (or 0.5 to 0.67 hrpd).

²³ $p = 0.007$; median = 51.8 minutes

²⁴ median = 3.1 hours

²⁵ median = 2.1 hours

²⁶ median = 1.8 hours

²⁷ $p < 0.001$

²⁸ $p = 0.059$

their ability to perform ADLs than were those who received less than 10 minutes of RN direct care²⁹.

Residents receiving a minimum level of **care aide** hours per day are at a lower risk for **weight loss**.

Dyck (2004), in her dissertation work, researched the quality outcomes of weight loss and dehydration amongst 363,895 residents living in 2,951 residential care facilities in 6 US states. Dyck found that residents receiving 3 or more hours of care aide per resident day had a 17% less risk of weight loss³⁰ compared to those residents receiving less than 3 hours of care aide time per day.

The articles reviewed in this section suggest that minimum staffing levels, for both nursing and personal care staff, are required to avoid adverse outcomes for a number of care related conditions. While the conclusions on levels of staff provide us with significant information for further consideration, caution should be taken in interpreting the findings because of differences between British Columbian residential care staffing and resident case mix and those discussed in the research.

(2) Outcome Quality of Care Indicators: Levels of Licensed Nurse and Personal Care Staffing Required to Improve Quality of Care Outcomes

The research discussed in this section focuses on staffing levels needed to improve quality of care outcomes (e.g. improvement in functional abilities). High versus low nurse and personal care staffing comparisons highlight the impact of staff levels on improved quality of care. The important observations from these studies are not necessarily the specific staff levels reported, but the fact that differences in quality of care have been observed with different levels of staffing.

Kramer and Fish (2001) examined the relationship between nurse staffing levels and the quality of care in 5,294 long-stay residential care facilities in 10 US states. The quality of care measures studied were improvement in functional abilities and in residents' incidences of resisting care, and incidence of weight loss and pressure ulcers (PU). The study found that the weighted threshold for total nurse and personal care staff levels (RN, LPN and CA), below which facilities were at increased risk of being in the worst 10% and above which there were no additional improvements in quality, were 4.1 total hours per resident day (hprd).

Total nurse and patient care hprd were found to be associated with **improvement in ADLs**, and **reduction in incidences of weight loss & pressure ulcers**

²⁹ p=0.046

³⁰ p=0.0008

More specifically, Kramer and Fish (2001) found that licensed staff levels thresholds, below which facilities were at increased likelihood of being in the worst 10% of facilities and above which there were no further benefits with respect to quality when additional staff were available, ranged from 0.95 to 1.55 hprd licensed nurse staffing (LPN and RN). The results of Kramer and Fish's study are strengthened by the use of Medicaid Cost Reports for staffing levels.

Minimum
licensed nurse
hprd needed
for
improvement
in resident
functioning

Kramer and Fish (2001), also found that minimum nurse staffing levels (1.55 hprd licensed nurses³¹) impacted improvements in functional abilities, and that minimum licensed nurse levels were needed to prevent weight loss (0.95 licensed nurse hprd³²), and were needed and for improvements in skin trauma (1.15 licensed nurse hprd³³). RN thresholds required for improved quality of care ranged from 0.6 hprd³⁴ for reduction in incidence of pressure ulcers, to 0.8 hprd³⁵ for improvements in resident functioning.³⁶

Kramer and Fish's (2001) research also found that a weighted average of 2.78 care aide hprd was necessary for improved care quality, and more specifically found that 3.1 care aide hprd³⁷ were needed for improvements in weight loss, 2.8 care aide hprd³⁸ were needed for improvements in the incidence of skin trauma and pressure ulcers, and that 2.4 care aide hprd³⁹ were need for residents to achieve functional improvements.

Using the same data base used by Horn et al. (2005) – the National Pressure Ulcer Long-Term Care Study – Dorr et al. (2005) conducted a similar retrospective longitudinal analysis of lower versus higher nurse staffing and adverse resident outcomes in 82 US residential care facilities. Dorr confirmed that rates of pressure ulcers, urinary tract infections and hospitalizations improved considerably with increased RN staffing levels. For example, the pressure ulcer rate per day in residential care facilities with low RN staffing levels (less than 10 minutes per resident per day) was 5.01×10^{-3} compared to a rate of 1.16×10^{-3} in residential care facilities with high RN staffing levels (30-40 minutes per resident per day or in other words, 0.5 to 0.67 RN hprd).⁴⁰

Increased RN
staffing levels
associated
with lower
pressure
ulcer rates

In a study of the effect of staffing level on the amount of time residential care facility residents were observed in bed in the daytime, Bates-Jensen et al. (2004) found that nurse and personal

³¹ 1.55 hprd licensed nurses needed for improvements in functional abilities; Adjusted Odds Ratio [AOR]=1.79; $p < .05$

³² AOR=1.24; $p < .05$

³³ related to PU; AOR=1.31; $p < .05$

³⁴ AOR=1.33; $p < .05$

³⁵ AOR=1.54; $p < .05$

³⁶ The impact of LPN time was not studied separately by Kramer and Fish.

³⁷ AOR=2.25; $p < .05$

³⁸ AOR=1.6; $p < .05$

³⁹ AOR=1.34; $p < .05$

⁴⁰ (Dorr *et al.*, 2005, p. 842)

care staffing level (including RNs, LPNs and CAs) was the strongest predictor of observed resident time in bed after controlling for residents' demographics and level of functioning.⁴¹

Bates-Jensen et al. observed that 43% of residents in lower-staffed homes⁴² were observed in bed during the day versus 26%⁴³ of residents in the higher-staffed homes⁴⁴. The residents in lower-staffed homes were observed in bed an estimated average of 5 hours a day (between 7 a.m. and 7 p.m.) versus an estimated average 3 daytime hours for residents in the high-staffed homes⁴⁵. In addition, adjusting for resident function, residents who were observed in bed during the daytime in more than 50% of hourly observations were observed to experience less social engagement⁴⁶ and consumed less food and fluids during mealtimes than those residents observed in bed in less than 50% of observations⁴⁷.

Residents in higher-staffed residential care facilities spent less **time in bed**, experienced more **social engagement**, and consumed more **food and fluids**.

The lower staffed homes, which were below the 90th percentile of all residential care facilities in the state, reported mean total licensed and nonlicensed nursing staffing of 3.1 +/- 0.3 hprd. The higher staffed homes, which were in the upper decile of all residential care facilities in the state, reported mean total licensed and nonlicensed nursing staffing of 4.8 +/- 1.1 hprd (Bates-Jensen *et al.*, 2004). With respect to care aide staffing levels required for improved residents' care, Bates-Jensen et al.'s (2004) study on the effect of staffing on in-bed times in residential care found that residents' care improved in high-staffed homes that reported a mean care aide staffing levels of 3.4 hprd ($\forall 0.7$).

Research on the impact of levels of nurse staffing on quality of care are supported by U.S. experts who, after reviewing records for 14,140 residential care facilities, concluded that the average nurse staffing levels in residential care facilities (RNs 0.72 hprd, LPNs 0.69 hprd, CAs 2.10 hprd, total = 3.51 hprd) could be too low in some facilities to provide high quality of care (Harrington *et al.*, 2000). The experts recommended that to improve the quality of care in residential care facilities, nurse staffing levels should be a total nurse and patient care staffing level of 4.55 hprd, which includes 1.15 RN hprd, 0.70 LPN hprd, and 2.70 CA hprd.

(3) Process Quality Indicators: The Impact of Staffing Levels and Mix on Resident Quality of Care

The studies in this section focus on process quality of care factors and staffing levels and mix (Bowers *et al.*, 2000; Engst *et al.*, 2004; Kayser-Jones & Schell, 1997; MacCourt, 2004; Rantz *et al.*, 2004; Schnelle & Simmons, 2001; Schnelle *et al.*, 2004; Simmons *et al.*, 2001). Process

⁴¹ odds ratio = 4.89; p=0.042

⁴² sample population of lower-staffed facilities included 746 residents from 28 U.S. nursing homes

⁴³ t=5.6; p<.001

⁴⁴ sample population of high-staffed facilities included 136 residents from 6 U.S. nursing homes

⁴⁵ Bates-Jensen et al. (2004), p. 935.

⁴⁶ p=.026

⁴⁷ p<.001, (Bates-Jensen *et al.*, 2004, p. 931)

quality indicators are those that measure such care activities as the provision of eating, repositioning or toileting assistance.

Schnelle et al.'s (2004) study of the relationship between staffing and quality of care in 21 residential care facilities, found that the highest-staffed homes performed significantly better on 13 of 16 care processes⁴⁸ compared to lower-staffed homes. In general, participants in the highest-staffed homes were engaged more frequently; received better feeding and toileting assistance; were repositioned more frequently; spent more time out of bed during the day; and showed more physical movement patterns during the day that could reflect exercise.

Residents in higher-staffed residential care facilities eat more meals in the dining room, receive more feeding assistance, more toileting assists and are observed to be more engaged with others than residents in lower-staffed residential care facilities

The most dramatic quality improvement occurred for homes that reported a total staffing hprd average from 4.8 (state data) to 4.5 (onsite interview data). Schnelle et al. (2004), also identified that residential care facilities with one care aide to 7.6 residents performed better on 13 out of 16 care process than lower staffed residential care facilities with one care aide for 9 to 10 residents. However, even participants in these highest-staffed facilities did not receive repositioning at the rate of once every two hours during the day or night and only received potential exercise activities at the rate of approximately one episode every four hours.

The results of Schnelle et al.'s (2004) research are strengthened by accuracy checks of year 2000 staffing statistics, by which research staff interviewed 118 CAs to verify the number of residents they were responsible for. The standardized measurement technology used is another major strength of the study. Sixteen care processes were measured by research staff using standardized

⁴⁸ The *Observation and Interview Measurement* Domains used by Schnelle (2004) (the care processes which the highest staffed homes performed significantly better on are indicated with a * for $p \leq .05$ or ** for $p \leq .001$):

Out of Bed/Engagement

**1. Percent of observations of residents in bed 7:00 a.m. to 7:00 p.m.

* 2. Percent observations of residents engaged with residential care staff, other residents, another person, or an organized group activity, or with an object (e.g., television, reading, sewing)

Nutrition: Feeding Assistance

**3. Percent of resident meals in dining room

**4. Average duration of feeding assistance to residents in minutes

**5. Average resident tray access time in minutes

Providing assistance to residents with low intake:

**6. Percent of residents who eat $<50\%$ and are provided with ≥ 1 minute of assistance

Providing assistance to physically dependent residents:

**7. Percent of residents feeding dependent, MDS >1 , and who receive ≥ 5 minutes assistance

Accuracy of food intake documentation:

* 8. Percent of residents who ate less than 50%; CA recorded $\leq 60\%$

9. Percent of mealtime observations with social interaction and verbal prompting (**not significant**)

* 10. Percent residents responding yes to "Do you have food choice during mealtime"

Incontinence

**11 Number of toileting assists received; MDS Recall Score ≥ 2

* 12. Percent residents responding yes to "Do you have to wait too long for assistance?" All Recall Scores

Exercise Activities

* 13. Number of exercise activities per hour (Day)—Thigh monitor (can't reposition or walk independently)

14. Number of repositioning movements per hour (Night)—Thigh monitor (can't reposition independently) (**not significant**)

* 15. Number of repositioning movements per hour (Day)—Thigh monitor (can't reposition independently)

16. Number of walking assists received MDS Recall Score ≥ 2 and can bear weight (**not significant**)

(page 241-242)

direct observation and resident interview protocols during three consecutive 12-hour weekdays in each residential care facility.⁴⁹

In a simulation study of the “minimum staffing levels necessary to achieve ‘good’ nursing facility care” Schnelle et al. (2001) demonstrated that, in order for care aides to provide optimal levels of feeding, toileting, exercise and personal care assistance, 3.2 care aide hprd are needed for high workload residential care facilities, 3.0 care aide hprd are needed for medium workload residential care facilities and 2.8 care aide hprd are needed for low workload homes. In other words, the minimum number of care aide full time equivalent (FTE) positions required per 24 hours for 40 residents for optimal care⁵⁰, varied from 16 FTE for high workload residential care facilities, to 15 FTE for medium workload facilities and to 14 FTE for low workload facilities (2001, p. 3-1).

Schnelle et al. (2001) argue that “this standard should be viewed as a necessary condition for optimal care by care aides, not a sufficient condition” (p. 3-32). Schnelle's findings are strengthened by the detailed analysis of the care needs of various groups of residents and the detailed breakdown of case mix by facility in estimating care aide staffing.

Rantz et al. (2004), in their study of 92 Missouri residential care facilities, found that in facilities with good resident outcomes, there are basics of care and processes surrounding each that staff were observed to consistently do: helping residents with ambulation, nutrition and hydration (serving good appealing food, serving food with the plate directly on the table in front of the resident - not on a tray, providing food choice, using adaptive devices to help residents eat independently, etc); toileting residents frequently and routinely; preventing skin breakdown (through toileting, ambulation, fluid access, better hygiene, better meals); and managing pain.

In facilities with good resident outcomes, a key finding was that those residents who needed to be helped with eating were helped with a ratio of one to two residents per staff. In facilities with poor outcomes, staff fed more than two residents at a time, and in many cases, more than five or six at a time (Rantz et al., 2004).

In facilities with good resident outcomes, a key finding was that residents who needed direct help eating were helped with a ratio of 1-2 residents per staff.

⁴⁹ Ibid.

⁵⁰ Schnelle et al. (2001) identified five care processes relevant for measuring quality of care. These were:

1. Consistently changing wet linens for incontinent residents who *could not* successfully toilet if given assistance;
 2. Providing timely toileting assistance for incontinent residents who *could* successfully toilet;
 3. Providing feeding assistance to either physically dependent residents or those with low food intake;
 4. Providing exercise to all residents; and
 5. Providing assistance that enhances the ability of residents to dress and groom independently.
- (pg. 3.2)

These five care processes were selected because they were associated with positive resident outcomes (i.e. improved quality of life or improved functional status) and because Schnelle et al. had access to available research data on the labour intensity required to implement each care process.

The results of Rantz et al.'s (2004) study are strengthened by the cleaning of the data and the cross checking of facility outcomes with observations. The sample selection excluded nursing facilities with less than 30 beds, because with their small population they were at greater risk for excessive variations in quality indicators.

Simmons et al. (2001), studied how many residents in a residential care facility who were eating less than 75% of the food offered during most meals were responsive to feeding assistance and how much time was required to provide feeding assistance to these residents. Their study found that the time required implementing the feeding assistance intervention greatly exceeded the time the nursing staff spent assisting residents in usual mealtime care conditions.

“Responsive” residents increased their intake of food from 47% to 70% with feeding assistance intervention. This intervention included 38 minutes (± 12.2) of assistance (compared to 9.4 minutes, ± 10.4 , of usual residential care facility care), 14.6 verbal prompts (± 10.4) per resident per meal (compared to usual 1.7 ± 3.0 residential care facility care), 31.1 ± 30.5 physical prompts (versus 19.7 ± 25.1 usual residential care facility care) and 38.9 minutes (± 12) average tray access time versus the usual 31.9 ± 9.0 minutes. The researchers suggest that increased staffing levels and better organization of staff can produce higher quality feeding assistance during mealtimes.

Similarly, Kayser-Jones and Schell (1997), who studied 58 residents from 2 residential care facilities, found that inadequate staffing resulted in residential care facility residents not receiving enough care before and during meals resulting in increased choking and coughing during meals and weight loss due to insufficient food intake. On the daytime shift, each care aide typically had to care for 7 to 9 residents. However, in the evening they were assigned 12 to 15 residents. If someone called in sick they had an even greater workload.

Kayser-Jones and Schell's (1997) results showed that inadequate staffing affected resident care before and during meals as well as where and how meals were served. Before meal personal care (i.e. grooming, hand washing, dressing) were often neglected. Many residents were served meals in their bed and those who were, often were not properly positioned, their food was served cold and sometimes not at all. Meals service in the dining rooms was also often an unpleasant experience as residents were often fed quickly and forcefully; solid food was mixed with liquids, a potentially harmful strategy contributing to choking and aspiration. Dysphagia was often undiagnosed and unrecognized.

In one facility, an LPN, with the help of an activities staff member, provided assistance and supervision at mealtime and under these conditions, residents received appropriate help and in general, the meal was a more pleasant event. However, in most facilities, licensed staff did not supervise or assist care aides during mealtime as they were busily occupied with other activities. The researchers found that the quality of care at mealtime was on the whole poor, especially for dysphasic residents, cognitively impaired residents and those without attentive families. Some residents lost a great deal of weight and many residents were observed coughing and choking during mealtime (Kayser-Jones & Schell, 1997).

Kayser-Jones and Schell recommend that a sufficient number of well-educated and supervised staff members are critical to improving care, including gerontologically degree trained RNs to assess each resident and then to teach other professional staff (e.g. LPNs) and CAs how to feed residents with complex eating problems.

A sufficient number of well-educated and supervised staff members are critical to improving quality of care at mealtime.

Kayser-Jones and Schell recommend having an RN on duty during mealtimes to provide supervision and having enough care aides so that each care aide has no more than two or three residents to feed or assist at mealtime. Although the generalizability of the results is limited by the small sample (2 residential care facilities), Kayser-Jones and Schell's (1997) study is strengthened by its use of primary data (observations) and its use of trained researchers.

In a British Columbian study involving 100 residents and 98 residential care staff (care aides and RNs), Engst et al. (2004), studied the impact of a scheduled toileting program on resident agitation or aggressive behaviours and on the risk of injury to caregivers. Scheduled toileting is an important aspect of quality of care because, as the researchers state, "scheduled toileting is associated with better bowel and bladder hygiene, improved skin care, and improved resident dignity and well being, and also can reduce frustration agitation and violence towards staff (Frantz, 2003; MacLeod, 1991; Spodhof, 1993)" (Engst *et al.*, 2004, p. 428).

Significantly more care aide time is required to implement a toileting program (compared to the time required to clean residents in bed).

Engst et al. (2004) found that resident agitation behaviour in the intervention group, expressed as verbal behaviours and emotional upset, appeared to have been reduced, when compared to the control group. However, the toileting program increased the cognitive demands and work load for care aides. Time analysis revealed a significant difference between the time required to transfer residents to the toilet (6:09 minutes) and the time required to clean residents in bed (4:08 minutes). Each care aide performed between 8 and 15 toileting transfers per shift. Accordingly, two additional minutes per toileting transfer could result in a considerable increase in time requirements for toileting tasks.

While the researchers did not report the use of resident risk adjustment factors, the research was conducted with residents on two units in one extended care facility (i.e. residents with complex care needs and very limited functional abilities) in B.C. (Engst *et al.*, 2004). The study is also strengthened by the use of primary data including: staff survey; resident agitation checklist (completed by care providers); incident reports for aggressive behaviour and for MSI; staff interviews; direct observation of care providers at work; and time analysis of toileting transfers and bed cleaning.

In their qualitative study, Bowers et al. (2000) found that care aides identified their relationship with residents to be the central determinant of quality care and that adequate staffing was essential to allowing them to nurture these relationships. High quality care was described "as

care that is done ‘affectionately’ or ‘individually’ in ways that are ‘like family’” (p. 63). Care aides described the relationship between staffing and quality in this fashion: “adequate and consistent staffing facilitates the development of relationships between CAs and residents. With relationships comes familiarity. This familiarity increases the chances that care will be provided in a way that the resident prefers and is more comfortable with, thus leading to better outcomes” (p. 58).

Adequate staffing was found to be essential to allowing CAs to nurture these relationships. When staffing was inadequate (i.e. they were short staffed), care aides used a number of time-saving measures including “not allowing residents the time to choose what they wanted to wear, not allowing them to wear clothing that was more difficult to put on or take off, eliminating time-consuming grooming preferences like braids and makeup, eliminating oral care, eliminating walking and range of motion exercises, abbreviating bathing procedures (“faces and bottoms” only), not stopping to chat, and reducing other activities designed to allow choice and enhance residents' sense of reciprocity and competence” (Bowers *et al.*, 2000, p. 60). Also, toileting plans were identified as one of the first “cares” to be eliminated when they were understaffed.

Adequate staffing necessary
for caring relationships

Bowers *et al.* (2000) suggest that the measurement of staffing is more complicated than simple counting of numbers of staff and residents. “Staff who do not have relationships with residents can be a hindrance as well as a help in the accomplishment of care tasks. Perhaps only staff who are familiar with residents – those who have established relationships – should ‘count’ when staffing levels are measured” (p. 63). Bowers *et al.*’s study is limited in that it is a qualitative study of care aides’ experiences providing care and therefore it does not control for any resident risk adjustment factors and in that it has a small sample size (38 care aides from 6 residential care facilities in 3 Midwestern US cities). The study is strengthened by its use of primary data collected from both interviews and observations and its longitudinal design (information was collected over 2 years).

In a British Columbian study, MacCourt (2004) interviewed 22 B.C. key informants' regarding their suggestions for a best practice model for aggressive behaviour prevention and management in BC residential care facilities. (The key informants included 22 B.C. clinical occupational health and safety experts and 2 external experts.) The key informants’ suggestions on how aggressive behaviour could be managed with regards to staffing resources were: “that the ratio of staff to residents must be increased, especially on evening and nights, if aggression is to be prevented...Continuity of staff was considered very important in preventing resident aggression...it was suggested that staff work permanent shifts rather than rotate...It was suggested that greater use of recreation and activity staff to provide appropriate activities for residents on evening and weekend could reduce resident boredom and frustration, increase well-being and prevent aggression” (p. 46).

Many of the BC key informants that MacCourt (2004) interviewed felt that the staff mix needed to be changed in order to improve resident care. In particular key informants suggested that RPNs and/or RPNs/RNs be hired. There were also some who suggested that LPNs be added to the staff mix but not to replace RNs (p. 46). Although MacCourt’s study is limited by its sample

size, methodology and limitations in representativeness, the opinions of local experts should be nonetheless considered in deliberations regarding nurse staffing in residential care.

Summary

This research shows that minimum staffing levels for all types of workers (i.e. RNs, LPNs and Care Aides) contributes to the avoidance of adverse care outcomes amongst residents and that added staffing can improve quality care.

Some of the evidence indicates how each level of staff makes a different and distinct contribution to quality of care outcomes. For example, the first five studies reviewed (Dyck, 2004; Horn *et al.*, 2005; Hutt *et al.*, 2000; Kramer *et al.*, 2000; Zhang *et al.*, 2006), showed that minimum staff levels for RNs, LPNs, care aides, and for total nurse and personal care staff were required to avoid residents' experiencing adverse outcomes such as the development of pressure ulcers, or deterioration in their functional independence. These staffing levels are summarized in Table 8 (also see Appendix 3).

The second group of studies reviewed (Bates-Jensen *et al.*, 2004; Dorr *et al.*, 2005; Harrington *et al.*, 2000; Kramer & Fish, 2001) emphasized the nurse and personal care staffing levels required to improve the quality of care outcomes of residents such as improvements in activities of daily living and food and fluid intake, and/or reduction in incidences of pressure ulcers.

Other evidence showed the extent to which each member of the care team can contribute to the process of providing quality of care within his or her specific scope of practice. For example, several of studies reviewed in the third section (Kayser-Jones & Schell, 1997; Rantz & Zwygart-Stauffacher, 2004; Schnelle & Simmons, 2001; Simmons *et al.*, 2001) found that quality eating assistance requires a minimum amount of nurse and care aide time as well as well educated and supervised staff. Other studies (Bowers *et al.*, 2000; Schnelle & Simmons, 2004) found that adequate staffing was central to meeting quality of life outcomes such as the development of caring relationships and opportunities for social engagement and exercise.

In summary, the research reviewed in this section demonstrates that there is a positive relationship between nurse and personal care staffing and quality of care in residential care. Recommendations on how this information may support quality of care and staffing in British Columbian residential care facilities will be discussed at the end of this report.

Table 8. Summary of nurse and personal care staffing levels recommended in the literature for resident quality of care

Researcher (year; country)	Nurse and Personal Care Staffing (hours per resident day)				
	Total	RN/LPN	RN	LPN	Care Aide
Recommended staffing levels to avoid adverse outcomes					
Dyck (2004; US)					>3.0
Horn et al. (2005; US)			0.5 to 0.67	>0.75	>2.25
Hutt et al. (2000; US)			>0.25	>0.77	
Kramer et al. (2000; US)		>0.76	>0.14	>0.53 to 0.63	>2.06
Zhang et al. (2006; US)	The minimum thresholds of RN staffing to achieve 50%, 75% and 90% quality levels were 0.31, 1.83 and 3.3				
Recommended staffing levels for improved quality of care					
Bates-Jensen et al. (2004; US)	4.8 +/- 1.1				3.4 +/- 0.7
Dorr et al. (2005; US)			0.5 to 0.67		
Harrington et al. (2000; US)	4.55	1.85	1.15	0.70	2.70
Kramer & Fish (2001; US)	4.1	0.95 to 1.55	0.6 to 0.8		2.4 to 3.1
Schnelle & Simmons (2004; US)	4.5 to 4.8				
Schnelle et al. (2001; US)					2.8 to 3.2
Research showing impact of staffing levels and mix on resident quality of care					
Kayser-Jones & Schell (1997; US)	Quality eating assistance requires an RN on duty to supervise and enough CA so that each CA has no more than 2-3 residents to assist at mealtime				
Rantz et al. (2004; US)	Residents who need to be helped with eating need to be help with a ratio of one to two residents per staff				
Bowers et al. (2000; US)	Adequate staffing of CAs is essential to allow CAs to nurture relationships with residents, which foster greater quality care.				
MacCourt (2004; Canada)	Ratio of staff to residents (in BC residential care facilities) must be increased, especially on evenings and nights, if aggression is to be prevented.				

Organizational and Managerial Characteristics and their Impact on Nurse and Personal Care Staffing and Quality of Care

In this section, research on the influence of organizational (e.g. staffing hours, retention) and managerial factors (e.g. relationship-oriented leadership, engaging staff participation in decision making, and communication openness), on quality of care, staffing and job satisfaction is reviewed. Eight of the studies examine the impact of managerial and organizational factors on resident quality of care outcomes, four examine the relationship between staff turnover and managerial and/or organizational factors, and the remaining seven studies researched the impact of managerial and organizational factors on job satisfaction (see Table 9).

Table 9. Literature examining managerial and organizational characteristics and their impact on nurse and personal care staffing and quality of care

Researcher (year; country)	Data Source		Study Design		Risk Adjustment	Variables
	Primary	Secondary	Cross-Sectional	Longitudinal		
Anderson et al. (2004; US)	*	*	*		2	Turnover & managerial/organization factors
Anderson et al. (2003; US)	*	*	*		2	Resident outcomes & managerial/org factors
Atchison (1998; US)	*		*		n/a	Job satisfaction & managerial factors
Banaszak-Holl & Hines (1996; US)	*	*	*		1	Turnover & managerial/organization factors
Barry et al. (2005; US)	*	*	*	*	3	Resident outcomes & managerial/org factors
Bowers et al. (2000; US)	*			*	n/a	Turnover & managerial/organization factors
Castle (2001; US)	*	*	*		1	Resident outcomes & turnover
Castle & Engberg (2005; US)	*	*	*		2	Resident outcomes & turnover
Hall et al. (2005; Canada)	*		*		n/a	Job satisfaction & managerial factors
Harrington & Swan (2003; US)		*		*	4	Turnover & organization factors
Horn et al. (2004; US)		*		*	4	Resident outcomes & turnover
Kramer & Fish (2001; US)		*		*	3	Resident outcomes & turnover
Krueger et al. (2002; Canada)	*		*		n/a	Job satisfaction & managerial factors
McGilton & Pringle(1999, Canada)	*		*		n/a	Job satisfaction & managerial factors
Parsons et al. (2003; US)	*		*		n/a	Job satisfaction & managerial factors
Trinkoff et al. (2005; US)		*	*		2	Job satisfaction & managerial/org factors
Yassi et al. (2003; Canada)	*	*	*		2	Job satisfaction & managerial/org factors
Weech-Maldonado et al. (2004;US)		*	*		3	Resident outcomes & managerial factors
Zimmerman et al. (2002; US)	*	*		*	4	Resident outcomes & turnover

Two of the nineteen studies reviewed in this section, Kramer and Fish (2001) and Bowers (2000), were discussed in the first half of this report. Fourteen of the eighteen research articles are based on data from the United States while four studies are Canadian. Primary data was used in 14 of the studies and secondary data was used in 12 of the studies (some studies used both primary and secondary data). Of these 19 studies, 2 used the preferred prospective longitudinal research design (Bowers *et al.*, 2000; Zimmerman *et al.*, 2002), 12 used the next best preferred – a cross-sectional prospective design, 3 used a retrospective longitudinal research design, one was

a retrospective cross-sectional design, and one employed both a cross-sectional and a longitudinal design.

With regards to adjustments for risk factors, 3 of the studies applied all four risk adjustment factors (Bowers *et al.*, 2000; Harrington & Swan, 2003; Horn *et al.*, 2004; Zimmerman *et al.*, 2002), 2 applied three risk adjustment factors, 4 applied two risk factors, two applied one risk adjustment factor and 6 studies were reviewed that did not include risk factors. However, these six studies were survey and/or interview studies of staff perceptions of job satisfaction and organizational factors and hence it could be argued that resident risk adjustment factors are not applicable. Appendix 4 provides detailed information on the data sample, data source, study design, number of risk adjustment factors, quality measures used, findings and the limitations and strengths of each of the studies reviewed in this section.

(1) Organizational and Managerial Characteristics Influencing Quality of Care

While staffing levels have been shown to affect quality of care, recent research (Anderson *et al.*, 2003; Barry *et al.*, 2005; Weech-Maldonado *et al.*, 2004) has demonstrated that managerial and organizational practices also impacts the quality of care provided by care aides and nurses. This research has implications for residential care facilities management and leadership.

In their study examining the relationship between organizational management and quality of care, Anderson *et al.* (2003) found that Director of Nursing's (DON) management practices of communication openness, decision making, relationship-oriented leadership, and formalization of work procedures, explained one or more of the following resident outcomes: aggressive behaviour, restraint use, immobility complications and fractures. For example, greater levels of RN participation in decision-making explained a lower prevalence of behaviour problems⁵¹.

Greater communication openness "defined as being able to say what you mean without fear of retribution" (p. 18), explained lower use of resident restraints⁵². Relationship-oriented leadership, which was defined as, "giving constructive feedback, helping staff resolve conflict, [and] generating trust" was related to decreased prevalence of fractures⁵³ and immobility complications among residents⁵⁴ (p. 18). More formalized work procedures, including rules and surveillance of work performance were related to a higher prevalence of immobility complications⁵⁵.

↑ RN participation in care decision associated with: ↓ behaviour problems
↑ DON relationship-oriented leadership related to: ↓ immobility complications and fractures

⁵¹ Beta=-.026, p<.05

⁵² Beta = -.226, p<.05

⁵³ Beta = -.242, p<.01

⁵⁴ Beta = -.222, p<.01

⁵⁵ Beta = .288, p<.01

Anderson et al. (2003) argue that their findings suggest “that strategies for improving resident outcomes go beyond the traditional emphasis on clinical process and the skills of care providers...developing alternative management strategies—ones that increase connections and interaction among people and increase cognitive diversity—are needed” (p. 20). In addition, Anderson et al. suggest that their findings may be explained by the greater depth of clinical and management knowledge DONs may have as a result of their longer tenure and greater experience. Anderson et al. suggest that a limitation of their study is that the analysis only included the perceptions of RNs and DONs, not that of LPNs or care aides. Nonetheless, the study is strengthened by its use of the “gold standard” Medicaid Cost Report data base and the use of a very conservative adjustment for case mix as well as the use of multiple sources of data.

In a study surveying Directors of Nursing (DONs) and day-shift charge nurses in a random sample of 156 residential care facilities in four US states, Barry et al. (2005) researched the effect of management practices used to empower care aides on resident outcomes (amount of social engagement and incidence of pressure ulcers). In situations where care aides were given higher numbers of rewards (measured by availability of an advanced care aide position, care aide participation on facility committees, facility provision of training and new staff orientations) there was a lower incidence of pressure ulcers⁵⁶. In situations where care aides had more influence in resident care decisions there were higher aggregate resident social engagement scores⁵⁷.

In another study of the impact of organizational factors on residents’ quality of care in 1,134 residential care facilities in 5 U.S. states, Weech-Maldonado et al. (2004) found that RN staffing patterns affected the incidences of pressure ulcers, use of restraints and residents’ cognitive functioning. Residents had better outcomes with regards to both pressure ulcers⁵⁸ and cognitive functioning⁵⁹ in residential care facilities with a higher RN staffing mix. Full-time RN staffing was associated with lower pressure ulcers⁶⁰ and residential care facilities that used a higher proportion of full-time RNs versus part-time and contract RNs had a lower use of restraints⁶¹.

(2) The Impact of Nurse Staffing Retention and Turnover on Quality of Care

Resident care in residential care facilities has been found to be negatively impacted by high levels of turnover among nursing staff in several ways. In the US, research has documented that widespread staff turnover in residential care facilities is resulting in poor resident outcomes. In 2001, the California Department of Health (2001) reported that “*High turnover disrupts continuity of patient care, undermines employee morale, increases demands on remaining staff, and increases facility costs for employee recruitment and training*” (p. 19).

⁵⁶ Beta = -0.07, p<0.1

⁵⁷ Beta = 0.085, p<0.01

⁵⁸ incidence of pressure ulcers: -0.069, p<.05

⁵⁹ cognitive functioning outcomes: -0.054, p<.05

⁶⁰ incidence of pressure ulcers: -0.048, p<0.1

⁶¹ restraint use: -0.059, p<0.01

When high turnover leads to staff shortages, the remaining staff must care for an increased number of residents, resulting in less care time for each resident and increasing risk that residents may suffer harm (Castle, 2005). Lack of continuity of care can also cause residential care residents to suffer psychological distress (Castle & Engberg, 2005). In addition, increased nursing staff workloads can lead to increased nursing staff injuries and lower job satisfaction. Care aide (CA) turnover in the US is estimated at 80% to 100%, while registered nurse and licensed practical nurse turnover is at 40% and 70%, respectively. In addition, turnover of residential care administrators in the US is estimated at 44% (Anderson *et al.*, 2004, p. 378).

Although turnover rates have been widely used to measure workforce stability, Barry *et al.* (2005) suggest “interpreting turnover rates in the absence of staff retention measures may be incomplete” (p. 312). For example, a facility that experiences high staff turnover may also maintain a stable core of experienced staff. It is possible that this facility’s turnover rate is measuring turnover within relatively few positions or full-time equivalents, which can be suggestive of successfully “weeding out” inappropriate hires (p. 312). The research discussed below (Castle, 2001; Horn *et al.*, 2005; Zimmerman *et al.*, 2002) examines the specific effects of staffing turnover without discussion of retention; hence this research should be considered with this limitation in mind. Two of the studies reviewed include measures of both turnover and retention (Barry *et al.*, 2005; Kramer & Fish, 2001).

↑ Administrator turnover associated with:

- ↑ incidence of pressure ulcers
- ↑ use of restraints
- ↑ use of psychoactive drugs
- ↑ incidence of catheterization

In a study of 420 residential care facilities in 5 US states, increased administrator turnover⁶² was associated with higher than average use of restraints, psychoactive drugs, catheterization, prevalence of pressure ulcers, and number of care deficiencies (Castle, 2001).

Chain residential care facilities (i.e. for-profit corporate residential care organizations) with higher administrator turnover had significantly higher psychoactive drug use and quality of care deficiencies and higher than average catheterization⁶³. In residential care facilities not belonging to chains, a 10% increase in turnover of administrators was found to be associated with a 7% increase in the odds a facility would have a higher than average proportion of residents who were given psychoactive drugs⁶⁴, a 7% increase in residents who were restrained⁶⁵, and a 5% increase in residents with pressure ulcers⁶⁶.

⁶² Administrator annual average turnover = 43% (Castle, 2001)

⁶³ A 10% increase in administrator turnover in chain nursing homes was associated with a 9% increase in the odds that a facility would have a higher than average drug use compared with lower than average ($P<.001$), a 5% increase in residents with pressure ulcers ($P<.05$), a 7% increase in residents who were catheterized ($P<.01$), and a 4% increase in quality of care deficiencies ($P<.001$). (Castle, 2001)

⁶⁴ $p<.001$

⁶⁵ $p<.01$

⁶⁶ $p<.001$

In a similar study (also discussed above), Anderson et al. (2003) found that Director of Nurses' (DONs) length of tenure in their current position was positively related to lower use of restraints⁶⁷ and DONs' increased years of experience was related to a lower prevalence of immobility complications⁶⁸ and restraint use⁶⁹.

In their longitudinal study of residential care facility risk factors for infection and hospitalization, Zimmerman et al. (2002) found that high rates of incidents of infection and hospitalization for infection were associated with RN turnover. "With each proportional loss of an RN (per FTE/100 beds) the risk of infection increases almost 30% and the risk of hospitalization increases more than 80%" (p. 1993)⁷⁰.

↑ RN turnover associated with:
↑ rates of infection
↑ hospitalization for infection

Castle and Engberg (2005) researched the impact of nurse and personal care staff turnover on quality of care in 354 residential care facilities in 4 US states and found that decreases in quality were associated with increases from low to moderate levels of RN turnover and with moderate to high levels of turnover for LPNs and care aides⁷¹. The quality of care measures that were affected by increases in staff turnover were restraint use, catheterization use, contracture prevalence, pressure ulcer prevalence and treatment with psychoactive drugs.⁷²

Horn et al. (2004) identified resident, treatment and facility characteristics associated with pressure ulcer development in 1,524 long-term care residents living in 95 facilities who were participating in the National U.S. Pressure Ulcer Long-Term Care Study. Seventy-one percent of the residents did not develop a pressure ulcer during the 12-week study while the remaining 29% developed a new pressure ulcer. LPN turnover of less than 25% was associated with less likelihood of developing a pressure ulcer⁷³.

Barry et al.'s (2005) study measured the impact of care aide turnover on quality of care. Median values for turnover (28%) and for retention (52%) were used to categorize the stability of a facilities care aide staff. Barry et al. found that facilities experiencing low turnover (measured by number of care aide resignations or terminations relative to the number of care aides employed over the previous 6 months) and high retention (measured by proportion of care aides with 2 or more years' tenure) were associated with lower pressure ulcer incidence⁷⁴.

⁶⁷ Beta = -.189, $p < .05$

⁶⁸ Beta = -.261, $p < .01$

⁶⁹ Beta = -.184, $p < .05$

⁷⁰ infection rate = 1.29, $p < .05$; hospitalization for infection rate = 1.83, $p < .05$

⁷¹ Low level turnover rates were defined as turnover rates between 0 and 20%; moderate levels of turnover were defined as between 21% and 50%; high levels of turnover were greater than 50% (Castle & Engberg, 2005)

⁷² The average 1-year turnover rates identified in Castle and Engberg's (2005) study were 85.8% for care aides and LPNs, and 55.4% for RNs.

⁷³ $p < .001$; 855 residents had less than 25% LPN turnover and a 24.7% incidence rate of PU while the remaining 669 had LPN turnover greater than 25% and incidence rate of 34.7% (Horn *et al.*, 2004, p. 364)

⁷⁴ Beta = -0.229, $p < 0.1$

CA retention <40% associated with: ↓ functional improvements ↑ incidence of pressure ulcers	In their study, Kramer and Fish (2001) found that the threshold for care aide retention below which facilities were at an increased risk of being in the worst 10% of residential care facilities and above which there were no additional improvements in quality was 40% for functional improvement ⁷⁵ ; 41% for incidence of pressure ulcers ⁷⁶ , and 37% for improvements in residents resisting care ⁷⁷ .
CA turnover >46% associated with: ↑ incidence of pressure ulcers	

In other words, if less than 40% to 41% of care aides were still employed by a long-stay residential care facility over the period of a year, the residential care facility was at an increased risk for being in the worst 10% of all residential care facilities with regards to incidence of pressure ulcers and functional improvements among residents (respectively).

Kramer and Fish (2001) also found that care aide turnover thresholds above which facilities were at an increased likelihood of being in the worst 10% and below which there were no additional improvements in quality in long-stay residential care facilities was 46%⁷⁸. In other words, if the turnover rate of care aides over the period of a year was greater than 46%, the residential care facility was at an increased risk for being in the worst 10% of all long-stay residential care facilities with regards to incidence of pressure ulcers.

(3) The Impact of Managerial and Organizational Factors on Nurse and Personal Care Staffing Retention and Turnover

The above research demonstrates the relationship between nursing and personal care staff retention and turnover on resident quality of care. However, before the effects of turnover can be resolved, the factors impacting turnover need to be understood. The findings discussed in this section reinforce the argument that organizational and managerial effectiveness matters. First, factors demonstrated to impact turnover, including but not limited to organizational change and climate, management communication openness, and inclusion of nursing and personal care staff in decision making and care planning will be explored. Then, the impact of organizational staffing resources (i.e. hours of nursing, personal care and Directors of Nursing staff) on staff turnover will be reviewed. The last section of this report will examine organizational management factors and job satisfaction, which can also be argued to be associated with turnover and retention.

Managerial Factors Impacting Staff Turnover

In their study of the dynamics of climate and communication on reducing turnover in 164 Texas residential care facilities, Anderson et al. (2004) identified that the mean annual turnover rate for

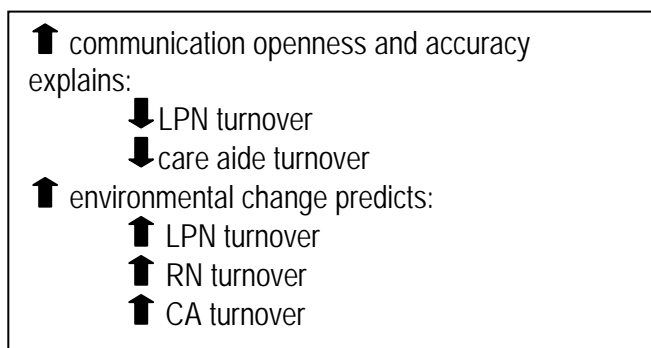
⁷⁵ functional improvement odds ratio = 2.72, $p < 0.05$

⁷⁶ pressure ulcers odds ratio = 2.54, $p < 0.05$

⁷⁷ improvements in residents resisting care odds ratio = 2.48, $p < 0.05$

⁷⁸ incidence of pressure ulcers adjusted odds ratio = 1.61, $p < 0.05$

RNs was 16.53, for LPNs was 13.88 and for care aides was 70.51. Anderson et al. found that climate and communication both affected turnover and that lower turnover was dependent on the interaction between climate and communication. Relative to residential care facilities with an ambiguous climate, in residential care facilities with reward-based administrative climates (i.e. merit-based rewards, clear goals, emphasis on employee welfare and relationships), higher levels of communication openness, (where one can speak directly without fear of repercussions), and greater accuracy of communication explained lower turnover of LPNs and care aides. Contrary to their hypothesis, CA turnover was found to be higher in homes where staff perceived a reward vs. ambiguous climate – the researchers hypothesized that this may have been due to the fact that the reward climate is linked to authoritarian management styles.



Greater perceived environmental changes predicted higher RN, LPN and care aide turnover. Anderson et al. (2004) argue that although managers cannot control environmental change, they can encourage staff to discuss and interpret environmental changes positively.

Controlling for resident case mix, job design and organizational characteristics, Banaszak-Holl and Hines (1996) studied care aide turnover in a sample of 250 residential care facilities from 10 states and found that aide turnover was significantly reduced by involvement in interdisciplinary care plan meetings. On average, the care aide turnover rate was 32% for the 6-month period studied. Care aides were likely to informally contribute suggestions and advice to care planning in most homes; however care aides only attended care planning meetings in 36% of the residential care facilities.

In homes in which care aides' suggestions were accepted by nursing staff, or even care plans were discussed with CAs, aides had turnover rates that were one-third lower than homes in which aides had no involvement in care planning. Furthermore, turnover rates were 50% lower in residential care facilities in which care aides were involved in care planning meetings⁷⁹. Overall, Banaszak-Holl and Hines' model of turnover explained 21% of the variance in turnover rates.

Care aide turnover 50% lower in residential care facilities where CAs are involved in resident care planning meetings

⁷⁹ p<.05

Banaszak-Holl and Hines' (1996) findings are strengthened by the use of primary data (interviews) and by controlling for resident functioning, job design and organizational characteristics and by including an analysis of the workforce stability.

Organizational Factors Impacting Staff Turnover

In this section, research demonstrating the impact of organizational factors, such as the tenure of nursing administrators and overall nurse staffing resources to residential care workforce stability will be reviewed (Anderson *et al.*, 2004; Bowers *et al.*, 2000; Castle, 2005; Harrington & Swan, 2003).

In their study of 3,449 nursing staff in 164 Texas residential care facilities, (also discussed above), Anderson *et al.* (2004) found that adequate staffing and longer tenure of the nursing director were strong predictors of lower turnover among RNs ($p < .01$) and a weak predictor of lower turnover among LPNs ($p < .1$). Anderson *et al.* (2004) suggest "it is possible that with longer tenure in the job, a DON is better able to connect with staff, to foster job commitment, and to learn more about the organization and its nurses for more effective management" (p. 386). Greater LPN hours per resident day (hprd) was significantly related to lower RN ($p < .001$) and LPN ($p < .05$) turnover. Greater availability of clinical resources (RNs) was also related to lower LPN turnover ($p < .1$). Allocation of care aide resources did not relate to RN turnover. However, greater care aide hprd was significantly related to lower care aide turnover ($p < .01$).

In Bower's (2000) study exploring the views of 38 care aides from 6 U.S. Northwest residential care facilities (also discussed in the first half of this report), the inability to provide quality care (due to lack of time) was a primary reason CAs gave for leaving their jobs. The study is limited by its small sample size (38 care aides from 6 residential care facilities in 3 Midwestern US cities), but is strengthened by its use of primary data collected from both interviews and observations and its longitudinal design (information was collected over 2 years).

In another study examining the relationship between hours of staffing and staff turnover, Harrington and Swan (2003) found that total nurse and personal care staff (including DONs, RNs, LPNs, and CAs) turnover rates were a significant⁸⁰ negative predictor of total nurse staffing hprd⁸¹. That is, high turnover rates were found in facilities with lower total and RN staffing levels. Similarly, RN turnover rates were a significant⁸² negative predictor of RN staffing and higher RN hours predicted lower RN turnover rates⁸³. Harrington and Swan suggest that higher staffing hours reduce turnover because higher hours reduce nursing workload.

⁸⁰ $p = 0.01$

⁸¹ Harrington and Swan (2003) found that in 1,155 freestanding residential care facilities in 1999 total average nursing staff hours in California per resident day was 3.2 hprd and RN hprd was 0.34.

⁸² $p = 0.01$

⁸³ $p = 0.01$

(4) Organizational and Managerial Factors and Job Satisfaction

Organizational and managerial features of residential care facilities can affect how nurses view their quality of work life and their job satisfaction. Job satisfaction is in turn an important factor in retaining and recruiting quality nursing staff. The research discussed below illustrates the association between such factors as respectful open communication, decision making latitude and autonomy, and supportive behaviours by managers and job satisfaction.

In their study on how to enhance the quality of supportive supervisory behaviour, Hall et al. (2005) conducted focus groups with 30 supervisors and 26 supervised staff from 12 Ontario residential care facilities. Analysis of responses from the focus groups identified two key themes: “supportive behaviours currently used by managers in long-term care settings” and “factors contributing to supportive behaviours of supervisors” (p. 183).

- ↑ quality of supportive supervisory behaviour related to:
 - ↑ considerate listening
 - ↑ praise, recognition and positive reinforcement
 - ↑ respect and trust
 - ↑ sharing of information
 - ↑ staff autonomy and control
 - ↑ knowledgeable supervisor

A key factor that enhanced supervisors' ability to support workers was communication, feedback and sharing of information. An effective supportive supervisor was also one who was seen to be knowledgeable by the staff.

Staff also liked to have some control and autonomy over their unit. Managers also identified that their ability to provide support to staff was enhanced by an individual “approach and personality.” (p. 186). The researchers argue that many of the behaviours identified can be linked to transformational leadership, which is identified by the attributes of charisma, individual consideration and intellectual stimulation. Although this study is limited by the small sample size, it nonetheless provides a Canadian perspective for further study of practices of supervisors in residential care.

In their study, McGilton and Pringle (1999) examined clinical control and its relationship to job satisfaction by surveying a sample of 113 RNs who worked in two Ontario residential care units: one of a community hospital and the other of a teaching hospital. The researchers found that RNs would prefer more control over organizational and clinical domains of their work. They found that there was a positive relationship between perceived organizational control and job satisfaction (RNs who perceived they had organizational control were more satisfied) and a negative relationship between preferred clinical control and job satisfaction (71% of RNs said they would prefer more clinical decision-making control).

- ↑ RN job satisfaction related to:
 - ↑ clinical decision making and work control
- ↑ CA job satisfaction related to:
 - ↑ personal growth and development
 - ↑ job security
 - ↑ job challenge
 - ↑ respect and fair treatment

In their study of low and high staff injury rates in residential care facilities, Yassi et al. (2003) found that organizational and managerial factors were related to staff injury rates. As well as being a recent British Columbian study of nurse staffing, Yassi et al.'s (2003) research is strengthened by the use of primary data, including interviews with managers (administrators, DONs), RNs and care staff, ergonomic measurements and Functional Independence Measurements (FIM) of each resident collected for the purpose of the study.

Yassi et al. found that facilities with lower injury rates had more visible and consistent practices around information sharing, problem solving, policy dissemination and monitoring, and follow-up concerns. In contrast to high injury rate facilities (HIRFs), workers in lower injury rate facilities (LIRFs) reported more supportive and trusting relationships between managers and front-line staff.

- ↓ injury rates related to:
- ↑ visible and consistent information sharing
 - ↑ problem solving and follow-up of concerns
 - ↑ policy dissemination and monitoring
 - ↑ care aide involvement in care planning
 - ↑ supportive, trusting management-staff relationships

Front-line staff in LIRFs were more involved in care planning and reported more positive views of the philosophy of care, the overall quality and fairness of service to residents, and their own effectiveness and flexibility as care providers.

Perceived quality of care was strongly correlated with burnout, health and satisfaction (Yassi *et al.*, 2003). Resident-to care aide/LPN ratios differed substantially between high and low injury-rated facilities. High injury rate facilities averaged 16:1 residents to LPN/CA staff compared with 12:1 residents to LPN/CA staff at lower injury rate facilities (average day shift across all units).

Trinkoff et al. (2005) similarly found that total nursing hours per resident day were significantly associated with worker injury rates in residential care facilities after they adjusted for acuity, profit status, aide training, total residents and U.S. state⁸⁴. Each additional hour of nursing care decreased the injury rate by nearly 16%. In other words, for each additional hour increase in nursing care, injuries were predicted to decrease by 2.4 per 100 FTEs.

In another Canadian study, Krueger et al. (2002) surveyed 4,486 Ontario health care workers⁸⁵ regarding their views about quality of work life. Two of the six sites included residential care workers and the predictors of job satisfaction varied by site. At the combined residential care /community hospital site (124/186 beds respectively), the most important predictors of job satisfaction were: good open communication between

- ↑ Residential care worker job satisfaction related to:
- ↑ open communication
 - ↑ belief the organization carries out its mission stmt
 - ↑ good supervisor social support
 - ↑ organization keeps staff informed
 - ↑ good decision latitude and authority
 - ↑ enough time to get the job done

⁸⁴ Beta = -2.39, P =0.0004

⁸⁵ Included all non-physician staff, therefore included other staff than nursing.

staff; good decision authority; good supervisor social support; that the organization keeps staff informed; and staff being satisfied with their pay level .

At the other residential care site (389 beds), the most important predictors of job satisfaction were: belief the organization carries out its mission statement, good supervisor social, good decision latitude, often or always given enough time to get the job done and spending 38 hours or more on the job or job related activities. Krueger et al.'s (2002) survey tool was strengthened with extensive consultation, review of the literature and pre-testing.

In a study of job satisfaction perceptions of 254 certified care aides and 29 non-certified care aides working in 24 Illinois and Indiana residential care facilities, Atchison (1998) found that personal growth and development, job security and job challenge were significantly related to job satisfaction. Although not significant at the 0.05 level, Atchison also found that 63.6% of the respondents perceived fair treatment and respect to be important to their job satisfaction.

In a state-wide survey of care aides working in residential care facilities in Louisiana, Parsons et al. (2003) found that of the 550 care aides participating in their survey, 60% were satisfied with their jobs and 30% planned to quit. The care aide's relationship with the resident was the most important work issue and their major reason for staying in the job. Care aides were most dissatisfied with pay, benefits, and recognition and appreciation of their work. Although the care aides were dissatisfied with benefits and salary, these work issues could not explain overall satisfaction or turnover. The multivariate analysis confirmed that professional growth, involvement in work-related decisions, supportive, fair supervision, and management keeping employees informed were significantly related to both turnover and overall satisfaction.

Parsons et al.'s (2003) study is strengthened by the survey tool, which was developed after a review of the literature and was constructed and revised after field testing. In addition, the researchers drew random samples from day, evening and night shifts so that all shifts were well represented.

Summary

In this section, research has demonstrated the influence of organizational and managerial factors on quality of care and staffing. First the research shows that there are key managerial factors associated with residents' quality of care outcomes. Incidences of aggressive behaviour, restraint use, immobility complications, and incidences of pressure ulcers have been found to be associated with the following managerial and organizational factors:

- Managerial Factors
 - Open communication
 - Opportunities for input and participation in care decisions
 - Relationship oriented leadership
 - Clearly defined work processes

Report on Residential Care Nurse and Patient Care Staffing and Quality of Care

- Fair supervision
 - Opportunities for training and career mobility for care aides
- Organizational Factors
 - Use of full time versus part time and contract staff
 - Director of Nurses' tenure and experience
 - RN, LPN and Care Aide turnover and retention

Because turnover and retention of nursing staff have been found to be associated with quality of care, this review included an examination of the organizational and managerial factors impacting turnover and job satisfaction, which not surprisingly, were similar to those listed above and as well included:

- Clear organizational goals
- Emphasis on employee welfare and relationships
- Involvement in care planning decisions
- Supportive management and staff relationships
- Considerate listening
- Respect and trust
- Opportunities for personal growth and development

In summary, the research reviewed in this section demonstrates that there is a relationship between managerial and organizational factors and quality of care, staffing and job satisfaction in residential care. Recommendations on how this information may support quality of care and staffing in British Columbian residential care facilities will be discussed in the next section.

Discussion

The research clearly establishes that there is a relationship between overall staffing levels and quality of residential care measured in terms of a number of different care-related indicators. It also suggests that each member of the patient care team (e.g. RN, LPN, CA) contributes to the quality of care, in both different and in some cases, similar ways. Additionally, the research indicates that minimum levels of staffing are required to avoid some adverse outcomes. In turn, the research demonstrates that organizational structure and managerial practices are associated with job satisfaction, staffing turnover and retention and quality of care. Several findings are discussed in this report that are worthy of further research and consideration by stakeholders involved in the provision of residential care.

The Advisory Committee and Next Steps

An advisory committee consisting of union, clinical, and health authority representatives has expertly guided and supported this project (see *Acknowledgements* on page 2). The advisory committee collaboratively established the criteria and scope of the literature review, reviewed and edited the report and provided suggestions for further discussion and research.

To continue the discussions initiated in this report and to further develop the policy analysis that emerges from it, this report will be forwarded to both the Nursing Directorate and to the new multi-stakeholder provincial Residential Care Policy Committee. As part of these processes consultations will be conducted with additional stakeholders; such as residential care affiliate employers, the Ministry of Health and the Medical Health Officers responsible for residential care licensing.

Suggestions for Further Discussion and Research

1. Quality of Care

Discussion and review of what clinical practices, skill mixes, staffing, training and education contribute to and promote best practices and the collection of meaningful measurements of care and staffing standards that will result in better outcomes for residents and consistency of client care.

Review, refine and/or develop quality indicators for residents including physical health and well-being indicators as well as quality of life indicators (i.e. indicators that measure social and spiritual aspects of care and that promote resident dignity and respect).

Discussion and review of the communication pathways and processes needed to coordinate the groups that collect and utilize indicators to promote standardized measurements of quality of care as well as standardized methodology for collecting and analyzing indicators.

Discussion of clinical research activities that may be undertaken to inform best practices and staffing policies, including but not limited to, research on quality measurements, work loads, and cost-analysis of staffing levels required for optimal care.

2. Staffing and Managerial Factors

Development of residential care leadership that has a working knowledge of gerontology, is well versed in licensing and health care policies and demonstrates positive relationship and team building skills.

Development of clinical team leaders who have knowledge and experience working with older persons and people with disabilities (and where appropriate have certification in Gerontology) and who demonstrate leadership skills.

Development of positive, respectful, effective resident care teams that include RNs/RPNs and LPN's in leadership roles and that recognize the central role played by Care Aides in the provision of direct resident care.

Support for and development of managerial practices that promote the meaningful inclusion of members of the patient care and nursing team in the planning and delivery of care.

Discussion of support required for development of a learning environment and for the provision of accessible continuing education programs for all categories of staff.

Development of team environments that encourage support and debriefing following episodes of agitation and excessive behaviours.

3. Organizational Factors

Discussion of the support needed to promote a residential care environment that is elder friendly and supports safe work places.

Discussion of appropriate staffing and other resources (e.g. lifts, bladder scanners, blanket warmers, etc.) needed to maintain best practices.

Discussion and review of the provision of allied health professionals and support services sufficient to provide physical activities as well as social engagement opportunities to make life meaningful.

Discussion of the support needed to ensure that documentation occurs to advance consistent care that is individualized to the client.

Appendix 1. Terms and Definitions

Area Resource File (ARF): National, secondary data source. The US maintains a count-specific data base on health resources information. The ARF data base contains a synthesis of secondary data from over 50 different primary source files and is maintained by Quality Resource Systems under contract by the National Center for Health Workforce Analysis (NCHWA), and the Bureau of Health Professions within the Health Resources and Services Administration. The data base contains more than 7,000 variables, including but not limited to information on health facilities, health professions, health status, socio-economic and environmental characteristics, for all 3,142 counties in the US (Center for the Study of Healthcare Management, 2004).

Activities of Daily Living: Activities of daily living, or “ADLs” refer to residents’ functioning abilities with regards to transferring (i.e. bed to chair, chair to toilet), locomotion (i.e. walking), dressing, eating, toilet use, and bathing.

Care Aides/Certified Nursing Assistant: In British Columbia, care aides must be certified and have completed a six to eight month care aide program. In the United States, “the Nursing Home Reform Act (NHRA), as part of the Omnibus budget Reconciliation Act of 1987, mandated that nurse aides must complete 75 hours of training and pass a competency exam” (Castle and Banaszak-Holl, 2003, p. 419).

Physical Restraints: Process quality of care indicator. Physical restraint use may be defined “as any chest/vest, wrist, mitt, belt, crotch, suit, or harness restraint plus any sheet used as a restraint or a geriatric chair with fixed tray table” (Sullivan-Marx *et al.*, 1999, p. 344). Physical restraints are “an important quality indicator because they are associated with an increased risk of morbidity and mortality in nursing home residents (Phillips *et al.*, 1993)” (Castle, 2003, p. 486).

Catheters: Process quality of care indicator. Refers to rate of use of indwelling urethral catheters for nursing home residents with continence problems. In 2003, the prevalence rate of indwelling catheters use in US nursing homes ranged from 1% to 32% (Castle & Engberg, 2005). An increased risk for functional decline is associated with high use of urethral catheters (Castle & Engberg).

Contractures: Outcome quality of care indicator. “Contractures are an abnormal shortening and stiffening of muscle tissue that can decrease the range of motion at a joint...Contractures are frequently used as proxy measures of care quality as they are effectively postponed and corrected by exercise programs, massage, and physical therapy (Granger, Seltzer, & Fishbein, 1987)” (Castle, 2003, p. 486).

Psychoactive Medications: Process quality of care indicator. “Psychoactive drugs are defined as medications ‘that affect psychic function, behaviour, or experience’ (Harrington, Tompkins, Curtis & Grant, 1992, p. 823)...The general concern with these psychoactive drugs is that the rates of use may be excessive or clinically unjustified” (Castle, 2003, p. 486).

Federal Audit Deficiencies: Process and outcome quality of care indicators. US federal deficiency audits measure 179 specific standards for care in 17 major categories (Harrington *et al.*, 2000b). Castle and Banaszak-Holl (2003) explain that “the Health Care Financing Administration (HCFA) is responsible for ensuring that nursing homes meet quality standards. State and federal surveyors conduct inspections every 9 to 15 months. When a facility does not meet a standard (or code), a deficiency citation is issued, particularly when this results in poor quality care” (Castle & Banaszak-Holl, 2003, p. 409). Two limitations of this quality of care measure are that staffing levels may impact the number of citations given and that the number of citations given varies from state to state (Castle & Banaszak-Holl, 2003)

Full Time Equivalent (FTE): Many of the US studies use national data provided by the On-line Survey Certification and Recording System (OSCAR). According to this database, one FTE represents a 35-hour per week position.

Hospitalizations: Outcome quality indicator. “The ability of nursing homes to manage the increasing clinical complexity of the residents that they serve and to prevent the acute flare-ups of chronic conditions that trigger hospitalizations is integral to providing quality care...Hospitalized nursing home residents often develop nosocomial diseases. The elderly are also prone to relocation stress, which may adversely affect their health. Tremendous financial savings could result from only a small reduction in the hospitalization of nursing home residents” (Intrator *et al.*, 1999, p. 229). But, for hospitalization to be used as a quality indicator, only potentially avoidable hospitalizations (such as CHF, electrolyte imbalance, respiratory infections, UTI, sepsis) can reflect quality of care (Kramer *et al.*, 2000).

Mortality: Outcome quality indicator. Death or mortality rates are sometimes used as an indicator of quality of care. The limitation of this indicator is that death “is often an expected outcome for nursing home residents. ...[and] it is not always known whether the death was for reasons of poor care or because of clinical conditions that were not amenable to treatment” (Anderson *et al.*, 1998, p. 298).

National Data: Data sources are categorized as “national”, that is derived from a national data source (e.g. see OSCAR and MDS explanations in this section), or “state/provincial”, that is derived from a state or provincial data source. In addition, data can be “facility” based (e.g. residents charts, facility payroll records). These descriptions of the data sources are used to provide the reader with increased details on the types of data used in the research studies so that the reader may judge the validity and reliability of the data used.

OSCAR: The U.S. Health Care Financing Administration’s On-line Survey Certification and Reporting System (OSCAR) data base is composed of information collected by state licensure and certification agencies as part of the Medicare and/or Medicaid certification process. This data base includes most nursing home facilities in the US (Castle & Engberg, 2005). The OSCAR data are based on information of staffing levels in the past 2 weeks that is self-reported by facilities on an annual basis. OSCAR staffing measures are not audited, and there is currently no mechanism to ensure the accuracy of the data. Frequently used for staffing data, White found

that the correlation between staffing figures from OSCAR and payroll data was relatively low (Pearson coefficient was 0.43, and the Spearman (rank) correlation was 0.52) (White, 2000, p. 37). The OSCAR data has been found to be particularly inaccurate with respect to reported care aide staffing (Pearson coefficient was 0.36 and the Spearman correlation was 0.46).

However, with the application of a series of decision rules (based on those developed by Charlene Harrington, 1996, 1998), the reliability and validity of the OSCAR data improves from .33 to a Pearson Correlation of .85 with Medicaid Cost Reports and from .43 to .54 with payroll data (p. 7-35, 7-36). The decision rules used by Abt (White, 2000) are:

Logical Decision Rules:

1. Exclude facilities that report more residents than beds (p. 7-28)
2. Exclude facilities that have more than 60 residents and no RN hours (p. 7-28)
3. Exclude facilities that report more than 12 hours per resident day (p. 7-29)
4. Exclude facilities that report fewer than 0.5 hours per resident day (p. 7-29)

Longitudinal-Based Decision Rules:

1. Exclude all facilities that had a change in total residents of 25 or more unless the facility reported a corresponding change in beds (p. 7-32)
2. Exclude facilities in the top 10% in terms of change in total hours per resident day across time periods (p. 7-33)

Medicaid Cost Reports: In the U.S., facilities must report their costs annually to their state reimbursement agency. States may penalize facilities that misreport data and cost reports are desk audited. Consequently, “Medicaid cost report data are considered quite accurate, certainly more accurate than OSCAR” (White, 2000, p. 11).

Minimum Data Set (MDS): The MDS is a national American database based on the collection of data on every nursing home resident at least every 90 days. “The Long Term Care Minimum Data Set (MDS) was developed in response to the OBRA 1987 legislation mandating the development of a national resident assessment system for nursing homes (Morris et al., 1990; U.S. Department of Health and Human Services, 1989)” (Dyck, 2004, p. 53).

Pressure Ulcers: Outcome quality of care indicator; also called decubitus ulcers. “A pressure ulcer is a sore that develops as a result of ischemia (insufficient oxygen) in the skin tissue. Most often this is the result of prolonged pressure on one area of the body” (Castle & Engberg, 2005, p. 618). Pressure ulcer rates are preventable in many cases, for example, by frequently changing residents’ positions in their bed and/or chairs, and their prevalence is an indicator of poor care practice (Horn *et al.*, 2005).

Social Engagement: Outcome quality of life indicator. In one study, engagement included “any verbal interaction with residential care facility staff or other persons, presence in any group activity, or presence of residential care facility staff providing feeding assistance with associated interaction” (Bates-Jensen *et al.*, 2004, p. 933).

Time in Bed: Outcome quality of care indicator. “Excessive time in bed has been associated with detrimental outcomes, including pressure ulcer development, pneumonia, under nutrition, urinary incontinence, infections and mortality” (Bates-Jensen *et al.*, 2004, p. 931).

Turnover Rates: Turnover rates are usually computed by dividing the number of a nursing home’s new hires in a defined period (usually one year) by the facilities average number of positions during that time period. (Feuerberg & White, 2001)

Retention Rates: “Sometimes referred to as stability or continuity rates, [retention rates] are usually expressed as a percentage and calculated by dividing the number of employees who have been employed by the organization for some period of time (usually one year) dividing by the number of employees at the beginning” (Feuerberg & White, 2001, p. 4).

USBLS (United States Bureau of Labor Statistics): Source of U.S. statistical data such as nursing wages (Hendrix & Foreman, 2001).

Appendix II. Research and Publications Reviewed and Not Included

- Aigner M.J., Drew S. & Phipps J. (2004): A Comparative Study of Nursing Home Resident Outcomes Between Care Provided by Nurse Practitioners/Physicians versus Physicians Only. *Journal of the American Medical Directors Association* **5**, 16-23.
- Aiken L.H., Clarke S.P., Sloane D.M., Sochalski J. & Silber J.H. (2002): Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *Journal of the American Medical Association* **288**, 1987-1993.
- Akinci F. & Krolkowski D. (2005): Nurse staffing levels and quality of care in Northeastern Pennsylvania nursing homes. *Applied Nursing Research* **18**, 130-137.
- Anderson R.A., Ammarell N., Bailey D., Colon-Emeric C., Corazzini K.N., Lekan-Rutledge D., Piven M.L. & Utley-Smith Q. (2005): The Power of Relationship for High-quality Long-term Care. *Journal of Nursing Care Quality* **20**, 103-106.
- Arling G., Kane R.L., Lewis T. & Mueller C. (2005): Future Development of Nursing Home Quality Indicators. *Gerontologist* **45**, 147-156.
- Arling G., Karon S., Sainfort F., Zimmerman D. & Ross R. (1997): Risk adjustment of nursing home quality indicators. *Gerontologist* **37**, 757-766.
- Atencio B.L., Cohen J. & Gorenberg B. (2003): Nurse Retention: Is It Worth It? *Nursing Economics* **21**, 262-269.
- Aud M.A., Rantz M.J., Zwygart-Stauffacher M. & Manion P. (2004): Developing a Residential Care Facility Version of the Observable Indicators of Nursing Home Care Quality Instrument. [Article]. *Journal of Nursing Care Quality* **19**, 48-57.
- Banaszak-Holl J., Berta W., Baum J.A.C. & Mitchell W. (2002a) Comparing service and quality among chain and independent U.S. nursing homes during the 1990's.
- Banaszak-Holl J., Berta W., Bowman D.M., Baum J.A.C. & Mitchell W. (2002b): The rise of human service chains: antecedents to acquisitions and their effects on the quality of care in US nursing homes. *Managerial and Decision Economics* **23**, 261-282.
- Baum J.A.C. (1999): The rise of chain nursing homes in Canada, 1971-1996. *Social Forces* **78**, 543-584.
- Berg K., Mor V., Morris J., Murphy K.M., Moore T. & Harris Y. (2002): Identification and evaluation of existing nursing homes quality indicators. *Health Care Financing Review* **23**, 19-36.
- Berta W., Laporte A. & Valdmanis V. (2005): Observations on institutional long-term care in Ontario: 1996-2002. *Canadian Journal on Aging/La Revue canadienne du vieillissement* **24**, 71-84.
- Binstock R.H. & Spector W.D. (1997): Five priority areas for research on long-term care. *Health Services Research* **32**, 715-730.
- Black K., Ormond B. & Tilly J. (2003) State-Initiated Nursing Home Nurse Staffing Ratios: Annotated Review of the Literature. U.S. Department of Health and Human Services (HHS), Office of Disability, Aging and Long-Term Care Policy (DALTCP) and the Urban Institute.

- Blair C.E. & Glaister J.A. (2005): Making the Most of Nursing Homes' Number One Resource. *Health Care Management Review* **30**, 110-115.
- Blegen M.A., Goode C.J. & Reed L. (1998): Nurse Staffing and Patient Outcomes. *Nursing Research* **47**, 43-50.
- Blegen M.A. & Vaughn T. (1998): A multisite study of nurse staffing and patient occurrences. *Nursing Economics* **16**, 196-203.
- Bostick J.E. (2004): Relationship of Nursing Personnel and Nursing Home Care Quality. [Article]. *Journal of Nursing Care Quality* **19**, 130-136.
- Burger S., Kayser-Jones J. & Prince Bell J. (2000) Malnutrition and dehydration in nursing homes: Key issues in prevention and treatment. National Citizens' Coalition for Nursing Home Reform.
- Burgio L.D., Fisher S.E., Fairchild J.K., Scilley K. & Hardin J.M. (2004): Quality of Care in the Nursing Home: Effects of Staff Assignment and Work Shift. *Gerontologist* **44**, 368-377.
- Canadian Nurses Association (2003) Staffing decisions for the delivery of safe nursing care [position statement]. Canadian Nurses Association.
- Canadian Nurses Association (2005a) Evaluation framework to determine the impact of nursing staff mix decisions. Canadian Nurses Association.
- Canadian Nurses Association (2005b) Nursing staff mix: A literature review. Canadian Nurses Association, Ottawa, pp. 20.
- Canadian Nurses Association & University of Toronto Faculty of Nursing (2004) Nurse and patient safety: A discussion paper. Canadian Nurses Association.
- Canadian Nursing Advisory Committee (2002) Our health, our future: Creating quality workplaces for Canadian nurses. Health Canada.
- Carter M.W. & Porell F.W. (2003): Variations in Hospitalization Rates Among Nursing Home Residents: The Role of Facility and Market Attributes. *Gerontologist* **43**, 175-191.
- Castle N. & Fogel B. (1998): Characteristics of nursing homes that are restraint free. *Gerontologist* **38**, 181-188.
- Castle N.G. (2000): Differences in Nursing Homes With Increasing and Decreasing Use of Physical Restraints. *Medical Care* **38**, 1154-1163.
- Castle N.G. & Lowe T.J. (2005): Report Cards and Nursing Homes. *Gerontologist* **45**, 48-67.
- Center for the Study of Healthcare Management (2004) Summary of Selected Healthcare Industry Data Sets. University of Minnesota.
- Cho S.-H., Ketefian S., Barkauskas V.H. & Smith D.G. (2003): The Effects of Nurse Staffing on Adverse Events, Morbidity, Mortality, and Medical Costs. *Nursing Research* **52**, 71-79.
- Chou S.C., Boldy D.P. & Lee A.H. (2002): Staff satisfaction and its components in residential aged care. *International Journal for Quality in Health Care* **14**, 207-17.
- Chouinard J. (1999): "Mine own countree": quality of care in nursing homes. *CMAJ* **160**, 1463-1464.
- Christine L. & Barrett E. (2004) Nursing worklife satisfaction - 2004: Annotated reference list update. Calgary Health Region.
- Cohen J.W. & Spector W.D. (1996): The effect of Medicaid reimbursement on quality of care in nursing homes. *Journal of Health Economics* **15**, 23-48.
- Committee on the Adequacy of Nurse Staffing in Hospitals and Nursing Homes Division of Health Care Services Institute of Medicine (1996) *Nursing Staff in Hospitals and Nursing Homes: Is It Adequate?* National Academy Press. Washington.

- Curtin L. (September 30, 2003) An Integrated Analysis of Nurse Staffing and Related Variables: Effects on Patient Outcomes. In *Online Journal of Issues in Nursing*.
- Curtin L. & Simpson R. (2000): Staffing and the Quality of Care. *Health Management Technology* **21**, 42-44.
- Davies S., Slack R., Laker S., Philp I. & Davies S. (1999): The educational preparation of staff in nursing homes: relationship with resident autonomy. *Journal of Advanced Nursing* **29**, 208-218.
- Decker F.H., Dollard K.J. & Kraditor K.R. (2001): Staffing of nursing services in nursing homes: Present issues and prospects for the future. *Seniors Housing & Care Journal* **9**, 3-26.
- Earthy A. (2003a) Care delivery systems. Fraser Health Authority, New Westminster, pp. 8.
- Earthy A. (2003b) Optimum Care Levels for Complex Care. Fraser Health Authority, New Westminster, pp. 25.
- Eaton S.C. (2000): Beyond 'unloving care': linking human resource management and patient care quality in nursing homes. *International Journal of Human Resource Management* **11**, 591-616.
- Eyers I. (2000): Care assistants overlooked? A cross-national study of care home staff in England and Germany. *Quality in Ageing* **1**, 15-26.
- Feuerberg M. & Joslin S. (2000) Time-motion approach to setting nurse staffing standards. In *Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes: Report to Congress, Phase I* (U.S. Department of Health and Human Services, ed.). Health Care Financing Administration, Washington, DC, pp. 13.1-13.14.
- Feuerberg M. & Reilly K. (2000) Review of selected research on nursing home staffing and resident outcomes. In *Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes: Report to Congress, Phase I* (U.S. Department of Health and Human Services, ed.), Washington, DC, pp. 6.1-6.40.
- Flesner M.K. & Rantz M.J. (2004): Mutual Empowerment and Respect: Effect on Nursing Home Quality of Care]. *Journal of Nursing Care Quality* **19**, 193-196.
- Frazier S.C. (2003): Magnet home care agencies: a professional way to impact quality and retention. *Home Healthcare Nurse* **21**, 603-10.
- Froggatt K.A. & Hoult L. (2002): Developing palliative care practice in nursing and residential care homes: The role of the clinical nurse specialist. *Journal of Clinical Nursing* **11**, 0962-1067.
- Funk L.M. (2003): Who wants to be involved? Decision-making preferences among residents of long-term care facilities. *Canadian Journal on Aging/La Revue canadienne du vieillissement* **23**, 47-58.
- Grant N.K., Reimer M. & Bannatyne J. (1996): Indicators of quality in long-term care facilities. *International Journal of Nursing Studies* **33**, 469-478.
- Gray-Siracusa K. (2005): Acuity-based staffing in long term care: does it influence quality? **140**.
- Hannan S., Norman I.J. & Redfern S.J. (2001): Care work and quality of care for older people: a review of the research literature. *Reviews in Clinical Gerontology* **11**, 189-203.
- Harrington C. (2002) Nursing Home Quality: State Agency Survey Funding and Performance. The Kaiser Commission on Medicaid and the Uninsured, Washington, DC, pp. 1-17.
- Harrington C. (2004): Saving Lives Through Quality of Care: A Blueprint for Elder Justice. *Alzheimer's Care Quarterly January/February/March* **5**, 24-38.

- Harrington C., Carillo H., Wellin V. & Shemirani B.B. (2002a) Nursing Facilities, Staffing, Residents, and Facility Deficiencies, 1995 Through 2001. Department of Social and Behavioral Sciences, University of California.
- Harrington C., Woolhandler S., Mullan J., Carrillo H. & Himmelstein D.U. (2001): Does investor ownership of nursing homes compromise the quality of care? *American Journal of Public Health* **91**, 1452-1455.
- Harrington C., Woolhandler S., Mullan J., Carrillo H. & Himmelstein D.U. (2002b): Does investor-ownership of nursing homes compromise the quality of care? *International Journal of Health Services* **32**, 315-25.
- Harrington C., Zimmerman D., Karon S.L., Robinson J. & Beutel P. (2000): Nursing home staffing and its relationship to deficiencies. *Journal of Gerontology: Social Sciences* **55**, S278-S287.
- Hayes L.J., O'Brien-Pallas L., Duffield C., Shamian J., Buchan J., Hughes F., Spence Laschinger H.K., North N. & Stone P.W. Nurse turnover: A literature review. *International Journal of Nursing Studies* **In Press, Corrected Proof**.
- Health Care Financing Administration (2000) Report to Congress: Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes. Phase I. U. S. Center for Medicare and Medicaid Services, Washington, DC.
- Health Care Financing Administration (2001) Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes. Report to Congress: Phase II Final Report. U. S. Center for Medicare and Medicaid Services, Washington, DC.
- Healy J. & Richardson S. (2003) Who cares for the elders? What we can and can't know from existing data. National Institute of Labour Studies, Flinders University, Adelaide, Australia.
- Hendrix T.J. (2000) Optimal Nursing Home Staffing. In *College of Health and Human Development*. Pennsylvania State University, pp. 92.
- Hickey E.C., Young G.J., Parker V.A., Czarnowski E.J., Saliba D. & Berlowitz D.R. (2005): The effects of changes in nursing home staffing on pressure ulcer rates. *Journal of the American Medical Directors Association* **6**, 50-53.
- Hickman D.H., Severance S., Feldstein A., Ray L., Gorman P., Schuldheis S., Hersh W.R., Krages K.P. & Helfand M. (2003) The Effect of Health Care Working Conditions on Patient Safety. Evidence Report/Technology Assessment: Number 74. Prepared by Oregon Health and Science University under Contract No. 290-97-0018 for Agency for Healthcare Research and Quality, Rockville, MD.
- Hirdes J.P. (1999): Quality control in nursing homes. *CMAJ* **161**, 127-.
- Hofmann M.T., Bankes P.F., Javed A. & Selhat M. (2003): Decreasing the Incidence of Falls in the Nursing Home in a Cost-Conscious Environment: A Pilot Study. *Journal of the American Medical Directors Association* **4**, 95-97.
- Hollinger-Smith L. & Ortigara A. (2004): Changing Culture: Creating a Long-Term Impact for a Quality Long-Term Workforce. *Alzheimer's Care Quarterly* **5**, 60-70.
- Horn S.D., Bender S.A., Bergstrom N., Cook A.S., Ferguson M.L., Rimmasch H.L., Sharkey S.S., Smout R.J., Taler G.A. & Voss A.C. (2002): Description of the National Pressure Ulcer Long-Term Care Study. *Journal of the American Geriatrics Society* **50**, 1816-1825.
- Horn S.D., Bender S.A., Ferguson M.L., Smout R.J., Bergstrom N., Taler G., Cook A.S., Sharkey S.S. & Voss A.C. (2004): The National Pressure Ulcer Long-Term Care Study:

- Pressure ulcer development in long-term care residents. *Journal of the American Geriatrics Society* **52**, 359-67.
- Hughes C.M., Lapane K.L. & Mor V. (1999): Impact of legislation on nursing home care in the United States: Lessons for the United Kingdom. *British Medical Journal* **319**, 1060-1063.
- Hughes C.M., Lapane K.L. & Mor V. (2000): Influence of Facility Characteristics on Use of Antipsychotic Medications in Nursing Homes. *Medical Care* **38**, 1164-1173.
- Intrator O., Zinn J.S. & Mor V. (2004): Nursing Home Characteristics and Potentially Preventable Hospitalizations of Long-Stay Residents. *Journal of the American Geriatrics Society* **52**, 1730-1736.
- Jenkins H. & Allen C. (1998): The relationship between staff burnout/distress and interactions with residents in two residential homes for older people. *International Journal of Geriatric Psychiatry*, **13**, 466-472.
- Jensdóttir A.B., Rantz M., Hjaltadóttir I., Gumundsdóttir H., Rook M. & Grando V. (2003): International comparison of quality indicators in United States, Icelandic and Canadian nursing facilities. *International Nursing Review* **50**, 79-84.
- Johnson C.E., Dobalian A., Burkhard J., Hedgecock D.K. & Harman J. (2004): Predicting Lawsuits against Nursing Homes in the United States, 1997-2001. *Health Services Research* **39**, 1713-1732.
- Kayser-Jones J., Chan J. & Kris A. (2005): A model long-term care hospice unit: Care, community, and compassion. *Geriatric Nursing* **26**, 16-64.
- Kayser-Jones J., Schell E., Porter C., Barbaccia J.C. & Shaw H. (1999): Factors contributing to dehydration in nursing homes: Inadequate staffing and lack of professional supervision. *Journal of the American Geriatrics Society* **47**, 1187-1194.
- Kemper P. (2003): Long-Term Care Research and Policy. *Gerontologist* **43**, 436-446.
- Kerrison S.H. & Pollock A.M. (2001): Regulating nursing homes: Caring for older people in the private sector in England. *British Medical Journal* **323**, 566-569.
- Konetzka R.T., Spector W.D. & Shaffer T. (2004): Effects of Nursing Home Ownership Type and Resident Payer Source on Hospitalization for Suspected Pneumonia. *Medical Care* **42**, 1001-1008.
- Konetzka R.T., Stearns S.C., Konrad T.R., Magaziner J. & Zimmerman S. (2005): Personal Care Aide Turnover in Residential Care Settings: An Assessment of Ownership, Economic, and Environmental Factors. *Journal of Applied Gerontology* **24**, 87-107.
- 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**, 77-80.
- Kuhar P., Miller D.N., Spear B., Ulreich S. & Mion L. (2004): The Meaningful Retention Strategy Inventory: A Targeted Approach to Implementing Retention Strategies. *Journal of Nursing Administration January* **34**, 10-18.
- Lambing A.Y., Adams D.L.C., Fox D.H. & Divine G. (2004): Nurse practitioners' and physicians care activities and clinical outcomes with an inpatient geriatric population. *Journal of the American Academy of Nurse Practitioners* **16**, 343-352.
- Laschinger H.K.S., Shamian J. & Thomson D. (2001): Impact of Magnet Hospital Characteristics on Nurses' Perceptions of Trust, Burnout, Quality of Care, And Work Satisfaction. *Nursing Economic\$* **19**, 209-220.

- Laschinger H.K.S., Wong C., McMahon L. & Kaufmann C. (1999): Leader Behaviour Impact on Staff Nurse Empowerment, Job Tension, and Work Effectiveness. *Journal of Nursing Administration* **29**, 28-39.
- Lemke S. & Moos R. (1989): Ownership and quality of care in residential facilities for the elderly [published erratum appears in *Gerontologist* 1989 Jun;29(3):427]. *Gerontologist* **29**, 209-215.
- Leveck M.L. & Jones C.B. (1996): The nursing practice environment, staff retention, and quality of care. *Research in Nursing & Health* **19**, 331-343.
- Liu J. (2003) Assessing the Relationship Between Staffing Levels and Quality Outcomes in Nursing Facilities. In *Graduate School*. University of Minnesota, pp. 131.
- Mark B.A. (2002): What explains nurses' perceptions of staffing adequacy? *Journal of Nursing Administration* **32**, 234-242.
- Masterson A. (2004): Towards and ideal skill mix in nursing homes. *Nursing Older People* **16**, 14-16.
- Mattiasson A.-C. & Andersson L. (1997): Quality of nursing home care assessed by competent nursing home patients. *Journal of Advanced Nursing* **26**, 1117-1124.
- McGillis Hall L. (2003) Nursing outcomes: Nurses' job satisfaction. In *Nursing-sensitive outcomes: State of the science* (D. Doran, ed.). Jones and Bartlett Publishers, Mississauga, pp. 283-318.
- McGillis Hall L. (2005) Indicators of nurse staffing and quality nursing work environments. In *Quality work environments for nurse and patient safety* (L. McGillis Hall, ed.). Jones and Bartlett Publishers, Sudbury, Mass, pp. 1-7.
- McGillis Hall L., Doran D. & Pink G.H. (2004a): Nurse staffing models, nursing hours, and patient safety outcomes. *Journal of Nursing Administration* **34**, 41-45.
- McGillis Hall L. & Doran D.I. (2001) A Study of the Impact of Nursing Staff Mix Models and Organizational Change Strategies on Patient, System and Nurse Outcomes. Ontario Council of Teaching Hospitals (OCOTH), Canadian Health Services Research Foundation (CHSRF).
- McGillis Hall L., Pringle D., Doran D., Streiner D., Pink G.H. & Pedersen C. (2004b) Long-term care nurse staffing study. University of Toronto, Faculty of Nursing, Toronto, pp. 3.
- McGilton K.S., O'Brien-Pallas L.L., Darlington G., Evans M., Wynn F. & Pringle D.M. (2003): Effects of a Relationship-Enhancing Program of Care on Outcomes. *Journal of Nursing Scholarship* **35**, 151-157.
- McGregor M.J., Cohen M., McGrail K., Broemeling A.M., Adler R. & Schulzer M. (2004) Difference in staffing levels in British Columbia's funded long-term care facilities by ownership type (not-for-profit vs. for-profit). In *Canadian Association of Health Policy Research*.
- McGregor M.J., Cohen M., McGrail K., Broemeling A.M., Adler R.N., Schulzer M., Ronald L., Cvitkovich Y. & Beck M. (2005): Staffing levels in not-for-profit and for-profit long-term care facilities: Does type of ownership matter? *CMAJ* **172**, 645-649.
- Mesirow K.M., Klopp A. & Olson L.L. (1998): Improving certified nurse aide retention. A long-term care management challenge. *Journal of Nursing Administration* **28**, 56-61.
- Mitchell W., Venkatraman A., Banaszak-Holl J., Baum J.A.C. & Berta W. (2003) The commercialization of nursing home care: Does for-profit efficiency mean lower quality

- or do corporations provide the best of both worlds? 2003 Strategic Management Society Conference.
- Mor V., Angelelli J., Jones R., Roy J., Moore T. & Morris J. (2003a): Inter-rater reliability of nursing home quality indicators in the U.S. *BMC Health Services Research* **3**.
- Mor V., Berg K., Angelelli J., Gifford D., Morris J. & Moore T. (2003b): The Quality of Quality Measurement in U.S. Nursing Homes. *Gerontologist* **43**, 37-46.
- Mor V., Zinn J.S., Angelelli J., Teno J.M. & Miller S.C. (2004): Driven to Tiers: Socioeconomic and Racial Disparities in the Quality of Nursing Home Care. *Milbank Memorial Fund Quarterly* **82**, 227-256.
- Mueller C. (2000): A Framework for Nurse Staffing in Long-term Care Facilities. *Geriatric Nursing* **21**, 262-267.
- Mueller C. (2002): Nurse Staffing in Long-Term Care Facilities. *Journal of Nursing Administration* **32**, 640-647.
- Mueller C. & Karon S.L. (2004): ANA nurse sensitive quality indicators for long-term care facilities. *Journal of Nursing Care Quality* **19**, 39-47.
- Mueller C.H. (1999): Cautions about nurse staffing standards for nursing homes. *Journal of Gerontological Nursing* **25**, 6.
- Mukamel D. & Brower C. (1998): The influence of risk adjustment methods on conclusions about quality of care in nursing homes based on outcome measures. *Gerontologist* **38**, 695-703.
- Mukamel D.B. & Spector W.D. (2003): Quality Report Cards and Nursing Home Quality. *Gerontologist* **43**, 58-66.
- Mullan F. (2001): A Founder of Quality Assessment Encounters A Troubled System Firsthand. *Health Aff* **20**, 137-141.
- National Academy of Sciences (2004) Maximizing workforce capability. In *Keeping patients safe : transforming the work environment of nurses* (A. Page, ed.). Committee on the Work Environment for Nurses and Patient Safety, Board on Health Care Service, The National Academies Press, Washington, pp. 162-225.
- National Aged Care Alliance (2004) Principles for staffing levels and skill mix in aged care settings. National Aged Care Alliance.
- Needleman J., Buerhaus P.L., Mattke S., Stewart M. & Zelevinsky K. (2001) Nurse staffing and patient outcomes in hospitals. US Department of Health and Human Services, Health Resources and Service Administration.
- Needleman J., Buerhaus P.L., Mattke S., Stewart M. & Zelevinsky K. (2002): Nurse-staffing levels and the quality of care in hospitals. *New England Journal of Medicine* **346**, 1715-1722.
- Neuhauser P.C. (2002): Building a high-retention culture in healthcare: Fifteen ways to get good people to stay. *Journal of Nursing Administration* **32**, 470-478.
- O'Brien-Pallas L., Thomson D., Alksnis C., Luba M., Pagniello A., Ray K.L. & Meyer R. (2003) Stepping to Success and Sustainability: An Analysis of Ontario's Nursing Workforce. Nursing Effectiveness, Utilization, and Outcomes Research Unit - University of Toronto.
- O'Neill C., Harrington C., Kitchener M. & Saliba D. (2003): Quality of Care in Nursing Homes: An Analysis of Relationships Among Profit, Quality, and Ownership. *Medical Care* **41**, 1318-1330.

- Pearson A., Hocking S., Mott S. & Riggs A. (1993): Quality of care in nursing homes: From the resident's perspective. *Journal of Advanced Nursing* **18**, 20-24.
- Pennington K., Scott J. & Magilvy K. (2003): The role of certified nursing assistants in nursing homes. *Journal of Nursing Administration* **33**, 578-84.
- Porell F. & Caro F.G. (1998): Facility-level outcome performance measures for nursing homes. *The Gerontologist* **38**, 665-683.
- Porell F., Caro F.G., Silva A. & Monane M. (1998): A longitudinal analysis of nursing home outcomes]. *Health Services Research* **33**, 835-65.
- Powers B.A. (2001): Ethnographic analysis of everyday ethics in the care of nursing home residents with dementia: a taxonomy. *Nursing Research* **50**, 332-9.
- Proenca E.J. & Shewchuk R.M. (1997): Organizational tenure and the perceived importance of retention factors in nursing homes. *Health Care Management Review* **22**, 65-73.
- Rachlis M.M. (2000) The hidden costs of privatization: An international comparison of community and continuing care. In *Without foundation: How medicare is undermined by gaps and privatization in community and continuing care* (M. Cohen & N. Pollak, eds). Canadian Centre for Policy Alternatives - BC Office, British Columbia Government and Service Employees' Union, British Columbia Nurses Union, Hospital Employees' Union, Vancouver, BC, pp. 55-85.
- Reeves T.C. & Ford E.W. (2004): Strategic Management and Performance Differences: Non-profit versus For-Profit Health Organizations. *Health Care Management Review* **29**, 298-308.
- Remsburg R.E. (2004): Pros and cons of using paid feeding assistants in nursing homes. *Geriatric Nursing* **25**, 176-177.
- Remsburg R.E., Armacost K.A. & Bennett R.G. (1999): Improving Nursing Assistant Turnover and Stability Rates in a Long-term Care Facility. *Geriatric Nursing* **20**, 203-208.
- Resnick B. (2000): Functional performance and exercise of older adults in long-term care settings. *Journal Of Gerontological Nursing* **26**, 7-16.
- Richardson S. & Martin B. (2004) The care of older Australians: A picture of the residential aged care workforce. National Institute of Labour Studies, Flinders University, Adelaide, Australia.
- Riggs C.J. & Rantz M.J. (2001): A model of staff support to improve retention in long-term care. *Nursing Administration Quarterly* **25**, 43-54.
- Rondeau K.V. & Wagar T.H. (2001): Impact of human resource management practices on nursing home performance. *Health Services Management Research* **14**, 192-203.
- Saliba D. & Schnelle J.F. (2002): Indicators of the Quality of Nursing Home Residential Care. *Journal of the American Geriatrics Society* **50**, 1421-1430.
- Schnelle J.F. (2004a): Determining the Relationship Between Staffing and Quality. *Gerontologist* **44**, 10-12.
- Schnelle J.F. (2004b): Long-Term Care Workforce and Quality. *Alzheimer's Care Quarterly* **5**, 1-2.
- Schnelle J.F., Cretin S., Simmons S.F. & Feuerberg M. (2000) Minimum Nurse Aide Staffing Required to Implement Best Practice Care in Nursing Homes. In *Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes: Report to Congress, Phase I* (U.S. Department of Health and Human Services, ed.). Health Care Financing Administration, Washington, DC, pp. 14.1-14.69.

- Service Employees' International Union Nurse Alliance The shortage of care: A study by the SEIU Nurse Alliance.
- Shapiro E. & Tate R. (1995): Monitoring the outcomes of quality of care in nursing homes using administrative data. *Canadian Journal on Aging/La Revue canadienne du vieillissement* **14**, 755-668.
- Shaver K.H. & Lacey L.M. (2003): Job and Career Satisfaction Among Staff Nurses: Effects of Job Setting and Environment. *Journal of Nursing Administration* **33**, 166-172.
- Simoens S., Villeneuve M. & Hurst J. (2005) Tackling Nurse Shortages in OECD Countries. Organization for Economic Co-operation and Development (OECD), Paris, pp. 58.
- Singh D.A. & Schwab R.C. (2000): Predicting Turnover and Retention in Nursing Home Administrators: Management and Policy Implications. *Gerontologist* **40**, 310-319.
- Smith M. (2004) Commitment to care: A plan for long-term care in Ontario. Ministry of Health and Long Term Care.
- Spector W.D., Selden T.M. & Cohen J.W. (1998): The impact of ownership type on nursing home outcomes. *Health Economics* **7**, 639-653.
- Spector W.D. & Takada H.A. (1991): Characteristics of nursing homes that affect resident outcomes. *Journal of Aging Health* **3**, 427-454.
- Spellbring A.M. (2001): A Task Force to Study Quality of Care in Maryland Nursing Facilities: A Case in Point. *Policy Politics Nursing Practice* **2**, 134-138.
- Spilsbury K. & Meyer J. (2001): Defining the nursing contribution to patient outcome: lessons from a review of the literature examining nursing outcomes, skill mix and changing roles. *Journal of Clinical Nursing* **10**, 3-14.
- Stone R.I., Dawson S.L. & Harahan M.F. (2004): Why workforce development should be part of the long-term care quality debate. *Alzheimer's Care Quarterly* **5**, 52-59.
- Tai T.W.C., Bame S.I. & Robinson C.D. (1998): Review of nursing turnover research, 1977-1996. *Social Science & Medicine* **47**, 1905-1924.
- The Resident/Staff Ratio Task Force (2002) Task Force on Resident/Staff Ratio in Nursing Homes. Nova Scotia Department of Health.
- Thompson T.P. & Brown H.N. (2002): Turnover of Licensed Nurses in Skilled Nursing Facilities. *Nursing Economics* **20**, 66-69.
- Tilly D.J., Black K., Ormond D.B. & Harvell J. (2003) State experiences with minimum nursing staff ratios for nursing facilities: Findings from case studies of eight states. Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services
- Office of Disability, Aging and Long-Term Care Policy, Washington, DC, pp. 1-17.
- Tilly J. & Harvell J. (2003) State Experiences with Minimum Nursing Staff Ratios for Nursing Facilities: Findings from the Research to Date and a Case Study Proposal. U.S. Department of Health and Human Services.
- Tomblin Murphy Consulting Inc (2005) Nurse-patient ratios and patient safety: A review of the literature. Canadian Federation of Nurses Unions and The Office of Nursing Policy, Health Canada, Ottawa, pp. 30 plus appendices.
- Tomblin Murphy G., Maaten S., Smith R. & Butler C. (2005) Review of concurrent research on nursing labour market topics. The Nursing Sector Study Corporation, Ottawa, pp. 1-62.
- Tsai A.G. & Konosian B. (2003): The Association Between Profit Levels and Quality of Care in California Nursing Homes. *Medical Care* **41**, 1315.

- Tune P. & Bowie P. (2000): The quality of residential and nursing-home care for people with dementia. *Age Ageing* **29**, 325-328.
- Walshe K. & Harrington C. (2002): Regulation of Nursing Facilities in the United States: An Analysis of Resources and Performance of State Survey Agencies. *Gerontologist* **42**, 475-487.
- Wan T.T. (2003): Nursing care quality in nursing homes: cross-sectional versus longitudinal analysis. *Journal of Medical Systems* **27**, 283-95.
- Weech-Maldonado R., Neff G. & Mor V. (2003): The Relationship Between Quality of Care and Financial Performance in Nursing Home. *Journal of Health Care Finance* **29**, 48-60.
- Weitzel T., Robinson S.B., Henderson L. & Anderson K. (2004): Satisfaction and retention of CNAs working within a functional model of elder care. *Holistic Nursing Practice* **18**, 309-12.
- Wells J.C. (2004): The Case for Minimum Nurse Staffing Standards in Nursing Homes: A Review of the Literature. *Alzheimer's Care Quarterly* **5**, 39-52.
- Wieck K.L., Oehler T., Green A. & Jordan C. (2004): Safe Nurse Staffing: A Win-Win Collaboration Model for Influencing Health Policy. *Policy Politics Nursing Practice* **5**, 160-166.
- Wiener J.M. (2003): An Assessment of Strategies for Improving Quality of Care in Nursing Homes. *Gerontologist* **43**, 19-27.
- Williams C.L., Hyer K., Kelly A., Leger-Krall S. & Tappen R.M. (2005): Development of nurse competencies to improve dementia care. *Geriatric Nursing* **26**, 98-105.
- Wilner M.A., Nakhnikian E., Joslin S., Hurd D., Rader J. & Boyd C. (2001) Training and Education: What is Needed to Prepare Nursing Assistants to Deliver Good Care. In *Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes: Phase II Final Report* (U. S. D. o. H. a. H. Services, ed.). Health Care Financing Administration, Washington, DC, pp. chapter 7, pp. 1-109.
- Yeh S.-C.J. & Lo S.K. (2004): Is Rehabilitation Associated With Change in Functional Status Among Nursing Home Residents? [Article]. *Journal of Nursing Care Quality* **19**, 58-66.
- Zhang X. & Grabowski D. (2004): Nursing home staffing and quality under the Nursing Home Reform Act. *The Gerontologist* **44**, 13-23.
- Zimmerman D. (2002) Improving nursing home quality of care through outcomes data: The MDS quality indicators. *Stride Magazine*.
- Zimmerman S., Sloane P.D., Hanson L., Mitchell C.M. & Shy A. (2003): Staff Perceptions of End-of-Life Care in Long-Term Care. *Journal of the American Medical Directors Association* **4**, 23-26.

Appendix III. Summary of research on the relationship between nurse and patient care staffing levels and resident quality of care and/or quality of life

Appendix III. Summary of research on the relationship between nurse and patient care staffing levels and resident quality of care and/or quality of life (in alphabetical order)

Author	Data Sample	Data Source	Study Design	Risk Adj. Factors	Quality of Care/Life Measures	Findings	Methodology Limitations and Strengths
Bates-Jensen et al. 2004	882 residents from 34 Calif residential care facilities	Primary data: observations, interviews, physical performance tests (2001-2002) Secondary data: facility medical records and state data (California cost reports) (2001-2002)	Cross-sectional	2	time-in-bed, social engagement, food intake	Nurse staffing level (including RNs, LPNs and CAs) was the strongest predictor of observed resident time in bed after controlling for residents' level of functioning (odds ratio = 4.89; P=0.042). In other words, 43% of residents in lower-staff homes were observed in bed during the day versus 26% (t=5.6, P<.001) of residents in the high-staffed homes. In addition, "residents observed in bed during the daytime in more than 50% of hourly observations were observed also to experience increased daytime sleeping (P<.001) and less social engagement (P=.026) and consumed less food and fluids during mealtimes than those observed in bed in less than 50% of observations, after adjusting for resident function (P<.001) (Bates-Jensen <i>et al.</i> , 2004, p. 931). The lower staffed homes (28 residential care facilities, and 746 participants), which were below the 90 th percentile of all residential care facilities in the state, reported mean total licensed and nonlicensed nursing staffing of 3.1 +/- 0.3 hprd and nurse aide hprd for the year 2000 of 2.1 +/- 0.2. The higher staffed homes (6 residential care facilities, 136 participants), which were in the upper decile of all residential care facilities in the state, reported mean total licensed and nonlicensed nursing staffing of 4.8 +/- 1.1 hprd and nurse aide hprd for the year 2000 of 3.4 +/- -0.7 (p. 932).	Limitation: data were collected over a limited time at each site Limitation: lack of data on resident preference for time in bed Limitations: did not use risk adjustment factors for residents' clinical information or medication use Strength: use of risk adjustment factors for residents' level of functioning and demographics Strength: use of primary data Strength: staffing information obtained from cost reports confirmed with direct interviews with nursing staff

Appendix III. Summary of research on the relationship between staffing and quality of care continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj. Factors</i>	<i>Quality of Care/Life Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
Bowers et al. 2000	38 Care Aides from 6 Midwest US residential care facilities (size 80 to 146 beds)	Primary data: interviews and participant observation (date n/a)	Prospective longitudinal field study (2 years)	n/a	choice, social engagement, toileting	The findings show that care aides deem their relationships with residents to be the central determinant of quality of care as well as an important outcome in itself. High quality care was described "as care that is done 'affectionately' or 'individually' in ways that are 'like family'" (p. 63). Care aides "described the link between staffing and quality in this way: adequate and consistent staffing facilitates the development of relationships between CAs and residents. With relationships comes familiarity. This familiarity increases the chances that care will be provided in a way that the resident prefers and is more comfortable with, thus leading to better outcomes" (p. 58). Adequate staffing is essential to allowing CAs to nurture these relationships. When staffing was inadequate (i.e. they were short staffed), care aides used a number of time-saving measures including "not allowing residents the time to choose what they wanted to wear, not allowing them to wear clothing that was more difficult to put on or take off, eliminating time-consuming grooming preferences like braids and makeup, eliminated oral care, eliminating walking and range of motion exercises, abbreviating bathing procedures ("faces and bottoms" only), not stopping to chat, and reducing other activities designed to allow choice and enhance residents' sense of reciprocity and competence" (p. 60). Also, toileting plans were identified as one of the first "cares" to be eliminated when they were understaffed.	Limitation: because this was a qualitative study, the application of resident risk adjustment factors was not applicable Strength: use of primary data collected from both interviews and observations and its longitudinal design (2 years)

Appendix III. Summary of research on the relationship between staffing and quality of care continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj. Factors</i>	<i>Quality of Care/Life Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
Dorr et al. 2005	1,376 residents of 82 US residential care facilities	Secondary data: facility data (medical records, physician orders, medication logs, Minimum Data Set, and staffing data, 1996-1997); state data (Bureau of Labor and Statistics, 2001)	Retrospective longitudinal (12 weeks)	3	pressure ulcers UTI, hospitalizations	Rates of pressure ulcers, urinary tract infections (UTIs) and hospitalizations improved considerably with increased RN staffing levels. For example, the pressure ulcer rate per day in residential care facilities with low RN staffing levels (<10 minutes prd) was 5.01×10^{-3} compared to a rate of 1.16×10^{-3} in residential care facilities with high RN staffing levels (30-40 minutes prd)	Limitation: the information on staffing was self-reported by facilities Limitation: did not adjust for medication use Strength: adjusted for resident risk factors: demographics, clinical information, functioning level Strength: use of an incidence versus a prevalence measure for pressure ulcers
Dyck 2004	363,895 residents in 2,951 residential care facilities in Ohio, Indiana, Illinois, Michigan, Wisconsin, and Minnesota	Secondary data: national data (OSCAR, MDS, 2000-2001)	Cross-sectional	4	weight loss, dehydration	Residents receiving 3 or more hours of CA time per day had a 17% less risk of weight loss ($P=0.0008$) compared to those residents receiving less than 3 hours of CA time per day.	Limitation: use of the national data source OSCAR for staffing information Strength: the OSCAR data was cleaned and a series of decision rules were applied to the data to increase its validity and reliability Strength: adjusted for resident risk factors: demographics, clinical information, functioning level and medication use.

Appendix III. Summary of research on the relationship between staffing and quality of care continued

Author	Data Sample	Data Source	Study Design	Risk Adj. Factors	Quality of Care/Life Measures	Findings	Methodology Limitations and Strengths
Engst et al. (2004)	100 residents from two 75-bed units in one BC (Canadian) residential care facilities 98 nursing home staff (care aides and registered nurses)	Primary data: staff survey; resident agitation checklist (completed by care providers); incident reports for aggressive behaviour and for MSI; staff interviews; direct observation of care providers at work; time analysis of toileting transfers and bed cleaning (2001-2002) Secondary data: Incident reports (2001-2002)	Prospective Longitudinal Quasi-Experimental (1 year)	0	agitation & aggressive behaviour	“Scheduled toileting appears to have reduced resident agitation expressed as verbal behaviours and emotional upset, based on a comparison of agitated behaviours between the intervention and comparison groups” (p. 435). “Significant differences were noted only in emotional upset, which decreased significantly ($F(1,40)=9.7$, $p=0.004$) from pre-intervention to mid-intervention but increased significantly ($F(1,33)=5.77$, $p=0.022$) from mid-intervention to post-intervention.” (p. 431) The toileting program increased the cognitive demands and work load for care aides. “The time required to transfer residents to and from the toilet (slightly longer than 6 minutes) was significantly longer ($F(1,13)=42.54$, $p<.0001$) than the time required to clean residents in bed (slightly longer than 4 minutes).” (p. 433)	Limitation: the researchers note that “the agitation awareness training provided to both units mid-intervention was a potential confounding factor in attempting to understand the influence of the toileting program on aggressive behaviour.” Limitation: the researchers report that there was sometimes incomplete documentation of toileting results during the initial implementation period, resulting in some conclusion whether residents were responding positively to scheduled toileting. Limitation: a labour dispute involving nurses and management hindered the progress of the program. Limitation: small sample size (2 units) Limitation: lack of mention of risk adjustment factors, however, the comparison units were from within the same residential care facility Strength: continuous mentoring, monitoring and clear communication resulted in improved documentation, communication, resident assessment and evaluation. Strength: the comparison group was selected based on similarities in organizational characteristics and baseline clinical practices. Strength: applicable to BC as the research conducted in a British Columbian residential care facility.
Harrington et al. 2000 (Experts)	14,140 US residential care facilities	Secondary data: research literature (over 80 studies cited from period 1982 to 1999); national data (OSCAR 1997; HCFA 1995-1997)	Cross-sectional	n/a	overall Q of C	Experts reviewed previous studies on staffing of quality of care and the time study data available from OSCAR and HCFA time studies and concluded that average nurse staffing levels (RNs 0.72 hprd, LPNs 0.69 hprd, NAs 2.10 hprd, total = 3.51 hprd) in nursing homes was too low in some facilities to provide high quality of care (Harrington <i>et al.</i> , 2000a). The experts recommended that to improve the quality of care of nursing home residents, nurse staffing levels should be: RN 1.15 hprd, LPN .70 hprd, CA 2.70 hprd, total nurses 4.55 HRPD.	Limitation: this was expert opinion of the literature -- not original research therefore resident risk adjustment factors are not applicable Strength: sample of 16 US experts regarding the nursing home field, whose opinions in this report have been widely accepted and adopted in the US

Appendix III. Summary of research on the relationship between staffing and quality of care continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj. Factors</i>	<i>Quality of Care/Life Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
Horn et al. 2005	1,376 residents 82 LTC facilities in 19 US states	Primary data: medical records 1996-1997 Secondary data: facility data (medical records, physician orders, MDS, and staffing data, 1996-1997)	Retrospective longitudinal (12-weeks)	4	pressure ulcers ADLs, UTI	Residents who received 30 to 40 minutes of RN direct care per day were 42% less likely to experience deterioration in their ability to perform ADLs and were 84% less likely to develop a PU than were those in the reference group who received fewer than 10 minutes of RN direct care per day. Residents who received 2.25 or more hours of CA time were 41% less likely to develop PU than those receiving less than 2.25 hours CA time per day ($p=0.059$) and residents receiving 45 or more minutes of LPN time were 42% less likely to develop PU ($p=0.017$). No significant relationships were found between LPN and CA staffing and weight loss, deterioration in the ability to perform ADLs, hospitalization, or the development of UTI.	Limitation: information on staffing was self-reported by facilities - no mention is made of audits to check the validity and reliability of the data. Limitation: nurse staffing data were not resident specific. (Nurse staffing time was reported by each facility as the number of hours of direct care provided to residents by RNs, LPNs and CA per 24-hr period for each month of the study.) Strength: adjusted for resident risk factors: demographics, clinical information, functioning level and medication use. Strength: use of the incidence (versus prevalence) of PU as an indicator of quality of care.
Hutt et al. 2000	519 NY residential care facilities and 728 Ohio residential care facilities	Secondary data: national data (MDS data and Medicaid Cost Report, 1996-1997)	Retrospective longitudinal (1 year)	2	pressure ulcers ADLs	"The likelihood or odds of a facility being in the worst 10% of facilities on pressure ulcer incidence were 4.97 times greater with LPN staffing less than .77 hours per resident day and 2.49 greater with RN staffing less than .109 hours per resident day. In Ohio, but not in New York, facilities in the lowest RN staffing decile were 2.58 times as likely to be in the worst decile of facilities for functional improvement." Though the relationship between functional improvement and staffing did not hold at the LPN level, when licensed staff were considered together (RN plus LPN), facilities in the lowest 20% of staffing were 2.62 times as likely to have low rates of functional improvement. In Ohio, low LPN, RN, and total licensed (RN plus LPN) staffing levels were associated with lower rates of resisting care improvement.	Limitation: the authors are less confident about the accuracy of care aide staffing ratios than licensed staffing ratios. The correlation between Medicaid Cost Reports and Payroll Data for aides was only 0.39 as compared to 0.73 for RNs. Limitation: the researchers caution that the MDS, from which the quality measures were chosen, was not designed as a quality assessment tool. Limitations: did not use risk adjustment factors for residents' demographics or medication use Strength: use of risk adjustment factors for residents' level of functioning and clinical information. Strength: use of an incidence, not prevalence, measure of pressure ulcers. Strength Medicaid Cost Reports have been found to be more reliable than other staffing databases (White, 2001).

Appendix III. Summary of research on the relationship between staffing and quality of care continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj. Factors</i>	<i>Quality of Care/Life Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
Kayser-Jones and Schell 1997	2 proprietary Pacific NW U.S. residential care facilities (including 36 physicians, 50 nursing staff, 58 residents and 50 families of residents)	Primary data: participant observation and in-depth interviews (1994-1997)	Prospective Longitudinal (4 yr, 1994-1999)	2	eating assistance, time-in-bed	The quality of care at mealtime was on the whole poor, especially for dysphasic residents, cognitively impaired residents, and those without attentive families. Some residents lost a great deal of weight and many residents were observed coughing and choking during mealtime. On the daytime shift, each care aide typically had to care for 7 to 9 residents. However, in the evening they were assigned 12 to 15 residents. If someone called in sick they had an even greater workload. Inadequate staffing affected resident care before and during meals as well as where and how meals were served. Before meal personal care, (i.e. grooming, hand washing, dressing) were often neglected. Many residents were served meals in their bed and those who were often were not properly positioned, their food was served cold and sometimes not at all. Meals serviced in the dining rooms was also often an unpleasant experience as residents were often fed quickly and forcefully; solid food was mixed with liquids, a potentially harmful strategy contributing to choking and aspiration. Dysphagia was often undiagnosed and unrecognized. In most facilities, licensed staff did not supervise or assist care aides during mealtime as they were busily occupied with other activities. The researchers recommend a higher staff-to-resident ratio at mealtime, including an RN on duty to provide supervision, and enough care aides so that each care aide has no more than two or three residents to feed or assist at mealtime.	Limitation: the small sample (2 nursing homes). Limitations: did not use risk adjustment factors for residents' clinical information or medication use Strength: use of risk adjustment factors for residents' level of functioning and demographics Strength: use of primary data (observations) and use of trained researchers.

Appendix III. Summary of research on the relationship between staffing and quality of care continued

Author	Data Sample	Data Source	Study Design	Risk Adj. Factors	Quality of Care/Life Measures	Findings	Methodology Limitations and Strengths
Kramer et al. 2000	1768 residential care facilities in NY, Ohio, Texas	Secondary data: national data (Medicaid Cost Report, Medicare Standard Analytic Files Part A, 1996-1997)	Retrospective longitudinal (1 year)	2	hospitalizations	Findings strongly support the existence of associations between specific staffing levels and quality of care. For 4 of the 5 quality measures, care aide staffing below 2.04 to 2.06 hours per day was associated with a 4-fold increase in the likelihood of high hospitalization rates ($P<0.001$). For LPNs the level varied between 0.53 (electrolyte imbalance) and 0.63 (UTI and sepsis) hours per day below which there was a substantial increase in hospitalization ($P<0.001$). For RNs there was a relationship between RN staffing and hospitalization for sepsis and UTI at staffing levels below 0.14 hprd (Adjusted Odds Ratio [AOR] = 2.74, $P=0.004$; and AOR=2.36, $P=0.012$ respectively). However, combined RN and LPN staffing below 0.76 was strongly associated (AOR = 5.08, $P<0.001$) with the likelihood of hospitalization on all 5 quality indicators.	Limitations: did not use risk adjustment factors for residents' demographics or medication use Strength: use of risk adjustment factors for residents' clinical and functioning risk factors for hospitalization to increase the probability of measuring preventable causes of hospitalization Strengths: used Medicaid Cost Reports for staffing levels (considered the "Gold Standard", White, 2001) Strength: quality of care was measured by hospitalization for selected causes (congestive heart failure [CHF], electrolyte imbalance, respiratory infection, urinary tract infections [UTI], and sepsis)
Kramer and Fish 2001	5,294 long stay residential care facilities in 10 US states	Secondary data: national data (Medicaid Cost Report, Medicare Standard Analytic Files Part A, MDS 2.0; 1999)	Retrospective longitudinal (1 year)	3	ADL, weight loss, PU	Facilities were at increased likelihood of being in the worst 10% for functional improvements when: - CA staffing was less than 2.4 hprd - licensed nurse staffing was less than 1.55 hprd - RN staffing was less than 0.8 hprd Facilities were at increased likelihood of being in the worst 10% for weight loss when: - CA staffing was less than 3.1 hprd - licensed nurse staffing was less than 0.95 hprd Facilities were at increased likelihood of being in the worst 10% for pressure ulcers when: RN staffing was less than 0.6 hprd The weighted threshold for nursing staff levels, below which facilities were at increased risk of being in the worst 10% and above which there were no additional improvements in quality, were 4.2 total hours per day, including 2.8 care aide hprd and 1.4 licensed nurse hprd, of which was 0.75 RN hprd.	Limitation: did not adjust for medication use Strength: adjusted for resident risk factors: demographics, clinical information, functioning level and hospitalization Strength: use of Medicaid Cost Reports for staffing levels (considered the "Gold Standard") Strength: use of an incidence versus a prevalence measure for pressure ulcers

Appendix III. Summary of research on the relationship between staffing and quality of care continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj. Factors</i>	<i>Quality of Care/Life Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
MacCourt 2004	22 BC clinical, OH&S experts; 2 external experts	Primary data: interviews (date n/a) Secondary data: literature review (date n/a)	Cross-sectional	n/a	agitation & aggressive behaviour	Key informants suggested that staffing resources were key to managing aggressive behaviour and "that the ratio of staff to residents must be increased, especially on evening and nights, if aggression is to be prevented. It was also felt by many key informants that the staff mix needed to be changed in order to improve resident care. In particular it was suggested that RPNs and/or RPNs/RNs be hired. There were some who suggested that LPNs be added to the staff mix but not to replace RNs...Continuity of staff was considered very important in preventing resident aggression... it was suggested that staff work permanent shifts rather than rotate...It was suggested that greater use of recreation and activity staff to provide appropriate activities for residents on evening and weekend could reduce resident boredom and frustration, increase well-being and prevent aggression. " (Page 46)	Limitation: qualitative research of experts' opinions therefore application of resident risk adjustment factors not applicable Limitation: the researcher also argues that written responses in addition to the telephone survey may have given the respondents greater opportunity to gather and present information from others. Strength: use of primary data Strength: sample included British Columbian key clinical (nurse clinicians, team leaders, educators, consultants, managers) and OH&S (Worker's Compensation Board, Professional Association, and Union representative) informants and 2 external experts (Clinical Nurse Specialist and a Psychogeriatric Nurse Specialist)
Rantz et al. 2004	92 Missouri residential care facilities	Primary data: observations (1998) Secondary data: national data (MDS, 2000-2001; Medicaid cost reports, 1998)	Cross-sectional, three-group exploratory study	2	eating assistance, toileting, walk assists	In facilities with good resident outcomes, a key finding was that those residents who needed to be helped were helped with a ratio of one to two residents per staff. In facilities with poor outcomes, staff fed more than two residents at a time, and in many cases, more than five or six at a time. The analysis revealed that there are necessary organizational attributes that must be in place in order for those basics of care to be accomplished: 1. consistent nursing and administrative leadership (DONs in facilities with good outcomes were much more likely to have been in their jobs for more than 5 years); 2. the use of team and group processes, and 3. an active quality improvement program.	Limitation: the researchers note the limitations of using existing quality indicator measures. Limitations: did not use risk adjustment factors for residents' clinical information or medication use Strength: use of risk adjustment factors for residents' level of functioning and demographics Strength: use of multiple methods. Strength: the cleaning of the data. (excluded nursing facilities with less than 30 beds because of their small population they were at greater risk for excessive variations in quality indicators) Strength: the cross checking of facility outcomes with observations

Appendix III. Summary of research on the relationship between staffing and quality of care continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj. Factors</i>	<i>Quality of Care/Life Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
Schnelle et al. 2001	674 New York facilities and 972 Ohio facilities	Secondary data: state data (MDS, 1996)	Simulation study	2	toileting, eating assistance, exercise, ADL	The minimum number of care aide FTE per 24 hours for 40 residents required for optimal care varies from 16 FTE for high workload nursing homes, to 15 FTE for medium workload facilities and to 14 FTE for low workload facilities. This is equivalent to 3.2, 3.0 and 2.8 hours of care aide hprd respectively.	Limitation: methodology (simulation study) Limitations: no risk adjustment factors for residents' demographics or medication use. Strength: clinical and functioning risk adjustments (based on case mix data). Strength: the detailed analysis of the care needs of various groups of residents and the detailed breakdown of case mix by facility in estimating care aide staffing.
Schnelle et al. 2004	21 Calif residential care facilities	Primary data: observations, interviews (2001-2002) Secondary data: state data (cost reports, 2000); facility data (resident charts)	Cross-sectional	2	time-in-bed, social engagement, eating assistance, repositioning, exercise, toileting, PU	Highest-staffed homes performed significantly better on 13 of 16 care processes implemented by care aides (CAs) compared to lower-staffed homes. In general, participants in the highest-staffed 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 exercise. However, even participants in these highest-staffed facilities did not receive repositioning at the rate of once every two hours during the day or night and only received potential exercise activities at the rate of approximately one episode every four hours. There was also no difference in the amount of social interaction observed between residents and staff during meals. Staff in the highest staffed homes (n=6), according to state cost reports, reported significantly lower resident care loads during onsite interviews across day and evening shifts (7.6 residents per CA) compared to the remaining homes that reported between 9 to 10 residents per CA (n=15). The most dramatic quality improvement occurred for homes that reported a total staffing hprd average from 4.8 (state data) to 4.5 (onsite interview data). The researchers suggest that CA staffing about 2.8 hours per day is associated with better quality. There were no licensed nurse performance measures that favored the higher-staff homes.	Limitation: the researchers note that residential care facility characteristics such as higher wages and lower staff turnover, which were not measured, may have mediated some of the effects reported in this study. Limitations: did not use risk adjustment factors for residents' clinical information or medication use Strength: use of risk adjustment factors for residents' level of functioning and demographics Strength: accuracy checks of year 2000 staffing statistics were employed (research staff interviewed 118 CA to verify the number of residents they were responsible for and if they were working "short". Administrators were also asked to report the number of NAs, LVNs, and RNs that were usually scheduled.) Strength: use of standardized measurement technology. Sixteen care processes were measured by research staff using standardized direct observation and resident interview protocols during three consecutive 12-hour week days in each residential care facility.

Appendix III. Summary of research on the relationship between staffing and quality of care continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj. Factors</i>	<i>Quality of Care/Life Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
Simmons et al. 2001	74 residents in 3 US residential care facilities	Primary data: observations (photographs) Secondary data: facility data (staffing data, resident charts)	Cross-sectional experimental (5 days)	4	food intake	The time required to implement feeding assistance intervention greatly exceeded the time the nursing staff spent assisting residents in usual mealtime care conditions. "Responsive" residents increased their intake of food from 47% to 70% with feed assistance intervention. This intervention included 38 minutes of assistance compared to 9.4 minutes, 14.6 verbal prompts per resident per meal compared to usual 1.7 prompts, 31.1 physical prompts versus 19.7 usual physical prompts and 38.9 minutes average tray access time versus the usual 31.9 minutes.	Limitation: the staffing information was self-reported by the director of nursing with no mention of validation of the data. Limitation: the comparison of usual mealtime care and the feeding assistance intervention was based on observations over 3 days/9 meals of a limited sample size. The intervention time was similarly a small sample over 2 days/6 meals. Strength: experimental design and use of primary data (observations). Strength: adjusted for resident risk factors: demographics, clinical information, functioning level and medication use.
Zhang et al. 2006	14,113 US residential care facilities (2002) 13,663 US residential care facilities (2003)	Secondary data: OSCAR	Cross-sectional statistical analysis (2002)	2	pressure ulcers catheterization physical restraint	"The average working hours per patient day of RNs, LPNs, NAs, and total nursing staff were 0.313, 0.661, 2.057, and 3.031, respectively. The average size of nursing homes was 95 beds. Among the nursing homes, 69% were for-profit, 54% were members of chains, and 36% had CA training programs... For RNs, minimum thresholds to achieve 50%, 75%, and 90% quality levels are 0.31, 1.83, and 3.3 hours per resident per day, respectively. LPN minimum levels could only be ascertained at the 90% level, at which they were 8.4 hours per resident per day... [The researchers] found indications that the relationship between staffing and quality was not linear, and that a point can be ascertained at which adding additional staff still improves quality but does so at a declining rate."	Limitation: study included both skilled nursing facilities (SNFs) and intermediate care facilities. Since the resident acuity (or case mix) level in SNFs is higher, those facilities require higher levels of nursing staff compared to intermediate care facilities. Therefore, the ratios found in this study, having been computed from both types of facilities, represent average ratios for both types, and will overstate the needs of the intermediate care facility and understate the needs of the SNF. Limitation: did not use risk adjustment for resident demographics or medication use. Strength: adjusted for resident risk factors: clinical information and functioning level Strength: corrected the OSCAR data by excluding residential care facilities with 15 or fewer residents; excluding residential care facilities that have hprd <0.5 or >12; and excluding residential care facilities that have staffing beyond mean +/- 2 standard deviations Strength: used an incidence, not prevalence, measure of PUs, catheterization and restraint

Appendix IV. Summary of research on the relationship between organizational characteristics and resident quality of care and of nurse staffing turnover and/or retention and resident quality of care

Appendix IV. Summary of research on the relationship between organizational characteristics, resident quality of care and nurse staffing (in alphabetical order)

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj Factors</i>	<i>Quality of Care Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
Anderson et al. 2004	3,449 NHA, DON and nursing staff (244 RNs, 964 LPNs, 2,317 CNAs) employed in 164 Texas residential care facilities	Secondary data: state data (Medicaid cost reports, 1995) Primary data: survey (self-administered questionnaire, 1995)	Cross-sectional	2	n/a	In their study of turnover in nursing homes, Anderson et al. found that climate and communication both affected turnover, but lower turnover was dependent on the interaction between climate and communication. In nursing homes with reward-based administrative climates, higher levels of communication openness and accuracy explained lower turnover of licensed vocational nurses and certified nurse assistants, relative to nursing homes with an ambiguous climate. Adequate staffing and longer tenure of the nursing director were also important predictors of turnover. Greater LPN HPRD was significantly related to lower RN turnover, greater RN HPRD was significantly related (weak relationship) to higher RN turnover (may be related to acuity of illness and dependency of residents - also highly related to HPRD). Allocation of CNA resources did not relate to RN turnover. Greater perceived environmental changes were related to higher RN, LPN and CNA turnover. Longer tenure of the DON was related to lower RN turnover and larger size was related to lower LPN turnover. Greater LPN HPRD and greater availability of clinical resources (RNs) were related to lower LPN turnover. Greater CNA HPRD was significantly related to lower CNA turnover. CNA turnover was higher in homes where staff perceived a reward climate (vs. ambiguous) - perhaps because reward climate is linked to authoritarian management styles.	Limitation: the lack of control for resident demographics, and level of functioning Strength: its use of the "gold standard" Medicaid Cost Report data base Strength: control for resident risk factors: clinical information and medication use Strength: use of primary and multiple sources of data.

Appendix IV. Summary of research on the relationship between organizational characteristics, resident quality of care and nurse staffing continued

Author	Data Sample	Data Source	Study Design	Risk Adj Factors	Quality of Care Measures	Findings	Methodology Limitations and Strengths
Anderson et al. 2003	164 Nursing Home Administrators (NHA)/directors of nursing, 244 RNs, 964 LPNs, 2,317 CNAs employed in 164 Texas residential care facilities	Primary data: survey (self-administered questionnaire, 1995) Secondary data: state data (Medicaid Cost Reports and the Texas nursing home Minimum Data Set, 1995)	Cross-sectional	2	restraints, fractures, agitation & aggressive behaviours, complications of immobility (PU, contractures, UTI)	Director of Nursing (DON) management practices of communication openness, decision making, relationship-oriented leadership, and formalization, explained one or more of the following resident outcomes: aggressive behaviour, restraint use, immobility of complications, and fractures. Greater levels of RN participation in decision-making explained a lower prevalence of aggressive or disruptive behaviours among residents. DONs length of tenure in their current position was positively related to lower use of restraints and DONs increased years of experience was related to a lower prevalence of immobility complications and restraint use. Greater communication openness explained lower use of resident restraints and relationship-oriented leadership explained a lower prevalence of fractures. Predictors explained 11% to 21% of the variance. Lower use of restraints was linked with greater communication openness, "defined as being able to say what you mean without fear of retribution" (Anderson <i>et al.</i> , 2003, p. 18). Additionally, more formalized work procedures, rules, job descriptions and surveillance of work performance was related to a higher prevalence of immobility complications.	Limitation: the use of MDS to estimate resident outcomes. The researchers note that "measures created using MDS data are not as precise as measures created using data from clinical assessment or record review. Limitation: the analysis only included the perceptions of RNs and DONs, not that of LPNs or care aides. Strength: its use of the "gold standard" Medicaid Cost Report data base Strength: use of a very conservative adjustment for case mix Strength: use of multiple sources of data.
Atchison 1998	283 nursing assistants in 24 Illinois & Indiana residential care facilities	Primary data: survey (researcher administered, 1995)	Cross-sectional	n/a	n/a	Atchison's study of the perceived job satisfaction factors of 254 certified and 29 non-certified care aides found that there were three factors care aides found important (significance level of 0.05). These three factors were: personal growth and development; job security, and job challenge. Although not significant at the 0.05 level, Atchison also found that 63.6% of the respondents perceived fair treatment and respect to be important to their job satisfaction.	Strength: use of primary data.

Appendix IV. Summary of research on the relationship between organizational characteristics, resident quality of care and nurse staffing continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj Factors</i>	<i>Quality of Care Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
Banaszak-Holl & Hines 1996	250 residential care facilities administrators and DONs from 10 US states	Primary data: interviews (telephone, 1993) Secondary data: national data (Medicare/Medicaid Automated Certification Survey - MMACS, 1991) state data (Area Resource File - ARF - 1992)	Cross-sectional	1	n/a	Banaszak-Holl and Hines studied care aide turnover in a sample of 250 nursing homes from 10 states and found that aide turnover was significantly reduced by involvement in interdisciplinary care plan meetings. "Relative to homes in which aides had no involvement in care planning, homes in which the nursing staff accepted aides' advice and suggestions or simply discussed care plans with aides had turnover rates that were one third lower, and homes in which aides were involved in care plan meetings had turnover rates that were 50% lower (p. 515)." Aide involvement in assessments, aide training and workload, case mix severity, payor source mix, and facility size were not significantly related to aide turnover. Overall, Banaszak-Holl and Hine's model of turnover explained 21% of the variance in turnover rates.	Limitation: lack of control for reasons for turnover Strength: its selection of 10 states that represented the diverse set of nursing home markets and its random sampling of homes within each state. Strength: use of primary data (interviews) Strength: controlling for resident functioning, job design and organizational characteristics and by including an analysis of the workforce stability.
Barry et al. 2005	156 DONs + 430 day-shift charge RNs from 156 residential care facilities in Maine, Mississippi, New York, and Ohio	Secondary data: national (OSCAR, 1995) + state (ARF, MDS, 1995) Primary data: interview (DONs), questionnaire (charge nurses) (1995-1996)	Cross-sectional secondary data analysis + survey Retrospective longitudinal (6 mon) survey	3	social engagement, PU	In situations where nursing aides were given higher numbers of rewards (measured by availability of an advanced care aide position, care aide participation on facility committees, facility provision of training, and new staff orientations) there was a lower incidence of pressure ulcers ($r = -0.07$, $P < 0.1$). In situations where care aides had more influence in resident care decisions there were higher aggregate resident social engagement scores ($r = 0.085$, $P < 0.01$).	Limitation: did not include aides' perceptions of empowerment strategies Limitation: the researchers report that the MDS data quality indicators used have since been found to be relatively unstable when used over short periods of time. Limitation: the use of risk adjustment for level of functioning that only included cognitive, not physical functioning and did not adjust for resident medication use. Strength: adjusted for resident risk factors: cognitive functioning, clinical information and demographics. Strength: use of an incidence versus a prevalence measure for pressure ulcers
Bowers et al. 2000	38 Care Aides from 6 midwest US residential care facilities	Primary data: interviews and participant observation (date n/a)	Prospective longitudinal field study (2 years)	n/a	choice, grooming, social engagement, toileting	Bower's (2000) found that care aides from 6 U.S. Northwest residential care facilities (also discussed above), the inability to provide quality care (due to lack of time) was a primary reason NAs gave for leaving their jobs. Other reasons for leaving including low pay and lack of respect by nurses and other supervisors.	Limitation: small sample size Strength: use of primary data collected from both interviews and observations and its longitudinal design

Appendix IV. Summary of research on the relationship between organizational characteristics, resident quality of care and nurse staffing continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj Factors</i>	<i>Quality of Care Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
Castle 2001	420 residential care facilities Administrators and 420 residential care facilities in Kansas, Maine, Mississippi, Texas, South Dakota	Primary data: survey (mailed questionnaires, 1999) Secondary data: national data (OSCAR, 1999)	Cross-sectional	1	restraints, psychoactive drugs, cathertization, PU	In chain facilities (n=221), administrator turnover averaged 45% per year while the average annual turnover rate non-chain nursing homes (n=199) was 41%. A 10% increase in administrator turnover in chain nursing homes was associated with a 9% increase in the odds that a facility would have a higher than average drug use compared with lower than average ($P<.001$), a 5% increase in residents with pressure ulcers ($P<.05$), a 7% increase in residents who were catheterized ($P<.01$), and a 4% increase in quality of care deficiencies ($P<.001$). In nursing homes not belonging to chains, a 10% increase in turnover of administrators was found to be associated with a 7% increase in the odds a facility would have a higher than average proportion of residents who were given psychoactive drugs ($P<.001$), a 7% increase in residents who were restrained ($P<.01$), a 5% increase in residents with pressure ulcers ($P<.001$), and a 2% increase in residents who were catheterized ($P<.05$).	Limitation: use of the national data source OSCAR for resident outcomes which are not based on 24 hour observations but usually occur during the day shift. Limitation: the risk adjustment for clinical information only included dementia and skilled care measures. Strength: adjusted for resident risk factors: clinical information Strength: use of primary data Strength: OSCAR data was cleaned – hospital based facilities and facilities that were part of a retirement centre were excluded because they tend to be unrepresentative of other residential care facilities in terms of clients and staff
Castle and Engberg 2005	354 residential care facilities and their administrators in Missouri, Texas, Connecticut, and New Jersey	Primary data: survey (mailed questionnaire, 2003) Secondary data: national data (OSCAR, 2003)	Cross-sectional	2	restraints, psychoactive drugs, cathertization, PU, contractures	Multivariate analysis showed that both low (0-20%) and medium (21-50%) turnover rates of RNs was associated with more residents being restrained ($p<0.1$), catheterized ($p<0.01$ at 21-50% rate), or administered psychoactive drugs ($p<0.1$). Turnover rates greater than 50% were also associated with similar outcomes, but not at a significantly greater level. The relation between CA and LPN turnover and quality of care was especially significant at higher levels of turnover. CA and LPN turnover rates exceeding 50% were associated with higher use of physical restraints ($p<0.01$), catheterization ($p<0.01$), use of psychoactive drugs ($p<0.01$), and with a higher incidence of contractures ($p<0.05$), and pressure ulcers ($p<0.01$).	Limitation: use of the national data source OSCAR for resident outcomes which are not based on 24 hour observations but usually occur during the day shift. Limitation: the risk adjustment for clinical information only included psychiatric and dementia diagnoses Limitation: prevalence, not incidence measure, used for PU and contractures Strength: turnover data obtained from primary data Strength: response rate of 67% Strength: use of random sampling of residential care facilities and its selective sampling of 2 states with higher turnover rates and 2 states with lower turnover rates. Strength: adjusted for resident risk factors: level of functioning and for clinical information

Appendix IV. Summary of research on the relationship between organizational characteristics, resident quality of care and nurse staffing continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj Factors</i>	<i>Quality of Care Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
Hall et al. 2005	30 supervisors and 26 supervised staff from 12 Ontario LTC facilities	Primary data: focus groups (date n/a)	Cross-sectional	n/a	n/a	Hall et al. (2005) analysis of responses from 12 focus groups of Ontario LTC workers generated information on two key themes: "supportive behaviours currently used by managers in long-term care settings and factors contributing to supportive behaviours of supervisors." Supportive behaviours used by managers fell into two groups: communication behaviours and role-modeling behaviours. "Communication behaviours included (1) considerate listening, (2) praise, recognition, and positive reinforcement, and (3) respect and trust. Role-modeling practical behaviours included more overt behaviours such as helping, teaching and advocating." (p. 183). A key factor that enhanced supervisors' ability to support workers was communication, feedback and sharing of information. An effective supportive supervisor was also one who was seen to be knowledgeable by the staff. Staff also liked to have some control and autonomy over their unit. Manager also identified that their ability to provide support to staff was enhanced by an individual "approach and personality." (p. 186).	Limitation: small sample size Strength: use of primary data
Harrington & Swan 2003	1,155 Calif residential care facilities	Secondary data: state data (California Office of Statewide Health Planning and Development, 2001; California Medicaid, 1999; California Department of Finance, 2001; ARF, 1990)	Cross-sectional	1	n/a	Harrington and Swan. found that total staff hours in California per resident day was 3.2 hprd and RN hprd was 0.34 in 1999. High turnover rates lowered total and RN staffing levels in residential care facilities. Higher total hours per resident day were associated with lower turnover rates (Harrington and Swan suggest that this is because higher hours reduces nursing workload). Care aide wages were found to have a significant positive impact on improving total nurse staffing hours in facilities.	Limitation: lack of use of resident risk adjustment factors for clinical information, medication use and/or demographics Strength: use of resident risk adjustment factor: level of functioning and by inclusion of facility characteristics, sociodemographic and economic variables as well as county health factors Strength: the size of the sample (1,155 facilities). Strength: the data on nurse staffing was obtained from mandatory cost reports (COSHDPD) and the data was cleaned by excluding "hospital-based facilities and intermediate care facilities for the mentally retarded" (p. 372).

Appendix IV. Summary of research on the relationship between organizational characteristics, resident quality of care and nurse staffing continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj Factors</i>	<i>Quality of Care Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
Horn et al. 2004	1,524 residents in 95 U.S. long-term care facilities	Secondary data: facility data (medical records, physician orders, medication logs, Minimum Data Set, and staffing data, 1996-1997)	Retrospective longitudinal (12 weeks)	4	PU	Seventy-one percent of the residents did not develop a pressure ulcer during the 12-week study while the remaining 29% developed a new pressure ulcer. Variables associated with less likelihood of developing a pressure ulcer (PU) were... an LPN turnover of less than 25% ($P<.001$) and with receiving more than 2 hours of nurses' aide care time per day ($P<.001$), and more than 15 minutes of registered nurse care time ($P<=.001$) per resident per day. This study included only residents who were at some level of risk of developing a PU, as defined by a Braden Scale score of 17 or less, rather than the whole population of residents.	Limitation: information on staffing was self-reported by facilities - no mention is made of audits to check the validity and reliability of the data (Horn et al, 2002). Strength: use of comprehensive resident risk adjustment factors including clinical information, level of functioning, demographics and medication use. Strength: use of incidence versus prevalence measure of pressure ulcers
Kramer and Fish 2001	5,294 long stay residential care facilities in 10 US states	Secondary data: national data (Medicaid Cost Report, Medicare Standard Analytic Files Part A, MDS 2.0; 1999)	Retrospective longitudinal (1 year)	3	ADL, weight loss, PU	This study confirmed a linear relationship between nursing aide retention and quality. The threshold for retention below which facilities were at increased risk of being in the worst 10% and above which there were no additional improvements in quality was 40% for functional improvement (odds ratio = 2.72, $P<.05$); 41% for incidence of pressure ulcers (odds ratio = 2.54, $P<.05$), and 37% for resisting care improvement (odds ratio = 2.48, $P<.05$). Turnover thresholds above which facilities were at an increased likelihood of being in the worst 10% and below which there were no additional improvements in quality in long stay residential care facilities was 46% (incidence of pressure ulcers adjusted odds ratio = 1.61, $P<.05$).	Limitation: did not adjust for medication use Strength: use of Medicaid Cost Reports for staffing levels (considered the "Gold Standard") Strength: adjusted for resident risk factors: demographics, clinical information, functioning level and hospitalization Strength: use of an incidence versus a prevalence measure for pressure ulcers

Appendix IV. Summary of research on the relationship between organizational characteristics, resident quality of care and nurse staffing continued

Author	Data Sample	Data Source	Study Design	Risk Adj Factors	Quality of Care Measures	Findings	Methodology Limitations and Strengths
Krueger et al. 2002	5,486 full, part and causal time (non-physician) staff on active payroll within six organizations (2 community hospitals, 1 community hospital/long-term care facility, 1 long-term care facility, 1 tertiary care/community health centre, and 1 visiting nursing agency) located in five communities in Central West Ontario, Canada	Primary data: survey (self-administered questionnaire, 2000)	Cross-sectional	n/a	n/a	Two of the six sites Krueger et al, (2002) surveyed included a total of 355 Long Term Care workers. The predictors of job satisfaction varied by site. At the combined LTC/community hospital site (124/186 beds respectively), "the most important predictors of job satisfaction were: 1) good open communication between staff (OR 2.55, 95% CI 1.03 to 6.35), 2) good supervisor social support (OR 6.27, 95% CI 1.36 to 29.00), 3) organization keeps staff informed (OR 3.73, 95% CI 1.51 to 9.20), 4) good decision authority (OR 3.49, 95% CI 1.25 to 9.73), and 5) being satisfied with pay level (OR 2.47, 95% CI 1.14 to 5.34)." At the LTC site (389 beds), "the most important predictors of job satisfaction were: 1) belief the organization carries out its mission statement (OR 4.63, 95% CI 1.77 to 12.51), 2) good supervisor social support (OR 3.32, 95% CI 1.22 to 9.04), 3) good decision latitude (OR 11.61, 95% CI 1.33 to 101.8), 4) often or always given enough time to get the job done (OR 3.05, 95% CI 1.00 to 9.35), and 5) spending 38 hours or more on the job or job related activities (OR 3.55, 95% CI 1.32 to 9.59).	Limitation: the response rate, which was 33.2%, and was even lower for the LTC facilities (32.4% and 30.1%). Limitation: information on the representation of the sample based on job classifications was not provided other than a notation that all organizations had respondents within each job classifications. Limitation: at the time of this survey, the local community hospital, which was attached to the LTC facility, was order to transfer its acute services to another facility Strength: the survey tool was developed with extensive consultation, review of the literature and pre-testing. Strength: use of primary data.

Appendix IV. Summary of research on the relationship between organizational characteristics, resident quality of care and nurse staffing continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj Factors</i>	<i>Quality of Care Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
McGilton & Pringle 1999	113 RNs working in 13 LTC units in Ontario	Primary data: survey (1993)	Cross-sectional	n/a	n/a	McGilton and Pringle (1999) surveyed a sample of 113 nurses who worked in Ontario long-term care units of a community hospital or a teaching hospital to examine clinical control. The researchers found that RNs would prefer more control over organizational and clinical domains of their work. They found that there was a positive relationship between perceived organizational control and job satisfaction (RNs who perceived they had organizational control were more satisfied) and a negative relationship between preferred clinical control and job satisfaction (71% of RNs said they would prefer more clinical decision-making control).	Limitation: the small sample size Limitation: the sample being of LTC facilities attached to hospitals. Limitation: only 11% of the variance in job satisfaction was accounted for by perceived clinical and organizational control and the researchers recommend a clearer conceptualization of clinical control. Strength: use of primary (Canadian) data
Parsons et al. 2003	550 nursing assistants from 70 Louisiana residential care facilities	Primary data: survey (mailed questionnaire, 1996)	Cross-sectional	n/a	n/a	Parson et al. found that of the 550 care aides participating in their survey, 60% were satisfied with their jobs and 30% planned to quit. The care aide's relationship with the resident was the most important work issue and their major reason for staying in the job. They were most dissatisfied with pay, benefits, and recognition and appreciation of their work. Although the respondents were dissatisfied with benefits and salary, these work issues could not explain overall satisfaction or turnover. The multivariate analysis confirmed that professional growth and involvement in work-related decisions, supervision, and management keeping employees informed were significantly related to both turnover and overall satisfaction. Personal characteristics including total years of experience as a nursing assistant ($r=-.191$), length of current employment ($r=-.197$), and length of employment in last job ($r=-.177$) were also significantly related to turnover ($p=.000$ or $.001$).	Limitation: response rate of the study, at 33.0%, arguably provides a relatively unreliable sample as it falls below the generally accepted minimum response rate of 50% (Singh, 2000). Limitation: the researchers argue that the respondents fit the profile of care aides presented in the literature; however, this profile (mainly unmarried Black women with children, and the sole supporters of their families) does not closely match the profile of Canadian care aides. Strength: the survey tool was developed after a review of the literature and was constructed and revised after field testing. Strength: the researchers drew random samples from day, evening and night shifts so that all shifts were well represented.

Appendix IV. Summary of research on the relationship between organizational characteristics, resident quality of care and nurse staffing continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj Factors</i>	<i>Quality of Care Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
Trinkoff et al. 2005	445 nursing homes in 3 states (Ohio, West Virginia, and Maryland)	Secondary data: national data (OSCAR, 2000), state data (First Reports of Injury and Workers' Compensation data, 2000)	Cross-sectional	2	n/a	Trinkoff et al. (2005) found that total nursing hours per resident day were significantly associated with worker injury rates in nursing homes after they adjusted for acuity, profit status, aide training, total residents, and state (Beta = -2.39, P = 0.0004). Their analysis showed that 25% of the variance in worker injury was explained by their model. Because the injury rates were skewed, the researchers regressed log-transformed injury rates, finding all relationships remained significant, although the elimination of positive skewness increased the predictability of the model to 38% of total variance. Each additional hour of nursing care decreased the injury rate by nearly 16%. In other words, for every unit increase in staffing, worker injury rebates decreased by 2 per 100 FTEs. For each additional hour increase in nursing care, injuries were predicted to decrease by 2.4 per 100 FTEs. The number of total residents also had a significant negative effect: as size increased, worker injuries decreased (\$Beta = -0.03, P<0.003).	Limitation: The study used a prevalence versus an incidence measure for pressure ulcers, which weakens the findings. Strength: The researchers cleaned the OSCAR data using six logical decision rules suggested by Harrington. They excluded nursing homes with 15 or fewer residents; hospital based nursing homes; nursing homes reporting no RN hours but having 60 or more beds; nursing homes reporting more than 12 RN hours per day; nursing homes with less than 0.5 total nursing hours per resident days). Strength: the worker injury data received considerable cleanup to increase its reliability. Strength: included resident risk adjustment factors: clinical information and use of medication
Weech-Maldonado et al. 2004	1,134 residential care facilities in 5 US states (New York, Maine, Vermont, Kansas, and South Dakota)	Secondary data: national data (MDS+, OSCAR, 1996); state data (ARF, 1996)	Cross-sectional	3	PU, ADLs, restraints, psychoactive drugs	Weech-Maldonado et al. examined the effect of full-time versus part-time and contract RNs on quality outcomes and found that full-time RN staffing was associated with lower pressure ulcers (-0.048, P<0.1) but not with lower cognitive decline or mood decline. Facilities that used a higher proportion of full-time RNs versus part-time and contract RNs had a lower use of restraints (-0.059, P<0.05). Higher RN staffing mix was found to be associated with better outcomes in terms of both pressure ulcers (-0.069, P<0.05) and cognitive functioning (-0.054, P<0.10)	Limitation: the study examined the impact of nurse staffing on a rather limited number of care processes Limitation: use of OSCAR staffing information Strength: the researchers cleaned the OSCAR data by excluding facilities with RN staffing variables in excess of 5 standard deviations from the mean and those with calculated staffing proportions greater than 100%. Strength: use of an incidence versus a prevalence measure for pressure ulcers Strength: use of risk adjustment factors for residents' functioning status, clinical information and demographics.

Appendix IV. Summary of research on the relationship between organizational characteristics, resident quality of care and nurse staffing continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj Factors</i>	<i>Quality of Care Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
Yassi et al. 2003	8 BC LTC facilities; 39 interviews (administrators, DONs, RNs, HEU members); 8 focus groups (care aides, LPNs); 310 phone surveys (LPNs, care aides)	Primary data: telephone survey (Nov 2001 - Feb 2002); staff interviews and focus groups (Nov 2001 to Feb 2002); on-site injury data collection Secondary data: provincial data (WCB records and injury statistics; Jan 1, 1999 to June 30, 2001); facility data (negotiated Essential Service Designation documents, personnel record files)	Cross-sectional	2	n/a	Resident-to care aide/LPN ratios differed substantially between high and low injury-rated facilities. High injury rate facilities (HIRFs) averaged 16:1 residents to staff compared with 12:1 residents to staff at lower injury rate facilities (LIRFs) (average day shift across all units). Facilities with lower injury rates had more visible and consistent practices around information sharing, problem solving, policy dissemination and monitoring, and follow-up concerns. In contrast to HIRFs, workers in LIRFs reported more supportive and trusting relationships between managers and front-line staff. Front-line staff in LIRFs were more involved in care planning and reported more positive views of the philosophy of care, the overall quality and fairness of service to residents, and their own effectiveness and flexibility as care providers. Perceived quality of care was strongly correlated with burnout, health, and satisfaction.	Limitation: the small size of the study sample, which limits generalizability; the small numbers of workers in the ergonomic study, which limits generalizability; Limitation: the time ordering of the data collection may have introduced historical biases, the number of workers available for the telephone survey due to turnover (average response rate was 72.3%) Limitation: the challenges of collecting complete facility data at one site due to its merger with another entity. Strength: use of primary data, including interviews with managers (administrators, DONs), RNs and care staff, ergonomic measurements and Functional Independence Measurements (FIM) of each resident collected for the purpose of the study. Strength: the phone survey tool was extensively researched, pilot tested, analyzed and modified. Strength: the secondary data, WCB records were cross-checked with time-loss incident records obtained from facility personnel records. Strength: the staffing level information was obtained from a reliable, valid source: the Essential Service Designation documents for each facility, as negotiated by the Health Employers Association of BC, the Hospital Employees Union and the Labour Relations Board. Strength: controlled for risk adjustment factors of demographics and functional level

Appendix IV. Summary of research on the relationship between organizational characteristics, resident quality of care and nurse staffing continued

<i>Author</i>	<i>Data Sample</i>	<i>Data Source</i>	<i>Study Design</i>	<i>Risk Adj Factors</i>	<i>Quality of Care Measures</i>	<i>Findings</i>	<i>Methodology Limitations and Strengths</i>
Zimmerman et al. 2002	2,285 residents from 59 residential care facilities in Maryland	Primary data: survey (initial interviews with residents, family members and care providers, Sept 1992 - March 1995; mid-point interviews with administrators, DONs, activity directors, 1993); observations (Sept 1992 - March 1995) Secondary data: facility data (medical records, Sept 1992 - March 1995)	Longitudinal prospective (2 years)	4	infection, hospitalization	High rates of incident of infection and hospitalization for infection were associated with RN turnover. "With each proportional loss of an RN (per FTE/100 beds) the risk of infection increases almost 30% and the risk of hospitalization increases more than 80%." High rates of incident infection, but not hospitalization for infection, were associated with more therapist and licensed practical nurse staffing and fewer nurses' aide staffing (unadjusted relative risk Therapist FTE/100 beds = 1.03, $P < .01$; LPN FTE/100 beds = 1.85, $P < .01$; Aide FTE/100 beds = 0.86, $P < .05$).	Limitation: self-reported staffing levels and resident information abstracted from residential care facilities charts, which may under-report incidences of infection. Limitation: no attempt was made to measure the effect of one facility factor while holding others constant. "The reported P-values...are best viewed as a set of descriptive statistics that mark association to be further investigated" (p. 1994). Strength: it considered relevant outcomes rather than indirect indicators Strength: use of primary data and longitudinal prospective methodology Strength: adjusted for resident risk factors: demographics, clinical information, functioning level and medication use.

References

- Anderson R.A., Corazzini K.N. & McDaniel R.R., Jr. (2004): Complexity Science and the Dynamics of Climate and Communication: Reducing Nursing Home Turnover. *Gerontologist* **44**, 378-388.
- Anderson R.A., Hsieh P.-C. & Su H.-F. (1998): Resource allocation and resident outcomes in nursing homes: Comparisons between the best and worst. *Research in Nursing & Health* **21**, 297-313.
- Anderson R.A., Issel M.L. & McDaniel R.R., Jr. (2003): Nursing Homes as Complex Adaptive Systems: Relationship Between Management Practice and Resident Outcomes. *Nursing Research* **52**, 12-21.
- Atchison J.H. (1998): Perceived job satisfaction factors of nursing assistants employed in midwest nursing homes. *Geriatric Nursing* **19**, 135-138.
- Banaszak-Holl J. & Hines M.A. (1996): Factors associated with nursing home staff turnover. *The Gerontologist* **36**, 512-517.
- Barry T.T., Brannon D. & Mor V. (2005): Nurse Aide Empowerment Strategies and Staff Stability: Effects on Nursing Home Resident Outcomes. *Gerontologist* **45**, 309-317.
- Bates-Jensen B.M., Schnelle J.F., Alessi C.A., Al-Samarrai N.R. & Levy-Storms L. (2004): The Effects of Staffing on In-Bed Times of Nursing Home Residents. *Journal of the American Geriatrics Society* **52**, 931-938.
- Bliesmer M., Smayling M., Kane R.L. & Shannon I. (1998): The relationship between nursing staffing levels and nursing home outcomes. *Journal of Aging and Health* **10**, 351-371.
- Bowers B.J., 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**, 55-64.
- California Department of Health Services (2001) Nursing staff requirements and the quality of nursing home care: A report to the California Legislature.
- Castle N.G. (2001): Administrative Turnover and Quality of Care in Nursing Homes. *The Gerontologist* **41**, 757-767.
- Castle N.G. (2003): Providing Outcomes Information to Nursing Homes: Can It Improve Quality of Care? *Gerontologist* **43**, 483-492.
- Castle N.G. (2005): Turnover Begets Turnover. *The Gerontologist* **45**, 186-195.
- Castle N.G. & Banaszak-Holl J. (2003): The Effect of Administrative Resources on Care in Nursing Homes. *Journal of Applied Gerontology* **22**, 405-424.
- Castle N.G. & Engberg J. (2005): Staff Turnover and Quality of Care in Nursing Homes. *Medical Care* **43**, 616-626.
- Center for the Study of Healthcare Management (2004) Summary of Selected Healthcare Industry Data Sets. University of Minnesota.
- Donabedian A. (1966): Evaluating the quality of medical care. *Milbank Memorial Fund Quarterly* **44**, S166-S206.
- Donabedian A. (1988): The quality of care. How can it be assessed? *Journal of the American Medical Association* **260**, 1743-1748.

- Dorr D.A., Horn S.D. & Smout R.J. (2005): Cost Analysis of Nursing Home Registered Nurse Staffing Times. [*Journal of American Geriatrics Society* **53**, 656-661.
- Dyck M.J. (2004) Nursing Staffing and Resident Outcomes in Nursing Homes. In *Nursing*. University of Iowa, Iowa, pp. 205.
- Engst C., Chhokar R., Robinson D., Earthy A., Tate R. & Yassi A. (2004): Implementation of a scheduled toileting program in a long term care facility: Evaluating the impact on injury risk to care giving staff. *Association of Occupational Health Nurses Journal* **52**, 427-435.
- Feuerberg M. & White A. (2001) Nursing Staff Turnover and Retention in Nursing Homes. In *Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes: Phase II Final* (U.S. Department of Health and Human Services, ed.). Health Care Financing Administration, Washington, DC, pp. 4.1-4.77.
- Hall L.M., McGilton K.S., Krejci J., Pringle D., Johnston E., Fairley L. & Brown M. (2005): Enhancing the Quality of Supportive Supervisory Behaviour in Long-term Care Facilities. *Journal of Nursing Administration April* **35**, 181-187.
- Harrington C., Kovner C., Mezey M., Kayser-Jones J., Burger S., Mohler M., Burke R. & Zimmerman D. (2000): Experts recommend minimum nurse staffing standards for nursing facilities in the United States. *The Gerontologist* **40**, 5-16.
- Harrington C. & Swan J.H. (2003): Nursing home staffing, turnover, and case mix. *Medical Care Research and Review* **60**, 366-392.
- Harrington C., Zimmerman D., Karon S.L., Robinson J. & Beutel P. (2000b): Nursing home staffing and its relationship to deficiencies. *Journal of Gerontology: Social Sciences* **55**, S278-S287.
- Hendrix T.J. & Foreman S.E. (2001): Optimal Long-Term Care Nurse-Staffing Levels. *Nursing Economics* **19**, 164-176.
- Hillmer M.P., Wodchis W.P., Gill S.S., Anderson G., M. & Rochon P.A. (2005): Nursing home profit status and quality of care: Is there any evidence of association? *Medical Care Research and Review* **62**, 139-166.
- Horn S.D., Bender S.A., Ferguson M.L., Smout R.J., Bergstrom N., Taler G., Cook A.S., Sharkey S.S. & Voss A.C. (2004): The National Pressure Ulcer Long-Term Care Study: Pressure ulcer development in long-term care residents. *Journal of the American Geriatrics Society* **52**, 359-67.
- Horn S.D., Buerhaus P., Bergstrom N. & Smout R.J. (2005): RN Staffing Time and Outcomes of Long-Stay Nursing Home Residents: Pressure ulcers and other adverse outcomes are less likely as RNs spend more time on direct patient care. *American Journal of Nursing* **105**, 58-70.
- Hutt E., Lin M. & Kramer A. (2000) Effects of nurse staffing on selected quality measures for long term residents derived from MDS. In *Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes: Report to Congress, Phase I* (Health Care Financing Administration, ed.). Health Care Financing Administration, Washinton, DC, pp. 10.1-10.19.
- Intrator O., Castle N.G. & Mor V. (1999): Facility Characteristics Associated With Hospitalization of Nursing Home Residents: Results of a National Study. *Medical Care* **37**, 228-237.

- Kayser-Jones J. & Schell E. (1997): The effect of staffing on the quality of care at mealtime. *Nursing Outlook* **45**, 64-72.
- Kramer A., Eilersten T., Lin M. & Hutt E. (2000) Effects of nurse staffing on hospital transfer quality measures for new admissions. In *Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes: Report to Congress, Phase I* (U.S. Department of Health and Human Services, ed.). Health Care Financing Administration, Washington DC, pp. 9.1-9.22.
- Kramer A. & Fish R. (2001) The Relationship Between Nurse Staffing Levels and the Quality of Nursing Home Care. In *Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes: Phase II Final Report* (U.S. Department of Health and Human Services, ed.). Health Care Financing Administration, Washington, DC, pp. 2.1-2.26.
- Krueger P., Brazil K., Lohfeld L., Edward H.G., Lewis D. & Tjam E. (2002): Organization specific predictors of job satisfaction: findings from a Canadian multi-site quality of work life cross-sectional survey. *BMC Health Services Research* **2**.
- MacCourt P. (2004) Best practice model for the development of an aggressive behaviour prevention and management program for long term care facilities to reduce aggression by residents with dementia towards staff, and the impact on staff in long-term care facilities. Nursing Directorate, British Columbia Ministry of Health, Victoria, pp. 81.
- McGilton K.S. & Pringle D. (1999): The effects of perceived and preferred control on nurses' job satisfaction in long term care environments. *Research in Nursing & Health* **22**, 251-261.
- Ministry of Health Services (2002) B.C.'s New Residential Care Access Policy.
- Parsons S.K., Simmons W.P., Penn K. & Furlough M. (2003): Determinants of satisfaction and turnover among nursing assistants. The results of a statewide survey. *Journal of Gerontological Nursing* **29**, 51-58.
- Rantz M.J., Hicks L., Grando V., Petroski G.F., Madsen R.W., Mehr D.R., Conn V., Zwygart-Stauffacher M., Scott J., Flesner M., Bostick J., Porter R. & Maas M. (2004): Nursing home quality, cost, staffing, and staff mix. *The Gerontologist* **44**, 24-38.
- Rantz M.J., Mehr D.R., Conn V.S., Hicks L., L., Porter R., Madsen R.W., Petroski G.F. & Maas M. (1996): Assessing quality of nursing home care: The foundation for improving resident outcomes. *Journal of Nursing Care Quality* **10**, 1-9.
- Rantz M.J. & Zwygart-Stauffacher M. (2004): Back to the Fundamentals of Care: A Roadmap to Improve Nursing Home Care Quality. [Miscellaneous]. *Journal of Nursing Care Quality* **19**, 92-94.
- Rantz M.J., Zwygart-Stauffacher M., Popejoy L., Grando V.T., Mehr D.R., L.L. H., Conn V.S., Wipke-Tevis D., Porter R., Bostick J., Maas M. & Scott J. (1999): Nursing home care quality: A multidimensional theoretical model integrating the views of consumers and providers. *Journal of Nursing Care Quality* **14**, 16-67.
- Schnelle J.F. & Simmons S.F. (2001) Minimum Nurse Aide Staffing Required to Implement Best Practice Care in Nursing Facilities. In *Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes: Phase II Final Report* (U.S. Department of Health and Human Services, ed.). Health Care Financing Administration, Washington, DC, pp. 3.1-3.40.
- Schnelle J.F. & Simmons S.F. (2004): Resolving Controversies About Nursing Home Staffing: Objective Technologies to Project Staffing Needs. *Alzheimer's Care Quarterly* **5**, 11-24.

- Schnelle J.F., Simmons S.F., Harrington C., Cadogan M., Garcia E. & M. Bates-Jensen B. (2004): Relationship of Nursing Home Staffing to Quality of Care. *Health Services Research* **39**, 225-250.
- Simmons S.F., Osterweil D. & Schnelle J.F. (2001): Improving Food Intake in Nursing Home Residents With Feeding Assistance: A Staffing Analysis. *J Gerontol A Biol Sci Med Sci* **56**, M790-794.
- Sullivan-Marx E.M., Strumpf N.E., Evans L.K., Baumgarten M. & Maislin G. (1999): Predictors of continued physical restraint use in nursing home residents following restraint reduction efforts. *Journal of the American Geriatrics Society* **47**, 342-8.
- Weech-Maldonado R., Meret-Hanke L., Neff M.C. & Mor V. (2004): Nurse staffing patterns and quality of care in nursing homes. *Health Care Management Review* **29**, 107-116.
- White A. (2000) Data Sources of Nursing Home Staffing Analysis, OSCAR: Reliability and Validity Analysis. In *Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes: Report to Congress, Phase I* (U.S. Department of Health and Human Services, ed.). Health Care Financing Administration, Washington, DC, pp. 7.1-7.38.
- Wilson A.L. & Cervero R.M. (1996) Learning from practice: Learning to see what matters in program planning. In *What really matters in program planning: Lessons in negotiating power and interests* (R. M. Cervero & A. L. Wilson, eds). Jossey-Bass, San Francisco, pp. 91-99.
- Wunderlich G.S. & Kohler P.O. (2001) Improving the quality of long-term care. In *Committee on Improving Quality in Long-Term Care, Division of Health Care Services, Institute of Medicine*. National Academy Press, Washington, DC.
- Yassi A., Cohen M., Cvitkovich Y., Park I.H., Ratner P.A., Ostry A.S., Village J., Pollak N., Uy C., Leyland T., Black L. & Fraser M.B. (2003) Reducing injuries in Intermediate Care: Risk factors for musculoskeletal and violence-related injuries among care aides and licensed practical nurses in Intermediate Care facilities. Workers' Compensation Board of British Columbia, Hospital Employees' Union, Occupational Health and Safety Agency for Healthcare in BC, Institute of Health Promotion Research, Canadian Institutes of Health Research, University of British Columbia, Vancouver, pp. 1-194.
- Yin R.K. (1994) *Case study research, design and methods*. Sage. Thousand Oaks, CA.
- Zhang N.J., Unruh L., Liu R. & Wan T.T. (2006): Minimum Nurse Staffing Ratios for Nursing Homes. *Nursing Economic\$* **24**, 78-85.
- Zimmerman S., Gruber-Baldini A.L., Hebel J.R., Sloane P.D. & Magaziner J. (2002): Nursing home facility risk factors for infection and hospitalization: Importance of registered nurse turnover, administration, and social factors. *Journal of the American Geriatrics Society* **50**, 1987-1995.