

## Report to Congress: Appropriateness of Minimum Nurse Staffing Ratios In Nursing Homes

### Organization of Phase 1 Report

Chapters 1 through 6 provide background, policy analyses and context for the study. Chapter 2 examines public policy and how it currently effects nurse staffing through quality regulations and Medicare and Medicaid payment rates. Chapter 3 presents a detailed analysis of current levels and trends of nursing home staffing in the U.S. Chapter 4 examines how HCFA's current non-ratio nursing home nurse staffing requirements are being implemented and assessed. Chapter 5 presents the results of focus groups discussions with direct care workers (Nurse Aides), and interviews with nursing facility management. Chapter 6, the last "background" chapter, provides a transition to the outcome analyses. This chapter critically reviews selected research on the relationship between staffing and resident outcomes.

Chapter 7 through 12, in a sense the core analysis of this Phase 1 report, present analyses on the relationship between staffing levels and quality outcomes. Chapters 7 and 8 assess the validity and reliability of OSCAR and Medicaid Cost Report Data. Chapters 9, 10 and 11 each present the results of an analysis of nurse staffing and a different set of quality outcome measures. Chapter 12, the last chapter of this core outcomes analyses, synthesizes the analyses of the preceding three chapters and extends the analyses to draw conclusions.

Chapter 13 examines three time-motion methods for setting nurse staffing levels. Chapter 14, the final chapter, asks how much nurse aide time is required to implement five specific, daily care processes that have been linked to good resident outcomes.

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## CHAPTER 6.0      REVIEW OF SELECTED RESEARCH ON NURSING HOME STAFFING AND RESIDENT OUTCOMES<sup>1</sup>

### 6.1      Introduction

The relationship between staffing levels and resident outcomes is not a new topic and has been the subject of several research studies with expert meetings reviewing these studies. One such

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<sup>1</sup> Sections 6.1, 6.2, 6.4, 6.5, and 6.7 of this chapter were written by Marvin Feuerberg, HCFA. Section 6.3 was written by Karen Reilly, Abt Associates. Valuable comments and suggestions were provided by Andy Kramer, University of Colorado Health Center on Aging and Division of Geriatric Medicine, University of Colorado Health Sciences Center, Denver, Colorado. Editorial assistance was provided by Jeane Nitsch and Susan Joslin, HCFA. Section 6.6 in this chapter called “Nursing Department Staff Ratios and Quality of Life was prepared by Rosalie A. Kane, Division of Health Services, Research, Policy and Administration at the University of Minnesota School of Public Health. Under contract with HCFA she directs a study called *Measures, Indicators, and Improvement of Quality of Life in Nursing Homes*. This scope of that study touches on how various aspects of overall staff mix, deployment, training, and role definition relate to the Quality of Life measures under development. Other key investigators associated with the study from the University of Minnesota include Robert L. Kane, Katherine Giles, Leslie Grant, Sandra Pothoff and Lois Cutler. Also among the investigators are M. Powell Lawton from the Philadelphia Geriatric Center and Howard Degenholtz from the University of Pittsburgh. Mary Pratt serves as the HCFA project officer. The Section was written on request from HCFA as a free-standing preliminary comment, reflecting on some issues related to quality of life that might impinge on recommended staffing ratios in nursing departments. The section was prepared without review of any of the other materials in the report. The investigators emphasize that as yet they have no findings from the study, *Measures, Indicators, and Improvement of Quality of Life in Nursing Homes*, and that their comments are based on review of a large literature on quality of life and a very scanty literature on how staff effects quality of life and early fieldwork in 40 nursing homes where they are developing indicators.



meeting of experts, referred to in previous chapters as the Hartford experts, has reviewed this research and made recommendations about appropriate minimum nurse staffing ratios, including recommendations of a minimum of 4.55 total nursing hours per resident day, as was discussed in Chapter 3. These recommendations were published in a recent issue of the *Gerontologist* (Harrington et al., 2000). In addition to recommended minimum nurse staffing ratios, the Hartford statement also made recommendations with respect to education and training, and the use of nurse practitioners, a recommended staffing issues that is outside the scope of our present study.

As was discussed in Chapter 1, expert consensus is one of the three research strategies that can be used to address our general study question of appropriate minimum staffing ratios. Although we have not assembled an expert panel to make recommendations, the Hartford experts were convened recently in April 1998 and their recommendations were published this year, 2000. We draw upon their published statement here in this chapter. In addition, our review of research on the relationship between nurse staffing and quality outcomes will reveal that the bulk of this research has been addressed to quality problems which come under the rubric of quality of care rather than quality of life.

Accordingly, this chapter has four objectives, to: 1) critically review selected research on nurse staffing and resident outcomes; 2) present background information on the Hartford meeting and discuss their findings and recommendations; 3) discuss other non-ratio aspects of staffing that are not analyzed in this Report; 4) review evidence on the relationship between staffing and quality of life.

## **6.2 Review of Selected Research on Nurse Staffing and Quality of Care Literature**

### **6.2.1 Introduction**

As we have seen, recent official reports by government agencies of serious problems in nursing homes of malnutrition, dehydration, pressure sores, abuse and neglect, coupled with a continuous flow of newspaper and television coverage, have led many to accept the position of the consumer advocacy organizations that inadequate staffing is the root cause of the identified problems. Second, it seems a matter of simple logic, faulty as we shall see, that more staffing must result in better resident care. It certainly seems counter intuitive that reductions in nurse staffing to very low levels would not result in quality problems; hence, the need for minimum standards. And, for the consumer advocates, much higher minimums than currently required. Third, there are some research studies which have been cited by a consensus statement of experts as consistently showing “the positive relationship between higher nurse staffing levels, especially RN staff, and the outcome of nursing home care.” We will discuss the consensus statement in the next section. In this section, we will briefly review *selected* research studies which report on the relationship between nurse staffing and resident outcomes. Our examination of these studies calls into question just how “positive” and how “consistent” the findings were and other study design elements which limit what can be concluded. This does not mean that the studies were not conducted competently and professionally. Every study has limitations and the studies

investigators often acknowledged some of our concerns described below. Although we cannot review each cited study here in great detail, the following should be noted in evaluating the strength of the evidence presented.

### **6.2.2 Sample Size and Representativeness**

Some of the studies were conducted with the resident as unit of analysis; others with the nursing home as the unit of analysis. With two exceptions, (Cohen and Spector, 1996; Harrington, et al, 1999) the data analyzed in each of the cited studies was limited to residents and facilities from a single State, and usually from a States with a small number of facilities. Cherry (1991) analyzed 1984 data of 134 Missouri nursing homes; Nyman analyzed 1984 data from 247 Iowa nursing homes; Aaronson et al. (1991) analyzed data from 449 Pennsylvania nursing homes; Spector and Takada (1991) analyzed data from 80 nursing homes in Rhode Island; Bliesmer et al. (1998) analyzed data from about 440 nursing homes in Minnesota over a 3-year period from 1988 through 1991; Munroe analyzed 1986 data from a sample of 455 Medicare certified skilled nursing facilities in California. The Munroe study (1990) analyzed data from a large sample of California SNFs. As will be shown below, the individual single State studies are so divergent - different design, data, measures, and research questions - that it is very difficult, really impossible, to aggregate them into a summary conclusion.

There are two studies that are not of single States. Harrington et al. (1999) has employed OSCAR data which reports on all Medicare, Medicaid, and dually certified homes in the United States. Cohen and Spector (1996), the other exception to a single State study , analyzed data from a nationally representative sample of 658 Medicaid-only homes from the Institutional Population Component of the National Medical Expenditure Survey (NMES), 1987.

The data for all the studies cover years prior to the implementation of OBRA '87 in October, 1990, although the Bliesmer et al. study straddles that period. Although we would expect that the relationship between staffing and outcomes to be consistent from year to year, the introduction of a number of changes in care practices as a result of OBRA may have altered that relationship. Whereas many of the cited studies were published after the implementation of OBRA, the data analyzed in all these studies, with the qualification noted above about the Bliesmer study, were from the pre-OBRA period.

### **6.2.3 Outcome Measures and Risk Adjustment**

Two studies, Harrington et al. (1999) and Munroe (1990) have employed number of deficiencies as the sole measure of resident outcomes, a suspect measure. Deficiencies represent discrete problems identified by State surveyors. Even if correctly determined by surveyors, they were never intended or conceptualized to be of equal importance and additive. For example, one nursing home can receive a deficiency for not prominently posting in the facility information on how to apply for and use Medicare and Medicaid benefits and another nursing home can receive a deficiency for placing residents in immediate jeopardy, e.g., failure to protect residents from abuse. HCFA's July, 1995 enforcement regulation recognized the unequal nature of

deficiencies. It required a two step process in deficiency determination on the part of surveyors. Every identified problem was to receive a deficiency followed by a second determination of the seriousness of the problem measured on a scope and severity scale.

In addition to the nonadditive nature of deficiencies, Harrington seems to acknowledge that the determination of the deficiency itself is faulty: "...there are known variations in the surveyor procedures and practices for determining deficiencies across the 50 States and the District of Columbia, as well as variance within states". This problem was also highlighted by the GAO and HCFA in prior studies.

The other studies typically employed a very limited array of outcome measures, usually 1 to 3 in number, with adequate to inadequate risk adjustment. Aaronson et al. (1994) used the pressure sore rate and restraint use rate as the outcome measures. The rate of pressure sores, a prevalence measure, can be viewed as an inadequate measure because it does not distinguish between pressure sores acquired in the facility from those present on admission. An incidence rate is far preferable than a prevalence rate. This difference cannot satisfactorily be addressed with risk adjustment, as was found in the analyses conducted for Chapters 9 through 12. All the resident data, including risk factor adjustments, were derived from HCFA's Medicare/Medicaid Automated Certification System (MMACS) data, a precursor of OSCAR, a data source for which we have no independent confirmation of its accuracy and good reason to think it grossly inaccurate (see discussion below). Further, their long term case mix index, also derived from MMACS data, employs nursing weights derived from over 25-year old studies of William Thoms, weights that are even more questionable as detailed in Chapter 13. Cherry (1991) also employs a composite measure derived from survey data which also appears to be a precursor of OSCAR.

Bliesmer et al. (1998) used as outcome measures functional ability, discharge home, and death one or more years after admission, controlling for residents' age and previous functional ability. The investigators acknowledged the data limitations, particularly the annual data collection, which "... cannot separate the effect of benefits from more active professional nursing that occurs immediately after admission from those that occur later in the patients' course." Spector and Takado (1991) also recognized the limitations in their data for evaluating the impact on short-stay residents. Their outcomes measures consisted of the probability of dying, declining or improvement in functional status over a 6-month period.

Nyman (1988) used several outcome quality measures, including plant maintenance, room maintenance, room furnishings, care plan, diet plan, medication plan, resident care, and quality of life. Plant maintenance, room maintenance, and room furnishing would not be recognized by most observers as *resident* outcome measures. The care plan, diet plan, and medication plan would also be considered by most as process rather than outcome measures, although it can be argued that they would be strongly related to quality outcome measures. The quality of life measure is derived from a random sample of ten residents and their response to a number of questions which are summed into a five point satisfaction score. As will be shown later in this chapter, quality of life is a very nuanced concept and particularly difficult to measure. Without

more information, this crude measure is suspect. The last outcome measure, one the author himself noted problems with, included resident care and measured the average number of patients who had clean clothing, were fully dressed, had clean hair, clean eyes, clean ears, daily oral hygiene, managed facial hair, clean and trimmed toenails, clean skin, good skin turgor, and fresh water available. As noted by Nyman, “the data regarding this variable, however, were ambiguous since some of the care categories may not have been applicable to all patients...”

Cohen and Spector (1996) used as outcome measures mortality within a year, having a bed sore (a prevalence measure with the attendant problem noted above), and Activities of Daily Living (ADL) status at the end of the study year. Both the ADL status measure and particularly the mortality measure are limited as measures of nursing home quality and the potential impact of nurse staffing. This is because the design of the study in measuring the outcomes counts their occurrence outside the nursing home which muddles their interpretation. If a former resident dies within the study year outside the nursing home, it is difficult to interpret this outcome as due to care received in the nursing home as opposed to care received in the hospital or from other non-nursing home care. Spector in another article (Spector and Mukamel, 1998) appears to acknowledge this difficulty when they note that “outcomes may be influenced by event after discharge for which the facility should not be held accountable (p. 300).” Further, Cohen and Spector themselves caution that “it is important to keep in mind that this study was limited to a few important outcomes. Because quality is multi-dimensional, analyses using a comprehensive set of outcome measures would be necessary to fully understand the relationship of reimbursement and staffing intensity to quality as measured by resident outcomes.”

#### **6.2.4 Measurement of Staffing**

Any study of the relationship between staffing and resident outcomes requires reasonably accurate measures of the various categories of nurse staffing, (i.e., Registered Nurse (RN), Licensed Practical Nurse (LPN), and Nurse Aide (NA)). At first glance, this might seem nothing more than simply counting people. However, nursing homes provide nursing staff 24 hours per day, different staff are on different shifts, often for different lengths of time, staff call in sick or on some kind of leave, and nursing homes often make use of temporary and sometimes extended use of contract nurses through outside agencies. Converting all the various times of nursing staff to total hours per resident day over some defined reporting period is more difficult than it might appear, particularly if the reporting period is not coterminous with the record keeping as seems to be the case for payroll records for regular staff and invoice records for contracted staff. In addition as noted in Chapter 6, the central independent variable(s) of staffing (RN, LPN, NA) per resident day also requires a resident count. Although this is a lot easier than counting staff, there is some variability in how this is typically measured - some count the residents in the facility at one point in time, others use average daily census over some period of time, and there are differences of whether people not in the facility but in the hospital are entered into the count.

Given the above, *it is surprising that not one of the studies reviewed offered any assessment or even consideration of the accuracy of the staffing data employed in their analysis.* Most of the studies explicitly employed MMACS, a precursor of HCFA’s OSCAR system, which has been

known to users to have a number of duplicate facilities and other major editing problems, as compared to OSCAR. Other studies appear to use MMACS or some other staffing data source which are generated by State Survey Agencies in the pre-survey period. And the OSCAR data themselves, while more accurate than MMACS, is very inaccurate particularly with respect to reported nurse aide time, as presented in a separate validity analysis in Chapter 7. Cohen and Spector used as a data source for staffing the Institutional Population Component (IPC) of the 1987 National Medical Expenditure Survey (NMES), the precursor of the 1996 Medical Expenditure Panel Survey (MEPS). As discussed in Chapter 3, all these data of nurse staffing are essentially self-reports by the facility with little to no editing and no independent validation or assessment. As such, their accuracy is suspect.

Some studies appear to employ Medicaid Cost Report data or other financial and operational data reported to a State Agency, presumably the rate-setting agency. As such, they should be more accurate because they are presumably desk audited, and potentially vulnerable to a real audit and sanctions for misreporting of data. Of course, since these data are used for reimbursement, there may be for some cost-based reimbursement systems counter incentives for exaggerating staffing levels. The analyses presented in Chapter 8 found nurse staffing as reported Ohio Medicaid cost reports to be reasonably accurate, particularly with respect to reported RN and LPN staffing and far more accurate than OSCAR data.

The key point here is that *none* of the reviewed studies offered any evidence or even consideration as to the accuracy of the reported staffing measures employed in the various analyses. And there is evidence presented in Chapter 7 and Chapter 8 that renders the reported data sources in the cited studies suspect. Finally, the use of some covariates in many of the regression analyses compounds this problem of staffing accuracy. In contrast to the analyses reported conducted in this study and reported in subsequent chapters, these regression often entered into the equations covariates that are known to be highly associated with nurse staffing such as profit/non-profit or hospital-based/freestanding status. These particular covariates are likely to weaken any association between staffing and quality by using a proxy for staffing in the model.

### 6.2.5

### Consistency and Strength of Findings

Apart from all the above noted limitations in the research cited in support of the Hartford findings, it is important to examine the findings themselves. As noted above, the studies typically attempted to examine the impact of nurse staffing on one to three outcome measures. The three studies with particularly suspect outcome measures found fairly weak results. Munroe (1990) found RN hours and LVN (licensed vocational nurse) hours had no impact on deficiencies; the ratio of RN to LVN hours per resident day had a significant negative relationship with number of deficiencies. However, this relationship was significant at  $p < .10$  level in a regression analysis that only explained about 9% of the variance. Similarly, Harrington (1999) found a highly significant ( $p < .01$ ) negative relationship between nursing care staff and total care deficiencies. However, it is not surprising that the large  $N=13,700$  produces

such a reasonably high significance level; the regression model only explained about 12.5% of the variance. Nyman found a combined measure of nursing hours to be significantly and positively related to three of his eight outcome measures. Two of these three measures, plant maintenance and room furnishings, cannot be viewed as resident outcome measures, as noted above. The third measure, quality of life, is of dubious value, again noted above. No significant relationship was found for the three process measures.

Cherry (1991) found a significantly negative relationship between RN hours per resident day and a composite measure of poor care. However, the regression model only explained 12% of the variance. No significant relationship was found for LPN and Aide hours per resident day and poor care. Aaronson et al. (1994) found a significantly ( $p < .10$ ) negative relationship between direct care (nursing) staff per 100 beds and the pressure sore rate; no significant relationship was found for restraint use rate even if at the higher significance threshold of .10. Bliesmer et al. (1998) essentially found highly significant positive and negative relationships ( $p < .001$ ) for licensed nursing hours and the probability of discharge home and death, respectively, in the final year for each study cohort. No significant relationship was typically found for nonlicensed nursing hours. Licensed, but not nonlicensed, nursing hours were significantly associated with less dependency of residents three years later. However, “this effect appears to be primarily due to the likelihood of discharge home or remaining alive. When only the chronic residents are studied, the role of professional nursing hours virtually disappears.”

Spector and Takada (1991) did not find any significant impact of staffing and high ADLs on death and functional decline. However, moderate staff/high ADL and low staff/high ADL were significantly associated with between 30% and 40% less likely to improve compared to high facilities with high staff and high ADLs. Cohen and Spector (1996) found that a higher RN intensity (ratio) “...was associated with a lower rate of mortality”. The investigators acknowledge that the effect is small. A higher intensity of LPN staffing was found to “...significantly improve functional outcomes, although this impact is also relatively small.” There appeared to be no impact of staffing on having a bedsore. In contrast, Aaronson et al. (1994) found a significant negative relationship, as noted above.

## **6.2.6 Conclusion: Review of Selected Research on Nurse Staffing and Quality of Care Literature**

### *6.2.6.1 Is There a Positive Association Between Staffing and Quality of Care Outcomes?*

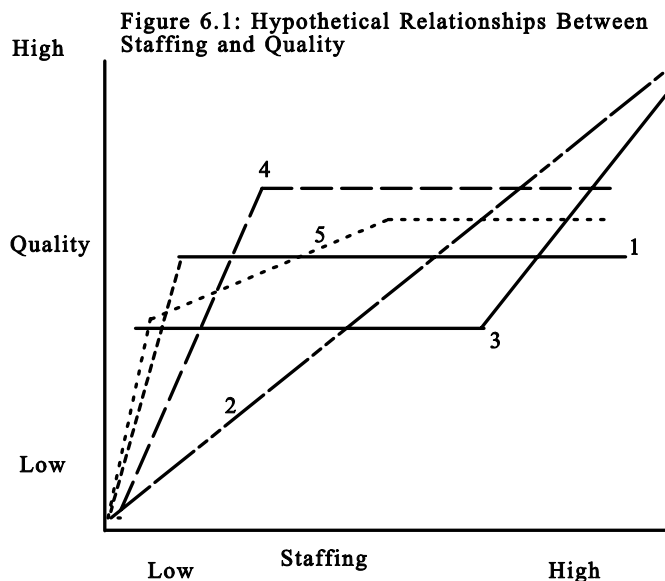
Any conclusion on the association between staffing and outcomes derived from the above studies would be based on small samples of limited representativeness, questionable outcome measures and risk adjustments, staffing measures of unknown accuracy, and findings that show no or very weak relationships between staffing and outcomes. We find no way to conclude on the basis of these reviewed studies that there is a strong and consistently positive association between staffing and quality of care outcomes.

However, it should also be acknowledged that none of the studies has found a significant negative relationship between staffing and quality. As such, this pattern suggests that better designed studies might produce the strong evidence claimed by the Hartford statement, but not found in our scrutiny of their evidence. This is not to suggest that the reviewed research was not professionally conducted. Many of the studies were limited by the data available to the investigators, as discussed above. Also, many of the studies were not primarily designed to investigate the impact of staffing on outcomes; often this was a secondary objective or a by-product of another analysis, (e.g., to evaluate the impact of Ombudsmen programs, reimbursement, or whether for-profit and not-for-profit homes behave differently). Hence, there is a need for a comprehensive study specifically designed to address the problems identified in the above studies and provide a more definitive assessment of the relationship between staffing and quality problems. It is just such a study that has been conducted for this Report and is presented in the following chapters.

### 6.2.6.2 Staffing Thresholds

Even if the above evidence on the association between staffing and quality had been stronger and more consistent, *none of the reviewed studies were even designed to identify a critical ratio of nurses to nursing home substantially problems.*<sup>2</sup>

respect to be generated to answer that found in the subsequent Chapter 1, this ratios depends thresholds and hypothesize relationships. relationships and quality in Lines 1 should be noted



*residents below which increased risk of quality* Relevant evidence with specific ratios can only from research designed question, as will be analyses presented in chapters. As noted in question of specific on an analysis of staffing it is instructive to about the possible These hypothetical between nurse staffing problems can be found through 5 below. It that these relationships,

as depicted by the five lines in Figure 6.1, are crudely drawn with straight lines for emphasis; the relationships revealed in actual data would be less pronounced.

<sup>2</sup> It is true that the Spector and Takada (1991) did conduct an analysis that differentiated between the impact of high, moderate and low staffing (see Table 4). However, we did not see any reporting of the cut points between these levels; hence, no specific thresholds were identified.

Line # 1 in the Figure illustrates the hypothetical relationship of no relationship between staffing and quality problems. Although the link between low staffing levels and quality problems may seem intuitively obvious, there is no necessary connection. Of course, we know that if all the nursing staff were removed, residents would not miraculously return to good health and functioning. Clearly, at *some* ratio of nurse staffing substantially increased levels of quality problems would occur. But there is no apriori reason, apart from empirical evidence, to assume that any or a substantial portion of nursing homes actually staff at these critically low levels. This hypothetical possibility is illustrated in Line # 1. For the entire range of staffing actually found in nursing homes as represented by the solid horizontal line, there is no relationship. Hence, under these circumstances, a study would report no association. Actual data might report a few homes that would lie in the broken line range, but they would be too few in number to impact the correlation. But *if* nursing homes were to staff below a very low threshold (between zero and very low), then quality would rapidly deteriorate as depicted by the broken line. Further, this is more than a theoretical possibility. As we have seen in Chapter 3, nursing homes may reduce their staffing levels in response to financial difficulties or labor shortages.

Line # 2 illustrates a hypothetical relationship expected by many observers. We see a strong positive relationship between staffing and quality of care over the entire range of staffing.

Under these circumstance, a requirement of a minimum staffing ratio established at any level would result in an improvement in quality. A fixed increase in the minimum would result in a fixed improvement in quality.

Line # 3 illustrates another hypothetical positive relationship between staffing and quality of care. Here we see for staffing at all but the highest levels, no relationship between staffing and quality of care, although quality of care is below average. However, when staffing levels are at a very high level, a threshold is reached and quality of care sharply improves. Hence, minimum staffing requirements established anywhere below this high threshold would not result in any improvement in quality of care.

Line # 4 illustrates another hypothetical positive relationship between staffing and quality. Here we see for staffing at all but the lowest levels, no relationship between staffing and quality of care, although quality of care is above average. However, when staffing levels reach a low level, quality of care sharply deteriorates. Hence, minimum staffing requirements established anywhere above this low threshold would not improve quality of facilities that normally staff above this low threshold.

Line # 5 illustrates still another hypothetical positive relationship between staffing and quality. Here we see two inflection points or thresholds. At moderate to high staffing levels there is no relationship between staffing and quality of care, although quality of care is above average. However, as staffing declines from moderate to low levels, quality of care deteriorate. And as staffing further declines from low to very low, quality of care deteriorates even more sharply. Under these circumstances, a minimum staffing requirement established anywhere below moderate levels would not improve quality of care for facilities that staff above average levels.



A minimum staffing requirement established at the first inflection point of very low staffing would result in quality improvement for the relatively few nursing homes that staff below this threshold. Similarly, a minimum staffing requirement established at the second inflection point of low (as opposed to very low) staffing would result in additional but somewhat less quality of care improvements.

These hypothetical relationships illustrate something extremely important. Actual data arrayed as illustrated in Lines 2 through 5 *would all produce a positive association between staffing levels and quality of care. Yet, they all reveal different inflection points or threshold relationships, and they would lend support to very different minimum staffing recommendations.* As we have seen, none of the reviewed research indicated thresholds, nor were they even designed to determine the potential existence of these thresholds. To support specific ratio requirements, research needs to be designed with the objective of identifying potential thresholds or inflection points in the relationships between staffing and quality of care problems. As will be discussed below, it is also important that possible recommendations for staffing ratios be based on an analysis of the relationship between staffing and quality that adjusts for case mix. The analyses presented in Chapter 9 through 12 are designed with that objective. Of course, in considering different potential thresholds for establishing a higher minimum staffing requirement, it would be necessary to balance the benefits of further improvements in quality of care with the costs of these improvements.

### **6.3 Hartford Institute for Geriatric Nursing--Nursing Home Staffing Conference**

#### **6.3.1 Background**

An invitational, one day conference was convened by the John A. Hartford Institute for Geriatric Nursing, Division of Nursing, New York University on April 14, 1998, to develop a research agenda and strategies for studying staffing and quality of care in nursing facilities. Funding for the conference (entitled, "Staffing, Case Mix, and Quality in Nursing Homes") was provided by the Agency for Health Care Policy Research (now known as the Agency for Healthcare Research and Quality). Approximately 30 national experts attended--leading nurse researchers, educators and administrators in long term care, consumer advocates, health economists, and health services researchers with expertise in nursing home staffing and reimbursement issues.

A major purpose of the conference was to identify priority areas for research regarding the relationship between staffing and quality taking into consideration resident case mix. Conference objectives included small group discussion to address education and training of professional staff; staffing in long term care facilities; and staffing in sub-acute and special care units. Discussion addressed consideration of the level of nurse staffing in U.S. nursing homes and minimum nurse staffing level in nursing homes by different types of staff (i.e., RNs, LVN/LPNs, and NAs). Discussion was launched incorporating published literature, information provided by three conference speakers, clinical experience, existing staffing standards benchmarks, Federal data, and ongoing nursing home staffing research. The conference concluded with expert input regarding impacts on and constraints to nurse staffing. Products

generated as a result of the conference included: a statement of research priorities, an agreement among some conference attendees about minimum staffing levels, and two journal articles.

### **6.3.2 Conference Proceedings**

The expert panel reviewed examples of some of the published literature and ongoing nursing home staffing research including: 1) previous studies on staffing and quality of care; 2) current nurse staffing levels for all nursing home in the U.S. from the Federal On-Line Survey Certification and Reporting System (OSCAR); 3) the Health Care Financing Administration's (HCFA) 1995 and 1997 nursing home staff time measurement studies (from the perspective of adjusting staff time for resident acuity); and 4) the October 1995 National Citizens Coalition for Nursing Home Reform (NCCNHR) position paper, "Consumers' Minimum Standards for Nurse Staffing in Nursing Homes" (which was in the process of being updated). The 1996 Institute of Medicine report entitled, Nurse Staffing Hospitals and Nursing Homes: Is It Adequate?, was also discussed indirectly as it related to research and also was reflected in NCCNHR's activities to update their position paper.

As background, three presentations were made at the start of the conference. The first presentation addressed quality in nursing homes relative to current knowledge regarding nursing home processes and outcomes. The second was an update on the current state of science in nursing homes, presenting organizational and clinical models of staffing and their relationship to quality. The third presentation pertained to case mix in nursing homes and the extent to which the resident case mix measures can be incorporated into the process of assessing staffing needs.

Three work groups were convened to identify research priorities. The work groups were organized around a key staffing concept area. Panel experts in each work group were asked to explore the concept area using the research and policy questions posed by the Hartford Institute to guide their discussions.

#### *6.3.2.1 Work Group One: Education and Training of Professional Staff*

Work Group One was given the task of evaluating education and training of nursing home professional staff. The work group formulated key research questions and from those questions developed key research priorities. Key questions included: What criteria should be used to judge staffing quality? What educational preparation, training, and credentials are necessary for professional staff in nursing homes? What experiences are relevant? How can we assure that this preparation is achieved? What should the regulatory standards be?

Key research priorities and discussion that evolved from these questions were:

- Staff quality is often judged on education and expertise. Furthermore, the quality of staff could be judged in terms of value the staff represents to different stakeholders (e.g., customers, nursing profession);

- Specifically in terms of education, there is a lack of clear documentation on basic nursing education and there is a need for training in gerontology, supervision, and leadership;
- There was consensus among the group that staffing gold standards do exist if one pursues two certifications simultaneously: one, American Nurses Association's certification in gerontological nursing and two, facility certification of their own nursing home medical directors. The work group members also explored the idea of a comparable certification process for the Director of Nurses (DON) in the gerontology area.

### *6.3.2.2 Work Group Two: Staffing in Long Term Care Facilities*

Work Group Two was given the task of evaluating staffing in long term care facilities. The work group formulated key research questions and from those questions developed key research priorities. The key questions included: How should the staffing mix differ for long term care, sub-acute, and special care units? How should these staffing levels vary to meet different resident (case mix) needs? What types of staffing models are successful and what types are inadequate? Are there norms already in practice for different approaches? What criteria, including process and outcomes, should be used to judge staffing? What minimum staffing standards should be set by HCFA?

Key research priorities and discussion generated by the second group's discussion included:

- There is a need to differentiate between 'recommended' versus 'ideal' facility staffing-- the group recommended a 24 hour/day RN services;
- Reflections regarding day shift adult nurse practitioner (ANP)/geriatric nurse practitioner (GNP) staffing levels that adjust for intensity and case mix;
- Consensus regarding a 1:2-3 feeding ratio;
- Consensus that current federal minimal standards are too low;
- Issues regarding low wages for NAs being indirectly associated with the NAs ability to successfully do the job;
- There is a need for understanding case mix and resident case mix flow as it relates to staffing issues and the need to understand the meaning of '>basic=' nursing service;
- Issues related to replacing staff when people call in sick recognizing that a large number of nursing homes do not replace staff who call in sick;
- Considerations regarding the size of the institution vis-a-vis inflexible nurse staffing standards that do not account for number of residents. The intensity of care varies on any given day and varies with the number of residents. Thus, the roles and responsibilities

change correspondingly on any given day.

### *6.3.2.3 Work Group Three: Staffing in Rehabilitation and Sub-Acute Units*

Work Group Three was given the task of evaluating the staffing in Rehabilitation and Sub-Acute Units. The key questions the group developed were similar to those posed by the second work group (Staffing In Long Term Care Facilities).

Key research priorities and discussion evolving from the third group's discussion included:

- The demand for staffing is not linear across a resident's stay (e.g., a resident's need for staffing intensity changes during their length of stay--generally it is highest in the beginning and at the end of the nursing home stay);
- RN staffing needs to be both front and back loaded in terms of a resident's stay and RN staff is required 24 hour a day;
- The RN is necessary to assure access to other levels of care;
- Aide staffing is relatively high at the beginning of an admission, but as a resident progresses, may be reduced. LPN time is variable;
- Subacute staffing requires higher RN time than rehabilitation staffing, with higher aide time and similar levels of care from other staff;
- LPN care is less important because resident needs access to either an MD or someone who can assess and/or start therapy;
- Issues of case management were also discussed. Case management is part of the RN's role and is part of the reason staffing is front and back loaded.

Research priority staffing issues that all work groups addressed included identifying the main gaps for answering the questions -- what mix of nursing staff is associated with the highest quality of care? Also discussed were aspects of staffing that make a difference, staffing priorities, and identifying a nursing home chain or network that would be willing to allow onsite data collection and research aimed at improving quality of care.

The work groups re-convened to present their findings to conference attendees and reach consensus on the research priorities formulated during small group discussions. The concept areas and research priorities were refined and further delineated through efforts by the hosting Hartford Institute staff. A statement of research priorities, a draft statement regarding nurse staffing recommendations, and two articles were produced based on the expert panel's input.

### 6.3.3 Conference Findings

After reviewing the data on staffing from a number of sources and discussing critical staffing issues among work group members, the experts at the conference made two (among other) research priority recommendations about nurse staffing. First, the Hartford statement concluded that the current average nurse staffing levels in nursing homes in the U.S. appear inadequate. Further research identifying variation in resident acuity, nursing home type, and staffing shift is necessary to accurately specify staffing levels. Second, some experts concluded that current federal minimum staffing regulations for nurses appear low, and recommendations regarding specific minimum nurse staffing standards were addressed by the expert members.

To this end, in August 1998, the Hartford Institute of Geriatric Nursing forwarded a staffing recommendation to conference participants asking for feedback. During this same time, Charlene Harrington, Ph.D., RN (UCSF) addressed the Institute of Medicine Committee on the Quality of Long Term Care regarding the need for staffing standards, and indicated that the conference experts were preparing a recommendation to raise minimum staffing standards. The first draft of the minimum staffing standards, developed by staff, was revised based on feedback from some conference participants (although all participants were given the opportunity to suggest changes, not all participants responded). The revised staffing standards were disseminated among all conference participants, seeking endorsement by October 1998. Comments on the revised standards were also encouraged. The final staffing standards, along with the list of endorsers, was submitted to Peter Kohler, the IOM Committee chair on Long-Term Care Quality in November 1998; by Mathy Mezey, Director of the Hartford Institute for Geriatric Nursing at NYU; and Christine Kovner, also of NYU. A similar submission was planned for the Senate Committee on Aging and the Health Care Financing Administration, who were both considering whether recommendations should be made to improve nursing home staffing standards.

A draft paper was developed by key conference leaders based on the conference discussions. Two articles were also produced based on conference proceedings. This first of two articles focused on the secondary theme of the conference--nursing home staffing recommendations. While the Agency for Health Care Policy and Research (AHCPR) provided funding for the conference, it is duly noted that AHCPR did not officially endorse a position regarding nursing home staffing recommendations. The second article, produced at a later date, more appropriately conveyed AHCPR's focus for the conference--identification of nursing home staffing research priorities.

The first paper, "Experts Recommend Minimum Nurse Staffing Standards for Nursing Facilities in the U.S.," was accepted for publication by the *Gerontologist* (February 2000, Vol. 40 (1)). The list of authors include Charlene Harrington, Ph.D., RN, University of California at San Francisco; Christine Kovner, Ph.D., New York University; Mathy Mezey, Ph.D., Hartford Institute for Geriatric Nursing; Jeanie Kayser-Jones, Ph.D., UCSF; Sarah Burger, RN, National Citizens= Coalition for Nursing Home Reform; Martha Mohler, RN, National Committee to Preserve Social Security and Medicare; Robert Burke, Ph.D., Muse and Associates; and David

Zimmerman, Ph.D., University of Wisconsin-Madison. Following is the Executive Summary from that paper:

*To address the issue of staffing and quality of care in nursing facilities, experts were convened from across the country. Using nursing home staffing data from Health Care Financing Administration and recent staff time studies, the experts concluded overwhelmingly that the average staffing levels in nursing homes are too low to provide high quality of care. The experts recommended minimum staffing standards for nursing administration, 24-hour RN supervision, additional education and training, direct care giver ratios (1 nurse to 5 residents on days, 1:10 on evenings, and 1:15 on nights and additional staff at mealtime), and licensed nurse ratios (1:15 on days, 1:20 on evenings, and 1:30 on nights). The total recommended time is 273 minutes (4.55 hours) per resident day compared with 210 minutes (3.51 hours) on the OSCAR data and 250 minutes (4.17 hours) for the HCFA time studies with adjustments upward to take into account resident case mix. The minimum standards are recommended to state legislators, Congress, and HCFA for new legislation.*

Seventeen out of the 30 conference participants endorsed the final staffing recommendations generated as a result of the conference proceedings. Three types of conference groups did not endorse the nurse staffing recommendations. The first group (seven people) was comprised of government officials, government contractors, or individuals on commissions who felt unable to take a position due to potential conflict of interest. The second group (three people) either did not respond or did not feel they had the expertise to make a judgement. The last group (three people) did not support the proposal. Of these three people, two nursing home administrators were concerned about the government's ability to fund the staffing level as well as the available labor pool to implement the staffing recommendation and one economist was concerned about the cost effectiveness of increasing the staffing level in nursing homes.

The second article, identifying research priorities, was also produced based on conference proceedings. The article, "Research Priorities for Staffing, Case Mix and Quality of Care in U.S. Nursing Homes," was accepted for publication in *IMAGE: The Journal of Nursing Scholarship* (forthcoming 2000). Article authors were Christine Kovner, Mathy Mezey, and Charlene Harrington.

## **6.4 Hartford Statement: Guide for Research**

### **6.4.1 Limitations**

As might have been inferred from the above discussion, it would be difficult to reconcile our review of selected research on the relationship between nurse staffing and resident outcomes with the Hartford statement's findings and recommendations as published in *The Gerontologist*. The same studies we reviewed here are cited in the *Gerontologist* article as consistently showing "the positive relationship between higher nurse staffing levels, especially RN staff, and the outcome of nursing home care." But our examination of the cited studies calls into question how "positive" and how "consistent" the findings were, and other study design elements which limit what can be concluded from these studies. Perhaps more importantly, as noted above, even if the above evidence on the association between staffing and quality of care had been stronger and more consistent, none of the reviewed studies were even designed to identify a critical ratio of nurses to residents below which nursing home residents are at substantially increased risk of quality of care problems. A positive association is consistent with many different critical thresholds (in the case of a positive linear relationship) for establishing minimum ratio requirements.

In spite of our review of the Hartford proceedings, it is not clear to us how they arrived at their recommendations. Normally expert panels are established to follow highly structured protocols in reviewing published research for the purpose of making recommendations. This is the normal procedure followed by AHCPR in developing their practice guidelines. It is also the procedure described by Jack Schnelle in Chapter 14 with respect to a RAND, Inc. project to develop quality indicators. As we have seen, our review of the research differs from the assessment reported in the *Gerontologist*. Alternatively, an expert panel is sometimes convened to render a consensus judgement, sometimes employed a Delphi technique, on a critical problem because of an absence of published research on the topic. Expert panelists render a judgement based on their general knowledge and experience. Again, we are unclear as to what procedure was followed in arriving at the consensus statement. It is also important to note, that only a bare majority endorsed the recommendations. The majority statement also said that a majority of those who did not endorse the statement were not explicitly opposed.

### **6.4.2 Guide for Research**

Although we are unclear as to how the Hartford participants arrived at their recommendations, the statement identified a number of other aspects of staffing that would eventually have to be address in any consideration of a minimum staffing ratio. These include recommendations with respect to education and training, use of nurse practitioners, allocation of staff between shifts, and allocation of staff between administrative and direct care activities. In addition to the studies reviewed above on the relationship between staffing and resident outcomes, the Hartford statement cited other relevant research (See Chapter 5 results of focus group interviews with NAs for supporting evidence.):

Inadequate food intake is a major determinant of mortality in the frail elderly in nursing homes (Blaum et al., Frisoni et al., 1995). Other studies have reported that inadequate staffing and inadequately trained staff are major contributors to poor feeding of residents, inadequate nutritional intake, undiagnosed dysphagia, poor oral health, resident deterioration, hospitalization, malnutrition, dehydration, and starvation (Amella 1999; Kayser-Jones, 1996, 1997; Kayser-Jones and Schell, 1997.)

Other studies (Bowers and Becker, 1992; Foner, 1994) reported that NAs (Nursing Assistants) cut corners to manage workloads and lack time to provide high quality, individualized care given the requirements for institutional efficiency and the high work volume.

In a prior Report to Congress (HCFA, 1998), we advanced a similar but more nuanced position. The argument essentially links malnutrition of nursing home residents to inadequate staffing:

In recent testimony before the U.S. Senate Special Committee on Aging, evidence from various studies was cited that “between one-quarter and one-third of all nursing home residents have a low Body Mass Index, while between 10% and 14% experience significant weight loss.”<sup>3</sup> Similar findings were found for these nutritional markers in the University of Colorado study described above.<sup>4</sup> While investigators were cautious in interpreting these nutritional markers as necessarily avoidable or treatable, especially for residents suffering from long-standing and profound chronic illnesses, clearly too much of this malnutrition is “. . . caused or exacerbated by poor care practices . . .” such as facility failure to provide nutritional supplementation in underweight residents or adequate assistance with eating. Although evidence was presented in the Senate testimony that these nutritional problems had not improved under the new survey, deficiencies for Menus and Nutritional Adequacy (F363) have declined from 15% of facilities being given deficiency citations in 1991 to just over 5% in the last 6 months of 1995<sup>5</sup> to under 5% for 1996.<sup>6</sup> While it is true that deficiency citations have declined in other areas as well, the decline of deficiencies in this specific area of nutrition does not appear justified by any decline in what many regard as a serious problem. Although the new HCFA initiatives outlined above are intended to address this problem, it is too early to judge their effectiveness.

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<sup>3</sup> Statement by Catherine Hawes, Ph.D., Director of Program on Aging and Long Term Care, Research Triangle Institute, for U.S. Senate Special Committee on Aging, October 22, 1997.

<sup>4</sup> “Recent Data Relating to Nutritional Status,” private communication from Andrew Kramer, M.D., to Marvin Feuerberg, Ph.D., November 6, 1997.

<sup>5</sup> Harrington, C. et. al., *Nursing Facilities, Staffing, Residents, and Facility Deficiencies, 1991 Through 1995*, Table 52, Department of Social and Behavioral Sciences, University of California, San Francisco, January 1997.

<sup>6</sup> Cowles, C.M. *Nursing Home Statistical Yearbook, 1996*, Table IV-3, Cowles Research Group.



#### 6.4.2.1 Staffing and Malnutrition of Nursing Home Residents

The above studies utilize MDS and other medical record data to generate outcome indicators of poor nutritional health, such as a low Body Mass Index or significant weight loss. Although the investigators acknowledge that these outcomes for some residents may be unavoidable, they argue that too much of this malnutrition is “caused or exacerbated by poor care practices” such as facility failure to provide nutritional supplementation in underweight residents or adequate assistance with eating. Unfortunately, these outcome studies provide no direct evidence on the extent and nature of these poor care practices. Some direct evidence can be found in a series of recent research articles presenting the findings from a four-year anthropological study that investigated the social, cultural, and clinical factors that influence eating in nursing homes.<sup>7</sup> The study employed participant observation and in-depth interviews with physicians, nursing staff, and nursing home residents and their families. Also, to study eating problems more directly, very careful observations were made weekly and detailed field notes were recorded at all three meals, seven days a week for 100 residents who were not eating well. The study found many factors, such as poor oral health, undiagnosed swallowing disorders, lack of ethnic foods, and lack of sensitivity to individual needs, as contributing to eating problems. However, “inadequate staffing emerged as the major factor that influenced nutritional care.” Some examples include:

“...because the food carts had to be returned to the kitchen at a specific time, the staff had only 45 minutes to an hour to feed residents. Feeling pressured to finish within the hour, the staff became impatient with those who ate slowly; they spoke to them authoritatively: ‘Open your mouth!’ ‘Don’t talk, eat!’ ‘Laura, keep quiet. Quiet, Laura, you’re eating!’...When residents ate too slowly, the staff often mixed the solid food... with the liquids... and residents were forced to ‘drink’ their meal. All of the food - - the entree, the vegetables, and the dessert - - were added to the milk, resulting in an unidentifiable, unpalatable mixture...Sometimes residents were forced to eat rapidly against their wishes: huge spoonfuls of food were placed in their mouths. Some residents choked and coughed as they were fed large amounts of food too quickly....”<sup>8</sup>

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<sup>7</sup> In addition to the Kayser-Jones article referenced above, see Kayser-Jones, J., “Inadequate Staffing at Mealtime - Implication for Nursing and Health Policy,” *Journal of Gerontological Nursing*, 1977, 23(8): 14-21. Also see Kayser-Jones, J., Schell, E., Porter, C., Paul, S., “Reliability of Percentage Figures Used to Record the Dietary Intake of Nursing Home Residents,” *Nursing Home Medicine*, 1977, 5(3): 69-76.

<sup>8</sup> Kayser-Jones, J., Schell, E., “The Effect of Staffing on the Quality of Care at Mealtime,” *Nursing Outline*. 1997, 45, p. 68.

Interview data from physicians, families, residents, and the nursing staff themselves all pointed to the inadequate number of staff to assist residents at mealtime. For example, a certified nursing assistant (CNA) noted, “Sometimes some CNAs have five or six feeders [residents who have to be fed] and no help so I try to go down the hall and give people a bite or two. Most of the time if they have a lot of feeders, the patients just don’t eat. There’s no one to feed them so the trays go back, and the people get no food.” The OSCAR data indicate that a considerable number of nursing home residents need assistance with eating. For example, nearly one half (47%) need some assistance. Over one fifth (21%) are totally dependent in eating.<sup>9</sup> Given this need for eating assistance, it is critically important that the ratio of CNAs, the staff who provide most of the mealtime care, to residents is sufficient. In this study, these ratios were not sufficient. On the day shift in Facility A, the ratio of CNAs to residents was about 1:9 to 1:10. On the evening shift, it was 1:13.5 to 1:15.5. At Facility B, the staff to resident ratio was slightly higher: 1:7.7 on the day shift and 1:11.5 during the evening.”<sup>10</sup> Although Kayser-Jones acknowledges that nursing homes could partially address the eating problems by more “creative planning,” her research emphasizes that “higher staff-to-resident ratios at mealtime are imperative.” Additionally, she maintains that it is also important for CNAs to be supervised by professional nurses and taught how to feed residents with complex eating problems.

#### *6.4.2.2 Summary: Malnutrition and Inadequate Staffing*

Essentially, this four-year anthropological study has found that eating problems of nursing homes residents are primarily due to inadequate staff. However, as we noted in the prior report, it is important to not overgeneralize these findings based on intensive observation for only two facilities. What would not be disputed is that there are a number of nutritional outcome measures, based on data by different investigators, indicating nutritional problems. Second, there are independent data sources indicating a relatively high percentage of residents needing assistance with eating and a relatively low CNA to resident ratio to meet this need. However, we have not identified any research analyzing the relationship between measures of nurse staffing to nutritional problems for a sufficiently large sample of nursing homes. This required analysis would have to address all the issues identified above in the Hartford cited research, including the need for appropriate risk adjustment. Although Kayser-Jones qualitative observations are dramatic and compelling, without a quantitative study conducted over more homes, her position that staffing numbers (as well as other aspect of staffing) are an important cause of malnutrition must be regarded as a compelling hypothesis.

### **6.5 Quality of Care vs. Quality of Life Outcomes**

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<sup>9</sup> Cowles, op cit, Table II-6.

<sup>10</sup> Kayser-Jones, “Inadequate. . .,” op cit., p17.

Researchers and HCFA regulations often distinguish between what are referred to as quality of care practices and outcomes (e.g., bathing, toileting, feeding, pressure ulcers, urinary tract infections, etc.) from the care processes and nursing home environment which enhances residents' dignity; individuality; autonomy/choice; sense of privacy; enjoyment; meaningful activity; relationships; sense of security/order; comfort; spiritual well-being, and functional competence. (See discussion below). With a few debatable exceptions, the outcome studies reviewed in this chapter would fall under the rubric of quality of care. Also, the outcomes analyses conducted for this study and presented in subsequent chapters would be viewed as quality of care outcomes. There are two important qualifications to this characterization, however. One of the outcome measures examined in Chapter 10 refers to change in resisting assistance with ADLs as a way to measure the personal relationship between residents and staff:

Change in resisting assistance with ADLs is a way to measure the personal relationship between residents and staff. According to Bowers and Kayser-Jones (1996 and 1999), patients and nursing staff regard the relationship that develops between a vulnerable adult and her caregiver to be of paramount importance in determining the quality of a resident's life. 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 (see Chapter 10).

The other qualification to characterizing our outcome measures and analyses as solely quality of life is conceptual. Chapter 14 presents an analysis by Jack Schnelle (UCLA) of the time it takes nurse aides to perform a number of "best practices" which would normally be regarded as quality of care activities: need for physical activity, incontinence care, and feeding and dressing assistance. Yet Schnelle argues "that a distinction between quality of care and quality of life is both arbitrary and misleading":

All care processes that met our inclusion criteria (for the study) involve significantly increased personal contact between residents and NH staff. Our literature review documented the extent to which this personal contact exceeds contact under "usual care" conditions for the protocols pertaining to feeding assistance, ADL dressing enhancement, and incontinence management. If one believes that increased social interaction and personal contact between residents and NH staff can improve residents' perceptions of life quality and/or their agitation and mood, then measures of these outcomes should also improve following implementation of the five care protocols that met our inclusion criteria.

Of course there is no necessary contradiction between acknowledging quality of life components inherent in the performance of quality of care processes and yet maintaining that there are other aspects of quality of life that are not captured at all in quality of care measures. Although an

analysis of the impact of nurse staffing on these other aspects are beyond the scope of this study, the next section, by Rosalie Kane, will review research on the relationship between nursing staff ratios and quality of life for nursing home residents. In addition, a description of an on-going study and some preliminary observations will be presented.

## **6.6 Nursing Department Staff Ratios and Quality of Life**

### **6.6.1 Background**

In May 1998, HCFA awarded a contract to the University of Minnesota for a project entitled *Measures, Indicators, and Improvement of Quality of Life (QOL) in Nursing Homes*. The scope of that project includes: specifying domains of quality of life, developing and testing measures of quality of life at the individual level, and developing and testing indicators (that is, characteristics of the facility programs, staff deployment, physical environments, and policies) that are associated with quality of life.

The QOL domains under development in this work are: dignity, individuality, autonomy/choice, sense of privacy, enjoyment, meaningful activity, relationships, sense of security/order, comfort, spiritual well-being, and functional competence. Each quality of life domain is being measured as a resident outcome, but the study also entails identifying and testing potential indicators that might be associated with one or more QOL domains for all or a subset of residents. Table 1 provides definitions of each QOL domain. Note that each domain can be examined in terms of negative outcomes that suggest that QOL is poor on that domain and positive outcomes; for example, boredom is a negative pole of *meaningful activity*, but meaningful activity can also be expressed in positive terms, such as being stimulated, interested, and engaged with daily life.

Table 6.1 Definitions of QOL Domains

<b>Domain</b>	<b>Outcome definition</b>	<b>Implication for indicators</b>
<b>Autonomy</b>	Residents make choices related to their care and their lives and, within limits of their conditions, direct their own lives.	Facility policies, programs, staff practices and physical environments encourage and do not discourage resident choice and self-direction.
<b>Individuality</b>	Residents feel that they are known and understood as individuals, maintain a sense of self, and continuity in their lives.	Facility policies and staff practices encourage individuality. Residents are not depersonalized.
<b>Sense of privacy</b>	Residents have solitude when desired, interact with others in privacy when desired, and preserve confidentiality regarding personal information.	Facility policies, staff practices, and physical environments support ability of residents to experience privacy.
<b>Dignity</b>	Residents feel that their dignity is intact and do not experience what they consider indignities.	Facility policies, programs, staff practices, and physical environments promote dignity.
<b>Enjoyment</b>	Residents experience enjoyment in their daily lives.	Facility policies, programs, staff practices, and physical environments promote resident enjoyment.
<b>Meaningful activity</b>	Residents have interesting things to see and do. They are not bored. Meaningful activity as the high end of functioning includes making a contribution to the well-being of others.	Facility policies, programs, staff practices, and physical environments promote meaningful activity.
<b>Relationships</b>	Residents are engaged with others in relationships, including with family and friends, other residents, and staff.	Facility policies, programs, staff practices, and physical environments promote viable relationships for residents.
<b>Sense of security/order</b>	Residents feel that they are safe and that the rules and norms in the facility are understandable and predictable. Residents are not afraid.	Facility policies, programs, staff practices, and physical environments promote a sense of security and order.
<b>Comfort</b>	Residents are free from pain and other physical discomforts and their discomforts are noticed and addressed.	Facility policies, programs, staff practices, and physical environments promote physical comfort.
<b>Spiritual well-being</b>	Residents perceive that their lives are worthwhile and meaningful and, when applicable, they take strength and comfort from their religion.	Facility policies, programs, staff practices, and physical environments promote spiritual well-being.
<b>Functional competence.</b>	Within the limitations of their disability, residents are as independent and care for themselves as much as they wish.	Facility policies, programs, staff practices, and physical environments promote resident independence and self-care.

The Wave 1 test of the Quality of Life measures began in January 2000. The plan is to collect data on quality of life outcomes for 2000 residents (50 residents in each of 40 facilities located in five States). As of April 1, 2000, data collection was complete on 1200 residents located in eight Minnesota facilities, eight Florida facilities, and eight California facilities. All Wave 1 data collection on the QOL of 2000 residents should be complete by mid-June 2000. Four potential sources of data are being used to measure resident quality of life: a resident interview, structured observations of the resident, a family questionnaire, and an interview with a line staff member about each resident.

To construct indicators, the investigators are collecting structure and process information from each facility on candidate indicators that may be associated with one or more quality of life outcomes for residents. After the Wave 1 analyses, those items that show a correlation with facility overall quality of life scores, or with quality of life scores for a subset of residents (e.g. residents with dementia, cognitively intact residents, long-stay residents, short-stay residents) will be used to help select a new group of facilities in which to administer streamlined quality of life measures in Wave 2 of data collection.

Numerous items regarding nursing department staff and other staff are being collected as candidate indicators that may be associated with QOL. Unfortunately, the investigators are not in a position to provide even preliminary results on how staff ratios affect quality of life at the time this Report was completed. Rather, this discussion is divided into the following sections: 1) a discussion of the literature on how nursing staff ratios affect quality of life; 2) a discussion of other aspects of staffing besides nursing staff-to-resident ratios that might conceptually be expected to affect quality of life; and 3) description of how our study of QOL might add to understanding on these points.

### **6.6.2 Literature Review and Conceptual Discussion**

In preparation for refining the research design, the investigators conducted an extensive review of factors associated with the various domains of QOL under study. Unfortunately, this review yields little hard evidence on how nurse staff ratios relate to QOL. In some ways this is not surprising. QOL is a complex concept, which can be hypothesized to be related to many aspects of a facility's programs, policies, staff characteristics, and physical environments as experienced by a particular resident. To the extent that staff characteristics are important predictors of one or more of the postulated QOL domains, sheer numbers of staff in nursing are unlikely to be the determinants. Beyond numbers is the question of what staff actually do, how well they do it, how their roles and tasks are defined, whether they are present in sufficient numbers on weekends and evenings, whether their jobs are structured so that they have the opportunity to know residents as people, and whether and how they are expected to respond to resident's requests and wishes. Also relevant are the types, roles, and behavior of other staff present, since nursing department members are not the only ones who can affect QOL outcomes. Of course, members of nursing departments comprise the vast majority of staff at most nursing homes, so

that absolute numbers of staff can readily be confounded with absolute numbers of nursing staff. Certainly some absolute number of staff members is necessary to create the conditions for both QOL and quality of care in nursing homes. In their elaborate research on the psychosocial quality of nursing home work, Brannon, Streit and Smyer (1992) identified more than 3300 tasks performed by nursing assistants in four nursing homes, and classified these tasks by complexity and the extent to which each task was oriented to the resident. They found that many tasks have little to do with direct care, and even when the tasks were direct-care-oriented they rarely involved interacting with residents. Yet other work in the literature, briefly reviewed below, suggest that the frequency and nature of staff interactions with residents influence the way residents perceive the quality of their lives.

Besides nursing staff (RNs, LPNs, and CNAs), other relevant staff include: dietary staff, housekeeping staff, social service staff, activities staff, and therapy staff. A large complement of volunteers in direct contact with residents may also make a QOL difference, and perhaps a dedicated paid staff member to recruit, train, and supervise volunteers might be a pathway to a larger, more effective volunteer program. Any estimation of the necessary ratio of nursing department staff to residents must take into account the total staff-to-resident ratio with an emphasis on those staff members who directly interact with residents. Table 2 shows how selected aspects of staff numbers, qualifications, and deployment might be expected to affect quality of life; Table 2 is not meant to be comprehensive, but merely illustrative. Adequate or above-average numbers of nursing staff may, of course, be related to all of the QOL outcomes, especially when nursing constitutes most of the labor force. The “comfort domain” may be particularly responsive to nurse presence, and if the nursing staff emphasizes restorative nursing such as continence and mobility programs, “functional competence” may also have a direct link the numbers of nursing staff.

Table 6.2 Illustrative Features of Staffing That Might Affect QOL Domains

Staff feature	Aut.	Priv	Dig	Ind	Enj	Act	Rel	Sec	Comf	Func com	SpWB
Nursing department staff ratios (RN to resident ratio, RN/LPN to resident ratio, total nursing staff-to resident ratio)			✓					✓	✓✓	✓	
Evening and weekend nurse ratios			✓					✓	✓✓	✓	
Permanent staffing assignments				✓			✓ ✓				
Use of payroll staff versus pools				✓			✓ ✓				
Number, type and deployment of therapy personnel										✓✓	
Nurse practitioners/restorative nursing										✓✓	
Number, training, deployment of activities personnel	✓			✓	✓✓	✓✓	✓				
Paid pastoral counselor				✓			✓				✓
Number, training, and role of social work staff	✓			✓		✓					
Number and deployment of volunteers, paid volunteer coordinator				✓	✓	✓	✓				
Model for care planning	✓			✓							



The literature abounds with statements about aspects of facilities that residents find important for the quality of their lives. Such statements are variously derived from empirical studies using focus groups (Abt Associates, 1996, National Citizens Coalition for Nursing Home Reform, 1985, Uman, 1995), questionnaires to residents or family members (Kane et al., 1997; Kane, Bell, Reigler, 1986), Q-sort studies with staff (Sano et al., 1999), systematic observations of residents (Lawton, Van Houtman, & Klapper, 1996; Lidz, Fischer, & Arnold, 1991), anthropological and ethnographic study (Gubrium, 1993; Savashitsky, 1991; Schmidt, 1990; Shield, 1991; Tellis-Nayak and Tellis-Nayak, 1989;), and psychologically oriented research dealing with the search for identity and meaning among nursing home residents (Tobin, 1991). Another rich vein of insight is derived from autobiographical or thinly fictionalized accounts of life in nursing homes from those who have lives in them (Laird, 1985; Tulloch, 1975) or worked in them as nurse's aides (Bennett; 1980; Diamond, 1992; Foner, 1994; Henderson, 1995; Tisdale, 1987).

This body of diverse work yields remarkably consistent findings about what cognitively intact residents deem important. With reference to staff, residents tend to accord high importance, all things being equal, to continuity in the personnel who give them direct care. This finding, in turn, has caused some people to assume that high turnover of caregiving staff is associated with poorer QOL. In one of the few empirical studies of this topic, Patchner & Patcher (1993) found that permanent assignment did seem to improve quality of care, but they did not examine QOL outcomes. Residents also appreciate staff members who are kind, polite, gentle, responsive to their requests for help or information, and who demonstrate that they care about the residents as people. Residents tend to value having control over aspects of their daily lives, which, in turn, means that they value staff who are flexible in their responses to residents' wishes. The much-publicized Eden Alternative (Thomas, 1994) is predicated, in part, on the belief that if nursing assistants are empowered to make decisions, they will, in turn, be free to enable resident choice. The work of the Nursing Home Pioneers, an almost grass-roots movement of individuals who are attempting to bring about culture change in nursing homes (Fagin, Williams, and Burger, 1997; Lustbader, in press) is based on principles that emphasize the importance of making nursing homes places where the human spirit can flourish and residents and staff both can experience a sense of community. The pioneering efforts include the full gamut of environmental, structural and attitudinal change, ranging from total systems such as the Eden Alternative, to the creation of physical settings that resemble households and neighborhoods rather than institutions, and to efforts to create a viable community of residents and staff through community organizing techniques such as those pioneered at the Live Oak Regenerative Community in the California Bay Area (Barkan, 1995). Some of these innovative efforts are profiled in case studies in a 1995 book (Gamroth, Semradek, & Tornquist, 1995).

The insights from the literature and the pioneer efforts underway are compelling. They seem to have face validity. However, we could not locate studies that examine how any particular feature valued by residents, say, reducing turnover of nursing staff or permanent assignment of nursing staff or reduction of average amount of time for answering call lights at various times of day are correlated with any or all QOL domains, or for that matter, even how they are correlated with quality of care. Similarly, the pioneering efforts have not as yet been rigorously evaluated

though investigators are studying the process of culture change carefully and also identifying issues that interfere with QOL in conventional nursing homes (Dannefer, Stein, & Gelein, 1998).

When residents are substantially cognitively impaired evaluating their QOL is harder, let alone determining how nurse-to-resident ratios effect it. The creation of Alzheimer's Special Care Units (SCU) was motivated by a desire to create an environment and a complement of staff who could provide care in a way that was attentive to the QOL of people with dementia, while also offering a better QOL to those who are cognitively intact by a more homogeneous mix in terms of cognition and removal of some individuals with so-called behavioral disturbances. The National Institute on Aging's series of studies on SCUs did not generate strong consistent findings supporting SCUs, in part because of the great differences among SCUs and different norms, patterns, and case mix on units not designated formally as SCUs (Lawton, in press). On a more anecdotal level, those SCUs that seem to have made substantial changes in the nature of life in the nursing home have sometimes used persons other than nurses to coordinate the units, thus reducing their nurse-to-resident ratio on the particular unit.

In addition to their emphasis on various aspects of staff behavior, cognitively intact nursing home residents also cite other features that make their lives better or worse in nursing homes, including the quality of food and the ambiance at meal time; having a private room or having a compatible or at least not incompatible roommate (Lawton & Bader, 1970; Kane et al., 1997; 1999); getting outside during pleasant weather; being able to maintain contacts and communicate readily with relatives and friends outside the facility (Kane et al., 1997); getting a good night's sleep; and, for some cognitively intact residents, being spared frequent close contact with residents with dementia, particularly those whose behavior and demeanor are frightening or disturbing (Teresi, Holmes, & Monaco, 1993). Residents with advanced cognitive disabilities are unable to report reliably and completely what affects the quality of their lives. On their behalf, observers comment on some things that seem to afford pleasure (for example, music, other sensory stimulation) and those that bring misery (for example, forced baths, being physically tied down). Regarding bathing, Joanne Rader, herself one of the nursing home pioneers, has been developing approaches whereby bathing can be a more individualized and pleasant experience for residents (Rader, et al., 1996; Hoeffler et al., 1997). Efforts to measure quality of life for nursing home residents with dementia have accelerated in the last few years; the available tools include scales administered to residents, staff, and/or family (Brod et al., 1999a, 1999b; Logsdon, et al., 1999; Lawton, et al., 1999; Rabins et.al, 1999).

Although the review has found no studies linking nurse staff levels or other staff features to QOL as the investigators have defined it, an important distinction is needed. Failure to find empirical evidence linking relationships discussed in the literature to QOL outcomes, does not in itself disprove those relationships. A major distinction must be made between studies that look for particular differences and fail to find them, compared to studies that examine a construct of interest, say permanent nurse assignments, to determine whether expected outcomes associated with the construct. As far as we can discern, investigators have simply not examined these many relationships between characteristics of staff and quality of life outcomes, which is quite different from examining them and finding them insignificant. It is also notoriously difficult to

study staff roles and behavior in action. Counting numbers is much easier (though by no means straightforward). Because observation of staff behavior is so difficult, investigators resort to inadequate proxies for the desired behaviors; for example, one can measure how frequently staff development and orientation programs touch on dignity and how many staff-minutes are spent learning about dignity, much more readily than making observations of behavior that sustains or destroys the dignity of residents. Similarly, it is much easier to audit care plans for mention of strategies to enhance individuality than to determine whether those strategies are carried out. It is easier to assign positive points to a nursing home where social workers, activities personnel, pastors, and/or dietary personnel contribute directly to care plans than to determine whether such comprehensive, multidisciplinary care-planning led to something different in the residents' lives and, if so, to better QOL outcomes.

### **6.6.3 Plans for Developing QOL Indicators**

In HCFA's ongoing QOL study, the investigators are examining many features of nursing homes that may be associated with QOL outcomes. Those concerning staff go beyond nursing staff to consider other staff members. In terms of nursing staff, we are, for example, examining: credentials; experience; and tenure of the Director of Nursing; presence or absence of other key positions in nursing, such as restorative care nurse, staff development coordinator, and wound care specialist; model used to complete the MDS (including the extent to which MDS completion is centralized in a few nurses or shared across caregiving staff and the extent to which MDS completion draws licensed nursing staff away from rather than toward direct care); model of nurse supervision (a unit-centered model versus a departmental model); permanency or length of nurse and nurse's aide assignment to residents; ratios of nursing staff to residents in the evenings and on the weekends; ratio of regular payroll staff to staff from agencies, pools, or registries as they are variously called; specific aide or assistance positions to transport or wheel residents around the facility or to enhance mobility; and flexibility and variation in the timing and performance of various routines such as getting residents up, putting them to bed, helping residents eat or feeding them, and bathing residents.

Regarding other staff besides nursing, the investigators are examining activities programs in terms of: the credentials of activities staff, the deployment of activities staff on weekends and evenings, the approach to record-keeping and individualizing of residents, and the nature and variety of programs developed. They are examining social work and therapy departments on similar parameters; with the latter they are interested in whether the program has an in-house versus a contracted therapy department, the ratio of therapists to residents, and the extent to which residents whose stay is not financed by Medicare Part A receive evaluations or treatments from PT, OT, or speech therapists. The protocol also notes whether the facility has a paid pastoral counselor or director of a spirituality program and how that individual spends his or her time.

Although the investigators will encounter difficulties in examining such a large number of staff-related variables as well as other structural and process variables in relation to QOL in a study

with only 40 nursing homes and about 120 nursing units, they expect to emerge with some data about key aspects of the facility, including its staff, that are associated with QOL outcomes.

Finally, the investigators note that the study design entails detailed, structured observations of staff-resident interactions in the facility as well as observations of the physical environments. Regarding the former, data collectors are completing facility walk-throughs at selected time periods and making stationary observations in dining rooms, activity areas, and lobby areas. They are noting positive interactions between staff and residents (e.g. a staff member pausing to answer a question, a staff member assisting a resident in distress, a staff member engaged in a conversation with a resident on a matter other than care) and negative interactions (e.g., staff moving residents in wheelchairs without discussion with them, staff discussing personal health matters relating to residents when others are present, staff ignoring residents who are in distress, staff conducting personal conversations over the head of a resident receiving care). Facilities often espouse a management principle that all staff from the Administrator on down must make a resident's needs paramount and interrupt their own activities to assist residents; we will be in a position to calculate whether positive interactions (that speak to outcomes like dignity, relationships, individuality, security, and comfort) occur and negative ones occur less in facilities with higher nursing department staff-to-resident ratios. In terms of physical environments, HCFA asked the investigators to give the physical design special attention. The study is exploring whether elements of the physical design effect QOL outcomes positively or negatively. It is likely that privacy, individuality, autonomy, and meaningful activity are deeply response to availability and use of space, including private space and the general ambiance in the nursing home. Staff may also respond positively to improved work environments and, indeed, be more efficient in them. If, indeed, physical environments make a big difference in resident QOL, policy-makers will face trade-offs between the likely costs of mandating staff ratios and the likely costs of environmental improvements.

#### **6.6.4 Preliminary Observations**

In preparing for this QOL study, the investigators wrote to all the nursing homes in the five catchments areas where the study sample was later drawn and, in a brief questionnaire, asked respondents to tell us what, if anything, they had been doing at their nursing homes to enhance QOL. Many of the responses dealt with staff preparation or deployment. Also since field work began, the investigators have been conducting interviews with key staff from administration, nursing, social work, activities, and (when applicable) pastoral counseling to collect indicator data and to learn how the nursing homes were structured. Even at this early point, it is obvious that staff are used in nursing homes in extremely varied ways. For example:

- Some nursing homes have almost abolished the concept of three shifts, using a great many overlapping shifts and partial shifts so as to ensure larger numbers of staff at peak times.
- Some nursing homes have far more than the average numbers of nurses employed in administrative-type positions with clinical significance for the whole facility. Special nursing assignments to restorative nursing or clinical care complicate determining the

ratio of nurses to residents on any unit. They also vary in the extent to which licensed nurses are used solely for the “paper” function of completing the MDS or, conversely, the way the MDS is used as an organizing force for all staff to plan care.

- Some nursing homes have the regular presence of a geriatric nurse practitioner (GNP) for 4, 8, or 16 hours a week. Typically these nurse practitioners are employed by physicians or clinics practicing in the nursing home, but the presence of these GNPs is typically said to enhance the effectiveness of the nursing department.
- Staffing shortages are almost (though not quite) ubiquitous and nursing homes use varying strategies to cope. Some use registries or pools heavily, whereas others prefer to ask staff to do extra shifts or have supervisory personnel do shifts. Some have made ingenious use of new types of positions (housekeeper, transport aide) or of nearby college students interested in part-time work. Some have in-house CNA training programs or choose to be practicum sites for LPNs and nurses in training; although personnel in training are typically not counted in staff-to-resident ratios, their regular presence is said to improve the capacity and responsiveness of staff.
- In practice, most facilities do not differentiate between RN and LPN/LVN for most supervisory roles. Whether a RN or LPN is employed on a particular shift is typically a function of availability of personnel and the historical circumstances of who is on the payroll. Payroll for any given one-week period may reflect an atypical use of an RN instead of an LPN or vice-versa.
- Numbers of people and FTEs in activities programs vary widely—for example from 1 person in one of our facilities to 20 people in several others (though the 20 would tend to constitute a much smaller number of FTEs, such as 6-10). Nursing homes vary in whether they pay some high school students for specific roles or expect such students all to volunteer, and whether they pay entertainers, and, for that matter, the size of the budgets under the discretion of the activities program.
- The provision of social work varies enormously. We have encountered the following variations: the DON also serves as the director and only social worker; one social worker who has no formal social work credential; multiple social workers with no formal social work credentials; one social worker with formal social work credentials; multiple social workers each of whom have formal social work education. The way that social workers construe their jobs also varies greatly as do the abilities of social workers and other personnel to tap mental health and social services resources from the larger community to be of service to the residents.

These and other variations in staff patterns and deployment in nursing and other departments leads us to speculate that sheer numbers of nursing staff to residents will not predict QOL. Rather it will probably be necessary to think of the numbers of nurses in the context of what the nurses do, as well as what other staff and human resources are present and what they do. Our

ongoing study of QOL should help shed light on these matters. Moreover, although a minimum threshold may be needed for general staff-to-resident ratios and nursing department staff-to-resident ratios, it seems increasingly clear that achieving such numbers would never be sufficient to improve quality of life. The key issue would be what these staff literally do and how they behave in the nursing home.

## 6.7 Conclusion

This chapter has presented a review of selected research on nursing home staffing and resident outcomes. This is not a new topic and has been the subject of several research studies and expert meetings that have reviewed these studies. One such meeting of experts, referred to in previous chapters as the Hartford experts, has reviewed this research and made recommendations about appropriate minimum staffing ratios, including a recommended minimum of 4.55 total nursing hours per resident day, as was discussed in Chapter 3. These recommendations were published in a recent issue of the *Gerontologist* (Harrington et al., 2000). In addition to recommended minimum staffing ratios, the Hartford statement also made recommendations with respect to education and training, and the use of nurse practitioners, a recommended staffing issues that is outside the scope of our present study.

We have found that any conclusion on the association between staffing and outcomes derived from the reviewed studies would be based on small samples of limited representativeness, questionable outcome measures and risk adjustments, staffing measures of unknown accuracy, and findings that show no or very weak relationships between staffing and outcomes. We find no way to conclude on the basis of these reviewed studies that there is a strong and consistently positive association between staffing and quality of care outcomes.

However, it should also be acknowledged that none of the studies has found a significant negative relationship between staffing and quality. As such, this pattern suggests that better designed studies might produce the strong evidence claimed by the Hartford statement, but not found in our scrutiny of their evidence. This is not to suggest that the reviewed research was not professionally conducted. Many of the studies were limited by the data available to the investigators, as discussed above. Also, many of the studies were not primarily designed to investigate the impact of staffing on outcomes; often this was a secondary objective or a by-product of another analysis, e.g., to evaluate the impact of Ombudsmen programs, reimbursement, or whether for-profit and not-for-profit homes behave differently. Hence, there is a need for a comprehensive study specifically designed to address the problems identified in the above studies and provide a more definitive assessment of the relationship between staffing and quality problems. It is just such a study that has been conducted for this Report and is presented in the following chapters.

Even if the above evidence on the association between staffing and quality had been stronger and more consistent, *none of the reviewed studies were even designed to identify a critical ratio of nurses to residents below which nursing home residents are at substantially increased risk of quality problems.* A positive association between nurse staffing and quality outcomes is consistent with many very different critical ratio thresholds. The existence and identification of

potential thresholds is necessary in order to formulate recommendations for minimum staffing requirements that are potentially effective and efficient for improving quality outcomes. Relevant evidence with respect to specific ratios will can only be generated from research designed to answer that question, as will be found in the analyses presented in subsequent chapters.

As was discussed in Chapter 1, expert consensus is one of the three research strategies that can be used to address our general study question of appropriate minimum staffing ratios. Although we have not assembled an expert panel to make recommendations, the Hartford experts were convened recently in April 1998 and their recommendations were published this year, 2000. We draw upon their published statement here in this chapter.

We have found it difficult to reconcile our review of selected research on the relationship between nurse staffing and resident outcomes with the Hartford Statement's findings and recommendations as published in *The Gerontologist*. The same studies we reviewed in this chapter are cited in the *Gerontologist* article as consistently showing "the positive relationship between higher nurse staffing levels, especially RN staff, and the outcome of nursing home care." But our examination of the cited studies calls into question how "positive" and how "consistent" and other study design elements which limit what can be concluded from these studies. Perhaps more importantly, as noted above, even if the above evidence on the association between staffing and quality had been stronger and more consistent, none of the reviewed studies were even designed to identify a critical ratio of nurses to residents below which nursing home residents are at substantially increased risk of quality problems.

Although we are unclear as to how the Hartford participants arrived at their recommendations, the statement identified a number of other aspects of staffing that would eventually have to be address in any consideration of a minimum staffing ratio. These include recommendations with respect to education and training, use of nurse practitioners, allocation of staff between shifts, and allocation of staff between administrative and direct care activities.

In addition to the studies reviewed above on the relationship between staffing and resident outcomes, other research cited in the Hartford statement and/or our review indicates that there are independent data sources indicating a relatively high percentage of residents needing assistance with eating and a relatively low CNA to resident ratio to meet this need. In addition, there is some dramatic evidence from an intensive qualitative study of two nursing homes that finds eating problems of nursing home residents are primarily due to inadequate staff. However, as we noted in this chapter, we have not identified any research analyzing the relationship between measures of nurse staffing to nutritional problems for a sufficiently large sample of nursing homes. Although the qualitative observations are dramatic and compelling, without a quantitative study conducted over more homes, the Hartford position that staffing numbers (as well as other aspect of staffing) are an important cause of malnutrition must be regarded as a compelling hypothesis, but not confirmed.

Our study conducted for this Report has focused on the potential impact on quality of one structural measure or construct, nursing home staffing ratios. Clearly, there are other non-ratio aspects of staffing which are important, perhaps more important than sheer numbers alone represented by staffing ratios. A number of studies, usually qualitative, suggest that there maybe a number of non-ratio staffing factors and work organization practices that impact importantly on quality outcomes. Some of these workforce factors that seem to favor high quality performance are use of teams of nurse aides, the sharing of information about patient care with nurse aides; involvement of families and aides in the organization of work and care; provision of on-the-job training and feedback to nurse aides, lower turnover, higher benefits, and career paths for nurse aides. Although these other factors are beyond the scope of our Phase 1 study, we anticipate a closer scrutiny in these areas when we conduct qualitative case studies for our Phase 2 study. This will be particularly important in explicating apparent anomalies in the data - e.g., low staffed facilities that have particularly good quality outcomes.

Researchers and HCFA regulations often distinguish between what are referred to as quality of care practices and outcomes (e.g., bathing, toileting, feeding, pressure ulcers, urinary tract infections, etc.) from the care processes and nursing home environment which enhances residents' dignity; individuality; autonomy/choice; sense of privacy; enjoyment; meaningful activity; relationships; sense of security/order; comfort; spiritual well-being, and functional competence. (See discussion below). These latter outcomes are often referred to as Quality of Life (QOL) outcomes. With a few debatable exceptions, the outcome studies reviewed in this chapter would fall under the rubric of quality of care.

Although an analysis of the impact of nurse staffing on these other aspects are beyond the scope of this study, a review of research by Rosalie Kane (University of Minnesota) on the relationship between nursing staff ratios and quality of life is presented together with a few preliminary observations from an ongoing study.

The review finds it doubtful that sheer numbers of staff in nursing are unlikely to be important determinants of QOL: "Beyond numbers is the question of what staff actually do, how well they do it, how their roles and tasks are defined, whether they are present in sufficient numbers on weekends and evenings, and whether their jobs are structured so that they have the opportunity to know residents as people, and whether they are expected to respond to resident's request and wishes." Preliminary observations reveals an enormous variation in the way staff are used in nursing homes. For example, some nursing homes have almost abolished the concept of 3 shifts; some nursing homes have the regular presence of a nurse practitioner for 4, 8, or 16 hours a week; staffing shortages are almost (though not quite) ubiquitous and nursing homes use varying strategies to cope; numbers of people and FTEs in activities programs vary widely; etc.. These and other variations in staff patterns and deployment in nursing and other departments leads the investigators to speculate that sheer number of nursing staff to residents will not predict QOL. Rather it will probably be necessary to think of the numbers of nurses in the context of what the nurses do, as well as what other staff and human resources are present and what they do.



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Chapters 7 through 14 for this Report to Congress: *Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes*, can be found in Volume II. Appendices are located in a separate volume as well.

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## CHAPTER 7.0 DATA SOURCES OF NURSING HOME NURSE STAFFING ANALYSIS, OSCAR: RELIABILITY AND VALIDITY ANALYSIS<sup>11</sup>

### 7.1 Introduction

HCFA's Online Survey and Certification Reporting System (OSCAR) provides staffing data for all certified nursing homes in the United States. The data are collected as part of the certification and annual recertification process. While some edit checks are performed by HCFA to identify survey errors, concerns remain about the accuracy and validity of staffing data from OSCAR.

In this study, staffing figures from a sample of nursing facilities in Ohio were used to assess the validity of OSCAR nurse staffing data. The payroll data were collected for the period corresponding to the most recently available OSCAR assessment, providing close to a "gold standard" measure of facility nurse staffing. This is the first data collection effort that captures both a similar definition and an identical time period as the OSCAR nurse staffing survey data, using an independently collected and not self-reported facility data source. As shown in Chapter 8, several types of comparisons were used to assess the validity of OSCAR data, including comparisons of mean staffing levels (both overall and for low-staffed facilities) and analysis of the correlation of staffing measures from OSCAR and the payroll data. The validity analyses showed considerable difference in staffing levels from OSCAR and payroll data for the same time period, suggesting that OSCAR staffing data for some facilities are unreliable. The correlation coefficient in a measure of total hours per resident day was less than 0.5. There was greater consistency in RN and LPN staffing figures than for nurses aides.

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<sup>11</sup> This report was completed by Alan White of Abt Associates for the Health Care Financing Administration (Contract #500-95-0062-T.O.3; Allison Walker, Abt Associates Project Director; Marvin Feuerberg, HCFA Project Officer). Other individuals who made valuable comments and suggestions on the analyses included in this chapter include Karen Reilly, Donna Hurd, and Terry Moore of Abt Associates, Andy Kramer and Michael Lin of the University of Colorado Health Center on Aging and Division of Geriatric Medicine, University of Colorado Health Sciences Center, Denver, Colorado, and Marvin Feuerberg, HCFA Project Officer. Beth Klitch of Survey Solutions, Inc., supervised the collection of Ohio payroll data. Editorial assistance was provided by Ed Mortimore and Susan Joslin, HCFA.

Few previous studies have examined the reliability of OSCAR staffing measures. Straker (1999) compared 1995 OSCAR data to 1995-1997 data from the Ohio Department of Health to determine the consistency between the two data sources in areas such as number of certified beds, resident count, and staffing levels. The study reported inconsistencies in resident count and staffing measures from the two data sources. For 1995, the correlation in total nursing hours per resident day was 0.61. An importance difference between this study and that of Straker is that Ohio payroll data used for the present reliability and validity analyses were not based on self-reported staffing data and covered the same time period as OSCAR. The Ohio Department of Health survey data used by Straker were based on self-reported data that did not typically cover the same period as the OSCAR assessment. There are questions about whether the Department of Health data were an independent data source, given that some facilities may complete both data sources in the same manner, which may or may not be accurate. Unlike the Department of Health data, the payroll data were collected independently, and were not based on self-reported information.

A set of decision rules were developed to determine which facilities to exclude from analyses due to concerns about the accuracy of OSCAR data. Two types of decision rules were applied. The first were a set of “logical” decision rules which identify obvious data errors. These build on earlier work by Harrington (1996, 1998). Facilities with data that fail one or more of the logical decision rules should be excluded from analyses. The second set of decision rules are based on the consistency of reported staffing and resident levels across time. Implementation of these decision rules requires data from at least two periods. Use of these longitudinal decision rules allows some data from facilities with outlier staffing levels (excluding the extreme outliers identified by the logical decision rules that represent fairly obvious data errors) to be included in the analysis sample, assuming that these data can be validated based on data from other periods.

The longitudinal decision rules differ from those of Harrington in that they do not automatically exclude facilities with very high or very low staffing levels (other than extreme outliers that represent obvious errors). Using Harrington’s decision rules, all facilities in the lowest 1% or highest 2% in staffing levels (per resident day) are excluded. This is particularly inappropriate for the current study, which is analyzing the relationship between staffing levels and resident outcomes, a relationship that might only be evident for facilities with very low staffing levels. The investigators also recommend against using Harrington’s rule to exclude non-hospital based facilities with 50 or more empty beds. The current analyses suggested that staffing data for these facilities were no less reliable than for other facilities. Instead, the investigators propose excluding facilities that have a large change in residents across time (adjusting for changes in the number of beds at the facility).

Nationwide, the decision rules resulted in the exclusion of about 14% of facilities. Their application significantly improved the reliability of OSCAR staffing figures for facilities that were not excluded. The correlation in 1997 total hours per day from OSCAR and data from Medicaid Cost Reports, which were used to conduct tests of the concurrent validity of OSCAR



data, improved from 0.13 to 0.55, and the correlation for the relatively small number of facilities with both OSCAR and Ohio payroll data improved from 0.43 to 0.54, after application of the decision rules. The decision rules were used for the analyses contained in this report.

There is anecdotal evidence that some facilities increase the number of staff immediately prior to the start of the annual certification survey (which is the period covered by OSCAR), and then decrease staffing after the completion of the survey. If this type of behavior occurs, then the staffing levels reported in OSCAR would be unrepresentative of typical staffing levels, and some type of adjustment to OSCAR might be warranted. The payroll data were periods, one corresponding to the assessment period and the second for a period which typically covered the six months prior to OSCAR. Essentially no evidence was found from the payroll data that facilities in the Ohio payroll sample tended to increase staffing levels during the period covered by OSCAR. This lack of evidence is not necessarily inconsistent with the observations of certification staff that facilities are ‘staffing-up’ in anticipation of the survey— it may be that facilities increase staffing in ways that do not appear in the payroll data, such as bringing in staff from other facilities or using administrative staff to provide patient care. These additional staff would be irrelevant to this analysis, since they would not be recorded in either OSCAR or in the payroll data.

## **7.2 Data Sources**

Data sources used in this study included OSCAR, Medicaid Cost Reports, and Ohio payroll data. The payroll data were collected for a sample of 107 facilities. Because of the small number of facilities for which payroll data were available, the investigators used Medicaid Cost Report data to test the impact of decision rules on the consistency of staffing measures from OSCAR and Medicaid Cost Report data. (Note that the Medicaid Cost Report data are examined in Chapter 8.) For most analyses in this chapter, 1996-97 staffing data from facilities in New York, Ohio, and Texas for which Medicaid Cost Report data were available was used. National OSCAR data were used to show the impact of the proposed decision rules.

### **7.2.1 Description of Ohio Payroll Data Collection**

#### *7.2.1.1 Purpose*

The staffing study required data from a large number of facilities to adequately conduct the analyses. The only national sources for staffing data are Medicaid Cost Reports and data from OSCAR. The payroll data collection activity of this project was designed to provide a “gold standard” measure of the accuracy of staffing data contained in the OSCAR system for a sample of facilities included in the larger-scale comparison of OSCAR and Medicaid cost report data.

#### *7.2.1.1.1 Overview of Methods*

This activity was accomplished through a subcontract between Abt Associates and Survey Solutions, Inc. (SSI). SSI, a long term care management consulting and accreditation company, hired experienced nursing home administrators to serve as data collectors. These consultants entered sampled facilities and reviewed their payroll records for two time periods: 1) the time period reported in the most recent OSCAR data available; and 2) a two-week period of time up to six months prior to the most recent survey. Data for the second time period were collected to test the hypothesis that facilities “staff-up” prior to the annual state survey. Data collected included paid nursing hours for all permanent employees as well as hours paid to temporary staff. Average daily census was also collected for the two time periods corresponding to the payroll data collection. Participation in the payroll data collection activity was voluntary, with SSI handling all of the contacts and recruiting of facilities.

### *7.2.1.2 Background*

#### *7.2.1.2.1 Staffing Definitions*

Staffing levels are generally established by a combination of clinical and financial personnel who collaborate to compile a budget for each facility. Since direct care staffing accounts for typically 65% - 80% of a facility’s total expenditures, accurate budgeting requires a detailed projection of direct care staff levels. Most facilities define direct care staff to include Registered Nurses (RNs), Licensed Practical or Vocational Nurses (LPNs/LVNs), and Certified Nursing Assistants (CNAs). Staffing levels are most commonly expressed throughout the nursing home industry in terms of Per Patient Day (PPD) nursing hours, rather than a less precise measure such as staff to resident ratios, e.g., 1:12. A PPD unit counts the average number of nursing hours budgeted and/or delivered per patient per day.

#### *7.2.1.2.2 Determining Adequate Staffing: Use of Acuity Measures*

Generally, staffing levels are broadly established to reflect resident acuity. While there is no single widely-accepted measure used to precisely adjust nursing hours relative to resident acuity, there is nearly universal recognition that the average measure of nursing hours per patient day may vary considerably with the acuity levels of residents. For example, a nursing facility with a typical population of residents with declining Activities of Daily Living (ADLs), dementia, and multiple chronic diseases may well meet residents’ needs with an average daily PPD level of 3.5 hours of nursing time. Conversely, a facility caring for a subacute population including residents who are technology-dependent, e.g., ventilators, residents receiving end-of-life care, feeding tubes, and/or residents with severe, unstable medical conditions may barely meet residents’ needs with an average daily PPD level of 4.5 hours of nursing time.

#### *7.2.1.2.3 Staffing Challenges: Recruiting and Retaining Staff*

Nursing facilities, once they have established a budgeted, average PPD level, then face the challenge of recruiting, training, supervising, and retaining sufficient numbers and types of qualified, experienced staff to fill the budgeted positions. With unemployment rates as low as 2% to 3% in many urban, suburban, and even rural areas, nursing facilities have significant difficulty achieving budgeted staffing levels. Many facilities have raised hourly wages to compete with other service industries hiring the same types of employees, offer a “signing bonus” of \$100 - \$1000 to attract new staff, and/or offer a “referral bonus” to current staff to encourage referrals of new staff. Most facilities are offering fairly comprehensive benefit packages, including health insurance, dental, vision, short-term and long-term disability insurance, retirement plans, and even stock options.

Nursing facilities face other obstacles to full staffing, including requirements for criminal background checks and reference checks, drug and alcohol testing policies, lack of on-site nursing assistant training programs, the 24-hour/day, seven day/week nature of nursing care schedules, the pervasively poor image of nursing home quality, the extensive documentation procedures required, the difficulty of caring for severely cognitively impaired residents, and the potential for injury.

National turnover rates for CNAs averaged 93.3% in 1997. This statistic means that virtually every CNA position “turned over” during the year. Average national turnover rates in 1997 were 50.6% for RNs and 51.3% for LPNs/LVNs.<sup>12</sup> . Therefore, not only do nursing facilities face difficulty attracting qualified staff, but retaining those staff is equally as difficult.

#### 7.2.1.2.4 *Mechanics of Scheduling*

The Director of Nursing (DON) and her designee is typically responsible for developing and maintaining a daily, weekly, biweekly, or monthly schedule for all nursing staff, including RNs, LPNs/LVNs and CNAs. The actual working schedule generally shows the number and types of all staff planned to work on each shift and for each unit or floor of the facility.

Frequently, the planned schedule must be adjusted to reflect staff who either do not show up to work the assigned shift and/or do not call in with an acceptable excuse for missing work. These occurrences, referred to as “no-call, no-shows,” contribute to unanticipated staffing shortages. Therefore, it is not unusual for a working schedule to be marked up with notes related to both planned and unplanned absences, staff willing to work a second consecutive shift, and temporary staff who must be called in to cover unanticipated absences.

If a facility is having an exceptionally difficult time recruiting staff, the DON may call a temporary staffing agency in advance to schedule temporary staff to work shifts for which the

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<sup>12</sup> Buck Consultants Survey of Managerial, Supervisory, and Staff Positions in Nursing Homes, 1997

facility has been unable to hire staff. Frequently, temporary staffing agencies in the geographic area are unable to fully supply all facilities' requests for temporary staff. It is not unusual for facilities to ask staff such as LPNs to "work aide duty," agreeing to pay the higher LPN hourly wage for this service. Administrative staff such as the DON, the MDS Coordinator, and Unit Managers are frequently pressed into service to "work charge nurse duty," pass medications, perform treatments, or act as shift supervisor.

Some facilities make up new schedules quite frequently, such as every two weeks, or monthly, thus creating significant unpredictability for direct care staff. Other facilities utilize a "permanent assignment" scheduling plan that creates permanent schedule slots, such as 7:00 AM to 3:00 PM on Mondays through Fridays, thus improving the predictability for direct care staff. Yet other facilities utilize a 4-4-2 schedule that requires a staff member to work four days each week of a biweekly pay period, and then to work every other weekend.

Some facilities utilize permanent, part-time staff to fill weekend staffing slots, others require all staff to work every second or third weekend. Most facilities permanently assign staff to one of either two or three shifts. Facilities with three shifts offer a choice of days, evenings, or nights. Days are typically 7:00 AM until 3:00 PM, or perhaps 6:00 AM until 2:00 PM. Evenings are usually 3:00 PM until 11:00 PM or occasionally 2:00 PM until 10:00 PM. Nights are considered 11:00 PM until 7:00 AM or sometimes 10:00 PM until 6:00 AM. Some facilities require a ½ hour shift overlap to encourage communication between the members of the off-going and the on-coming shifts. Other facilities, because of concerns about overtime liability under federal wage and hour work rules, require employees to "clock out" within 5 minutes of the end of a shift, thus discouraging inter-shift communication. Sometimes facilities schedule 12-hour shifts, rather than the more typical 8-hour shifts, generally from 7:00 AM until 7:00 PM and 7:00 PM until 7:00 AM. Infrequently, facilities may have some direct care staff working 8-hour shifts and others working 12-hour shifts simultaneously. Weekend shifts are often different lengths and may have varying start times due to the increased difficulty of obtaining staff to work these less desirable shifts.

Facilities experience an exacerbation of staffing problems at certain times of the year, such as during summer vacation periods, holidays, local events such as festivals, winter weather, Mondays, and non-payday Fridays (for those facilities with biweekly payroll frequency). Many facilities offer a payroll bonus or hourly wage differential pegged to perfect attendance during a payroll period, e.g., the hourly wage for a CNA may be \$7.50 per hour, with an extra \$1.00 per hour if the CNA works all scheduled shifts during the two-week payroll period, thus raising the effective wage to \$8.50 per hour. Facilities routinely offer double-time pay for staff willing to work holidays such as Christmas and Thanksgiving.

### *7.2.1.3 Payroll Data Collection Activity*

#### *7.2.1.3.1 Sampling*

The sample of facilities selected for participation in the study was drawn by Abt Associates, using OSCAR data to group facilities into one of four staffing categories based on the total hours of nursing time per patient day reported in OSCAR. The facility identifying information, most recent survey date, and staffing categorization were provided to SSI, who entered this information into a database, color-coding the facilities according to their reported staffing category. The SSI field consultants utilized laptop computers loaded with the color-coded database to collect payroll data. In addition, the data collectors compiled information on the time spent in data collection. The data collectors did not know which staffing category related to which color, so as not to bias the data collection effort; they were simply instructed to complete data collection in a certain number of facilities from each color group.

#### *7.2.1.3.2 Data Collectors*

SSI selected three experienced, Ohio-licensed nursing home administrators to perform the data collection task. It was decided by the project team that administrators would be the most appropriate people to use for this activity because of their familiarity with the types and locations of required documents and because it was expected that they could form a collegial bond with the administrators of sampled facilities (from whom they would need to obtain permission for data collection). The three individuals selected for this task were drawn from the Northeast, Central/Northwest, and Southwest regions of Ohio to reflect geographic concentrations of nursing facilities in the sample and to minimize travel time.

#### *7.2.1.3.3 Facility Recruitment*

Because participation in the study was voluntary for facilities, a process was developed for use by SSI to maximize the likelihood of facility agreement to participate. SSI, Abt, and HCFA each prepared a formal letter of authorization explaining the study's purpose, emphasizing the confidentiality of all data to be collected, and requesting the facilities' cooperation. SSI administrative staff faxed copies of all three letters to each facility selected from the larger sample framework. In order to do so, each facility needed to be contacted by telephone to obtain their fax numbers. In collecting this information, SSI staff also verified all of the facility identifying information that was obtained from the OSCAR database during sampling. Faxing, rather than mailing, the introductory letters was selected as the most effective means for contacting facilities in light of the time constraints and importance of the study.

Within the next several days following each fax, the SSI data collectors placed telephone calls directly to each facility administrator and requested an appointment for data collection. Scheduling an appointment with the administrator in advance was determined to be the most effective way of ensuring that he/she would give consent, be present at the time of data collection, and authorize review of all necessary materials. Initially, the data collectors attempted to make "cold calls" to facilities, arriving following the facilities' receipt of the letters,

but without a pre-scheduled appointment. The data collectors found that it was difficult to see the administrator and complete data collection under these circumstances and the approach was discontinued.

There were very few outright refusals to participate in the study. Among the facilities contacted that did not participate, the most common reasons were time and logistic difficulties in setting up appointments with administrators. Several facilities that are part of large, national, multi-facility organizations stated that they were unable to participate without corporate authorization. SSI then contacted the designated corporate officials directly and secured permission for these facilities to participate. A number of facilities contacted the SSI office to confirm the details of the study after receiving the letters and/or phone calls from the data collectors. Other facilities that heard about the project called to volunteer even though they were not in the sample selected.

In some cases, there were difficulties with communications between the data collectors and facilities for the purpose of scheduling appointments, as the data collectors were in the field for the duration of the activity, making it complicated to leave messages for administrators and receive timely responses. With regard to the lowest-staffed category of facilities, who were of particular interest to HCFA for this study, however, at least four separate attempts were made by a combination of the data collectors and SSI office staff to confirm an appointment with each of these facilities. In the process of trying to schedule these facilities, SSI learned that some of them had been closed.

OSCAR data were used to stratify Ohio facilities into one of four categories, based on total nursing hours per resident day. Consideration was also given to ensure facility variation with respect to size, geographic distribution, for profit/not for profit status, and chain affiliation, although these stratification requirements were less stringent. In all strata, except for the nursing hours per resident per day, the facility sample distribution generally parallels the Ohio facility distribution or facility average. Practical constraints limited the total sample to 107 facilities. Initially, 1997 OSCAR data were used to stratify facilities, but Abt gained access to the 1998 OSCAR data during the data collection process, and an updated facility category listing was generated using this more recent survey data. The goal was to select a stratified random sample based on facility staffing levels, using the following sample distribution.

<i>Category 1:</i>	Less than 2.0 total nursing hours per resident per day; 31 facilities;
<i>Category 2:</i>	2.0 - 2.5 total nursing hours per resident per day; 21 facilities;
<i>Category 3:</i>	2.6-3.6 total nursing hours per resident per day; 21 facilities;
<i>Category 4:</i>	Over 3.6 total nursing hours per resident per day; 34 facilities.

Low-staffed facilities were over-represented in the sample design. In 1998, only 3% of Ohio facilities fell into Category One, 11% in Category 2, 59% in Category 3, and 27% in Category 4 (These figures are based on 1998 OSCAR data for Ohio facilities, before the application of any of the decision rules discussed later in this chapter).

Low-staffed facilities were over-sampled in order to evaluate the reliability of OSCAR among low-staffed facilities. As a result, the payroll sample is not representative of Ohio facilities. Ohio had few facilities in Categories 1 or 2, and, based on staffing levels, the payroll sample was actually more representative of nursing homes nationwide than it is of Ohio facilities. Nationwide, nearly 8% of facilities had fewer than two nursing hours per resident day, while 17% had between 2.0 and 2.5 total hours, 53% used between 2.5 and 3.6 total hours, and 22% used 3.6 or more total nursing hours per resident day.

Due to an insufficient number of available facilities within the lower category strata<sup>13</sup>, facilities denying access for data collection, and the potential for the facility category to be redefined based on more current OSCAR data this strict facility category numbers were not maintained. However, the final sample yielded a general distribution of low versus high staffed facilities as originally designed (i.e., Category One n=8; Category Two n=24; Category Three n=40; and Category Four n=35). The investigators attempted to acquire data on more low staffed facilities, but were not able to due to facility refusals. An ongoing dialog with the government project officer was maintained during these strata adjustments to ensure the integrity of the final facility sample was maintained, especially in terms of its application in resident outcomes analyses.

#### 7.2.1.3.4 Data Collection Process

When data collectors arrived at the facility, they met with the administrator and requested the necessary payroll and financial records. It was determined in consultations between SSI, Abt, and HCFA that the most comprehensive and accurate information about actual staffing patterns is best elicited by reviewing both permanent employee payroll records and temporary staff hours as reflected in agency invoices. While a nursing facility's working schedule is an accurate, if ever changing, plan for direct care staffing, the most accurate source of information indicating actual employee staffing levels/hours worked and paid is the payroll journal. These payroll records are based upon employee time cards or other records indicating the exact amount of time worked for each day's shift. Most facilities are quite careful about recording and maintaining payroll records accurately due to federal wage and hour requirements. Payroll records are usually categorized by department, such as nursing, and are further categorized by employee type, such as Director of Nursing (DON), administrative nurses, Registered Nurses (RNs), Licensed Practical or Vocational Nurses (LPNs/LVNs), and Certified Nursing Assistants (CNAs). While payroll frequency varies from weekly, biweekly, semi-monthly, and monthly, the most common frequency is biweekly. Facilities generally maintain six months to a year of payroll data in the facility, easily accessible for review.

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<sup>13</sup> In 1998, there were only 15 Ohio facilities that had fewer than 2.0 total nursing hours per resident day (excluding Directors of Nursing), after applying the OSCAR decision rules developed in this chapter.

Payroll records for direct care staff hired through temporary staffing agencies are found in a different set of financial records, usually Accounts Payable invoices submitted by the agency weekly, biweekly, or monthly. These invoices generally list the categories of staff utilized during the applicable period, as well as the dates, shifts, and hours worked by each temporary staff member.

While on-site at the facility, the data collectors reviewed both of these sources of information (payroll journal and staffing agency invoices) for the period that corresponded to the most recent facility survey by the state, so as to examine data for the same time period that should have been reported by the facility on the HCFA-670 form, contained in the OSCAR database. In addition, data collectors requested the same payroll and staffing agency information for a two-week period six months prior to the most recent survey date. If the payroll journals and invoices from that period were not available in the facility (e.g., had been removed to off-site storage), then the data collectors requested data for a two-week time period as far back to the most recent survey that the facility maintained in-house.

The data collectors reported that the data needed to complete the items contained in the database were universally available at the facilities visited and that, on average, the data collection process took approximately 30 to 40 minutes per facility, from the time the data collectors obtained the appropriate payroll records to be reviewed. They noted that the process was not perceived by facility staff to be highly intrusive or onerous. Both the employee payroll data and the temporary staffing agency invoices were simple to identify and to review. Because the facility data sources list staff according to the same categories that were of interest and contained in the database created for this task, there were no judgment calls that needed to be made by the data collectors on site – the data elements were recorded exactly as they were found in facility records.

### **7.2.2 Online Survey and Certification Reporting System (OSCAR) Data**

The Health Care Financing Administration's Online Survey Certification and Reporting System (OSCAR) database contains information on every nursing home in the United States that is certified by Medicare and/or Medicaid. The data are collected by the state survey and certification agencies at the time of the facility's survey (performed at least annually). The survey form instructs the facility to calculate the number of staff hours worked in the last 14 days<sup>14</sup>. Full time status is defined as 35 or more hours worked per week; part time status is less than 35 hours per week. Contract staff includes individuals and organizations under contract. The OSCAR data are based on data that are self-reported by facilities and input with minimum edit checks.

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<sup>14</sup> Note that there is some ambiguity about the time period to be recorded in OSCAR. The instructions call for facilities to use a two week period to calculate hours worked, but facilities that do not use a two week payroll period may record hours corresponding to the payroll period rather than a two week period. This is a potential source of error in the OSCAR data.



Typically, facilities are surveyed annually, as recertification must occur no less often than every fifteen months. Some facilities are surveyed more than once in a given year if there are substantial changes in a facility's organization or because of complaints about the quality of care. OSCAR calendar year files contain all facility surveys performed during that year. The beginning date of the facility's survey determines the calendar year into which the facility survey data will fall.

OSCAR staffing variables are reported in terms of FTE equivalents based on a 35 hour work week over a two week period. The conversion from FTEs to staff-hours-per-resident-day was made by summing staff types within each staffing category (e.g., LPN hours per resident day were calculated as the sum of full time LPN full-time equivalents (FTEs), part time LPN FTEs and contracted LPN FTEs) per day for the period covered by OSCAR. Total nurse staff hours per resident per day was calculated by dividing the total staff hours per day by the average daily number of residents recorded in OSCAR. There is some ambiguity about how the number of residents is recorded in OSCAR— for example, facilities may differ with respect to how they report residents that were hospitalized during the period covered by OSCAR.

Two analytic samples were used for this study. OSCAR data from 1995-1999 were used in the study. Cleaned data for calendar year files 1995 through 1997 for Ohio, New York, and Texas were provided by Mick Cowles, of Cowles Research Group. The cleaning process involved deleting duplicate records, back-filling clearly erroneous data fields through a series of logic edits, and retaining only nursing home and skilled nursing facility observations. OSCAR data from 1998-1999 were extracted from the HCFA Data Center for facilities in the payroll sample.

### **7.2.3 Medicaid Cost Reports**

Medicaid Cost Report data were obtained directly from New York, Texas, and Ohio for the years 1995, 1996 and 1997. Cost report data provide a comprehensive listing of facility staffing and cost variables used by the state for facility reimbursement and accounting purposes. Facilities report their costs annually to their state reimbursement agency, and states may use penalties against facilities misreporting data. Because the cost reports are desk audited and associated with facility reimbursement and because there are punitive measures associated with misrepresenting information, the Medicaid cost report data are considered quite accurate, certainly more accurate than OSCAR (see Chapter 8 for a comparison of the reliability of OSCAR and Medicaid Cost Report data.) It is important to note that, even if both the OSCAR and Medicaid Cost Report data were accurate, facilities could have different staffing levels reported in the two sources, given the different time periods that they cover. The Medicaid Cost Report data were used to test the effects of potential decision rules, since these data were available for a larger sample than were the payroll data.

## **7.3 Methods**

### 7.3.1 Assessing the Validity and Reliability of OSCAR Data

The validity of OSCAR data was evaluated by comparisons with the Ohio payroll data. Payroll data from the period corresponding to the most recently available OSCAR assessment was acquired (This was in either 1998 or 1999). Several types of comparisons were made to assess the validity of OSCAR:

- Comparisons of mean staffing levels, both overall and for facilities on the low end of the staffing distribution. The payroll data were used to identify low-staffed facilities for the validity analyses discussed in this report. In addition to analyzing total nursing hours per resident day, the investigators also separately analyzed RN, LPN, and nurses aide hours per resident day.
- Correlation analysis. Correlation coefficients are a measure of the strength and direction of the linear relationship between two variables. The correlation between staffing measures from the three data sources was examined using Pearson and Spearman correlation coefficients and Kendall's Tau, another measure of association between variables.

The Pearson correlation coefficient is calculated as the square root of the R-squared obtained by regressing one variable on the other. A coefficient of one indicates a linear relationship between the two variables, while a correlation coefficient of zero indicates that no relationship between the two variables is present.

The Spearman correlation coefficient is the correlation of the *ranks* of the variables. Because the Pearson correlation coefficients may be greatly affected by outliers, which contribute disproportionately to the total variance of reported staffing measures, the Spearman correlations are a useful complement to the more commonly used Pearson correlation coefficients.

Kendall's Tau-b is a measure of association between ordinal variables. It is based on the number of concordant and discordant pairs of observations and uses a correction for tied pairs. The weakness of Tau-b is that it is difficult to interpret as a measure of association (or reduction in error of prediction).

- Categorical analysis. Categorical variables (e.g., the facility's quartile rank of a given staffing measure) were used to assess the validity of OSCAR.

### 7.3.2 Assessing the Impact of Decision Rules

The payroll data were useful for comparing the validity of OSCAR data, but because these data were only available for about 100 facilities, it was not always possible to measure the impact of potential exclusion rules on the reliability of OSCAR staffing measures for non-excluded facilities. As a result, the Medicaid Cost Report data were used to measure the impact of decision rules on the reliability of OSCAR, using a variety of measures.

## 7.4 Comparison of Staffing Measures from OSCAR and Ohio Payroll Data

Comparison of staffing measures from OSCAR to those from the payroll data, which provide close to a “gold standard” measure of facility nurse staffing, is important for understanding the overall validity of OSCAR data. The analyses in this section used OSCAR data for all facilities in the payroll sample, without applying the decision rules described below (In Section 7.5, the payroll data were used to measure how the application of exclusion criteria affect the consistency of OSCAR data for the remaining sample.) Note that for the analyses described in this section, nine facilities were excluded because the OSCAR and payroll data did not cover the same time period.

### 7.4.1 Analysis of Average Staffing Levels

Mean staffing levels from OSCAR and the payroll data were similar (Table 7.1). The largest difference was for RN hours per resident day, which were 0.56 in the payroll data and 0.46 in OSCAR. It is important to note that the similar mean figures do not imply that staffing measures from the two data sources are necessarily consistent, as there may be large differences in staffing values for individual facilities that are masked by mean staffing levels.

Because of the interest in the identification of a potential minimum staffing level below which residents are at increased risk of poor outcomes, facilities on the low end of the staffing distribution were emphasized in the validity analyses. Among facilities that ranked in the bottom quartile in terms of total hours per resident day, mean staffing measures from OSCAR were somewhat higher than those from the payroll data, particularly for nurses aides. Total nursing hours for these facilities were 2.48 in OSCAR compared to 2.36 in the payroll data. Mean RN hours for these facilities were higher in the payroll data (0.39 compared to 0.30 in OSCAR), but mean nurses aide hours were much higher in OSCAR (1.65 hours) than in the payroll data (1.43 hours).

<b>Table 7.1: Comparison of Reported Staffing Levels from Ohio Payroll Data to OSCAR– Average Staffing Levels</b>		
	<b>Mean hours per resident day (standard deviation)</b>	
	<b>Ohio payroll data</b>	<b>OSCAR</b>

	Mean hours per resident day (standard deviation)	
	Ohio payroll data	OSCAR
<b>All facilities</b>		
Total hours per resident day	3.46 (1.52)	3.39 (1.68)
RN hours per resident day	0.56 (0.56)	0.46 (0.54)
LPN hours per resident day	0.83 (0.60)	0.79 (0.39)
Nurses aide hours per resident day	2.08 (0.75)	2.13 (1.16)
<b>Low staffed facilities- Bottom quartile in total nursing hours per resident day</b>		
Total hours per resident day	2.36 (0.40)	2.48 (0.81)
RN hours per resident day	0.39 (0.19)	0.30 (0.14)
LPN hours per resident day	0.55 (0.26)	0.54 (0.23)
Nurses aide hours per resident day	1.43 (0.45)	1.65 (0.63)
N= 98; 25 in lowest quartile. Sources: Ohio payroll data, OSCAR		

**7.4.2 Consistency of Staffing Measures**

Figures 1-4 compare staffing measures from OSCAR and the payroll data. The figures show that staffing figures are quite comparable for some facilities (facilities with staffing figures that lie on the diagonal lines of Figures 1-4 have identical staffing data for the two data sources). There are other facilities, however, for which there are large differences in staffing levels. These include not only facilities with outlier staffing values, which will be excluded by the decision rules described below, but also other facilities which are much less likely to be excluded by the decision rules.

There was less consistency in nurses aide staffing figures (Figure 4) than for either RNs (Figure 2) or LPNs (Figure 3). The payroll sample included four facilities for which OSCAR reported no nurses aide hours per resident day, figures that were contradicted by the payroll data.

#### *7.4.2.1 Correlation Analysis*

The correlation between staffing figures from OSCAR and the payroll data were relatively low. For total hours per resident day, the Pearson correlation coefficient was 0.43, and the Spearman (rank) correlation was 0.52. For individual staffing categories, the correlation between OSCAR and the payroll data were higher for RN and LPN hours per resident day than for nurses aides (Table 7.2).

There was little relationship in staffing measures from the two data sources among facilities in the lowest quartile of total hours per resident day (based on the payroll data). The Pearson correlation coefficient in total hours per resident day was negative for these facilities, while the Spearman correlation coefficient was 0.08. The correlation coefficients for individual staffing categories was somewhat higher, especially for RNs and LPNs.

The relatively low correlation coefficients suggest the presence of inaccurate data in OSCAR, underscoring the importance of developing a set of decision rules for which facilities could be excluded from analyses. One criteria for evaluating decision rules is how their impact on the correlation between OSCAR and payroll data for facilities that are not excluded.

#### *7.4.2.2 Analysis of Categorical Staffing Measures*

The investigators also analyzed the consistency of staffing measures from OSCAR and the payroll data using categorical measures of staffing based on the facility's quartile rank in total hours per resident day from OSCAR and the payroll data. Analogous measures of the facility's quartile rank for RN, LPN, and Nurse Aide hours per resident day were also compared to the payroll data. Clearly, there were some facilities which were inconsistently classified in the two data sources:

- For total staffing hours per resident day, twenty percent of facilities in the lowest quartile in the payroll data were in one of the top two quartiles based on OSCAR (Table 7.3, adding up the third and fourth quartile figures).
- Of facilities classified in the lowest quartile of total staffing hours by OSCAR, 8% were in the third highest quartile, and 16% in the top quartile, based on the payroll data.
- For total nurse aide hours per resident day, twenty nine percent of facilities in the lowest quartile in the payroll data were in one of the top two quartiles based on OSCAR (Table 7.3C).

On the other hand, the OSCAR categorical staffing measures appear relatively good for RN and LPN staffing:

- 58% of facilities in the lowest quartile for RNs in the payroll data were also in the lowest quartile for OSCAR; 75% of the top quartile in the payroll data were also in the top quartile in OSCAR (Table 7.3A).
- For LPNs, 63% of the lowest quartile in the payroll data were also in the lowest quartile for OSCAR; 79% of the top quartile were also in the top quartile for OSCAR (Table 7.3B).

Depending on the degree of accuracy needed, the OSCAR categorical staffing measures may be adequate, particularly for RN and LPN hours.

Figure 7.1: Total hours per resident day from OSCAR and Ohio payroll data

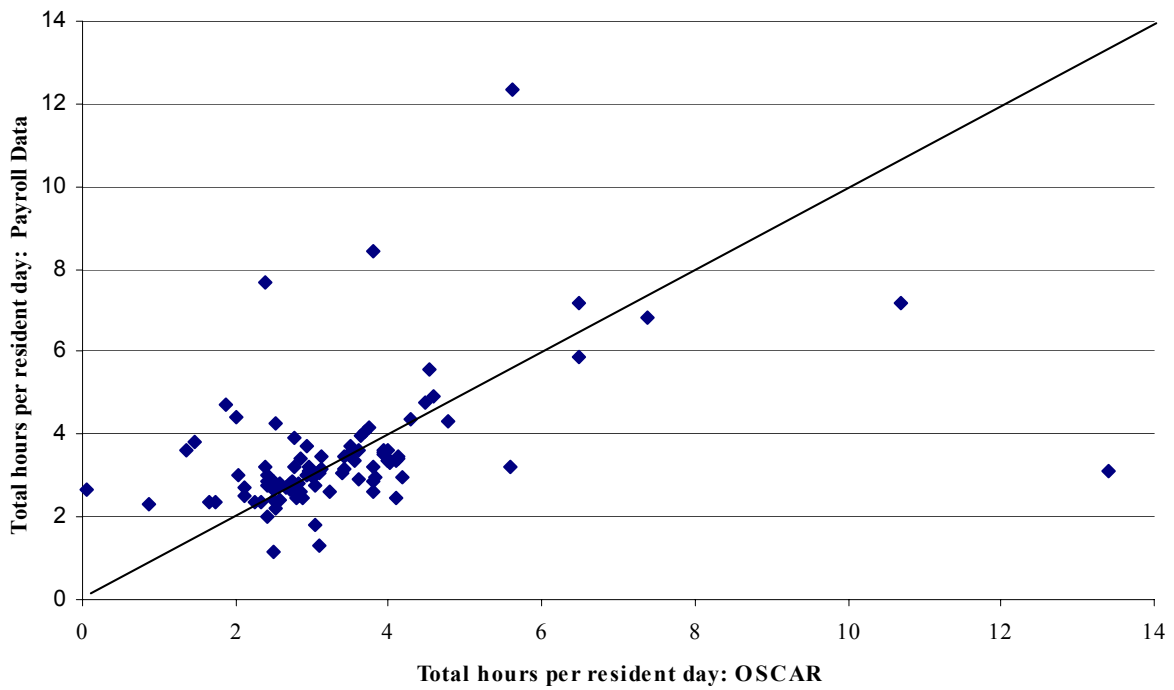


Figure 7.2: RN hours per resident day from OSCAR and Ohio payroll data

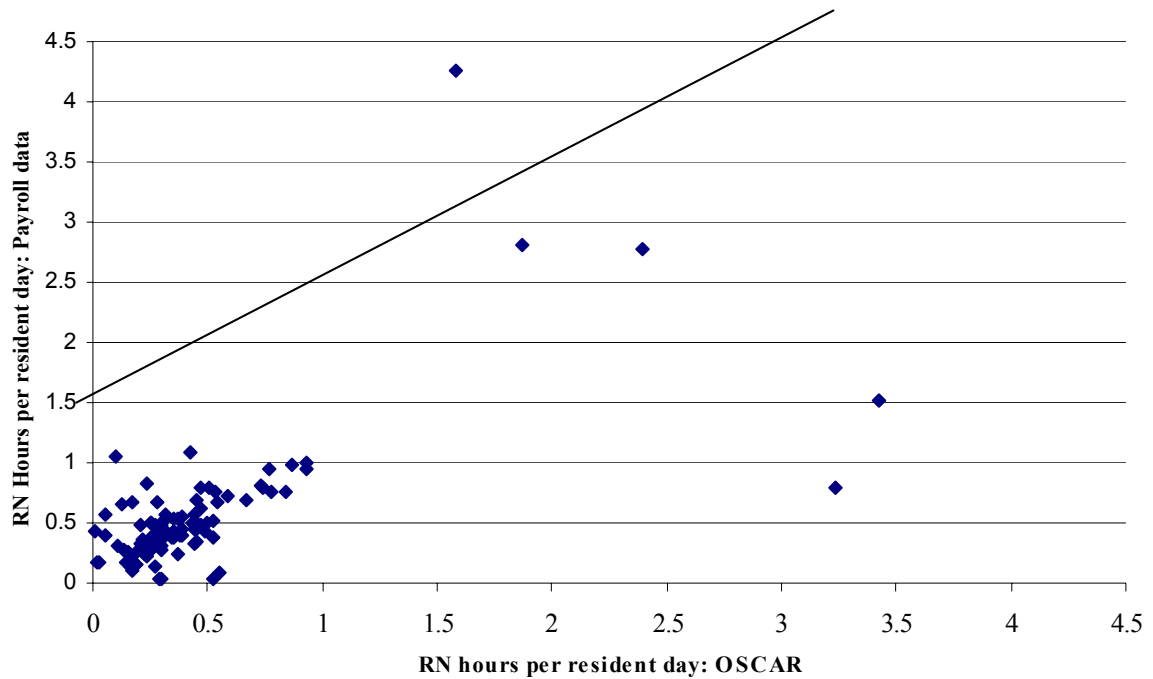


Figure 7.3: LPN hours per resident day from OSCAR and Ohio payroll data

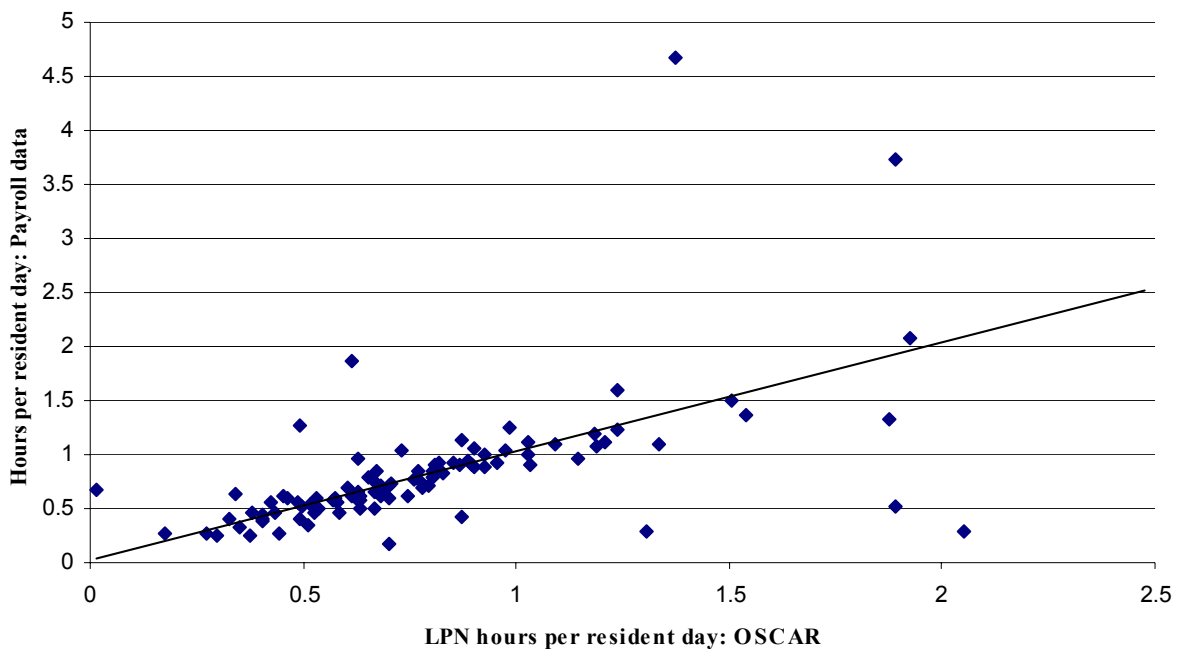
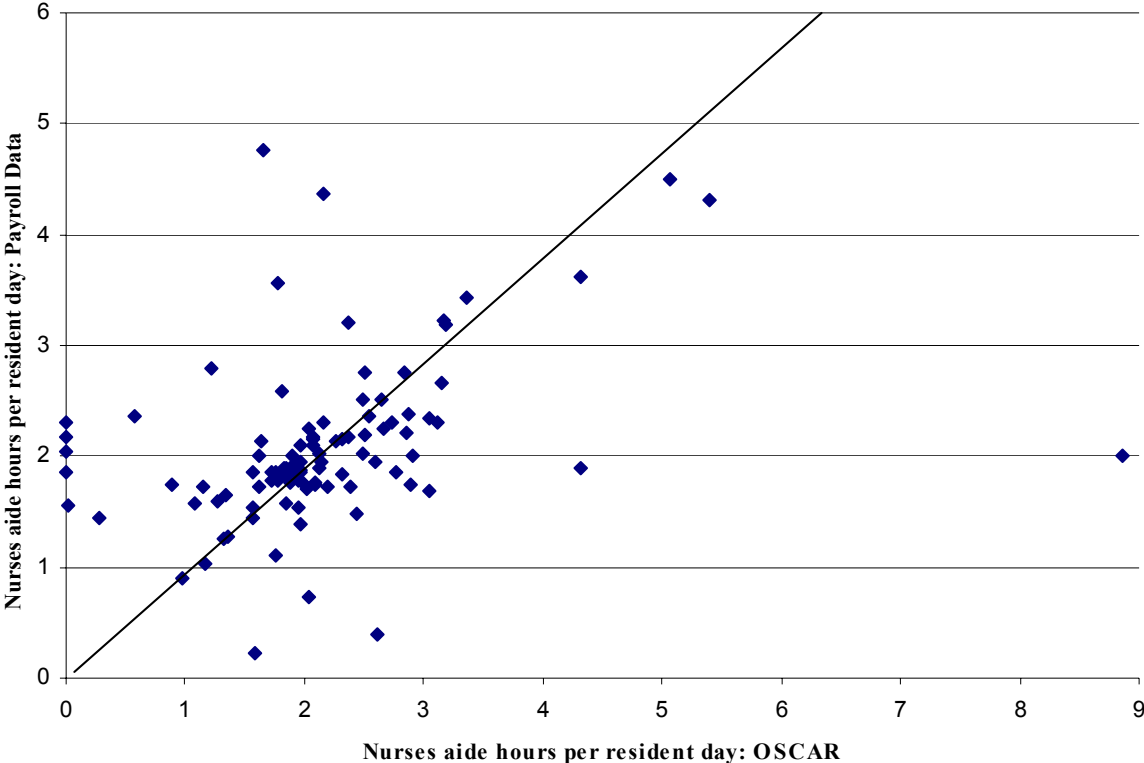




Figure 7.4: Nurses aide hours per resident day from OSCAR and Ohio payroll data



**Table 7.2:**  
**Comparison of Reported Staffing Levels from Ohio Payroll Data to OSCAR–**  
**Correlation Coefficients**

	Correlation coefficient		
	Pearson	Spearman	Kendall's Tau-b
<b>All facilities</b>			
Total hours per resident day	0.43	0.52	0.40
RN hours per resident day	0.63	0.59	0.46
LPN hours per resident day	0.55	0.71	0.60
Nurses aide hours per resident day	0.36	0.46	0.34
<b>Low staffed facilities- Bottom quartile in total nursing hours per resident day</b>			
Total hours per resident day	-0.10	0.08	0.05
RN hours per resident day	0.28	0.38	0.29
LPN hours per resident day	0.61	0.55	0.43
Nurses aide hours per resident day	0.02	0.27	0.18
N= 98			
Sources: Ohio payroll data, OSCAR			

**Table 7.3:**  
**Comparison of Reported Staffing Levels from Ohio Payroll Data to OSCAR– Consistency of Quartile**  
**Staffing Measures (Based on Total Hours per Resident Day)**

Payroll data	OSCAR data			
	Lowest quartile	Second quartile	Third quartile	Highest quartile
Lowest quartile	52%	28%	16%	4%
Second quartile	25%	42%	25%	8%
Third quartile	8%	16%	32%	44%
Highest quartile	16%	13%	25%	46%
N= 98				
Sources: Ohio payroll data, OSCAR				

**Table 7.3A:**  
**Comparison of Reported RN Staffing Levels from Ohio Payroll Data to OSCAR– Consistency of Quartile Staffing Measures (Based on RN Hours per Resident Day)**

<b>Payroll data</b>	<b>OSCAR data</b>			
	<b>Lowest quartile</b>	<b>Second quartile</b>	<b>Third quartile</b>	<b>Highest quartile</b>
Lowest quartile	58%	29%	4%	8%
Second quartile	20%	40%	32%	8%
Third quartile	16%	24%	52%	8%
Highest quartile	4%	8%	12%	75%

N= 98

Sources: Ohio payroll data, OSCAR

**Table 7.3B:**  
**Comparison of Reported LPN Staffing Levels from Ohio Payroll Data to OSCAR– Consistency of Quartile Staffing Measures (Based on LPN Hours per Resident Day)**

<b>Payroll data</b>	<b>OSCAR data</b>			
	<b>Lowest quartile</b>	<b>Second quartile</b>	<b>Third quartile</b>	<b>Highest quartile</b>
Lowest quartile	63%	17%	8%	12%
Second quartile	32%	60%	8%	0%
Third quartile	0%	20%	72%	8%
Highest quartile	4%	4%	13%	79%

N= 98

Sources: Ohio payroll data, OSCAR

**Table 7.3C:**  
**Comparison of Reported Nurses Aide Staffing Levels from Ohio Payroll Data to OSCAR–**  
**Consistency of Quartile Staffing Measures (Based on Nurses Aide Hours per Resident Day)**

Payroll data	OSCAR data			
	Lowest quartile	Second quartile	Third quartile	Highest quartile
Lowest quartile	54%	17%	21%	8%
Second quartile	16%	56%	16%	12%
Third quartile	24%	16%	44%	24%
Highest quartile	13%	13%	21%	54%

N= 98  
Sources: Ohio payroll data, OSCAR

### 7.4.3 Comparison of Staffing Levels From the Period Covered by OSCAR to the Preceding Period

It is commonly believed that some facilities, particularly ones with low staffing levels, increase the number of staff immediately prior to the start of the annual certification survey, and then decrease staffing after the survey period ends. Since OSCAR staffing data cover the two-week period preceding the annual survey, if facilities “staff-up” in anticipation of the annual certification survey, then the staffing levels reported in OSCAR may be higher than the typical staffing levels at the facility.

To measure the extent to which facilities increase staffing during the survey period, total nursing staff payroll hours per resident day using Ohio payroll data from the survey period to were compared to a second time period that, where available, covering six months prior to the most recent facility survey.

Little evidence was found that facilities, even those with low staffing levels in the pre-survey period, increased staffing levels during the OSCAR assessment period. Staffing levels were relatively stable across the two time periods, although facilities with low staffing levels in the pre-survey period were more likely to have higher staffing levels during the survey period.

- Mean total hours per resident day were slightly higher during the survey period (Table 7.4). Overall, 51% of facilities had higher total hours per resident day in the pre-survey period (Table 7.5), although the differences were often small (Figure 5).
- Average RN hours were almost identical in the survey and pre-survey periods, while mean LPN hours were somewhat higher in the survey period (Table 7.4, Figure 6). Across all

facilities, only 39% had higher RN hours in the survey period, while 52% had higher LPN hours (Table 7.5).

Of the facilities with higher staffing in the OSCAR period, most of the increases were small (Figure 5). Only 16 facilities had an increase in total hours per resident day of 10% or more. Nineteen facilities had a decrease of 10% or more.

Note that while there was no evidence from the payroll data that facilities increased staffing around the period covered by OSCAR, this does not necessarily contradict with the anecdotal evidence that some facilities increase the number of staff immediately prior to the start of the annual certification survey (which is the period covered by OSCAR). It may be that facilities increase staffing in ways that do not appear in the payroll data, such as bringing in staff from other facilities or using administrative staff to provide patient care. These additional staff would be irrelevant to this analysis, since they would not be recorded in either OSCAR, which covers the two weeks preceding the survey, or in the payroll data. These additional staff would not be recorded in either OSCAR or the payroll data.

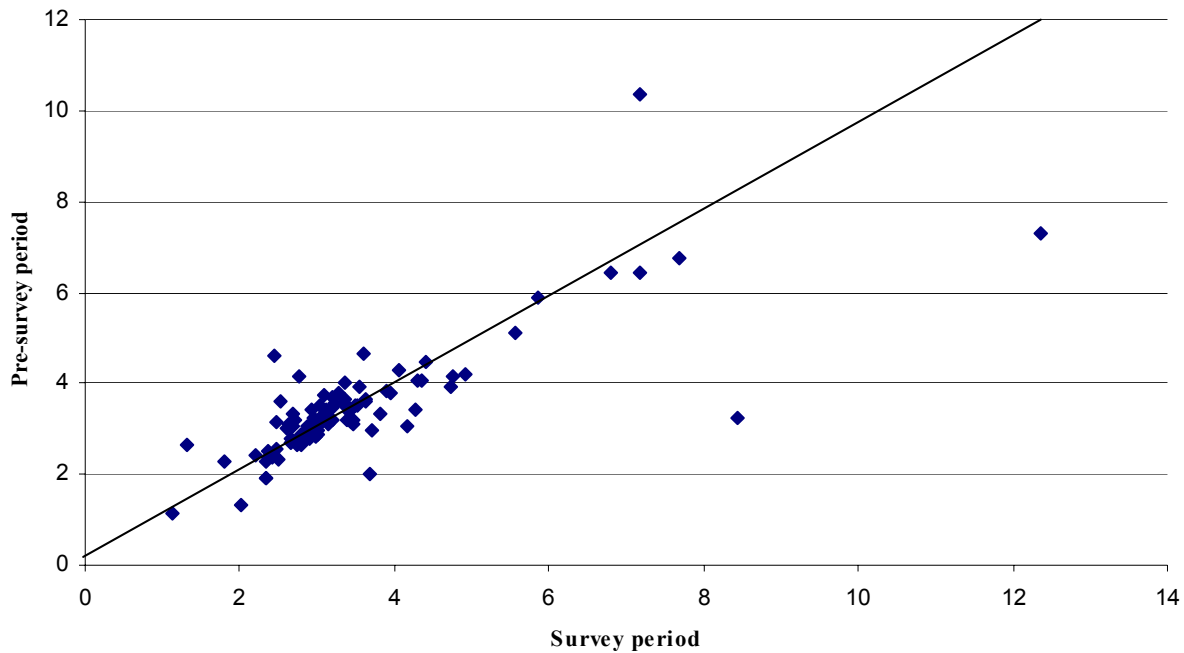
The investigators expected that facilities with low staffing levels would be more likely to increase staffing in anticipation of the annual certification survey. As a result, the investigators analyzed how staffing levels changed for low-staffed facilities. There was more evidence of increases in staffing corresponding to the survey period for these facilities, although it is not possible to determine whether this is due to anticipation of the survey assessment period or regression to the mean.

- Among the 50 lowest staffed facilities (based on the pre-survey period), mean total hours per resident day were 0.06 (just over 2%) higher in the survey period (Table 7.4). Among these facilities, 63% had higher hours per resident day in the survey period and 8 had higher hours per resident day in the preceding period (Table 7.5), although only 41% reported higher RN hours.
- Among facilities in the lowest quartile in total hours per resident day, total hours per resident day were 2.36 in the pre-survey period and 2.43 during the Survey period, a difference of about 3% (Table 7.4). Sixty-five percent of these facilities had higher total staffing during the Survey period (Table 7.5), although only 39% increased RN staffing.
- Among the lowest 10 staffed facilities (based on the pre-survey period), average total hours per resident day were 2.3 during the survey period and 2.0 in the preceding period, an average increase of 15 percent. There were increases in all three labor categories, and the largest increase was for RNs, which increased from 0.31 to 0.42 hours per resident day (Table 7.4). Nine of these facilities had higher staffing during the survey period, but most of the changes were small. Among these facilities, the largest change in total hours per resident day were at a facility where total hours per resident day increased from 2.02 to 3.61. At the

facility with the second largest increase, total hours per resident day increased from 1.93 to 2.17 (Figure 5). It is not possible to determine whether these increases were due to “staffing-up” or other factors, such as regression to the mean.

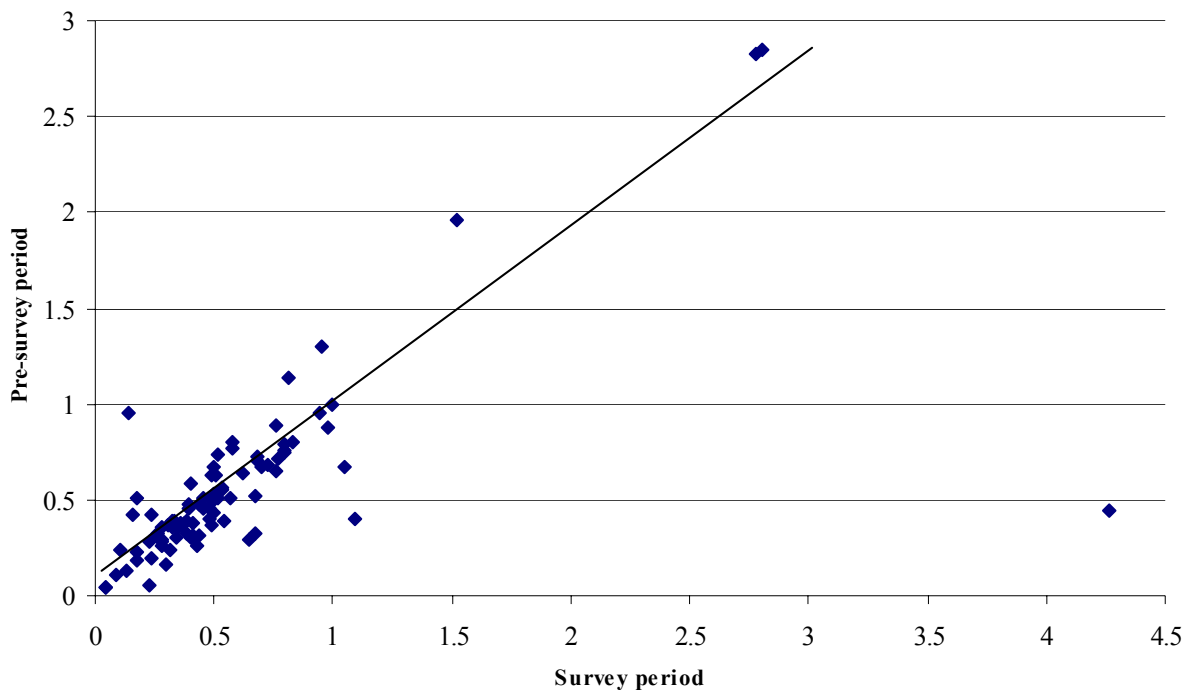
Comparison of the two payroll periods does not support any adjustment to the staffing levels reported in OSCAR. Except for a few facilities, staffing levels during the survey period were not any higher than staffing levels during the pre-survey period, and staffing was actually lower

**Figure 7.5: Comparison of total hours per resident day from survey and pre-survey periods**



during the survey period for nearly 50% of facilities.

**Figure 7.6: RN hours per resident day in survey and pre-survey periods**



<b>Table 7.4: Comparison of Reported Staffing Levels from Ohio Payroll Data from OSCAR Assessment Period (Survey Period) and Preceding Period (Pre-Survey Period)</b>				
<b>Staffing measure</b>	<b>Pre-survey period</b>		<b>Survey period</b>	
	<b>mean</b>	<b>std dev</b>	<b>mean</b>	<b>std dev</b>
<b>All facilities</b>				
Total hours per resident day	3.44	1.26	3.49	1.57
RN hours per resident day	0.55	0.44	0.57	0.58
LPN hours per resident day	0.75	0.41	0.83	0.62
Nurses aide hours per resident day	2.15	0.81	2.08	0.78
<b>Lowest 50 in total nursing hours per resident day (in pre-survey period)</b>				
Total hours per resident day	2.69	0.47	2.75	0.56
RN hours per resident day	0.38	0.15	0.41	0.18
LPN hours per resident day	0.59	0.22	0.63	0.28
Nurses aide hours per resident day	1.72	0.42	1.72	0.44
<b>Lowest quartile in total nursing hours per resident day (in pre-survey period)</b>				
Total hours per resident day	2.36	0.44	2.43	0.53
RN hours per resident day	0.39	0.15	0.42	0.22
LPN hours per resident day	0.53	0.20	0.56	0.25
Nurses aide hours per resident day	1.44	0.40	1.43	0.43
<b>Lowest 10 in total nursing hours per resident day (in pre-survey period)</b>				
Total hours per resident day	2.00	0.44	2.30	0.64
RN hours per resident day	0.31	0.09	0.42	0.30
LPN hours per resident day	0.51	0.22	0.60	0.28
Nurses aide hours per resident day	1.18	0.44	1.27	0.47
<p><i>Notes:</i> _ : These data were unavailable for one facility. Where available, data were collected for the period six months prior to the period covered by OSCAR.  N= 92 (Some facilities omitted from this analysis because pre-survey period data were unavailable.)  <i>Sources:</i> Ohio payroll data.</p>				



<b>Table 7.5: Comparison of Reported Staffing Levels from Ohio Payroll Data from OSCAR Assessment Period and Preceding Period– Percentage of Facilities with Higher Staffing Levels in Survey Period</b>	
<b>All facilities</b>	<b>Percentage of facilities with higher staffing in survey period</b>
Total hours per resident day	51%
RN hours per resident day	39%
LPN hours per resident day	52%
Nurses aide hours per resident day	41%
<b>Lowest 50 in total nursing hours per resident day (in pre-survey period)</b>	
Total hours per resident day	63%
RN hours per resident day	41%
LPN hours per resident day	54%
Nurses aide hours per resident day	48%
<b>Lowest quartile in total nursing hours per resident day (in pre-survey period)</b>	
Total hours per resident day	65%
RN hours per resident day	39%
LPN hours per resident day	61%
Nurses aide hours per resident day	57%
<b>Lowest 10 in total nursing hours per resident day (in pre-survey period)</b>	
Total hours per resident day	90%
RN hours per resident day	50%
LPN hours per resident day	80%
Nurses aide hours per resident day	60%
N=92 (Some facilities omitted from this analysis because pre-survey period data were not available. <i>Sources:</i> Ohio payroll data	

## 7.5 Developing Exclusion Criteria for OSCAR Data

Comparison of staffing measures from OSCAR to those from Ohio payroll data showed sometimes large discrepancies in staffing measures, demonstrating the importance of developing a set of exclusion criteria for facilities with unreliable OSCAR data. To identify a subset of facilities with reliable OSCAR staffing data, two general types of decision rules are proposed:

- A set of “logical decision rules” that identify facilities with fairly obvious data errors. Many of the proposed logical decision rules are similar to those developed by Charlene Harrington. Facilities with data that fail one or more of the logical decision rules should be excluded from analyses, at least for data for the period that failed the logical decision rules.
- A set of decision rules that are based on the consistency of reported staffing and resident levels across time. Implementation of these decision rules requires data from at least two periods or two data sources. Use of these decision rules means that exclusion decisions need not be based on the facility’s actual staffing *level* (except for extreme outliers that represent obvious data errors), but rather in the *consistency* of staffing measures (either across time, or, if staffing data from a second source are available, across data sources for a given time period). The longitudinal decision rules focus on the two items— total nursing hours and total residents— that are used to calculate nursing hours per resident day.

The use of longitudinal OSCAR data (or data from a second source if available) to develop exclusion criteria is the major difference between Abt’s decision rules and those of Harrington. Harrington excluded facilities with staffing levels in the lower 1% or the upper 2%, regardless of whether these figures were consistent with other data for the facility. The logical decision rules developed here eliminate extreme outliers using a somewhat different threshold than that of Harrington, and are supplemented by the decision rules based on across-time changes in staffing levels or resident counts. They result in the exclusion of some facilities that do not have outlier staffing values, but do have staffing or resident figures that are inconsistent with other data for the facility.

Use of a set of decision rules that is based on *change* in reported staffing levels rather than the actual *level* of staffing better allows the distribution of staffing levels to be preserved, permitting low-staffed facilities with reliable data to be included in the analysis. Except in the case of extreme outliers, which represent obvious data errors, reliability judgments were based on the based on across-time consistency of the staffing and resident count variables that are used to calculate staffing measures on a per resident day basis.

The investigators do not recommend implementation of several of the decision rules developed by Harrington. Using her decision rules, all facilities in the lowest 1% or highest 2% in staffing

levels (per resident day) are excluded. While data for most facilities that report low staffing levels is likely inaccurate, automatic exclusion of low-staffed facilities is particularly inappropriate for the current study, which is analyzing the relationship between staffing levels and resident outcomes, a relationship that might only be evident for facilities with very low staffing levels. Exclusion of extreme outliers, combined with exclusion of facilities with large changes in staffing levels across time, allows data for a subset of low-staffed facilities with validated staffing data to remain in the analysis sample.

The investigators also recommend against using Harrington's rule to exclude non-hospital based facilities with 50 or more empty beds. The current analyses suggested that staffing data for these facilities were no less reliable than for other facilities (based on comparison to OSCAR data from different time periods or to staffing measures from Medicaid Cost Report data; the payroll sample is too small to draw any conclusions about the appropriateness of this decision rule). After applying Abt's logical decision rules, the correlation between total hours per resident day figures from 1997 OSCAR and Medicaid Cost Report data was 0.37 for non-hospital based facilities affected by Abt's decision rules compared to 0.28 for other non-hospital based facilities.

Given that the staffing measure, hours per resident day, depends both on the number of FTEs reported in OSCAR and the number of residents at the facility, it is important to have exclusion criteria to identify facilities with inaccurate resident count data. The investigators propose a decision rule that is based on the change in residents across time (relative to changes in the number of beds at the facility).

### **7.5.1 Logical Decision Rules**

**1. Exclude facilities that report more residents than beds** This decision rule is designed to identify facilities with questionable resident count information. Nationwide, much less than 1% of facilities reported more residents than beds (Table 7.6). No facilities in the payroll sample were affected by this decision rule, which was also used by Harrington. Because few facilities were affected by this decision rule, it had no effect on the correlation of 1997 OSCAR staffing figures to those from either 1996 OSCAR or 1997 Cost Report data (Table 7.7).

**2. Exclude facilities that report no RN hours and have 60 or more beds** Current minimum federal standards require that all certified nursing homes with 60 or more beds have an RN on duty for 8 hours a day seven days a week and a licensed nurse (either an RN or an LPN) on duty evenings and nights. RN Directors of Nursing do not count towards this requirement. Facilities with fewer than 60 beds can obtain a waiver that exempts them from this requirement.

As a result, the reliability of OSCAR data for facilities with more than 60 beds that report no RN hours per resident day is questionable. Nationwide, about 1% of facilities were affected by this

decision rule. This decision rule had no effect on the correlation of total hours per resident day figures (Table 7.7).

**3. Exclude facilities that report more than 12 hours per resident day** Development of this threshold was guided by analysis of whether the data in OSCAR could be validated based on data from another time period or from the Medicaid Cost Reports. Harrington et al. used a slightly higher threshold, but data for no facilities reporting twelve or more total nursing hours per resident day could be validated using the Ohio payroll or Medicaid Cost Report data. The across-time correlations for OSCAR data for these facilities was also low. Nationwide, about 3% of facilities reported more than 12 hours per resident day. Only one facility in the payroll sample was reported with more than 12 hours per resident day— a facility that had 2.98 hours per resident day in the payroll data, compared to more than 13 hours per resident day in OSCAR.

Of the facilities that reported more than 12 hours per resident day in OSCAR, none reported more than 5.3 hours per resident day in the Medicaid Cost Report data. Forty percent of the facilities affected by this decision rule were hospital-based and Medicaid Cost Report data were unavailable for most hospital-based facilities. There were only eight facilities with more than 12 hours per resident day in OSCAR for which Medicaid Cost Report data were available. As a result, The investigators focused on the across-time consistency of OSCAR data in developing this decision rule.

Nationwide, among facilities that reported more than 12 hours per resident day in either 1997 or 1998, the Pearson correlation coefficient between 1997 and 1998 hours per resident day was 0.34, compared to 0.72 for facilities that did not report more than 12 hours per resident day in either year (based on comparison of the first and fourth rows of Table 7.7)<sup>15</sup>. Application of this decision rule had a large impact on the consistency of OSCAR staffing measures. Use of the rule increased the correlation in 1997 total staffing between the Medicaid Cost Report data and OSCAR from 0.13 to 0.49 (Table 7.7).

**4. Exclude facilities that report less than 0.5 total hours per resident day** One goal in the development of decision rules was to avoid excluding facilities with low staffing levels reported simply because of the level of their staffing. The investigators were, however, unable to validate OSCAR data for any facilities reporting less than 0.5 total hours per resident day using Medicaid Cost Report data, suggesting that these facilities should be excluded. One facility in the payroll sample that was affected by this decision rule, and the payroll data reported that this facility had 2.55 total hours per resident day. The decision rule affected 0.3% of facilities in the nationwide

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<sup>15</sup> The correlation for facilities with between 12 and 24 total hours per resident day was 0.29, suggesting that staffing figures for these facilities tended to be unreliable relative to facilities with lower staffing levels.

OSCAR data (Table 7.6). Application of this decision rule had little effect on the consistency of OSCAR staffing measures, either across time or across data sources (Table 7.7).

Overall, the logical decision rules resulted in a large increase in the across-time and across-data source consistency of OSCAR staffing figures—

- Without the decision rules, the Pearson correlation coefficient between 1996 and 1997 total hours per resident day from OSCAR was 0.33. This increased to 0.73 after excluding facilities identified by the logical decision rules.
- The Pearson correlation between OSCAR and Medicaid Cost Report increased from 0.13 to 0.49 after applying the decision rules to the OSCAR data. Most of the increase was the result of excluding facilities that reported more than 12 hours per resident day.
- Comparisons based on the payroll sample are limited by the small number of facilities for which payroll data were available, but application of the logical decision rules improved the OSCAR- payroll data correlation from 0.41 to 0.54 (Table 7.8).

**Table 7.6:**

**Nationwide Proportion of Facilities Affected by Logical Decision Rules**

Decision rule	% of facilities affected			
	1996	1997	1998	1999
Exclude facilities that report more residents than beds	0.01%	0.02%	0.03%	0.02%
Exclude facilities that have more than 60 residents and no RN hours	1.3%	1.1%	1.0%	1.1%
Exclude facilities that report more than 12 hours per resident day	3.9%	3.4%	3.2%	2.7%
Exclude facilities that report fewer than 0.5 hours per resident day	0.3%	0.3%	0.3%	0.3%
Total	5.4%	4.7%	4.5%	4.1%

N= 1996: 16,176; 1997: 16,074; 1998: 15,319; 1999: 8,117

Sources: OSCAR (Nationwide data). 1999 OSCAR data were available only through June 1999.

**Table 7.7:**  
**Correlation between 1997 OSCAR and other OSCAR and Medicaid Cost Report data with and without application of logical decision rules**

Decision rule	Pearson Correlation coefficient of 1997 OSCAR total hours per resident day to:	
	1996 OSCAR_	1997 Medicaid Cost Report
No logical decision rules applied	0.33	0.13
Exclude facilities that report more residents than beds	0.33	0.13
Exclude facilities that no report zero RN hours and 60 or more beds	0.33	0.13
Exclude facilities that report more than 12 hours per resident day	0.71	0.48
Exclude facilities that report fewer than 0.5 hours per resident day	0.33	0.13
All logical decision rules applied	0.73	0.49

\_ : Logical decision rules applied to both 1996 and 1997 data.  
 N= 1,474 facilities with 1997 OSCAR and Medicaid Cost Report data; 1,985 facilities with 1996 and 1997 OSCAR data.  
 Sources: OSCAR data for New York, Ohio, and Texas

**Table 7.8:**  
**Correlation Between OSCAR and Ohio Payroll Data With and Without Application of Logical Decision Rules**

Decision rule	Correlation coefficient of OSCAR total hours per resident day to payroll data
No logical decision rules applied	0.41
All logical decision rules applied	0.54

N= 98  
 Sources: OSCAR data, Ohio payroll sample

## 7.5.2 Decision Rules Based on Changes in Staffing or Resident Levels Across Time

A second set of decision rules was developed to identify facilities that had large changes in reported staffing levels or number of residents (adjusted for changes in the number of beds) across time. Staffing and resident levels for most facilities remain stable over time, and data for facilities reporting large changes in these values are suspect. If a second data source that is less than a “gold standard” (e.g., Medicaid Cost Report or some other self-reported data) are available, these data can be used to validate staffing or resident changes across time. If only OSCAR data are available, then The investigators recommend excluding all facilities with changes in total residents or total hours per resident day beyond a given threshold. Implementation of these decision rules requires data from at least two time periods.

***1. Exclude all facilities that had a change in total residents of 25 or more, unless the facility reported a corresponding change in beds.*** Invalid staffing data (expressed in terms of hours per resident day) can result from inaccurate resident count information. Analysis of changes in resident count across time (adjusted for anticipated changes that result from changes in the number of beds at the facility) can identify facilities with questionable resident count data.

The two periods of payroll data that were collected did not cover the same time interval as longitudinal OSCAR data, but showed that the number of residents at a facility tends to remain relatively stable across time. The correlation in the patient day measures for the two payroll periods was 0.75. While there are undoubtedly facilities that experience large changes in resident counts, among facilities that report large changes in staffing levels across time there is likely a disproportionate share with errors in the OSCAR data.

The decision rule that is proposed is to *exclude all facilities that had a change in total residents of 25 or more, unless the facility reported a corresponding change in beds.* To implement this decision rule, one must create a measure of ‘expected residents,’ which equals the resident count in the preceding period adjusted for the change in beds between the two periods.

This decision rule affected 3% of facilities, about 3% of the sample, excluding facilities affected by the logical decision rules described above (Table 7.9). Application of this decision rule appears to greatly improve the reliability of OSCAR data:

- The correlation between 1996 and 1997 OSCAR total hour per resident day figures was 0.77 for facilities that did not have a large change in total residents (i.e., not affected by this decision rule), after excluding facilities affected by the logical decision rules, relative to 0.73 with only the logical decision rules applied (Table 7.10) The correlation for facilities excluded by this decision rule was 0.54 (Table 7.11).
- The correlation between 1997 total hour per resident day figures derived from OSCAR and Medicaid Cost Report data was 0.50 for facilities not affected by this decision rule (after

excluding facilities affected by the logical decision rules), compared to 0.22 for facilities affected by the rule (Table 7.11). This was a small increase in consistency relative to using only the logical decision rules (Table 7.10).

**2. Exclude facilities in the top 10% in terms of change in total hours per resident day across time periods** The final decision rule excludes facilities with large changes in reported staffing levels across time. While some facilities have large changes in staffing levels across time, large changes more likely reflect the presence of errors in the OSCAR data. If there is a second source of staffing data available, it can be used to validate staffing changes, but if OSCAR is the only data source available then facilities with large changes in staffing levels across periods should be excluded.

To apply this decision rule, the facility's *percentile rank* in total hours per resident day needs to be calculated. This can be done using PROC RANK in SAS with the GROUPS=100 option. Percentile rank, rather than actual staffing levels, was used as the basis for this decision rule so that the decision rule is applied independently of facilities' staffing levels. Facilities in the top 10% in terms of *change* in total hours per resident day are excluded based on this decision rule. (Note that selection of a threshold is somewhat arbitrary and depends partly on the available sample size and the purpose for which OSCAR data are being used.)

Application of this rule appears to result in substantial improvements in the reliability of OSCAR data—

- By definition, exclusion of facilities with changes in staffing will lead to improvement in the correlation of OSCAR staffing measures across periods, and such a comparison is not particularly useful.
- A better test of this decision rule is to compare staffing measures from OSCAR to those from either the Medicaid Cost Report or payroll data. The correlation between 1997 data from OSCAR and Medicaid Cost Reports was 0.50 for facilities without large across-time changes in staffing level, compared to 0.10 for facilities excluded as a result of this rule (Table 7.11).

### 7.5.3 Overall Impact of Decision Rules

Overall, 16% of facilities are excluded by the decision rules described above (based on 1997 OSCAR data). The decision rules affected 11% of the payroll sample. Application of these decision rules results in an analytic sample that has much greater reliability and validity than results from using uncleaned OSCAR data.

- The correlation in total hours per resident day from 1996-1997 OSCAR data was 0.85 after



applying the decision rules, compared to 0.33 without using any of the decision rules (Table 7.10).

- The correlation in 1997 total hours per day from OSCAR and the Medicaid Cost Report data improved from 0.13 to 0.55 after excluding facilities based on the decision rules.
- The correlation for the relatively small number of facilities with both OSCAR and Ohio payroll data improved from 0.43 to 0.54 after applying the decision rules (Table 7.12). The correlation went from 0.43 to 0.57 using only the logical decision rules, and then decreased slightly after also applying the decision rule based on the change in total hours per resident day. Given the small number of facilities in the payroll sample, it is more appropriate to evaluate the impact of this decision rule using the OSCAR-Medicaid Cost Report comparisons, for which a much larger sample was available.

**Table 7.9:  
Nationwide Proportion of Facilities Affected by OSCAR Decision Rules**

<b>Decision rule</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>
Logical decision rules only	4.7%	4.5%	4.1%
Exclusion based on change in total hours per resident day	10.1%	10.0%	10.1%
Exclusion based on change in total residents (relative to change in number of beds)	2.7%	2.8%	2.3%
Apply all decision rules: exclusion based on change in total hours, change in total residents, and logical decision rules	14.6%	14.4%	12.8%

N= 1996: 16,176; 1997: 16,074; 1998: 15,319; 1999: 8,117

Sources: OSCAR (Nationwide data). 1999 OSCAR data were available only through June 1999.

**Table 7.10:**  
**Correlation Between 1997 OSCAR and Other OSCAR and Medicaid Cost Report Data With and Without Application of Logical and Longitudinal-Based Decision Rules**

Decision rule	Pearson Correlation coefficient of 1997 OSCAR total hours per resident day to:	
	1996 OSCAR	1997 Medicaid Cost Report
No logical decision rules applied	0.33	0.13
All logical decision rules applied	0.73	0.49
Exclusion based on change in total hours per resident day and logical decision rules	0.84	0.50
Exclusion based on change in total residents (relative to change in number of beds) and logical decision rules	0.77	0.54
Apply all decision rules: exclusion based on change in total hours, change in total residents, and logical decision rules	0.85	0.55

N= 1,474 facilities with 1997 OSCAR and Medicaid Cost Report data; 1,985 facilities with 1996 and 1997 OSCAR data.

Sources: OSCAR data for New York, Ohio, and Texas

**Table 7.11:**  
**Correlation Between 1997 OSCAR and 1997 Medicaid Cost Report Data**  
**Stratified by Whether Facility Is Excluded by OSCAR Decision Rules**

Decision rule	Pearson Correlation coefficient of 1997 OSCAR and Medicaid Cost Report total hours per resident day	
	Included facilities	Excluded facilities
No logical decision rules applied	0.13	N/A
Apply all logical decision rules	0.49	0.07
Exclusion based on change in total hours per resident day (using logical decision rules for both included and excluded facilities)	0.50	0.30
Exclusion based on change in total residents (relative to change in number of beds) (using logical decision rules for both included and excluded facilities)	0.54	0.10
Apply all decision rules: exclusion based on change in total hours, change in total residents, and logical decision rules	0.55	0.29

N= 1,474 facilities with 1997 OSCAR and Medicaid Cost Report data  
 Sources: OSCAR data for New York, Ohio, and Texas

**Table 7.12:**  
**Correlation Between OSCAR and Ohio Payroll Data With and Without Application of Logical and**  
**Longitudinal-Based Decision Rules**

	Pearson correlation coefficient of OSCAR total hours per resident day to Ohio payroll data
No logical decision rules applied	0.43
All logical decision rules applied	0.57
Exclusion based on change in total hours per resident day and logical decision rules	0.54
Exclusion based on change in total residents (relative to change in number of beds) and logical decision rules	0.57
Apply all decision rules: exclusion based on change in total hours, change in total residents, and logical decision rules	0.54

N= 98  
 Sources: OSCAR, Ohio payroll data

## 7.6 Conclusion

This chapter analyzed the reliability and accuracy of OSCAR staffing measures, based on comparison to payroll data from a sample of Ohio facilities. These analyses showed that there were a significant number of facilities for which there were differences in staffing measures from the two data sources. The correlation between staffing figures from OSCAR and the payroll data was relatively low. For total hours per resident day, the Pearson correlation coefficient was 0.43, and the Spearman (rank) correlation was 0.52. There was less consistency in nurses aide staffing figures than for either RNs or LPNs.

This study also investigated whether facilities, particularly ones with low staffing levels, tended to increase staffing levels (particularly for RNs) immediately prior to the start of the annual certification survey. Since OSCAR staffing data cover the two-week period preceding the annual survey, if facilities “staff-up” in anticipation of the annual certification survey, then the staffing levels reported in OSCAR may be higher than the typical staffing levels at the facility. The Ohio payroll data included two time periods, one corresponding to the survey period and a second that typically covered the period six months prior to the most recent facility survey. Little evidence was found to suggest that this type of “staffing-up” is a widespread phenomenon. Staffing levels were relatively stable across the two time periods, although facilities with low staffing levels in the pre-survey period were more likely to have higher staffing levels during the survey period. It is not possible to determine whether this reflects some type of increased staffing corresponding to the survey period or merely reversion to the mean.

A set of decision rules were developed for determining which facilities should be excluded from analyses due to concerns about the accuracy of OSCAR staffing measures. These decision rules build on those developed by Charlene Harrington, but also consider changes in staffing levels across time in assessing reliability.

Overall, 16% of facilities are excluded by the decision rules described above (based on 1997 OSCAR data). Application of these decision rules results in an analytic sample that has much greater reliability and validity than results from using uncleaned OSCAR data. The correlation in 1997 total hours per day from OSCAR and the Medicaid Cost Report data improved from 0.13 to 0.55 after excluding facilities based on the decision rules. The correlation for the relatively small number of facilities with both OSCAR and Ohio payroll data improved from 0.43 to 0.54 after application of the decision rules.

The investigators recommend that the decision rules described above be applied to all analyses that use OSCAR for which data from at least two time periods are available. If no longitudinal data are available, use of the logical decision rules will result in considerable improvement in the

reliability of data in the analytic sample, but will not capture facilities with large unexplained changes in either staffing levels or resident counts.

## References

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## CHAPTER 8 DATA SOURCES OF NURSING HOME NURSE STAFFING ANALYSIS: ASSESSMENT OF OSCAR COMPARED TO MEDICAID COST REPORTS<sup>16</sup>

### 8.1 Introduction

The purpose of this chapter is to compare the reliability and validity of staffing measures from the Online Survey Certification and Reporting System (OSCAR) to staffing measures derived from Medicaid Cost Report data. These analyses were used to determine the source of staffing data for the outcome analyses presented in Chapters 9 through 12 that analyze the relationship between staffing levels and resident outcomes.

Reliability and validity were tested based on comparison to a sample of nursing facilities in Ohio for which payroll records were collected. The payroll data provide close to a “gold standard” measure of facility nurse staffing. They were collected for the period corresponding to the most recently available OSCAR assessment and a second period, which typically covered the six months prior to OSCAR. This is the first data collection effort that captures both a similar definition and an identical time period as the OSCAR nurse staffing survey data using an independently collected and not self-reported facility data source. The validity analyses included a variety measures of correlation with the payroll data, including Pearson and Spearman correlation coefficients and Kendall’s Tau.

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<sup>16</sup> This report was completed by Alan White of Abt Associates for the Health Care Financing Administration (Contract #500-95-0062-T.O.3; Allison Walker, Abt Associates Project Director; Marvin Feuerberg, HCFA Project Officer). Other individuals who made valuable comments and suggestions on the analyses included in this chapter include Karen Reilly, Donna Hurd, and Terry Moore of Abt Associates, Andy Kramer and Michael Lin of the University of Colorado Health Center on Aging and Division of Geriatric Medicine, University of Colorado Health Sciences Center, Denver, Colorado, and Marvin Feuerberg, HCFA Project Officer. Mike Murphy of Abt Associates prepared the staffing files, which were based in part on OSCAR data for 1995-1997 prepared by Mick Cowles, of Cowles Research Group. Other valuable assistance was offered by Beth Klitch of Survey Solutions, Inc., who supervised the collection of Ohio payroll data, and Ed Mortimore and Sheila Lambowitz of the Health Care Financing Administration. Editorial assistance was provided by Susan Joslin, HCFA.

While the small sample size was a reason for caution (there were 78 facilities in the Ohio payroll sample for which both OSCAR and Cost Report data were available), our analyses suggested that the Cost Report data were more valid and reliable than OSCAR. This was especially true for lower staffed facilities, an important criterion given the interest in these facilities for the outcomes study. Because the OSCAR and payroll data covered the same time period, while the Cost Report data were based on the facility average across an entire year, the finding that staffing measures from the Cost Report data tended to be more highly correlated with the payroll data than staffing measures from OSCAR, strongly suggests that the Cost Report data were the more reliable and valid source of staffing data, and that they should be the source of staffing measures for the outcomes study.

While the Cost Report data were more reliable than OSCAR, there were some facilities for which Cost Report data did not appear to be accurate. Two types of potential decision rules were developed to exclude facilities with questionable staffing measures. The first is a set of “logical” decision rules that identify facilities with obvious data errors. The second is based on the consistency of staffing measures across time and across data sources. While there are certainly some facilities that experience large changes in staffing levels across time, it is likely that a disproportionate share of data for these facilities are inaccurate. It may be desirable to exclude facilities that report large changes in staffing measures reported in the Cost Report data if these changes cannot be validated using OSCAR (or some other independent data source). A limitation of this type of exclusion criteria is that it relies on OSCAR to validate changes in Cost Report data, although it was found that the Cost Report data were more valid and reliable than OSCAR.

Decision rules that are based on *change* in reported staffing levels rather than the actual *level* of staffing (except in the case of extreme outliers) allows the distribution of staffing levels to be preserved, keeping low-staffed facilities with reliable data in the analysis. The payroll sample was not large enough to evaluate the impact of these decision rules on the validity of staffing measures for non-excluded facilities, but analysis of the impact of the decision rules on the consistency of staffing measures from the Cost Report and OSCAR data showed that application of the decision rules improved the consistency of staffing measures from the two data sources.

## **8.2 Data Sources**

Data sources used in this study included OSCAR, Medicaid Cost Reports, and Ohio payroll data. The payroll data were collected for a sample of 107 facilities, 78 of which also had Medicaid Cost Report data available. Medicaid Cost Report and OSCAR data for the years 1995-1997 were also available for other Ohio facilities and facilities from New York and Texas. A brief discussion follows. A detailed description of the Ohio payroll data collection can be found in Chapter 7.

### **8.2.1 Ohio Payroll Data**



Primary data collection was performed by Survey Solutions, Inc. Data collectors, experienced in skilled nursing facility administration, were trained to collect nursing staff payroll journal data closely following the OSCAR survey variable definitions (e.g., staff type, hours per week). The payroll data were logged using a computer laptop application. All nursing staff hours were captured, including full time, part time, and contract staff/organizations, as well as information regarding resident census. Other data sources, beyond payroll journals, were also used to capture staffing information. For example, staff time sheets, contract invoices, or other invoices were also considered potential sources of staffing documentation.

Total nursing staff payroll hours were collected for two time periods. The first reflects the two week time period prior to the most recent facility survey (i.e., the same time period used by the state survey agency). Payroll data were also collected for a second time period that reflected six months prior to the most recent facility survey. Where six month payroll data were unavailable, data were collected to encompass the oldest two week period available, provided there was at least one month between the first time period and the second.

HCFA's OSCAR data were used to capture records on Ohio facilities and stratify the facility into one of four nursing hours categories. Consideration was also given to ensure facility variation with respect to size, geographic distribution, for profit/not for profit status, and chain affiliation although these stratification requirements were less stringent. In all strata, except for the nursing hours per resident per day, the facility sample distribution generally parallels the Ohio facility distribution or facility average. Furthermore, the Ohio facility distribution is reflective of the US for these facility characteristics.

OSCAR was used to stratify Ohio facilities into one of four categories, based on total nursing hours per resident day. Consideration was also given to ensure facility variation with respect to size, geographic distribution, for profit/not for profit status, and chain affiliation, although these stratification requirements were less stringent. In all strata, except for the nursing hours per resident per day, the facility sample distribution generally parallels the Ohio facility distribution or facility average. Practical constraints limited the limited the total sample to 107 facilities. Initially, 1997 OSCAR data were used to stratify facilities, but Abt gained access to the 1998 OSCAR data during the data collection process, and an updated facility category listing was