

## Conference Paper

# Hospital staffing, organization, and quality of care: cross-national findings

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### Abstract

**Objective.** To examine the effects of nurse staffing and organizational support for nursing care on nurses' dissatisfaction with their jobs, nurse burnout, and nurse reports of quality of patient care in an international sample of hospitals.

**Design.** Multisite cross-sectional survey.

**Setting.** Adult acute-care hospitals in the United States (Pennsylvania), Canada (Ontario and British Columbia), England, and Scotland.

**Study participants.** 10 319 nurses working on medical and surgical units in 303 hospitals across the five jurisdictions.

**Interventions.** None.

**Main outcome measures.** Nurse job dissatisfaction, burnout, and nurse-rated quality of care.

**Results.** Dissatisfaction, burnout, and concerns about quality of care were common among hospital nurses in all five sites. Organizational/managerial support for nursing had a pronounced effect on nurse dissatisfaction and burnout, and both organizational support for nursing and nurse staffing were directly, and independently, related to nurse-assessed quality of care. Multivariate results imply that nurse reports of low quality care were three times as likely in hospitals with low staffing and support for nurses as in hospitals with high staffing and support.

**Conclusion.** Adequate nurse staffing and organizational/managerial support for nursing are key to improving the quality of patient care, to diminishing nurse job dissatisfaction and burnout and, ultimately, to improving the nurse retention problem in hospital settings.

**Keywords:** burnout, health care surveys, health services research, nursing service (hospital), outcome assessment (health care), quality of health care

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Hospitals are facing multiple challenges. Governments have increasingly mandated containment of rising hospital costs. Advances in technology, including less invasive surgical procedures, have reduced the need for inpatient care on the one hand, resulting in excess inpatient capacity. On the other hand, the complexity of medical and surgical interventions undertaken in hospitals requires an ever bigger and more sophisticated clinical workforce. Reconciling budget constraints and excess bed capacity with increasingly complex, labor-intensive clinical care requirements has challenged hospital leaders.

Reductions in hospital inpatient capacity have been common for more than a decade. Additionally, various managerial reforms have been undertaken to improve productivity in the hospital sector. These initiatives have taken different forms, some focusing on new organizational arrangements such as vertical and horizontal integration of services, mergers, and regionalization of services, and others on process re-engineering and work redesign [1–5].

Evidence is mounting that these changes have not been well received. Recent surveys of consumers reporting on their most recent hospitalizations as well as quality, availability,

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and affordability of health care in five countries found substantial public dissatisfaction with health care. Strikingly, 18% of US and UK consumers and 27% of Canadian consumers rated their last hospital stay as fair or poor [6,7]. Physicians concur that quality of hospital care in these five countries is threatened by shortage of nurses [8]. Studies of restructured hospitals reveal high levels of nurse dissatisfaction [9,10]. Analyses of the nurse labor market point to poor prospects for recruiting adequate numbers of nurses to meet future health care needs [11]. Finally, media coverage of deficiencies in hospital quality of care and associated nurse shortages is widespread [12–15].

The International Hospital Outcomes Study was undertaken in response to widespread public and professional discontent with health system change as it has impacted on hospital care [16]. The study seeks to determine how potentially modifiable attributes of hospital organization and staffing affect patient outcomes and nurse retention in order to improve decision making on how best to meet the challenges faced by hospitals without adversely affecting patient outcomes [17]. We report here on preliminary findings.

## Study background

The International Hospital Outcomes Study Consortium consists of seven interdisciplinary research teams headed by the University of Pennsylvania's Center for Health Outcomes and Policy Research. The study includes over 700 hospitals located in the United States (Pennsylvania), three provinces in Canada (Ontario, Alberta, British Columbia), England, Scotland, and Germany. The conceptual framework and design of the study derive from more than a decade of research on US hospitals conducted by the Center that began with a series of studies of the organizational features of good hospitals [18].

A national reputational study conducted in 1982 by the American Academy of Nursing identified 41 hospitals that were successful in attracting and retaining professional nurses when other hospitals in their local labor markets had high nurse vacancy and turnover rates [19]. These hospitals were found to have a common set of organizational attributes: flat organizational structure, decentralized decision making by bedside caregivers, inclusion of the chief nurse executive in top management decision making, flexible nurse scheduling, unit self-governance, and investment by management in the continuing education of nurses [20]. The constellation of organizational features of magnet hospitals resulted in a clinical practice environment in which nurses had more autonomy, more control over the conditions of practice at the bedside, and better relationships with physicians compared with non-magnet hospitals [21]. These hospitals were also shown to have lower Medicare mortality (five fewer deaths per 1000 discharges) than matched hospitals [21].

From this early work we constructed and began testing a conceptual model of the mechanisms by which organizational features of hospitals affect patient and nurse outcomes (see Figure 1). We posit that nurses constitute the ongoing surveillance system in hospitals for the early detection of adverse

occurrences, complications, and errors. Early detection is affected by nurse-to-patient ratios and nursing skill mix (the proportion of nursing personnel who are registered professional nurses). Indeed there is a growing research literature linking nurse-to-patient ratios and skill mix with variation in patient outcomes [22–27]. Once a potential problem has been identified, organizational features determine the speed with which the institution responds to intervene. The earlier the problem is detected and managed, the lower the probability of a poor outcome. Relatively little research has been undertaken to determine the extent to which organizational features other than staffing affect patient outcomes [28]. Our particular interest has been to contribute to improved understanding of the link between organization and outcomes.

Our first major test of this conceptual model was a 20-hospital US study designed to determine how hospital organizational features, including nurse staffing, affected outcomes for hospitalized AIDS patients and the nurses who cared for them. We selected three different organizational forms of inpatient AIDS care for study: hospitals with dedicated AIDS units, magnet hospitals without dedicated AIDS units, and non-magnet conventionally organized hospitals with AIDS care scattered on general medical units [29]. The probability of AIDS deaths within 30 days of hospital admission was significantly lower in magnet hospitals and in hospitals with dedicated AIDS units as compared with matched non-magnet hospitals where AIDS patients were cared for on general medical units [30]. The nursing practice environment on dedicated AIDS units was similar to magnet hospitals in that in both organizational forms, nurses had more autonomy, greater control, and better relations with physicians than did nurses in conventionally organized hospitals. Nurse staffing was an important factor accounting for lower AIDS mortality: an additional nurse per patient day reduced the odds of dying within 30 days of admission by half. The extent of organizational support for nursing care in magnet hospitals and dedicated AIDS units was the primary explanation for higher patient satisfaction [31] and better nurse outcomes, including lower burnout [32] and lower rates of needlestick injuries [33,34]. Organizational support as operationalized in these analyses included two components: staffing adequacy and managerial support for nurses' decisions.

Key to our research on the effects of organizational attributes on patient outcomes was the development of a method and instrument for empirically quantifying organizational variation. Our method is grounded in organizational sociology and the work of sociologists Aiken and Hage [35], who pioneered the use of worker surveys to provide information about organizational relationships and features. Thus, we measure organizational features of hospitals by surveying staff nurses using a modified version of the Nursing Work Index [36]. We selected nurses as informants because of their close proximity to patients and because their work brings them into contact with managerial policies and practices, physicians and other clinical care providers, and most of the hospital support services including housekeeping,

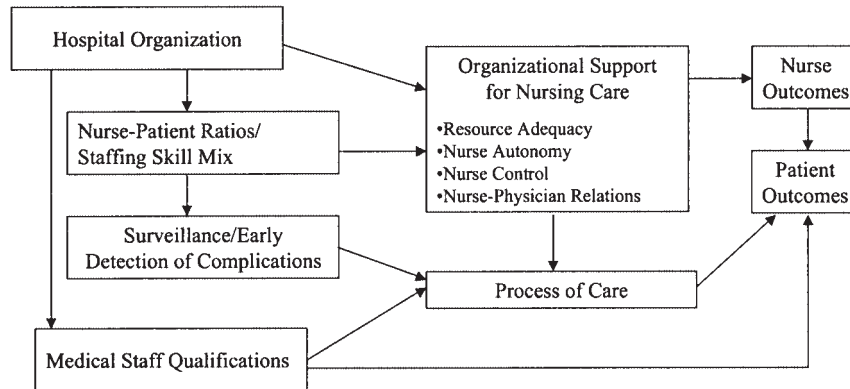


Figure 1 Hospital organization, nursing organization, and patient outcomes.

food service, pharmacy and supplies, clerical support, transport, security, and family services. As noted above, we have established the predictive validity of survey-based measures of organizational features in explaining variation in patient and nurse outcomes. The International Hospital Outcomes Study incorporates these measures into a design that allows for the study of a large representative group of hospitals in five countries. This paper presents preliminary results from the nurse survey component of the study.

## Methods

### Study design

The International Hospital Outcomes Study includes three primary linked and overlapping sources of data. These sources include surveys of nurses, patient discharge data, and secondary data on hospital characteristics. We sought to study hospitals in comparable countries but with differently organized and financed health care systems, and selected the United States (Pennsylvania), Canada, the UK (England and Scotland), and Germany. Where feasible, our design called for the inclusion of all hospitals in a defined geographic area. This was possible in Pennsylvania, the Canadian provinces of Ontario, Alberta, and British Columbia, and Scotland because of the availability of patient data on all discharges for the year 1999. In England and Germany, patient data were not available from national sources on all hospitals. Thus we included in these countries hospitals that subscribed to benchmarking organizations from which patient-level discharge data could be obtained, yielding 32 hospital trusts in four regions in England and 29 hospitals in Germany.

### Sample

Surveys of nurses employed in study hospitals were undertaken to obtain data on hospital organizational attributes, managerial policies, staffing and resource availability, job satisfaction and burnout, and nurse-assessed patient outcomes. In jurisdictions where all hospitals were included in the study, lists from registered nurse licensing bodies provided a sampling frame for the nurse survey. In Pennsylvania a

50% sample of active registered nurses residing in the state was surveyed by means of self-administered questionnaires mailed to their home addresses. They were asked to provide the name of their employing hospital and to fill out the questionnaire in reference to that hospital. Similar nurse sampling procedures were followed in Canada. In Scotland, England, and Germany, participating hospitals provided lists of employed nurses working in positions involving direct patient care roles comparable to those held by registered nurses in North America, and all nurses listed were surveyed. Response rates ranged from 42 to 53% across geographic jurisdictions, which compare favorably with those in recently published studies involving surveys of health professionals. We have found no evidence of systematic biases created by non-response on the part of nurses with certain demographic characteristics or nurses who are particularly displeased or pleased with conditions in their hospitals. In Pennsylvania, response rates were quite similar across hospitals, and differences in response rates across hospitals were not associated with hospital-level assessments of organizational support ( $r=0.03$ ). While it is impossible to rule out response bias, we find no reason to believe that systematic tendencies for certain types of nurses to respond to the questionnaire accounts for the results we present here.

The present analyses exclude the province of Alberta in Canada and Germany because of delays in obtaining completed survey data. Since we have found some differences in nurse ratings of hospital and job characteristics across specialties [37], we limited the nurse sample in these first analyses to staff nurses employed in medical and surgical units. We also limited the hospital sample to hospitals with 10 or more medical-surgical nurses who responded to our survey to provide sufficiently large samples to derive reliable and stable estimates of hospital characteristics, yielding a total sample of 10 319 nurses. Table 1 lists the numbers of hospitals and nurses in Pennsylvania, Ontario, British Columbia, England, and Scotland represented in the analyses.

### Measures

In our investigations of the effects of hospital-level organizational characteristics on nurse and patient outcomes,

**Table 1** Numbers of medical-surgical nurses in hospitals with 10 or more medical-surgical nurse respondents, in the United States, Canada, and the UK

Study site	Nurses	Hospitals	Mean number of nurse respondents per hospital
Pennsylvania	2969	115	25.8
Ontario	2784	96	29.0
British Columbia	601	33	18.2
England	2144	32	67.0
Scotland	1821	27	67.4
Total	10 319	303	34.1

the two primary independent variables of interest are nurse staffing and organizational support for nursing care.

*Nurse staffing.* Our measure of nurse staffing is derived from the nurse surveys. Nurses were asked to provide details on the last shift (day, evening, or night) they had worked, including the number of patients they were assigned. Since staffing is systematically different on conventional medical-surgical nursing units versus specialty units such as labor and delivery suites and intensive care units, and varies systematically at different times of day, we derived a comparable staffing measure within and across sites by computing the average number of patients assigned to medical-surgical staff nurses in each hospital who last worked a day shift. What is gained in precision by restricting attention to staffing in a particular specialty on a specific shift versus considering staffing across all specialties and shifts will be examined in future analytical work.

*Organizational support for nursing practice.* We are primarily interested in a measure of hospital organizational climate that reflects managerial decisions that shape the context in which nursing care takes place. The nurse survey included a modified version of the Nursing Work Index, which asked nurses to rate the extent to which a set of 49 organizational attributes are present in their current job. Responses to the items on the scale were aggregated at the hospital level. The organizational support for nursing care subscale consists of nine items reflecting nurses' appraisals of the adequacy of staffing and managerial support for nurses' decisions about care. The items that comprise the scale are listed in the Appendix. The reliability and predictive validity of the scale have been previously established [36].

*Nurse job satisfaction and burnout.* Nurses rated their satisfaction with their current jobs on a four-point scale ranging from very dissatisfied to very satisfied. Burnout was measured using the Maslach Burnout Inventory (MBI), a standardized instrument with published norms for medical personnel that has been used previously in international research [38–40]. We use emotional exhaustion (nine items), the MBI subscale most extensively used in health care research, in these analyses. The respondent indicates, for each of the items (e.g. 'I feel emotionally drained by my work'), how frequently they experience the feelings in question. 'Never' is coded 0 and

'every day' is coded 6. Of the three subscales, emotional exhaustion most directly reflects the impact of chronically stressful working conditions and has been the subject of a previous analysis by our team [41]. An internal consistency coefficient of 0.91 for this subscale was observed in the present data set. Scores in the present sample showed the full range of possible values from 0 to 54. According to norms published in the manual, scores of 27 and above on the scale are considered 'high' for medical personnel.

*Nurse reports of quality of hospital care.* Nurses were asked to assess the quality of care on their unit using a four-point scale ranging from poor to excellent. Nurses were also asked to indicate how confident they felt that their patients were able to manage their care at the time of hospital discharge, and whether they felt that the quality of patient care in their hospital had improved, deteriorated, or remained the same over the past year. The questions referred to in the paper, including the item referring to nurse-rated quality of care on the respondent's own unit used as a dependent variable in the analyses, are listed in the Appendix.

## Data analysis

The odds of nurses (1) being dissatisfied with their current jobs; (2) having high emotional exhaustion; and (3) reporting that the care on their units was fair or poor were examined using logistic regression models that controlled for clustering of nurses within hospitals using robust regression procedures [42]. Models were used to estimate the gross and net effects of nurse staffing and organizational support on each of the outcomes of interest, controlling for differences in outcomes across sites. For analytical purposes, hospitals in each country were divided into quartiles on the basis of their aggregate nurse staffing levels and organizational support scores. We present odds ratios corresponding to the differences in nurse-reported outcomes between nurses from the hospitals in lowest and highest quartiles of staffing and organizational support in each site.

## Results

We begin by describing some key variables in the sample of medical-surgical nurses we used in these exploratory analyses.



Table 2 provides mean scores by jurisdiction for staffing, organizational support, and burnout. Staffing levels vary by country and site and may reflect differences in average length of stay and severity of illness between countries. The United States has the shortest average patient length of stay and Pennsylvania nurses also have the smallest numbers of assigned patients. Interestingly, average organizational support scores are similar across countries, but Table 2 shows that there was substantial variation among hospitals within each jurisdiction. The survey findings suggest substantial levels of job dissatisfaction and burnout across all five jurisdictions. The percentage of nurses with burnout scores above published norms for medical personnel varied from 54% of nurse respondents in Pennsylvania to 34% in Scotland. As shown in Table 3, substantial percentages of nurses in all of the jurisdictions studied rated the quality of care in their units, and on their last shift, as fair or poor. Nurses in Pennsylvania were most likely and nurses in Scotland were least likely to rate care on their units as fair or poor.

Table 4, which displays the results of logistic regression modeling to predict nurses' job satisfaction, burnout, and ratings of quality of care on their units, shows a statistically significant effect of hospital-level staffing before, but not necessarily after, controlling for organizational support. A pronounced effect of hospital organizational support for nursing care on both nurse-specific outcomes is evident, both before and after nurse staffing is controlled. Nurses working in hospitals with weak organizational support for nursing care were twice as likely to report dissatisfaction with their jobs and to have burnout scores above published norms for medical personnel. The last line of Table 4 shows that both nurse staffing and organizational support for nursing care had significant impacts on nurse-assessed quality of care, whether considered individually or together. Figure 2 depicts graphically how the odds of reporting poor quality nursing care vary as a function of nurse staffing and organizational support for nursing care. In Figure 2, it is clear that in the best- and worst-staffed hospitals within each site, those that provide the least organizational support for nursing care are more likely to be rated by nurses as providing low quality care. Better staffing is positively associated with higher nurse-assessed quality of care, although its effect is not as pronounced as the effect of organization. We estimate that nurses in the worst-staffed hospitals were 1.3 times as likely as those in the best-staffed to rate the quality of care on their units as fair or poor, once organization is controlled. Nurses in hospitals observed to have the lowest levels of support for nursing care were more than twice as likely to rate the quality of care on their units as fair or poor.

## Discussion and conclusions

Consumers' and health professionals' concerns about adverse consequences of health system change on quality of hospital care are consistent with the findings of the International Hospital Outcomes Study. Deficiencies in hospital care were found in the five jurisdictions included in the present analysis

representing the United States, Canada, and the UK. In addition to uneven quality of care, high levels of nurse job dissatisfaction and burnout signal the potential for a worsening international nursing shortage. Here we document findings indicating that these troublesome conditions in hospitals have real consequences. A limitation of this analysis is the use of the same nurses' reports to provide data regarding both the independent measures, particularly organizational climate, and also the job satisfaction, burnout, and nurse-rated quality of care outcomes for hospitals. However, analyses involving patient outcomes in Pennsylvania data, which are uncontaminated with survey response biases, suggest that hospital-level nurse staffing and organizational support for nursing as measured using our survey predict mortality in general, orthopedic, and vascular surgery patients [43].

The nature and magnitude of perceived problems in hospital care, as well as the associations of these problems with nurse-reported outcomes, across countries with differently organized and financed health care systems, are strikingly similar. Each country tends to think its problems with uneven quality of care and shortage of nurses and other healthcare workers are a consequence of unique demographic and social phenomena or specific policies, such as the growth of managed care and the reduction in Medicare hospital payments following the 1997 Balanced Budget Act in the United States. Our data suggest that contrary to popular opinion what ails hospitals knows no country boundaries. New thinking is required about how to organize hospitals, their work, and their workforces for the 21st century [40].

New thinking does not necessarily mean reaching out for totally new untested ideas of hospital restructuring and re-engineering. The widespread diffusion of new models for organizing care that have no evidence base may be part of the problem rather than the solution. As Marmor [44] notes in a recent critique of managerial reform in health care, if reform does not live up to its promise of sensible and effective care, it is just a synonym for change, not improvement. Our work underscores the importance of renewed attention to the clinical missions of hospitals, greater managerial engagement with clinicians, and recognition of the vital roles nurses play in inpatient outcomes. Hospital managers too often look to outside managerial consultants to solve clinical care problems when clinicians in their institutions could solve these problems themselves with appropriate support from management. The magnet hospital concept, developed by nurses and fostered by informed management, has a strong evidence base of good patient and nurse outcomes [45] and has been operationalized in a voluntary program available to hospitals internationally [46].

Organizational climate in hospitals, and specifically organizational support for nursing care that is potentially modifiable, has been an undervalued determinant of poor patient outcomes and nurse recruitment and retention failure. These preliminary findings from the International Hospital Outcomes Study underscore the importance of managerial support for clinical care services and providers, namely nurses. While hospital nurse staffing levels have been demonstrated in many studies, including this one, to be important in

**Table 2** Hospital and nurse characteristics

	Pennsylvania (n = 2969)	Ontario (n = 2784)	British Columbia (n = 601)	England (n = 2144)	Scotland (n = 1821)
Mean no. patients assigned per nurse on last shift ±SD	6.3 ± 1.4	7.1 ± 2.2	7.0 ± 1.9	9.9 ± 2.0	9.7 ± 1.2
Mean hospital-level aggregate patient load ±SD (range)	6.5 ± 1.6 (4.2–11.5)	7.7 ± 2.6 (3.7–18.0)	7.3 ± 1.9 (4.4–11.7)	10.1 ± 2.2 (5.7–14.9)	9.6 ± 1.3 (7.4–12.9)
Mean hospital-level aggregated organizational support score ±SD (range)	21.6 ± 1.8 (16.8–25.9)	21.7 ± 1.9 (18.3–28.8)	21.9 ± 1.8 (18.0–26.5)	22.7 ± 1.2 (19.3–25.0)	23.0 ± 0.9 (21.2–24.8)
% of nurses dissatisfied with present jobs	48.1	41.8	42.6	38.3	40.8
% of nurses with burnout scores above norms for medical personnel	54.2	46.3	49.9	37.2	32.9

**Table 3** Percentage of nurses reporting quality of care problems

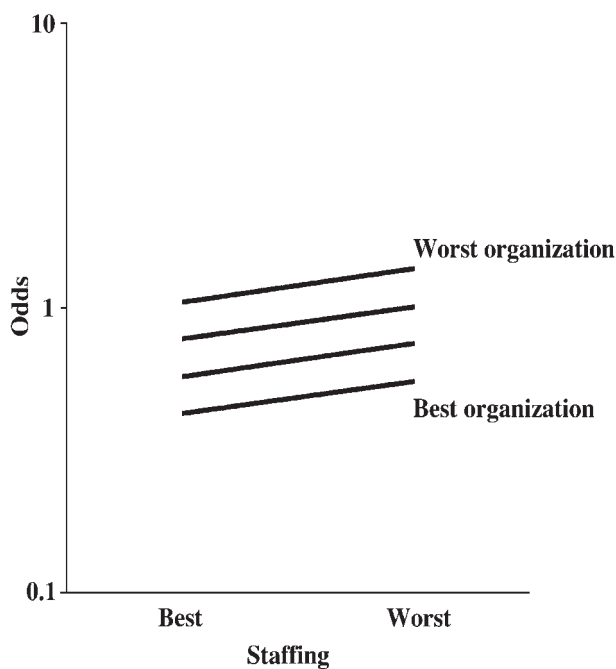
	Pennsylvania (n = 2969)	Ontario (n = 2784)	British Columbia (n = 601)	England (n = 2144)	Scotland (n = 1821)
Rate quality of care on unit as fair/poor	20.8	14.4	15.5	16.2	11.4
Rate quality of care on last shift as fair/poor	30.8	15.4	28.5	14.9	10.4
Somewhat or not confident that patients can manage care after discharge	66.3	73.2	68.7	31.7	38.5
Report that quality of care in their hospital has deteriorated over past year	47.0	45.6	49.8	25.2	21.0

**Table 4** Odds ratios associated with the effects of nurse staffing and organizational support on job dissatisfaction, nurse burnout, and nurse reports of low quality of care

	Worst versus best staffing		Least versus most organizational support	
	Gross effect	Net effect	Gross effect	Net effect
Dissatisfied with current job	1.35 (1.18, 1.54)***	1.12 (0.98, 1.28)	2.08 (1.81, 2.40)***	2.02 (1.75, 2.34)***
Emotional exhaustion (burnout) score above published norms for medical workers	1.25 (1.09, 1.43)***	1.04 (0.91, 1.17)	2.05 (1.78, 2.35)***	2.03 (1.76, 2.34)***
Fair/poor quality of care on unit	1.66 (1.38, 2.00)***	1.30 (1.11, 1.54)***	2.63 (2.20, 3.14)***	2.44 (2.05, 2.91)***

Odds ratios are derived from robust logistic regression models that controlled for country/site and accounted for the clustering of observations. Models incorporate staffing or organizational support individually (gross effects) and staffing and organizational support simultaneously (net effects).

\* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .



**Figure 2** Odds on nurses reporting low quality care on their nursing unit, by hospital-level staffing and organization. The odds plotted above are for the United States (Pennsylvania). The pattern of odds is the same for other countries, but is shifted downwards by factors of 0.69 (British Columbia), 0.64 (Ontario), 0.73 (England), and 0.49 (Scotland).

producing good patient outcomes, the International Hospital Outcomes Study provides compelling evidence that poorly organized practice environments can negate the benefits of excellent staffing. Most of the organizational restructuring in the hospital sector has taken place at the system level or

has been primarily focused on managerial and operational efficiencies. Priority should now be placed on creating organizations that enable clinicians to deliver care of high quality.

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## References

1. Decter M. *Healing Medicare: Managing Health System Change the Canadian Way*. Toronto: McGilligan Books, 1994.
2. Leatt P, Baker GR, Halverson PK, Aird C. Downsizing, re-engineering, and restructuring: long-term implications for health-care organizations. *Front Health Serv Manage* 1997; **13**: 3–37.
3. Brannon RL. Restructuring hospital nursing: reversing the trend toward a professional work force. *Int J Health Serv* 1996; **26**: 643–654.
4. Walston SL, Burns LR, Kimberly JR. Does reengineering really work? An examination of the context and outcomes of hospital reengineering initiatives. *Health Serv Res* 2000; **34**: 1363–1387.
5. Burke RJ, Greenglass ER. Hospital restructuring and downsizing in Canada: are less experienced nurses at risk? *Psychol Rep* 2000; **87**: 1013–1021.
6. Donelan K, Blendon RJ, Schoen C, Davis K, Binns K. The cost of health system change: public discontent in five nations. *Health Aff* 1999; **18**: 206–216.
7. Donelan K, Blendon RJ, Schoen C, Binns K, Osborn R, Davis K. The elderly in five nations: the importance of universal coverage. *Health Aff* 2000; **19**: 226–235.
8. Blendon RJ, Schoen C, Donelan K et al. Physicians' views on quality of care: a five-country comparison. *Health Aff* 2001; **6**: 233–243.
9. Aiken LH, Clarke SP, Sloane DM. Hospital restructuring: does it adversely affect care and outcomes? *J Nurs Admin* 2000; **30**: 457–465.
10. Davidson H, Folcarelli P, Crawford S et al. The effects of health care reform on job satisfaction and voluntary turnover among hospital-based nurses. *Med Care* 1997; **35**: 634–645.
11. Buerhaus PI, Staiger DO. Trouble in the nurse labor market? Recent trends and future outlook. *Health Aff* 1999; **18**: 214–222.
12. Berens MJ. Nursing mistakes kill, injure thousands. *Chicago Tribune*, September 10, 2000.
13. Driedger SD. The nurses: the front-line caregivers are burned out. Is it any wonder? *Macleans* 1997; **110**: 24–27.
14. Kendall P. One nurse in three 'is ready to resign'. *Daily Mail (London)*, May 7, 2001; 15.
15. Trafford A. When the hospital staff isn't enough. *Washington Post*, January 7, 2001; A1 & A4.
16. Aiken LH, Sochalski JA (eds). Hospital restructuring in North America and Europe: patient outcomes and workforce implications. *Med Care* 1997; **35 Suppl.**: 152.
17. Sochalski JA, Aiken LH. Accounting for variation in hospital outcomes: a cross-national study. *Health Aff* 1999; **18**: 256–259.
18. Aiken LH, Sochalski JA, Lake ET. Studying outcomes of organizational change in health services. *Med Care* 1997; **35**: NS6–NS18.
19. McClure ML, Poulin MA, Sovie MD et al. *Magnet Hospitals: Attraction and Retention of Professional Nurses*. Kansas City, MO: American Academy of Nursing, 1983.
20. Kramer M, Schmalenberg C. Magnet hospitals—Part I: institutions of excellence. *J Nurs Admin* 1988; **18**: 13–24. Magnet hospitals—Part II: institutions of excellence. *J Nurs Admin* 1988; **18**: 11–9.
21. Aiken LH, Smith HL, Lake ET. Lower medicare mortality among a set of hospitals known for good nursing care. *Med Care* 1994; **32**: 771–787.
22. Mitchell PH, Shortell SM. Adverse outcomes and variations in organization of care delivery. *Med Care* 1997; **35**: NS19–NS32.
23. Hartz AJ, Krakauer H, Kuhn EM et al. Hospital characteristics and mortality rates. *N Engl J Med* 1989; **321**: 1720–1725.
24. Knaus WA, Draper EA, Wagner DP et al. An evaluation of outcomes from intensive care in major medical centers. *Ann Intern Med* 1986; **104**: 410–418.
25. Blegen MA, Goode CJ, Reed L. Nurse staffing and patient outcomes. *Nurs Res* 1998; **47**: 43–50.
26. Kovner C, Gergen PJ. Nurse staffing levels and adverse events following surgery in U.S. hospitals. *Image J Nurs Sch* 1998; **30**: 315–321.
27. Needleman J, Buerhaus P et al. Nurse staffing and patient outcomes in hospitals. Washington, DC: U.S. Department of Health and Human Services, Health Resources Services Administration. Final Report 230–99–0021, 2001. Available at <http://bhpr.hrsa.gov/dn/staffstudy.htm>. Accessed August 14, 2001.
28. Flood AB. The impact of organizational and managerial factors on the quality of care in health care organizations. *Med Care Rev* 1994; **51**: 381–428.
29. Aiken LH, Lake ET, Sochalski JA, Sloane DM. Design of an outcomes study of the organization of hospital AIDS care. *Res Sociol Health Care* 1997; **14**: 3–26.
30. Aiken LH, Sloane DM, Lake ET, Sochalski JA, Weber AL. Organization and outcomes of inpatient AIDS care. *Med Care* 1999; **37**: 760–772.
31. Aiken LH, Sloane DM, Lake ET. Satisfaction with inpatient acquired immunodeficiency syndrome care: a national comparison of dedicated and scattered-bed units. *Med Care* 1997; **35**: 948–962.
32. Aiken LH, Sloane DM. Effects of organizational innovations in AIDS care on burnout among hospital nurses. *Work Occup* 1997; **24**: 455–479.
33. Aiken LH, Sloane DM, Klocinski JL. Hospital nurses' occupational exposure to blood: prospective, retrospective, and institutional reports. *Am J Public Health* 1997; **87**: 103–107.
34. Clarke SP, Sloane DM, Aiken LH. The effects of hospital staffing and organizational climate on needlestick injuries to nurses. *Am J Public Health* (in press).
35. Aiken M, Hage J. Organizational interdependence and intra-organizational structure. *Am Sociol Rev* 1968; **6**: 912–930.



36. Aiken LH, Patrician, PA. Measuring organizational traits of hospitals: the Revised Nursing Work Index. *Nurs Res* 2000; **49**: 146–153.
37. Sochalski JA. Quality of care, nurse staffing, and patient outcomes. *Policy Polit Nurs Pract* 2001; **2**: 9–18.
38. Maslach C, Jackson SE. Burnout in health professions: a social psychological analysis. In *Social Psychology of Health and Illness*. Hillsdale, NJ: Lawrence Erlbaum Associates, 1982.
39. Maslach C. *Maslach Burnout Inventory*, manual, 2nd edn. Palo Alto, CA: Consulting Psychologists Press, 1986.
40. Aiken LH, Clarke SP, Sloane DM *et al*. Nurses' reports of hospital quality of care and working conditions in five countries. *Health Aff* 2001; **20**: 43–54.
41. Aiken LH, Sloane DM. Effects of organizational innovations in AIDS care on burnout among urban hospital nurses. *Work Occup* 1997; **24**: 453–477.
42. StataCorp. Obtaining robust variance estimates. In *Stata Statistical Software: Version 6.0 User's Guide*. College Station, TX: Stata Corporation, 1999; 256–260.
43. Aiken LH. *Findings from the International Hospital Outcomes Study*. Paper presented at: Annual Meeting of the Academy for Health Services Research and Health Policy, June 12, 2001, Atlanta, GA.
44. Marmor TR. Hope and hyperbole: the rhetoric and reality of managerial reform in health care. *J Health Serv Res Policy* 1998; **3**: 62–64.
45. Havens DS, Aiken LH. Shaping systems to promote desired outcomes: the magnet hospital model. *J Nurs Admin* 1999; **29**: 14–20.
46. American Nurses Credentialing Center. The Magnet Nursing Services Recognition Program. Available at: <http://www.nursingworld.org/ancc/magnet.htm>. Accessed August 14, 2001.

## Appendix

(a) Organizational support subscale (nurses were asked whether the following were present in their current job, and responses were scored as follows: 1=Strongly Disagree, 2=Somewhat Disagree, 3=Somewhat Agree, 4=Strongly Agree).

1. Adequate support services allow me to spend time with my patients.
2. Physicians and nurses have good working relationships.
3. Nursing controls its own practice.
4. Enough time and opportunity to discuss patient care problems with other nurses.
5. Enough registered nurses to provide quality patient care.
6. Freedom to make important patient care and work decisions.
7. Not being placed in a position of having to do things that are against my nursing judgment.
8. Much teamwork between nurses and doctors.
9. Patient assignments foster continuity of care (i.e. the same nurse cares for the patient from one day to the next).

(b) Items related to quality of care

In general, how would you describe the quality of nursing care delivered to patients on your unit?

1. Excellent 2. Good 3. Fair 4. Poor

How would you describe the quality of nursing care delivered on your last shift?

1. Excellent 2. Good 3. Fair 4. Poor

Overall, over the past year would you say the quality of patient care in your hospital has

1. improved? 2. remained the same? 3. deteriorated?

How confident are you that your patients are able to manage their care when discharged from the hospital?

1. Very confident 2. Confident 3. Somewhat confident 4. Not at all confident

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