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Performance Implications of Contract Nurse Staffing Strategies

Mark P. Brown and Ross L. Fink

Significant interest has been focused on the importance of nurse staffing levels on hospitals' performance (Evans, 2006; Stanton & Rutherford, 2004). In spite of this interest, little attention has been focused on understanding the implications of how this staffing is obtained (Page, 2008; Stanton & Rutherford, 2004). While evidence suggests nurse staffing levels are positively related to hospitals' performance (e.g., Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2001), virtually no attention has been devoted to the implications of various staffing options,

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such as the use of contract or registry nurses to sustain high staffing levels (Page, 2008; Stanton & Rutherford, 2004). This article will investigate the performance implications of using contract or registry nurse personnel in the context of a hospital's nurse staffing strategy. Specifically, the article will address whether the source of nurse staffing (i.e., contract or regular staff) affects the performance outcomes of hospitals' nurse staffing levels?

Theoretically, this article will further develop understanding of the implications of using contract workers in the context of staffing strategies. Practically, it will help hospital managers evaluate decisions regarding the use of temporary versus permanent nurses when attempting to achieve a particular nurse staffing level.

Staffing Levels

Increased staffing levels generate positive benefits as they decrease the overall

work load of individual employees (Brown, Sturman, & Simmering, 2001). In a hospital setting, increased nurse staffing allows nurses to pay greater attention to individual patients and their needs, allow nurses to closely monitor patient condition and response to treatment (Kovner & Gergen, 1998). This increased monitoring is clinically beneficial as it facilitates quicker detection of potential complications and adverse patient outcomes.

Higher nurse staffing levels also permit nurses to exercise more attention to detail in their patient care and treatment activities. Patient care mistakes are a well recognized source of adverse outcomes in hospitals (Aiken, Clarke, Sloane, & Sochalski, 2001). By increasing nurse staffing, hospitals can decrease errors and improve patient care outcomes. Thus, increased nurse staffing is not only beneficial to the extent it gives nurses the opportunity to closely

monitor patients, but also as it allows nurses greater opportunities for attention to detail in their patient care activities.

The Use of Contract Staffing

Although nurse staffing levels are an important contributor to patient care quality, the method used to obtain and maintain a specific nurse staffing level may influence their (i.e., the staffing levels) effectiveness. While hospitals have traditionally used staff nurses (i.e., nurses who are regular employees of the hospital) to maintain specific nurse staffing levels, recent shortages in nurses, combined with competitive nurse labor markets have led hospitals to increasingly use contract nurses to achieve specific staffing levels (Page, 2008).

Contract nurses are nursing staff who are not regular employees of the hospital. Although contract nurses must have the same credentials and licensure as a hospital's staff nurses, contract nurses—due to their nonpermanent status—lack knowledge of the unique policies and procedures a specific institution may employ. This lack of “local knowledge” may adversely influence contract nurses performance. For instance, a contract nurse may be unfamiliar with a specific brand of equipment a hospital employs. Although the nurse understands the

purpose of the equipment, they may not understand the uniqueness of operating the unfamiliar equipment. This unfamiliarity may either slow or introduce opportunities for errors in patient care. Patient care errors are a documented source of poor hospital performance and negative patient outcomes (Aiken et al., 2001). Likewise, as contract nurses are temporary employees, they lack specific knowledge of their coworkers' unique skills and abilities or dealing with a physician's specific idiosyncrasies contributing to poor coordination and communication among and between nursing staff and physicians.

Performance Implications of Nurse Staffing

Both overall nurse staffing levels and the level of nurse staffing obtained through contract nursing personnel are potentially important determinants of hospitals' performance. The influence of nurse staffing levels and the use of contract nurse personnel may be particularly relevant in the context of evaluating hospitals' organizational efficiency and their quality of care.

Average length of stay (ALOS) is an operational measure of hospital performance that is useful in terms of both evaluating hospitals' efficiency and their quality of care as it reflects both efficiency and patient care outcomes.

Average length of stay is the average number of days patients stay in a particular hospital. Low hospital ALOS is indicative of positive performance whereas high ALOS is reflective of negative hospital performance. ALOS is indicative of organizational efficiency as it indicates the resources a hospital requires to discharge a patient (Brown, Halbesleben, & Wheeler, 2010). Hospitals with lower ALOS are more efficient as they require fewer days of treatment to discharge a patient (Brown, Sturman, & Simmering, 2003). ALOS is also a useful indicator of hospitals' treatment quality as higher ALOS is likely associated with poor quality care as patient care failures likely lead to increased patient complications and consequently higher lengths of stay (Thomas, 1997).

Interaction Between Contract Staffing and Nurse Staffing Levels

The authors hypothesize that the relation between nurse staffing and ALOS is moderated by the level of contract nurse staffing and that the greater the use of contract nurses the less strong the relation will be between nurse staffing levels and hospital performance as measured by ALOS. Higher levels of contract nurses introduce inefficiencies and patient care errors that degrade the positive benefits of increased overall nurse staffing. Thus, the positive

implications of high nurse staffing will decline as the use of contract nurses increases. Hospital performance as measured by ALOS will be best (i.e., lower ALOS) with high levels of nurse staffing and low levels of contract nurses. Moreover, hospital performance as measured by ALOS will decline as greater percentages of contract nurses are employed.

Hypothesis:

*A Hospital's percent-
age of contract nurses
will moderate the
relation between high
levels of nurse
staffing and hospital
performance as
measured by ALOS.
Specifically, when
nurse staffing levels
are high, hospital
performance as
measured by ALOS
will be higher (i.e.,
lower ALOS) with low
levels of contract
nurses and hospital
performance, as
measured by ALOS,
will be lower (i.e.,
higher levels of ALOS)
with high levels of
contract nurses.*

Methods

Sample

The hypothesis was investigated using a sample of 315 California short term stay acute care hospitals. Data for the independent, dependent, and control

variables were drawn from state mandated (Chapter 1326, California statutes of 1984) annual hospital disclosure reports provided by each hospital to the California Office of Statewide Health Planning and Development covering the 2006 fiscal year (i.e., July 2005 through June 2006) (OSHPD, 2007).

Dependent Variables

Average length of stay.

ALOS was used to evaluate hospitals' performance in terms of their organizational efficiency and quality of patient care. ALOS is calculated by dividing a hospital's total number of patient days by their total discharges (OSHPD, 2007).

Independent Variables

Total nurse hours per patient. Total nurse hours per patient is the average number of nursing hours provided per discharged patient. Total nurse hours per patient is a broadly inclusive measure of a hospital's nursing efforts as it includes the hours of Registered Nurses, Licensed Practical Nurses, Nurse Aides, and Orderlies. Total nurse hours per patient includes the hours of both regular and contract nursing employees.

In the instant analysis, total nurse hours per patient is a measure of nurse staffing representing an average of the total nurse

hours per patient for each hospital.

Contract ratio.

Contract ratio is the percentage of all nursing hours (i.e., Registered Nurses, Licensed Practical Nurses, Nurse Aides, and Orderlies) provided by contract nursing employees. Since contract ratio is operationalized as a ratio, we used a logarithmic transformation of contract ratio in all of our analyses to correct for skewness in the contract ratio variable (Long, 1997, McCullagh & Nelder, 1989).

Control Variables

The authors controlled for several factors beyond the staffing related independent variables that might influence the hospitals' ALOS. Specifically, we controlled for organizational characteristics such as each hospital's size (using the number of staffed beds) (e.g., Beekun, Stedham, & Young, 1998) and whether each hospital was either a not-for-profit or for-profit organization (e.g., Goes & Park, 1997). Additionally, to control for differences in severity of illness in the hospitals respective patient populations, we controlled for each hospital's case mix index (OSHPD, 2007). Case mix index represents the average severity of illness for patients in a particular hospital. Case mix index

controls for differences in each hospital's ALOS that are due to differences in each hospital's patients' level of illness.

Regression Methods

A hierarchical regression analysis for a moderated variable was performed following the procedures outlined by Zedeck (1971) and Cohen and Cohen (1975).

Results

Table 1 presents the summary statistics and correlations for the study's variables. A hierarchical multiple linear regression model was used to investigate the hypothesis. Table 2 presents the results of the model investigating the moderating effect of contract staffing (i.e., contract ratio) on the relation between hospitals' nurse staffing levels and their ALOS. Step 1 shows the impact of the control variables (Profit/Non-profit, Size (as measured by number of staffed beds), and Case Mix). The results indicate that the regression model for Step 1 is significant at the .001 level. In Step 2, the main effects variables (Total Nurse Hours per Patient, and Log of contract ratio) are added to the model. The overall model is significant at the .001 level. A statistical test was performed comparing the model from Step 1 with the model from Step 2. This resulted in an F-value of

9.643 that is significant at the .001 level. In Step 3 of the model, the regression is again significant at the .001 level, and the test comparing Step 2 with Step 3 results in an F-value of 4.920 that is significant at the .001 level. Most importantly, the coefficient for the total nurse hours per patient-contract ratio interaction term is statistically significant indicating tentative support for the hypothesis (Bedeian & Mossholder, 1994).

Summary

To better illustrate the results of the regression results Figure 1 graphically presents the relation between nurse staffing levels and hospitals' ALOS for three levels of contract staffing (Aiken & West, 1991). High contract staffing is represented by a contract staffing level three standard deviations above the mean contract staffing level. Average contract staffing level is represented by a mean level of contract staffing. Low contract staffing is represented by a contract staffing level three standard deviations below the mean level of contract staffing. Nurse staffing levels were accounted for in Figure 1 by calculating each line (i.e., high contract, average contract, low contract) using a mean value and a three standard deviations above and below the mean value for the nurse staffing independent

variable (i.e., total nurse hours per patient). Supporting the hypothesis, Figure 1 adds further credence to Table 2's statistical results. Figure 1 illustrates that at high level of nurse staffing, increasing use of contract nurses serves to negatively influence (i.e., increase) hospitals ALOS. Specifically, Figure 1 demonstrates that when nurse staffing levels are high ALOS is lower (i.e., better) when contract nurse staffing is low than when contract nurse staffing is high.

Discussion

Many hospitals resort to contract nurse staffing to maintain a high level of nurse staffing. Our results suggest that while correctly recognizing the benefits of high nurse staffing, these hospitals may actually experience decreased performance when they use significant contract nurse staffing in the context of a high level nurse staffing strategy. Illustrating this, Figure 1 demonstrates that when contract nurse staffing is high, declining organizational performance occurs as nurse staffing levels are increased (i.e., ALOS increases which is indicative of poor performance), whereas with low contract nurse staffing increased performance occurs as nurse staffing levels increase (ALOS decreases which is indicative of good performance).

Table 1
Summary Statistics and Correlations

Variable	Correlations									
	Mean	Standard Deviation	Average Length of Stay	Case Mix	Profit	Beds Staffed	Per Patient	Contract Ratio	Total Nurse Hours	Contract Ratio
Average Length of Stay	4.567	1.966	Person Correlation	.446**	.212**	.169**	.169**	.169**	.169**	-.033
Case Mix	1.172	.2977	Person Correlation	1.000	.167**	.210**	.097	.097	.097	-.017
Profit	.2400	.4300	Person Correlation	.212**	1.000	-.211**	-.069	-.069	-.069	.107
Beds Staffed	187.31	143.7	Person Correlation	.169**	.210**	1.000	-.110	-.110	-.110	-.116*
Total Nurse Hours Per Patient	86.859	77.05	Person Correlation	.169**	.097	-.110	1.000	1.000	1.000	-.105
Contract Ratio	.0997	.0848	Person Correlation	-.033	-.017	-.116*	.107	.107	.107	1.000

Note: n = 315, P < .05 *, P < .01 **, p < .001 ***

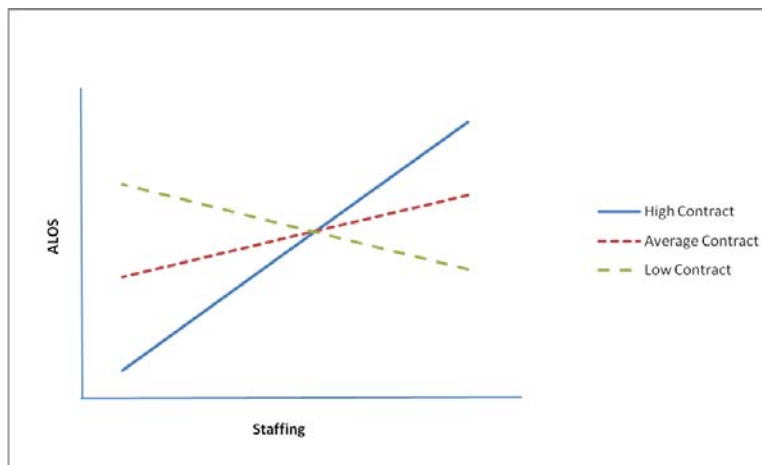
Table 2
Regression Results:
The Moderating Effect of Contract Ratio on the Relation
Between Nurse Staffing Levels and Hospital's Average Length of Stay

		Step 1	Step 2	Step 3
Step 1	Control Variables:			
Beta Coefficient	Profit/Non Profit	.800***	.909***	.941***
	Size (Staffed Beds)	.002*	.002**	.002**
	Case Mix	2.616***	2.404***	2.292***
Step 2	Main Effects Variables:			
Beta Coefficient	Total Nurse Hours Per Patient		.006***	.015***
	Log of Contract Ratio		-.003	-.218
Step 3	Interaction Variable:			
Beta Coefficient	Total Nurse Hours Per Patient * Log of Contract Ratio			.003*
	F-Value	30.462***	23.117***	20.383***
	Overall (Adjusted) R ²	.224	.266	.275
	Change in R ²		.042	.009
Comparison of Models	F-Value		9.643***	4.920**
	Model		(1 vs 2)	(2 vs 3)

Note: n = 315, P < .05 *, P < .01 **, p < .001***

Dependent variable is Average Length of Stay (low ALOS represents positive performance)

Figure 1
The Moderating Effect of Contract Ratio on the Relation Between
Nurse Staffing Levels and Hospital's Average Length of Stay



Note: Low ALOS is indicative of positive organizational performance.

Decreased performance due to increased contract nurse staffing is likely a consequence of contract nurses' unfamiliarity with a hospital's equipment, its policies and procedures, and its employees and medical staff. Hospitals can counter these negative effects by better familiarizing contract nurses with the hospital's unique ways of doing things through orientation and training. In particular, attention should be devoted to understanding the hospital's unusual equipment and/or techniques. Alternatively, managers might consider those hospital services which are unique or distinctive—these are also likely areas of institutional specific challenges for contract nurses. Once unique facets of the hospital are identified, contract nurses should be educated in these areas so their lack of familiarity does not adversely influence the hospital's performance. Likewise, non-contract employees and physicians should be reminded of the contract nurses' relative unfamiliarity with the hospital, its employees, and its physicians. In particular, these reminders should emphasize the positive benefits of promoting and maintaining effective communication and coordination throughout the hospital.

Conclusion

From a practical perspective, findings have value for hospital managers charged with effectively managing nurse staffing levels. Results suggest that while it may seem useful to pursue high levels of nurse staffing, the source of this staffing must be considered. Specifically, hospital managers should carefully evaluate the use of contract nurse staffing in the context of a high level nurse staffing strategy. Theoretically, these findings contribute to the long held notion that institution specific human capital positively contributes to organizational performance. Moreover, to the extent our results indicate the benefit of using full time rather than contract workers, the results also validate the use of institution specific training and socialization activities.

The authors recognize limitations in their use of ALOS as a measure of efficiency and quality of care. Lower ALOS, rather than being an indication of efficiency and quality care, could also simply reflect discharging patients before they are ready to leave the hospital. Nevertheless, it is believed unlikely as the financial costs of payers restricted reimbursements to hospitals for readmissions due to poor quality care is likely to far outweigh any benefits

associated with premature discharges.

Future researchers should continue to investigate the relation between nurse staffing and organizational performance and the effect of the use of contract nurses on this relationship. In particular, it seems future research which looks at specific clinical outcomes in relevant areas of the hospital would be useful. Thus, rather than investigating the effect of nurse staffing levels and contract nurse staffing at the organizational level, this research would consider the effects at the nursing unit level with nursing unit specific outcomes. For instance, the level of nurse staffing and contract nurse staffing could be evaluated in a coronary care unit using heart attack mortality rates as a performance measure. Additionally, it would also be interesting to consider our findings in the context of specific types of nurses (i.e., registered nurses, licensed practical nurses, nurse aids). Research could investigate topics such as whether the implications of using a high percentage of contract nurse aids or licensed practical nurses are similar to those of using a high percentage of contract registered nurses.

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