

When Agency Fails: An Analysis of the Association Between Hospital Agency Staffing and Quality Outcomes

Bradley Beauvais , Rohit Pradhan , Zo Ramamonjiarivelo, Michael Mileski ,
Ramalingam Shanmugam

School of Health Administration, Texas State University, San Marcos, TX, USA

Correspondence: Rohit Pradhan, Email pradhan@txstate.edu

Introduction: Staffing is critical to hospital quality, but recent years have seen hospitals grappling with severe shortages, forcing them to rely on contract or agency staff for urgent patient care needs. This shift in staffing mix has raised questions about its impact on quality. Consequently, this study investigated whether the increased use of agency staff has affected healthcare quality in hospitals. Given the limited recent research on this topic, practitioners remain uncertain about the effectiveness of their staffing strategies and their potential impact on quality.

Methods: Drawing from agency theory, data were obtained from Definitive Healthcare which consolidates information from numerous public access databases pertaining to hospitals such as the American Hospital Association Annual Survey (hospital profile) and the Hospital Value-Based Purchasing Program (quality data). We conducted a cross-sectional study using a multivariable linear regression model (2021–2022) with appropriate organizational and market-level control variables. Quality was measured across eight variables while the independent variable of interest was agency labor cost ratio operationalized as the percentage of net patient revenue consumed by agency labor expense.

Results: Our results suggested that the employment of agency staff was significantly and negatively associated with six of eight quality measures tested, including the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) star rating, Hospital Compare rating, the hospital Total Performance Score (TPS), and three of the four sub-domains that comprise the TPS: clinical domain score, person and community engagement domain score, and the efficiency and cost reduction score.

Discussion: Our results indicated that the increased use of agency labor may have a significant negative influence on quality outcomes at the hospital level. Our findings support the premise that interventions that promote full-time staffing may be more supportive of the quality of care delivered as well as patients' perceptions of care.

Keywords: hospital, quality, patient safety, contract staffing, agency staffing

Introduction

Background

Healthcare professionals are critical to the performance of healthcare organizations including hospitals.¹ Unfortunately, in recent years, hospitals have been confronted with a severe staffing shortage, a crisis further intensified by the unprecedented challenges posed by the COVID-19 pandemic. Alarming, one in five healthcare professionals chose to resign from their positions amid the pandemic.² The staffing deficit is particularly acute for nurses with the United States (US) healthcare system grappling with a projected shortfall of 275,000 registered nurses (RNs) by 2030.^{3,4} Multiple factors have contributed to this complex issue including high turnover rates fueled by demanding work environments, limited career advancement opportunities, and inadequate workplace support.⁵ Hospitals face competition for hourly employees from non-healthcare organizations, which may have greater wage flexibility and the capacity to transfer increased costs to consumers.⁶

To address staffing challenges, healthcare organizations often rely on contract or agency staff, temporary workers employed by third-party agencies, who fill in staffing gaps across various facilities.⁷ While seemingly plugging staffing gaps, the dependence on agency staff can have a negative impact on both hospital financial stability as well as its ability to provide high-quality care.²

The healthcare workforce is inherently expensive, with employee wages and benefits constituting the most significant expense for acute care hospitals.⁸ Clinical labor costs rose by almost 40% between 2019 and early 2022² as hospitals struggled to recruit and retain staff. A recent examination indicated that the hospital staffing deficiencies imposed an additional financial burden of \$24 billion on hospitals. The increased utilization of agency staff is an important reason for the dramatic escalation in staffing costs.⁹ The agency staff is significantly more expensive than regular full-time equivalent (FTE) staff—typically adding 50% or more to an employee's hourly rate.¹⁰ The use of agency staff may have adverse quality implications due to various factors such as their temporary nature that can result in a lack of crucial institutional knowledge. The increased financial strain of employing agency nurses may also stretch hospital budgets and compromise their ability to invest in high quality care.¹⁰

Healthcare professionals form the cornerstone of a well-functioning healthcare system.¹¹ The literature has consistently demonstrated a clear link between increased nurse staffing and improvements in important hospital quality metrics such as shorter length-of-stay, fewer infections, and lower mortality rates.^{12–14} Given the myriad structural challenges contributing to the shortage of healthcare personnel, hospitals will continue to rely on agency staff to ameliorate labor shortage in the foreseeable future. Consequently, it is important to empirically investigate the implications of utilizing agency staff on hospital performance, particularly quality of care.

Hospital Quality of Care

The issues of quality of care and patient safety in US hospitals have acquired increased prominence in the last two decades. The Institute of Medicine's (IOM's) seminal report, *To Err Is Human: Building a Safer Health System*, estimated that as many as 98,000 deaths in hospitals each year could be the result of inpatient safety issues,¹⁵ and medical errors may be the third leading cause of death in the U.S.¹⁶ The Centers for Medicare & Medicaid Services (CMS) has launched the Hospital Quality Initiative which includes initiatives such as value-based purchasing and public reporting to improve the quality standards in US hospitals.¹⁷ Despite these regulatory and policy efforts, and significant financial investments—The US spent a staggering \$4.5 trillion on healthcare in 2022¹⁸—The quality of care within U.S hospitals has remained a persistent concern.

The existing literature that addresses the impact of agency staff on hospital quality is limited, often contradictory, and restricted almost exclusively to nurses. Hockenberry and Becker¹⁹ found decreased patient satisfaction with the use of agency nurses, while Shiang et al²⁰ reported no adverse effects on patients' assessments of hospitals. Aiken et al²¹ found no negative impact on quality of care after controlling for hospital work environment. However, their data were collected in 2006 and may be outdated. Other recent studies, such as Zaranko et al,²² have found no correlation between the use of agency nurses and adverse patient outcomes such as mortality. Conversely, other studies have reported that the use of agency nurses negatively impacted hospital quality of care in terms of care left undone²³ and increased likelihood of hospital-acquired pressure injuries. Dall'Ora et al's²⁴ investigation has established a positive correlation between agency nurse use and mortality rates. However, this study was conducted within a single acute-care hospital. The divergence in the literature on the impact of agency nurses on hospital quality highlights the crucial role of study context and design. Weerdt et al²⁵ have pointed out that inconsistent definitions of agency staff and methodological challenges have complicated the understanding of this complex and important relationship.

The relative lack of recent and comprehensive studies on agency staff in hospitals presents a significant knowledge deficit and is particularly notable for two reasons. First, as we have discussed previously, it is likely that the utilization of agency staff has substantially expanded in US hospitals¹⁰ with some of the largest hospital systems replicating the gig economy model with staffing apps,²⁶ and have even acquired staffing agencies.²⁷ Second, the COVID-19 pandemic, while a devastating experience for the US healthcare system, also served as a catalyst exposing and amplifying long-standing concerns such as inadequate staffing, poor infection control, and high rates of patient harm.²⁸ Post-pandemic, ensuring high-quality care in hospitals has become more critical than ever. However, addressing hospital quality is

challenging given the diverse array of contributing factors. These determinants encompass access barriers, high costs, resource constraints, disparities and inequities, and the relative neglect of public health.²⁹ Despite this evident complexity, it is imperative to identify the underlying determinants of hospital quality, particularly those that can be effectively addressed at the facility/organizational level. Among these, hospital labor emerges as perhaps its most potent determinant.

Purpose of the Study

Examining a national sample of US hospitals, and utilizing recent data (2021–2022), our study investigated the impact of agency staff on hospital quality. To circumvent definitional challenges prevalent in earlier studies,²⁵ we utilize agency labor cost as a proxy for agency staff. This methodological approach not only enhances precision but also recognizes that while nurses are pivotal to hospital quality, healthcare is a collaborative process where staff members across domains contribute synergistically to the overall performance.

Conceptual Framework

Jensen and Meckling³⁰ defined an agency relationship as a contract in which a principal (the owner of the organization) engages an agent (an individual or a group of individuals hired by the principal) to perform a service on its behalf which involves delegating authority to the agent. The agency theory assumes that both principal and agent are utility maximizers, acting in their self-interest, and their utility functions are mutually independent.³¹ Therefore, the agent may act opportunistically, prioritizing her self-interest over that of the principal. The principal attempts to minimize the likelihood of the agents' deviant behavior by either offering incentives or by incurring additional monitoring costs termed as agency costs. The agency theory highlights the challenges inherent in aligning the interests of the principal and the agent within an agency relationship. An interesting application of agency theory has been within the public administration literature where it has been utilized to understand contractual relationships.³² It has also been widely used in health services research to explore the various facets of the performance of healthcare organizations.^{33,34}

Within the framework of this study, the hospital serves as the principal, entrusting agency staff with responsibilities as agents. Eisenhardt³⁵ has argued that the principal-agent relationship is defined by two features: adverse selection and moral hazard. Adverse selection or information asymmetry arises when an agent possesses details unknown to the principal, potentially influencing the latter's decision-making processes in a manner detrimental to their interests.³² Agency staff may withhold crucial patient information, leading to inadequate care due to incomplete understanding of specific needs. The challenge of verifying agency staff claimed expertise further exacerbates the issue, as hospitals may struggle to discern genuine qualifications from inflated claims.³⁵

The existence of moral hazard poses challenges for principals in observing and evaluating all actions undertaken by agents. Agency staff may have a weaker connection to the hospital and its patients. Frequent turnover among agency staff further complicates monitoring and accountability, making it difficult to consistently track individual performance and address lapses in care. The lack of oversight creates an environment conducive to neglect and lower quality care.³⁶ Furthermore, hospitals may incur additional monitoring costs to police the conduct of agency staff, creating inefficiencies and imposing additional financial burden.

Based on the agency theory and the preceding discussion, we hypothesize that,

Hypothesis 1: The utilization of agency staff would be associated with lower quality of care in hospitals.

Materials and Methods

Data

Data were obtained from Definitive Healthcare which consolidates information from numerous public access databases pertaining to hospitals in the United States, such as the American Hospital Association Annual Survey (hospital profile), Medicare Cost Reports (financial data), the Hospital Value-Based Purchasing Program (quality data), and Hospital Compare (quality data).³⁷ Definitive Healthcare provided 2314 hospital observations of contract labor costs from 2021 and quality measures from 2022. The original data set consisted of 3876 short-term acute care hospitals in the United

States. All Federal hospitals, including 172 Veterans Affairs, 26 Indian Health Service, and 31 Military Health System facilities, were excluded from our study sample due to a lack of relevant data elements. We removed an additional 1333 facilities because of significant data missingness. Furthermore, additional facilities were removed on a study-by-study basis within each separate regression analysis, particularly if the quality measure in question was not available to serve as a dependent variable. In our most robust analyses, the final data set comprises nearly 60% of the total active short-term acute care facility population in the United States.

Dependent Variable

Consistent with prior studies evaluating the quality-of-care outcomes in the short-term acute care hospital industry, we included eight dependent variables in our study for the year 2022.³⁸ The year 2022 was chosen as the most recent complete year of data. The first dependent variable included the HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) summary star rating. The HCAHPS survey asks discharged patients a total of 29 questions about their experience with a hospital stay including questions about communication with nurses and doctors, the cleanliness and quietness of the hospital environment, discharge information, overall rating of the hospital, and whether they recommend the hospital. The patient survey summary star rating is the average of all the star ratings of the HCAHPS measures. Hospitals can earn 1 to 5 stars for this metric, in which more stars are better.³⁹

The second dependent variable included in the study was the Hospital Compare overall rating. This measure provides consumer-focused aggregated scores related to hospitals' performance by taking the weighted average of scores calculated based on measures of mortality, safety of care, readmission, patient experience, effectiveness of care, timeliness of care, and efficient use of medical imaging. Hospitals can earn 1 to 5 stars for this metric, in which more stars are better.⁴⁰

The third dependent variable was the Hospital-Wide All-Cause Readmission Rate. The 30-day rate indicates how many patients had to be readmitted back into a hospital within 30 days after they were originally discharged. Hospitals maintain lower readmission rates when they have appropriately resolved the patient's healthcare needs without further intervention.⁴¹

The fourth through eighth variables considered included the 2022 Hospital Value-Based Purchasing (VBP) Total Performance Score (TPS) and the associated domain scores. VBP is a CMS program that adjusts a hospital's payments based on its performance in four equally weighted quality measurement domains that comprise its TPS. The four domains include (1) clinical outcomes, (2) safety, (3) person and community engagement, and (4) efficiency and cost reduction]. The *clinical outcomes* domain includes measures such as mortality from acute myocardial infarction (AMI) and chronic obstructive pulmonary disease (COPD). The *safety* domain contains healthcare-associated infection measures including catheter-associated urinary tract infections (CAUTIs), and central line associated bloodstream infections (CLABSIs). The *person and community engagement* domain contains dimensions derived from the HCAHPS Survey including communication with nurses and responsiveness of the hospital staff. Lastly, the *efficiency and cost reduction* domain contains one measure related to Medicare Spending per Beneficiary.⁴²

Independent Variable

The independent variable of interest in this study is the "agency labor cost ratio" (ALCR) or the percent of net patient revenue consumed by agency labor expense. We operationalized this variable by extracting measures from the Definitive dataset as shown in Equation I below:

$$\text{Agency Labor Cost Ratio} = \frac{\text{Total Agency Labor Cost}}{\text{Net Patient Revenue}}$$

Control Variables

Numerous independent variables were included in the study to account for the variation in hospital quality associated with various individual hospital and hospital market characteristics,³⁸ including number of hospital discharges, number of staffed beds, urban or rural location, average age of the facility (in years), bed utilization rate, average length of stay,

academic medical center designation, sole community hospital designation, market concentration (as measured via the Herfindahl–Hirschman Index (HHI)), government-operated or not, for-profit hospital or not, Medicaid days of service, Medicare days of service, surgical case mix index, medical case mix index, and overall case mix index, the complication/comorbidity and major complication/comorbidity (CC/MCC) rate, and geographic region of the country as defined by the American Hospital Association (Regions 1–9).⁴³ Region 1 (ME, VT, NH, MA, RI, CT) was used as the control group.

Analysis

Descriptive statistics and eight multivariable linear regressions with pairwise deletion were conducted using IBM (International Business Machines) SPSS (Statistical Package for Social Sciences) Statistics package 28. In each of the analyses performed, the association between the studied independent variables and the dependent variable was rejected at an $\alpha = 0.05$. Model fit was assessed using adjusted R^2 . The potential for reverse causality prompted us to use older contract staff cost data (2021) to ensure that our two datasets did not fully overlap. This allows for the impact of contract staffing expense to be realized in the hospital financial reporting systems. The practice of replacing an explanatory variable with its lagged value to counteract endogeneity is prevalent across a wide variety of disciplines in economics and finance.^{44–46} Due to the skewness of the independent variable, the distribution was shifted via min-max scaling. Multicollinearity was evaluated and all variables maintained a variance inflation factor under 10 in all analyses. To aid in ease of interpretation, all independent variables of interest were treated as continuous variables, including the Likert-scale Hospital Compare and HCAHPS star ratings. This approach is in alignment with prior research that indicates ordinal variables with five or more categories can be used as continuous data without any harm to the analysis.^{47–50} Several control variables were also included as dichotomous measures, including rural = 1, urban = 0; government = 1, not government operated = 0; and for-profit = 1, not-for-profit = 0.

Results

A descriptive analysis of all variables is available in [Table 1](#). Our sample was comprised of 6% academic medical centers (SD = 0.24), 15% sole community hospitals (SD = 0.36), 26% rural hospitals (SD = 0.44), 34% government operated (SD = 0.32), 24% for-profit (SD = 0.43), while the highest percentages were located in AHA Regions 4 and 5 (17%; SD = 0.38). Our sample of hospitals maintained an average age of plant of just over 14 years (SD = 10.39), experienced a CC/MCC rate of 63% on average (SD = 0.14), and managed an average length of stay of 4 days (SD = 3.37). The payer mix was comprised of 9% Medicaid (SD = 9.66%) and 28% Medicare (SD = 11.59%) and utilized 52% bed occupancy (SD = 22.12%).

In general, we observed statistically significant relationships in six of the eight tested dependent variables with directional consistency related to our independent variable of interest. [Table 2](#) presents the multivariable regression results for our first four analyses. Our regression findings indicated that agency staffing was associated with lower levels of hospital quality across three of the first four quality dimensions. In the first analysis, hospital agency labor expense (ALCR) was negatively associated with HCAHPS summary star rating ($R^2 = 42.9\%$, $\beta: -2.071$, S.E.: 0.194, $p < 0.001$). Similar findings were observed in the analysis of the Hospital Compare rating ($R^2 = 20.5\%$, $\beta: -2.861$, S.E.: 0.311, $p < 0.001$). ALCR was negatively associated with the HVBP TPS ($R^2 = 24.5\%$, $\beta: -14.503$, S.E.: 2.954, $p < 0.001$). However, we observed no statistically significant association between agency staff expenses and the all-cause readmission rate.

[Table 3](#) presents multivariable regression results for the second set of four dependent variables of interest pertaining to the HVBP sub-domains. In this set of variables, our findings still generally indicated that agency staffing was associated with lower levels of hospital quality performance, with one exception: HVBP safety domain score was not significant. Agency staff expense (ALCR) was negatively associated with the HVBP clinical domain score ($R^2 = 11.0\%$, $\beta: -4.129$, S.E.: 1.326, $p < 0.01$), the HVBP engagement domain score ($R^2 = 37.2\%$, $\beta: -10.498$, S.E.: 1.276, $p < 0.001$), and the HVBP efficiency domain score ($R^2 = 35.1\%$, $\beta: -4.932$, S.E.: 1.811, $p < 0.01$).

We also found several significant relationships between some organizational-level and market-level control variables and healthcare quality variables. With respect to organizational variables, our findings indicated that hospital size and average length of stay were negatively associated with hospital quality of care. Government and for-profit hospitals generally reported poorer quality outcomes across multiple domains. On the other hand, hospitals with academic health center

Table 1 Descriptive Statistics of the Analytical Sample (n=2314)

	Min	Max	Mean	Std Dev
Total Performance Score	6	92.67	33.77	11.41
Hospital Compare overall rating	1	5	3.16	1.17
Patient Survey (HCAHPS) summary star rating	1	5	3.21	0.86
Hospital-Wide All cause Readmission Rate	11.20%	20.70%	14.54%	0.87%
Patient experience of care domain score	1.25	33.33	8.67	5.40
Safety domain score	0	33.33	10.01	5.30
Clinical care domain score	0	32.22	11.43	4.70
Efficiency and cost reduction domain score	0	33.33	5.69	7.54
Agency labor cost ratio	0	100%	8.30%	0.09
Number of discharges (in thousands)	1	168.4	9.29	11.06
Number of staffed beds (in thousands)	1	2.25	0.19	0.19
Location (rural)	0	1	0.26	0.44
Average age of facility (Years)	1.05	74.35	14.02	10.39
Bed utilization rate	0.10%	100.00%	52.26%	22.12%
Average length of stay	1	144.38	4.39	3.37
Academic medical center	0	1	0.06	0.24
Sole community hospital	0	1	0.15	0.36
Competition (HHI)	0.02	1	0.34	0.32
Government operated	0	1	0.14	0.35
For profit	0	1	0.24	0.43
Payor mix: Medicare days		91.00%	28.12%	11.59%
Payor mix: Medicaid days	0%	99.80%	8.85%	9.66%
Case mix index (CMI)	0.67	5.35	1.74	0.40
Surgical CMI	0.56	2.21	1.34	0.14
Medical CMI	1.01	5.49	2.94	0.60
CC/MCC rate	0	1	0.63	0.14
Region 1 (CT, ME, MA, NH, RI, VT)	0	1	0.01	0.12
Region 2 (NJ, NY, PA)	0	1	0.12	0.32
Region 3 (DE, KY, MD, NC, VA, WV, DC)	0	1	0.09	0.28
Region 4 (AL, FL, GA, MS, SC, TN, PR)	0	1	0.17	0.38
Region 5 (IL, MI, IN, OH, WI)	0	1	0.17	0.37
Region 6 (IA, KS, MN, MO, NE, ND, SD)	0	1	0.08	0.28
Region 7 (AR, LA, OK, TX)	0	1	0.14	0.34
Region 8 (AZ, CO, ID, MT, NM, UT, WY)	0	1	0.07	0.26
Region 9 (AK, CA, HI, NV, OR, WA)	0	1	0.12	0.32

Abbreviations: HCAHPS, Hospital Consumer Assessment of Healthcare Providers and Systems; HHI, Hirschman-Herfindahl Index; CMI, Case mix index; CC/MCC, Complication/comorbidity and major complication/comorbidity.

designation had higher quality of care across all measures of quality except for Hospital Compare rating, safety domain score, and Hospital-Wide All-Cause Readmission Rate (significantly higher rate). The different measures of patient complexity had a varying association with hospital quality. For instance, CMI was positively associated with HCAHPS summary star rating, Hospital Compare rating, and clinical outcomes domain score. However, CMI had a negative impact on quality of care in terms of TPS, safety domain score, engagement domain score and efficiency domain score.

Our results also indicated some significant relationships between market-level control variables and quality of care measures. For instance, compared to urban hospitals, rural hospitals had a higher quality of care in terms of HCAHPS summary rating, TPS, safety domain score, engagement domain score, and efficiency domain score. Higher market concentration (meaning less competition) was associated with decreased quality of care based on Hospital Compare rating, all-cause readmission rate, TPS, clinical outcomes domain score, and safety domain score.

Table 2 Regression Results of ALCR on Hospital Quality: HCAHPS, Hospital Compare, Readmissions & TPS (n=2314)

Analysis of Association Between ALCR and Quality	HCAHPS Summary Star Rating			Hospital Compare Rating			Hospital-Wide All Cause Readmission Rate			Total Performance Score		
	Adj R ² = 42.9%			Adj R ² = 20.5%			Adj R ² = 15.7%			Adj R ² = 24.5%		
	β	S.E	Sig	β	S.E.	Sig	β	S.E.	Sig	β	S.E.	Sig
ALCR	-2.071	0.194	***	-2.861	0.311	***	0.193	0.237	-	-14.503	2.954	***
Number of discharges	0.003	0.003	-	0.010	0.004	*	-0.003	0.003	-	-0.030	0.04	-
Number of staffed beds	-0.572	0.155	***	-0.732	0.25	**	0.406	0.19	*	-10.564	2.37	***
Location (Rural)	0.200	0.046	***	-0.078	0.074	-	0.122	0.056	*	2.113	0.702	**
Average age of facility (Years)	-0.003	0.001	*	-0.003	0.002	-	-0.001	0.002	-	0.058	0.021	**
Bed utilization rate	-0.004	0.001	***	-0.001	0.001	-	0.002	0.001	*	-0.022	0.013	+
Average length of stay	-0.053	0.005	***	-0.025	0.008	**	-0.009	0.006	-	-1.048	0.078	***
Academic medical center	0.241	0.067	***	0.101	0.108	-	0.143	0.082	+	2.392	1.021	**
Sole community hospital	-0.082	0.049	+	-0.080	0.079	-	0.008	0.061	-	1.330	0.753	+
Competition (HHI)	0.081	0.059	-	-0.190	0.095	*	-0.398	0.073	***	-2.067	0.903	*
Government operated	-0.038	0.043	-	-0.242	0.069	***	0.069	0.053	-	-3.142	0.659	***
For profit	-0.648	0.039	***	-0.648	0.062	***	0.322	0.047	***	-2.577	0.591	***
Payor mix: Medicaid days	0.005	0.001	***	0.004	0.002	+	0.000	0.002	-	0.018	0.021	-
Payor mix: Medicare days	-0.003	0.002	-	-0.005	0.003	*	0.004	0.002	*	0.010	0.026	-
Case mix index (CMI)	0.844	0.053	***	0.758	0.085	***	-0.740	0.065	***	-3.521	0.811	***
Surgical CMI	-1.174	0.14	***	-1.391	0.225	***	-0.069	0.172	-	-16.313	2.137	***
Medical CMI	-0.246	0.042	***	-0.322	0.068	***	0.361	0.052	***	1.924	0.644	**
CC/MCC rate	-0.482	0.147	***	1.646	0.236	***	-0.162	0.18	-	11.359	2.24	***
Region 2 (NJ, NY, PA)	-0.383	0.079	***	-0.618	0.127	***	-0.027	0.096	-	-1.705	1.201	-
Region 3 (DE, KY, MD, NC, VA, WV, DC)	-0.038	0.083	-	-0.459	0.134	***	-0.231	0.102	*	0.458	1.267	-
Region 4 (AL, FL, GA, MS, SC, TN, PR)	-0.133	0.077	+	-0.571	0.123	***	-0.146	0.094	-	-1.642	1.168	-
Region 5 (IL, MI, IN, OH, WI)	-0.12	0.077	-	-0.266	0.123	*	-0.181	0.094	*	-0.851	1.171	-
Region 6 (IA, KS, MN, MO, NE, ND, SD)	0.013	0.082	-	-0.096	0.132	-	-0.504	0.101	***	2.373	1.257	+
Region 7 (AR, LA, OK, TX)	0.001	0.079	-	-0.353	0.127	**	-0.266	0.097	**	-1.721	1.21	-
Region 8 (AZ, CO, ID, MT, NM, UT, WY)	-0.106	0.087	-	-0.069	0.139	-	-0.678	0.106	***	1.231	1.323	-
Region 9 (AK, CA, HI, NV, OR, WA)	-0.227	0.079	**	-0.152	0.127	-	-0.366	0.09	***	3.577	1.206	**

Notes: + p < 0.1, * p < 0.05; ** p < 0.01; *** p < 0.001; Region 1 (CT, ME, MA, NH, RI, VT) is referent.

Abbreviations: ALCR, ALCR: Agency labor cost ratio; HCAHPS, Hospital Consumer Assessment of Healthcare Providers and Systems; TPS, Total performance score; HHI, Hirschman-Herfindahl Index; CMI, Case mix index; CC/MCC, Complication/comorbidity and major complication/comorbidity.

Discussion

Using the agency theory framework, the primary purpose of this study was to investigate the association between agency staff utilization and hospital quality-of-care. As anticipated, the study findings generally indicated that increased use of agency labor was associated with decreased quality performance. Our results are aligned with earlier studies that have reported a negative association between the utilization of agency labor and hospital quality.

There are many reasons why agency staff utilization in hospitals may have a detrimental impact on quality. One plausible explanation lies in the transient nature of agency staff, who, by virtue of being unfamiliar with the specific requirements of a particular healthcare setting, may struggle to provide seamless and patient-centered care. This deficit can contribute to missed cues, communication breakdowns, and ultimately suboptimal resident outcomes. Additionally, unfamiliarity with institutional protocols, procedures, and organizational culture can create operational burdens. Agency staff may require increased supervision and be less participatory in teamwork, leading to burnout and decreased morale among permanent nursing staff.⁵¹ Prior research has highlighted the significance of fostering a sense of community and organizational commitment to enhance the quality of service within healthcare settings.⁵² However, agency labor may struggle to develop strong organizational commitment given their short tenures. The presence of agency staff may also disrupt continuity of care and amplify cultural differences between the caregivers and patients.

Table 3 Regression Results of ALCR on HVBP Sub-Domains (Clinical, Safety, Engagement & Efficiency)

Analysis of Association Between ALCR and Quality	Clinical Outcomes Domain Score			Safety Domain Score			Engagement Domain Score			Efficiency Domain Score		
	N = 2295, Adj R ² = 11.0%			N = 1878, Adj R ² = 18.5%			N = 2304, Adj R ² = 37.2%			N = 2307, Adj R ² = 35.1%		
	β	S.E.	Sig	β	S.E.	Sig	β	S.E.	Sig	β	S.E.	Sig
ALCR	-4.129	1.326	**	-1.522	1.58	-	-10.498	1.276	***	-4.932	1.811	**
Number of discharges (in thousands)	0.043	0.018	**	-0.052	0.021	**	0.006	0.017	-	0.004	0.024	-
Number of staffed beds (in thousands)	0.164	1.064	-	-3.766	1.267	***	-4.153	1.024	***	-6.971	1.453	***
Location (Rural)	-0.381	0.315	-	1.092	0.376	**	2.135	0.303	***	2.221	0.431	***
Average age of facility (Years)	-0.003	0.009	-	0.016	0.011	-	0.009	0.009	-	0.028	0.013	*
Bed utilization rate	-0.003	0.006	-	-0.011	0.007	-	-0.045	0.006	***	-0.038	0.008	***
Average Length of Stay	0.097	0.035	**	-0.407	0.042	***	-0.595	0.034	***	-0.773	0.048	***
Academic medical center	0.942	0.458	*	-0.075	0.546	-	2.333	0.441	***	1.696	0.626	**
Sole community hospital	0.442	0.338	-	0.412	0.403	-	-0.399	0.325	-	1.121	0.462	*
Competition (HHI)	-2.545	0.405	***	-1.073	0.483	*	-0.153	0.39	-	0.695	0.554	-
Government operated	-0.752	0.296	**	-0.791	0.353	*	-0.312	0.285	-	-2.041	0.404	***
For profit	0.241	0.265	-	1.097	0.316	***	-2.788	0.255	***	-1.765	0.362	***
Payor mix: Medicaid days	0.035	0.009	***	0.004	0.011	-	0.026	0.009	**	-0.069	0.013	***
Payor mix: Medicare days	-0.029	0.011	**	0.015	0.014	-	0.016	0.011	-	0.024	0.016	-
Case mix index (CMI)	1.128	0.364	**	-3.478	0.433	***	-2.301	0.35	***	-4.045	0.497	***
Surgical CMI	-1.768	0.959	+	2.655	1.143	*	-7.72	0.923	***	-12.782	1.31	***
Medical CMI	-0.552	0.289	*	1.679	0.345	***	1.609	0.278	***	1.720	0.395	***
CC/mcc rate	3.416	1.005	***	-2.875	1.198	*	-0.492	0.967	-	7.909	1.373	***
Region2 (NJ, NY, PA)	-1.562	0.539	**	0.703	0.643	-	-1.357	0.519	**	0.761	0.737	-
Region3 (DE, KY, MD, NC, VA, WV, DC)	-2.314	0.569	***	1.164	0.678	+	-0.068	0.547	-	1.663	0.777	*
Region4 (AL, FL, GA, MS, SC, TN, PR)	-2.608	0.524	***	1.055	0.624	+	0.518	0.504	-	-0.192	0.716	-
Region5 (IL, MI, IN, OH, WI)	-0.842	0.526	-	0.102	0.626	-	-0.35	0.506	-	-0.485	0.718	-
Region6 (IA, KS, MN, MO, NE, ND, SD)	-1.452	0.564	**	0.322	0.672	-	0.158	0.543	-	3.557	0.771	***
Region7 (AR, LA, OK, TX)	-2.078	0.543	***	1.379	0.647	*	0.791	0.523	-	-1.778	0.742	*
Region8 (AZ, CO, ID, MT, NM, UT, WY)	-1.211	0.594	*	0.819	0.708	-	0.371	0.571	-	2.160	0.811	**
Region9 (AK, CA, HI, NV, OR, WA)	-0.800	0.541	-	1.689	0.645	**	-0.381	0.521	-	3.892	0.739	***

Notes: + p < 0.1, * p < 0.05; ** p < 0.01; *** p < 0.001; Region 1 (CT, ME, MA, NH, RI, VT) is referent.

Abbreviations: ALCR, Agency labor cost ratio; HBVP, Hospital value-based purchasing; HHI, Hirschman-Herfindahl Index; CMI, Case mix index; CC/MCC, Complication/comorbidity and major complication/comorbidity.

Another consideration is the potential variability in the skill sets and experience levels among agency staff. While staffing agencies aim to provide qualified professionals who must meet minimum regulatory standards, the diversity within the pool of agency staff may lead to inconsistencies in the quality of care delivered.⁵³ Variations in competencies, training, and familiarity with hospital protocols could contribute to a lack of standardized care practices, potentially compromising overall quality.

In contrast to our collective findings showing a negative association between agency labor use and hospital quality, a few results require additional consideration. Among our primary dependent variables of interest, only the Hospital-Wide All-Cause Readmission Rate and HVBP safety performance sub-domain did not exhibit a significant association with agency staff. This is ironic given the central role that hospital staff play in ensuring patient safety and reducing readmissions. One possible explanation could be the variability in the tasks performed by agency staff, with some of their roles potentially exerting a less direct impact on readmission rates or safety metrics. Some researchers have also questioned the validity of the readmission rate as a measure of hospital quality.⁵⁴ Future researchers might consider evaluating the types and locations of agency staffing through more detailed cost analysis at the service line or the procedural level. Unfortunately, developing a study of this granular nature was not possible with the currently available data.

Operational/Practice Implications

Workforce-related challenges are perhaps the most significant obstacle currently faced by US hospitals. While the relentless expansion of agency staff in hospitals may be plateauing,⁵⁵ it is evident that they will continue to play a significant role in the hospital labor landscape. This is particularly accurate for certain staffing domains such as nursing where the US confronts long-term shortages with no immediate remedies on the horizon.⁵⁶

Hence, the key challenge lies not in the complete elimination of agency staff but rather in optimizing their utilization and mitigating potential drawbacks. To achieve this, potential strategies could include implementing competency assessment tools and developing onboarding programs specifically tailored for agency nurses to familiarize them with resident needs, facility protocols, and care standards.^{57,58} Second, prioritizing continuity of care is crucial especially for staffing domains relevant to resident care and hospital quality. For instance, agency nurses should be assigned to specific resident groups. This fosters relationship building, improves understanding of individual needs, and allows for more effective care planning and delivery. The organizational commitment of agency staff could be enhanced by investing in collaborative opportunities with FTE staff, fostering knowledge exchange and a sense of shared responsibility for residents' well-being. And finally, implementing robust quality assurance measures with rigorous monitoring and regular evaluations could help identify and address any lapses in care standards, regardless of staff type.

What should be concerning to health care leaders is how much impact agency staffing might have on downstream profitability as quality decrements are recognized in the marketplace by payers, providers, and patients. Previous research has identified a positive association between high quality of care in hospitals and their financial performance.^{44,59} Specifically, many of the steps taken to improve patient perceptions of quality and safety are all in the best interest of the patient but also serve to financially support the organization's long-term economic viability. Notably, initiatives such as VBP provide a financial incentive for hospitals to deliver high-quality care.⁶⁰ This program directly ties reimbursement to the quality of services rendered, offering increased financial rewards to hospitals that exhibit superior performance across various quality measures, including patient outcomes and satisfaction. Consequently, while the deployment of agency staff may appear as a convenient solution to alleviate chronic staffing shortages, it is crucial to recognize that this strategy may entail adverse financial implications as reimbursement is increasingly linked directly to the quality of services provided.

Our findings also suggest that organizational and geographic contexts may play a significant role in healthcare quality. Hospitals can address the variables that may negatively affect quality of care such as reducing average length of stay and increasing the number of nurses when the number of staffed beds increases.

This study presents several limitations. First, the current study is drawn from a single data year (2022), and we have lagged independent and control variables (2021) to address endogeneity and reverse causality. Future research should consider using longitudinal data and/or incorporating a more robust data set with more complete data. Second, there may be additional significant factors that influence the variation in our chosen quality variables. For instance, factors such as the service mix, the demographics of the supported patient population, the range of services offered by the hospital, and the composition of the clinical staff may all be relevant in teasing out additional variation in the dependent variables. Unfortunately, these data are not available to us at the present time. The inclusion of interaction terms among our studied variables might also be an interesting addition to the research. A final limitation centers on the fact that all our chosen quality-dependent variables are weighted aggregates. Although this provides consistency across our studied population, additional insight might be gained by examining our study relationship on more granular aspects of each of the current dependent variables. As an example, even though we have evaluated each of the sub-domains of the VBP TPS, future research could examine more closely the component measures of the sub-domains. We were also not able to measure other clinical outcomes such as mortality and hospital-acquired infection rates due to data limitation. Nevertheless, this is the first study that has included a comprehensive understanding of healthcare quality.

Conclusions

The COVID-19 pandemic has exacerbated existing staffing shortages in US hospitals compelling them to employ agency labor to meet immediate patient needs. However, the existing research on the impact of agency staff on hospital quality is

limited and often contradictory, leaving a critical knowledge gap. To mitigate this lacuna in the literature, this study employed a national sample of hospitals, with the primary objective of understanding the impact of agency staff on hospital quality. Our results highlight the potential pitfalls of this reliance on agency staff, as it can negatively impact hospital quality of care across a wide spectrum of measures.

The high financial cost associated with agency labor not only inhibits hospitals from making substantial investments in high-quality care, but the wage disparity may contribute to discontent among regular FTE employees, potentially fueling a vicious cycle.⁵⁵ Therefore, hospitals might consider investing in recruitment and retention of regular staff via various means, including competitive pay scales, tuition reimbursement programs, and flexible scheduling. In the interim, targeted interventions such as competency assessment and encouraging collaborative opportunities may be necessary to minimize the risk to hospital quality of care. This approach is essential for hospitals to navigate the challenges posed by staffing shortages, while still maintaining their commitment to delivering high quality care for their patients.

Institutional Review Board Statement

Prior research of this type has been reviewed by the Texas State University Research Integrity and Compliance (RIC). According to the provisions in 45 CFR § 46.102 pertaining to “human subject” research, the RIC has previously determined studies of this type exclusively involve the examination of data originally collected and created by Definitive Healthcare, which provides data that are anonymous and publicly available. Therefore, the RIC has concluded this type of research does not use human subjects and is not regulated by the provisions in 45 CFR § 46.102, and therefore an IRB review of the study has not been required.

Data Sharing Statement

All analyses were conducted in SPSS, Version 28, and all tables were constructed in Microsoft Excel.

Disclosure

The authors declare no conflicts of interest in this work.

References

1. Krijgsheld M, Tummers LG, Scheepers FE. Job performance in healthcare: a systematic review. *BMC Health Serv Res.* 2022;22(1):149. doi:10.1186/s12913-021-07357-5
2. KaufmanHall, The financial effects of hospital workforce dislocation; 2022. Available from: <https://www.kaufmanhall.com/sites/default/files/2022-05/KH-NHFR-Special-Report-2.pdf>. Accessed January 23, 2024.
3. Haddad LM, Annamaraju P. Toney-Butler Nursing Shortage; 2023.
4. Auerbach DI. A worrisome drop in the number of young nurses. *Health Affairs Forefront.* 2022;1:3.
5. Halter M, Boiko O, Pelone F, et al. The determinants and consequences of adult nursing staff turnover: a systematic review of systematic reviews. *BMC Health Serv Res.* 2017;17(1):1–20. doi:10.1186/s12913-017-2707-0
6. HealthCare Finance Hospital staffing shortages face new competition from Amazon, Apple and other disruptors. 2020. Available from: <https://www.healthcarefinancenews.com/news/hospital-staffing-shortages-face-new-competition-amazon-apple-and-other-disruptors>. Accessed January 23, 2024.
7. Manias E, Aitken R, Peerson A, et al. Agency nursing work in acute care settings: perceptions of hospital nursing managers and agency nurse providers. *J Clin Nurs.* 2003;12(4):457–466. doi:10.1046/j.1365-2702.2003.00745.x
8. American Hospital Association. Massive growth in expenses and rising inflation fuel continued financial challenges for America’s hospitals and health systems; 2022. Available from: <https://www.aha.org/guidesreports/2022-04-22-massive-growth-expenses-and-rising-inflation-fuel-continued-financial>. Accessed January 23, 2024.
9. American Hospital Association. The current state of hospital finances: fall 2022 update; 2022. Available from: <https://www.aha.org/guidesreports/2022-09-15-current-state-hospital-finances-fall-2022-update>. Accessed January 23, 2024.
10. American Hospital Association. Data brief: workforce issues remain at the forefront of pandemic-related challenges for hospitals; 2022. Available from <https://www.aha.org/issue-brief/2022-01-25-data-brief-workforce-issues-remain-forefront-pandemic-related-challenges>. Accessed January 23, 2024.
11. Salmund SW, Macdonald M. Invest in nursing: the backbone of health care systems. *JBIC Evidence Synth.* 2021;19(4):741–744. doi:10.11124/JBIES-21-00089
12. Griffiths P, Maruotti A, Recio Saucedo A, et al. Nurse staffing, nursing assistants and hospital mortality: retrospective longitudinal cohort study. *BMJ Qual Saf.* 2019;28(8):609–617. doi:10.1136/bmjqs-2018-008043
13. Needleman J, Buerhaus P, Pankratz VS, et al. Nurse staffing and inpatient hospital mortality. *N Engl J Med.* 2011;364(11):1037–1045. doi:10.1056/NEJMsa1001025

14. Needleman J, Buerhaus P, Mattke S, et al. Nurse-staffing levels and the quality of care in hospitals. *N Engl J Med.* 2002;346(22):1715–1722. doi:10.1056/NEJMsa012247
15. Donaldson MS, Corrigan JM, Kohn LT, eds.. *To Err is Human: Building a Safer Health System.* Washington D.C: Institute of Medicine; 2000.
16. Makary MA, Daniel M. Medical error—the third leading cause of death in the US. *BMJ.* 2016;353:i2139. doi:10.1136/bmj.i2139
17. Centers for Medicare & Medicaid services hospital quality initiative; 2023. Available from: <https://www.cms.gov/medicare/quality/initiatives/hospital-quality-initiative>. Accessed January 23, 2024.
18. Centers for Medicare & Medicaid services national health expenditures 2022 highlights; 2023. Available from: <https://www.cms.gov/files/document/highlights.pdf>. Accessed January 23, 2024.
19. Hockenberry JM, Becker ER. How Do hospital nurse staffing strategies affect patient satisfaction? *ILR Rev.* 2016;69(4):890–910. doi:10.1177/0019793916642760
20. Shang J, You L, Ma C, et al. Nurse employment contracts in Chinese hospitals: impact of inequitable benefit structures on nurse and patient satisfaction. *Human Res Health.* 2014;12(1):1–10. doi:10.1186/1478-4491-12-1
21. Aiken LH, Shang J, Xue Y, et al. Hospital Use of Agency-Employed supplemental nurses and patient mortality and failure to rescue. *Health Serv Res.* 2013;48(3):931–948. doi:10.1111/1475-6773.12018
22. Zaranko B, Sanford NJ, Kelly E, et al. Nurse staffing and inpatient mortality in the English National Health Service: a retrospective longitudinal study. *BMJ Qual Saf.* 2023;32(5):254–263. doi:10.1136/bmjqs-2022-015291
23. Senek M, Robertson S, Ryan T, et al. The association between care left undone and temporary Nursing staff ratios in acute settings: a cross-sectional survey of registered nurses. *BMC Health Serv Res.* 2020;20(1):1–8. doi:10.1186/s12913-020-05493-y
24. Dall’Ora C, Maruotti A, Griffiths P. Temporary staffing and patient death in acute care hospitals: a retrospective longitudinal study. *J Nurs Scholarsh.* 2020;52(2):210–216. doi:10.1111/jnu.12537
25. Weerd CV, Peck JA, Porter T. Travel nurses and patient outcomes: a systematic review. *Health Care Manage Rev.* 2023;48(4):352–362. doi:10.1097/HMR.0000000000000383
26. Evans M, Nurse Shortage Pushes Hospitals Into the Gig Economy, in The Wall Street Journal; 2023. Available from <https://www.wsj.com/articles/nurse-shortage-hospitals-hiring-gig-economy-dc94bdb2>. Accessed January 23, 2024.
27. Miller A, Hospital systems are creating their own staffing agencies as a cheaper alternative to temp and travel nurses, in Fortune; 2022. Available from: <https://fortune.com/2022/12/13/hospital-systems-staffing-agencies-contract-nurse-costs/>. Accessed January 23, 2024.
28. Dorsett M Point of no return: COVID-19 and the U.S. healthcare system: an emergency physician’s perspective; 2020. Available from: <https://www.science.org/doi/10.1126/sciadv.abc5354>. Accessed January 23, 2024.
29. Geyman J. COVID-19 has revealed America’s broken health care system: what can we learn? *Int J Health Serv.* 2021;51(2):188–194. doi:10.1177/0020731420985640
30. Jensen MC, Meckling WH, Theory of the firm: managerial behavior, agency costs and ownership structure, in Corporate governance; 2019:77–132.
31. Liu X, Mills A. Agency theory and its applications in health care. *Public Ends Private Means.* 2007;2:151–178.
32. Lambright KT. Agency theory and beyond: contracted providers’ motivations to properly use service monitoring tools. *J Public Administration Res Theory.* 2009;19(2):207–227. doi:10.1093/jopart/mun009
33. Pradhan R, Weech-Maldonado R, Harman JS, et al. Private equity ownership and nursing home financial performance. *Health Care Manage Rev.* 2013;38(3):224–233. doi:10.1097/HMR.0b013e31825729ab
34. Epané JP, Weech-Maldonado R, Hearld L, et al. Hospitals’ use of hospitalists: implications for financial performance. *Health Care Manage Rev.* 2019;44(1):10–18. doi:10.1097/HMR.0000000000000170
35. Eisenhardt KM. Agency Theory: an Assessment and Review. *Acad Manage Rev.* 1989;14(1):57–74. doi:10.2307/258191
36. Davlyatov G, Weech-Maldonado R, Pradhan R, et al. The impact of contract nurse utilization on nursing home quality. *Innovation Aging.* 2023;7 (Supplement_1):226. doi:10.1093/geroni/igad104.0746
37. Definitive Healthcare; 2023. Available from <https://www.definitivehc.com>. Accessed January 23, 2024.
38. Beauvais B, Kruse CS, Ramamonjirivelo Z, et al. An exploratory analysis of the association between hospital labor costs and the quality of care. *Risk Manage Healthc Pol.* 2023;Volume 16:1075–1091. doi:10.2147/RMHP.S410296
39. Centers for Medicare & Medicaid services HCAHPS: patients’ perspectives of care survey; 2023. Available from: <https://www.cms.gov/medicare/quality/initiatives/hospital-quality-initiative/hcahps-patients-perspectives-care-survey>. Accessed January 23, 2024.
40. Centers for Medicare & Medicaid services hospital quality initiative public reporting; 2023. Available from <https://www.cms.gov/medicare/quality/initiatives/hospital-quality-initiative/hospital-compare>. Accessed January 23, 2024.
41. Benbassat J, Taragin M. Hospital readmissions as a measure of quality of health care: advantages and limitations. *Arch Int Med.* 2000;160 (8):1074–1081. doi:10.1001/archinte.160.8.1074
42. Centers for Medicare & Medicaid services hospital value based purchasing – total performance score. 2023. Available from: <https://data.cms.gov/provider-data/dataset/ypbt-wvdk>. Accessed January 23, 2024.
43. American hospital association American hospital association regions. 2023. Available from: <https://trustees.aha.org/system/files/media/file/2020/12/American%20Hospital%20Association%20Regions.pdf>. Accessed January 23, 2024.
44. Beauvais B, Richter JP, Kim FS. Doing well by doing good: evaluating the influence of patient safety performance on hospital financial outcomes. *Health Care Manage Rev.* 2019;44(1):2–9. doi:10.1097/HMR.0000000000000163
45. Stiebale J. Do financial constraints matter for foreign market entry? A firm-level examination. *World Econ.* 2011;34(1):123–153. doi:10.1111/j.1467-9701.2010.01306.x
46. Buch CM, Koch CT, Koetter M. Do banks benefit from internationalization? Revisiting the market power–risk nexus. *Rev Finance.* 2013;17 (4):1401–1435. doi:10.1093/rof/rfs033
47. Johnson DR, Creech JC. Ordinal measures in multiple indicator models: a simulation study of categorization error. *Am Sociological Rev.* 1983;48 (3):398–407. doi:10.2307/2095231
48. Norman G. Likert scales, levels of measurement and the “laws” of statistics. *Adv Health Sci Educ.* 2010;15(5):625–632. doi:10.1007/s10459-010-9222-y
49. Sullivan GM, Artino AR. Analyzing and interpreting data from Likert-type scales. *J Graduate Med Educ.* 2013;5(4):541–542. doi:10.4300/JGME-5-4-18

50. Zumbo BD, Zimmerman DW. Is the selection of statistical methods governed by level of measurement? *Canadian Psychology/Psychologie Canadienne*. 1993;34(4):390. doi:10.1037/h0078865
51. Castle NG. Use of agency staff in nursing homes. *Res Gerontol Nurs*. 2009;2(3):192–201. doi:10.3928/19404921-20090428-01
52. Lampinen M-S, Suutala E, Konu AI. Sense of community, organizational commitment and quality of services. *Leadersh Health Serv*. 2017;30(4):378–393. doi:10.1108/LHS-06-2016-0025
53. Bourbonniere M, Feng Z, Intrator O, et al. The use of contract licensed nursing staff in US nursing homes. *Med Care Res Rev*. 2006;63(1):88–109. doi:10.1177/1077558705283128
54. Fischer C, Lingsma HF, Marang-van de Mheen PJ, et al. Is the readmission rate a valid quality indicator? A review of the evidence. *PLoS One*. 2014;9(11):e112282. doi:10.1371/journal.pone.0112282
55. KaufmanHall, 2023 State of Healthcare Performance Improvement: signs of Stabilization Emerge; 2023. Available from: https://www.kaufmanhall.com/sites/default/files/2023-10/KH-Report_2023-State-Healthcare-Performance-Improvement.pdf?utm_source=agcy&utm_campaign=performance-improvement-report&utm_medium=pr&utm_term=231024. Accessed January 23, 2024.
56. Sanford K, Kaufmann J, Cottrell EK. Nursing Shortages: treating a Chronic Problem Turned Acute. *NEJM Catal Innovat Care Deliv*. 2023;4(1). doi:10.1056/CAT.23.0034
57. Hennerby C, Joyce P. Implementation of a competency assessment tool for agency nurses working in an acute paediatric setting. *J Nurs Manage*. 2011;19(2):237–245. doi:10.1111/j.1365-2834.2011.01223.x
58. Bliss JB, Alsdort P. Generic orientation for agency nurses. SLACK Incorporated Thorofare, NJ. 1992:60–62.
59. Enumah SJ, Sundt TM, Chang DC. Association of measured quality and future financial performance among hospitals performing cardiac surgery. *J Healthc Manag*. 2022;67(5):367–379. doi:10.1097/JHM-D-21-00262
60. Centers for Medicare & Medicaid services the hospital value-based purchasing (VBP) Program; 2023. Available from: <https://www.cms.gov/medicare/quality/value-based-programs/hospital-purchasing>. Accessed January 23, 2024.

Risk Management and Healthcare Policy

Dovepress

Publish your work in this journal

Risk Management and Healthcare Policy is an international, peer-reviewed, open access journal focusing on all aspects of public health, policy, and preventative measures to promote good health and improve morbidity and mortality in the population. The journal welcomes submitted papers covering original research, basic science, clinical & epidemiological studies, reviews and evaluations, guidelines, expert opinion and commentary, case reports and extended reports. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/risk-management-and-healthcare-policy-journal>