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Evaluating the Influence of Nursing Staffing Levels and Work Environment on Patient Care Quality in Tertiary Care Hospitals

Haris Maqbool
harrisharry926@gmail.com
BSN, Rashid Latif Nursing College (RLNC), Rashid Latif Medical Complex (RLMC), Lahore, Pakistan

Sheeza Manzoor
2020-RLNC-2416@rlmc.edu.pk
BSN, Rashid Latif Nursing College (RLNC), Rashid Latif Medical Complex (RLMC), Lahore, Pakistan

Jerry Zahid
jerry.zahid@rlmc.edu.pk
Senior Nursing Lecturer, Rashid Latif Nursing College (RLNC), Rashid Latif Medical Complex (RLMC), Lahore, Pakistan

Faisal Nadeem
faisal.nadeem@rlmc.edu.pk
Associate Professor, Rashid Latif Nursing College (RLNC), Rashid Latif Medical Complex (RLMC), Lahore, Pakistan

Warda Tu Nisa
wardatu.nisa@rlmc.edu.pk
Assistant Professor, Rashid Latif Nursing College (RLNC), Rashid Latif Medical Complex (RLMC), Lahore, Pakistan

Rehana Tabbasum
rehana.tabbasum@rlmc.edu.pk
Senior Nursing Lecturer, Rashid Latif Nursing College (RLNC), Rashid Latif Medical Complex (RLMC), Lahore, Pakistan

Swara Mushtaq
swara.mushtaq@rlmc.edu.pk
Nursing Lecturer, Rashid Latif Nursing College (RLNC), Rashid Latif Medical Complex (RLMC), Lahore, Pakistan
Corresponding Author: * Haris Maqbool harrisharry926@gmail.com

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ABSTRACT

The quality of patient care worldwide is compromised by inadequate nursing staffing and poor working environments, leading to higher burnout and adverse outcomes. Staffing shortages, driven by factors like retirements, low enrollment, and migration, significantly impact healthcare quality and patient safety. Countries like the USA, Japan, and Pakistan face similar challenges, with workforce planning and policies often falling short. Ensuring appropriate nurse-to-patient ratios and improving work conditions are essential for enhancing patient satisfaction and health outcomes. To explore the influence of nursing staffing levels and the overall workplace environment on patient care quality, and to assess the relationship between these factors and patient outcomes. This cross-sectional study recruited 222 government hospital nurses and 73 private hospital nurses' accumulated 295 sample size, using SPSS version 23 to analyze the relationship among the variables. The patient care quality in both healthcare institutions was strongly influenced by the work environment, according to the analysis. In the government hospital, the work environment had a substantial and significant positive effect ($\beta = 0.772$, $p < .001$), and the model explained 68.2% of the variance ($R^2 = 0.682$). Likewise, 59.7% of the variation

was explained by the private hospital model (R^2 = 0.597), with the work environment having a significant effect (β = 0.671, p <.001). In both contexts, staffing levels had positive, non-significant impact. Improved work environment and adequate nursing staffing amounts have a positive impact on patient care quality. Nursing staffing levels and work environment conditions should be focused on to improve patient care quality in healthcare facilities.

Keywords: *Nursing Staffing, Patient Care Quality, Work Environment*

INTRODUCTION

Globally the patient care quality has been underscored due to multiple factors, particularly inadequate nursing staffing and poor working environment, that adversely affect nursing care. Adverse patient outcomes are generally observed in health care facilities that are more often than not a contribution of inadequate nursing staffing levels and poor work environments. It has been observed that 34% of United States of America (USA) nurses reported that inappropriate staffing levels lead to higher burnout rates that effect nursing care quality and eventually cause adverse effects on patient health (McHugh et al., 2021).Similarly, patient care quality has been improved in USA nursing homes with good working environments with lower cases of pressure ulcers and hospitalizations that contribute to better patient outcomes, improved quality of life of patients, lesser time spend in hospitals, more patient and nurse's satisfaction level, reduced workload for nurses and better communication among health care professionals (White et al., 2020). According to Halm (2019) a correlation between nursing staffing and positive patient and nurse outcomes exists and it has served as a backbone of healthcare facilities that enhance patient outcomes as well as their satisfaction level, increased trust in healthcare professionals and increased quality of life. A study conducted by Andersson et al (2022) explains the importance of nurses and nursing management to appropriately manage missed nursing care because it may contribute as an element to unforeseeable events and compromise patient safety. The nursing workforce shortage is one of the biggest issues facing the profession today, as per a survey 92.3% of the hospitals in Seoul were inadequately staffed, despite the fact that everyone can credibly attest to the importance of nurses in providing healthcare services. This shortage seriously jeopardizes the quality of healthcare services, as well as efforts to improve global population health and attain universal health coverage.

This highlights the utter importance of appropriate levels of nursing staff in a health care facility. An adequate level of nursing staff is necessary for providing appropriate care to the patients through timely attending, if and when they need it, reducing the mortality and morbidity rates of patients (Adams et al., 2021; Park & Yu, 2019; Yahyaei et al., 2022). The shortage of nurses is a result of numerous issues impacting the healthcare sector. If these issues are not resolved in a timely and effective manner, the number of individuals in need of high-quality nursing care will continue to rise, making it more difficult to achieve the main objective of enhancing and safeguarding the individual's health (Matsuo et al., 2021). It has been observed that there are disparities in the provision of competent nurses to keep the nursing workforce at a balanced state in response to the aging population, retirement, and the recruitment and retention of new nurses, as most of our nursing workforce is consistent of the elderly who either are near their retirement phase or take an early retirement while there is no significant increase in the number of new recruitments but rather nurses intention to leave the healthcare facility and turnover is increasing drastically, making it challenging to meet the rising demand (Adams et al., 2021).

There are multiple factors that contribute to the shortage of nursing, these include the reduced number of student nurse's enrolment in nursing programme and reduced number of allocation seats for the students due to a lack of proper planning and funding availability and the increased number of early retirement due to health problem. For instance, Japan has an insufficient work force due to a dropping birth rate and an increasing population. Moreover, Thailand's nursing shortage is mostly caused by the country's rapid

nurse migration to countries like Europe and United states, which results from below average working conditions and environments. While 34% of the research conducted suggested that, poor job satisfaction continues to be the primary driver of nurse migration in Singapore and other industrialized nations. In addition, the newly graduated nurses of Lebanon with bachelor's degree leave the country due to which nursing staff pool is affected. Inadequate policies and workforce planning, however, are among the primary problems mentioned in numerous countries (Tamata & Mohammadnezhad, 2023).

Health care providers agree with the fact that human resources are vital and play a crucial role in preserving and enhancing community health according to a study conducted in Iran. The primary issues facing hospitals, as they are the primary providers of healthcare services, stem from a shortage of personnel or their inefficient allocation of care to the patients. On the other hand, a nursing team constructs about 56% of all hospital employees and is an essential component of the healthcare system. Therefore, a lack of adequate nursing workforce may result in lower-quality nursing care (Shamsi & Peyravi., 2020). Adequate nursing staffing and a good work environment are the elements that are essential for the appropriate fulfillment of the duties and tasks assigned to a nurse through enhancing the feasibility of essential nursing care that improves the overall patient satisfaction level. The concept of rationing of care, was initially applied to nursing care in 2008 and came from hospital administration. Rationing of nursing care (RONC) describes essential nursing duties that nurses neglected or withheld because of a lack of staff, time, or skill sets. The variable known as "rationing of care" was first implemented in nursing care in 2008 and it came from hospital administration. When required nursing duties are withheld or neglected because of personnel levels, skill mixes, or time constraints, it's referred to as rationing of nursing care (RONC). A rough component of RONC is missed nursing care, which is the term for the inability or delay in providing nursing care due to a variety of circumstances (Xiaowen Zhu., 2019).

Similarly in other Asian countries like Pakistan the same challenge of inappropriate nursing staffing levels is apparent in healthcare settings. The Pakistan Nursing Council (PNC) has addressed this problem and worked to resolve it. In 2021 the PNC outlined the minimum nurse to patient ratio for the hospitals in Pakistan. The following instructions were given by the PNC on nurse-to-patient ratios. The ideal nurse-to-patient ratio in general hospital units is 1:3, meaning that there should be three nurses for every 10 beds, plus one relief nurse for every ten beds. The nurse-to-patient ratio in critical and specialist units such as the cardiovascular, intensive care unit, neurosurgery, urology, peritoneal dialysis, hemodialysis, and kidney transplant units is two nurses per patient during an 8-hour shift and six nurses per patient throughout a 24-hour period. The recommended nurse-to-patient ratio in operating rooms is two nurses per table every shift. The nurse-to-patient ratio in anesthesiology departments is two nurses per equipment every shift. The nurse-to-patient ratio for specialty departments like Psychiatric Emergency, Casualty, Emergency rooms, Recovery Rooms, Pediatric Surgery, Thoracic Surgery, Burn Surgery and Plastic Surgery is one nurse for every two patients with an 8-hour shift and three nurses for every two patients with a 24-hour shift, which is yet unachieved due to a lack of nursing workforce. This situation is made worse by open jobs brought on by a lack of qualified nurses, which lowers the standard of nursing service further contributing to the decreased quality of care for the patients in both private and government sector healthcare facilities (Hassan, 2023).

Research Objectives

- To explore how nursing staffing levels and the workplace environment as a whole effect patient care quality.
- To assess if there is a relationship between patients care quality and nursing staffing level and work environment.

METHODS

This study is a comparative analysis of the patient care quality in a government and a private hospital with a descriptive, cross-sectional design that uses quantitative approach to address the research questions. The study population is comprised of registered nurses from two different tertiary care hospitals (government and private).This study was conducted for an estimated duration of 3-6 months including the time of preparation of the synopsis, going for its approval, the procurements of the research and the survey to collect data to find the results of the study. Sample size is calculated by using Open Epi version 3.0 with the total population N size of 1250 of nursing staff of two hospitals (government and private) combined with the major population (222) belonging to the government hospital and the minor portion (73) of the private hospital while taking a probability value of (p = 0.05) to evaluate the results. The technique used in this study is stratified random sampling. Inclusion criteria for the participants was to be registered nurses with Bachelor of Nursing (BSN), Master in Nursing (MSN), Registered Nurse (RN) degree and/or Diploma holders. Additionally, the participants must sign an informed consent form to be selected as a data source. Exclusion criteria included healthcare workers without BSN, RN degree or Nursing diploma and those who fail to sign an informed consent. The data was collected from the selected participants of two different tertiary care hospitals (Government and Private) in Lahore after briefing the research title, problem statement and goals that the researchers hope to achieve through this research to the healthcare authorities and obtaining the permission to collect data from their relevant hospitals. The Researchers provided the participants with an online survey link and explain the questionnaire (briefing about each item) to the population to collect data while taking their consent, giving them a time frame of 30 mins to complete the questionnaire, which was collected after its completion and saved on an online database. The study utilizes the PES-NWI tool to measure the impact of nursing staffing and work environment on patient care quality. The tool provides a Likert scale to assess the answers the items regarding this variable with 4 responses: strongly agree (1 point), agree (2 points), disagree (3 points), and strongly disagree (4 points). The PES-NWI tool has been used globally for assessing the nursing work environment with the reliability value (Cronbach alpha) > 0.80 (Lake, 2024). The ethical committee of Rashid Latif Nursing College Lahore has approved that there is no penalty for the participants if they wish to withdraw from the study due to any reasons.

RESULTS

Table 1: Demographic Data of Private and Government Nurses

Gender	Private Hospital (n)	Government Hospital (n)
Male	27 (37%)	9 (4%)
Female	46 (63%)	213 (96%)
Age in Years		
20 – 30	39 (53%)	142 (64%)
30 – 40	22 (30%)	65 (29%)
40 – 50	10 (14%)	12 (5%)
> 50	2 (3%)	3 (2%)
Qualification		
Nursing Diploma	17 (23%)	35 (16%)
Post RN	34 (47%)	70 (31.5%)
BS Nursing	22 (30%)	116 (52%)
MS Nursing	0	1 (.5%)

Table 1 showcases the demographic details of study participants in which females made up larger quantity of the participants at private hospital, compared to men. Government hospital, on the other hand,

had a much larger percentage of female participants than male participants. In both hospitals, the biggest age group was between the ages of 20 and 30. With the 30 to 40-year-old age participants coming next. In both healthcare facilities, older age groups (40–50) came with smaller percentages while 50+ age group accounted for the least percentages of in both private and government hospitals. Post-RNs made up the largest number of the nurses at private hospital, followed by BS Nursing and Nursing Diplomas. The majority of the group at government hospital held a Bachelor of Science in Nursing, followed by Post-RN and Nursing Diploma. Just a fraction of people had an MS degree in nursing.

Table 2: Mean Score of Nursing Staffing, Work Environment and Patient Care Quality

Subscale	Government Hospital Mean (SD)	Private Hospital Mean (SD)
Nurse Participation in Hospital Affairs	1.7993 (.50641)	1.7565 (.47490)
Nursing Foundations for Quality of Care	1.75883 (.43825)	1.7976 (.45975)
Nurse Manager Ability, Leadership, and Support of Nurses	1.7730 (.50481)	1.7342 (.53960)
Staffing and Resource Adequacy	1.9583 (.50641)	1.8596 (.54802)
Collegial Nurse-Physician Relations	1.8559 (.62722)	1.7991 (.57128)

Table 2 represents the nurses' assessments of their work environment staffing levels and patient care quality varied somewhat across government and private hospitals when compared across five sub-scales .The Government Hospital had a slightly higher mean score in Nurse Participation in Hospital Affairs than the Private Hospital. The Government Hospital received a lower score, whereas the Private Hospital had a somewhat higher score for Nursing Foundations for Quality of Care. The Government Hospital scored higher in Nurse Manager Ability, Leadership, and Support, than the Private Hospital. The Government Hospital scored higher in Staffing and Resource Adequacy, compared to the Private Hospital. This was the biggest difference. Finally, the Government Hospital received a score in Collegial Nurse-Physician Relations, which was marginally higher than the Private Hospital's score. Nurses at both institutions agreed at comparable levels, with the Government Hospital receiving somewhat higher scores overall in most categories.

Table 3: Effect of Work Environment and Nursing Staffing on Patient Care Quality for Private Hospital

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.773[a]	.597	.586	.29584

Predictors: (Constant), Staffing Levels, Work Environment
Dependent Variable: Patient Care Quality

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.261	.156		1.678	.098
	Work Environment	.735	.102	.671	7.220	.000
	Staffing Levels	.132	.078	.157	1.693	.095

The private hospital's work environment and staffing levels were analyzed using multiple linear regression to predict the quality of patient care. The two predictors account for almost 59.7% of the variance in patient care quality, according to the robust overall model, which had R value of 0.773 and an R^2 of 0.597. The estimate's standard error was 0.296, and the modified R^2 was 0.586. The quality of patient care was significantly positively impacted by the work environment among the predictors (B = 0.735, β = 0.671, p <.001), indicating a substantial correlation between improved work conditions and higher quality treatment. A positive correlation was also found between staffing levels (β = 0.157, B = 0.132), however this was not statistically significant (p =.095). The findings, taken together, highlight the importance of the work environment in influencing perceptions of patient care quality in private hospital.

Table No.4: Effect of Work Environment and Nursing Staffing on Patient Care Quality for Government Hospital

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.826[a]	.682	.679	.24821

Predictors: (Constant), Staffing Levels, Work Environment.

Coefficients[a]

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	Std. Error	Beta		
2	(Constant)	.332	.069		4.839	.000
	Work Environment	.730	.047	.772	15.510	.000
	Staffing Levels	.057	.036	.080	1.600	.111

Dependent Variable: Patient Care Quality

Strong model performance (R = 0.826, R^2 = 0.682) is revealed by this multiple linear regression study that looks at the factors impacting the quality of patient care in a government hospital. This model explains around 68% of the variance in patient care quality. Work environment is a substantial and strong predictor of patient care quality (β = 0.772, p < 0.001), according to the data, with every unit improvement in work environment translating into a 0.73 unit increase in care quality. The staffing levels, on the other hand, displayed a slight positive correlation that was not statistically significant (β = 0.080, p = 0.111), thus indicating that staffing levels don't really affect the quality of care in hospital settings.

Table No.5: Comparison of Regression analysis: Government vs Private Hospital.

Parameter	Government Hospital	Private Hospital	Difference
Model Fit			
R	0.826	0.773	0.053 higher in Government
R Square	0.682	0.597	0.085 higher in Government
Adjusted R Square	0.679	0.586	0.093 higher in Government
Std. Error of Estimate	0.24821	0.29584	0.04763 lower (better) in Government
Coefficients			
Constant (B)	0.332	0.261	0.071 higher in Government
Constant Significance	p < 0.001	p = 0.098	Significant in Government only
Work Environment			
Unstandardized B	0.730	0.735	0.005 higher in Private
Standard Error	0.047	0.102	0.055 lower (better) in Government
Standardized Beta	0.772	0.671	0.101 higher in Government
t-value	15.510	7.220	8.290 higher in Government
Significance	p < 0.001	p < 0.001	Both significant
Staffing Levels			
Unstandardized B	0.057	0.132	0.075 higher in Private
Standard Error	0.036	0.078	0.042 lower (better) in Government
Standardized Beta	0.080	0.157	0.077 higher in Private
t-value	1.600	1.693	0.093 higher in Private
Significance	p = 0.111	p = 0.095	Neither significant at α=0.05

More variation in patient care quality is explained by the government hospital model (68.2%) than by the private hospital model (59.7%). Strong relationships between predictors and outcomes are evident in both models; however, the Government Hospital model outperforms the other. In both institutions, the best indicator of patient care quality is the work environment. In the Government Hospital, the impact is greater (β = 0.772) than in the Private Hospital (β = 0.671). In the private hospital, the effect of staffing levels is greater (β = 0.157) than in the government hospital (β = 0.080). In the Private Hospital, the impact is close to significant (p = 0.095), whereas in the Government Hospital, it is further distant (p = 0.111).

DISCUSSION

The comparison with Lake et al. (2020) shows that staffing levels have a far less effect on the quality of patient care than does the work environment. This study found that whereas staffing levels only exhibited minor, non-significant associations with patient care quality, the work environment had a considerable and statistically significant beneficial influence (β = 0.671 and β = 0.772, respectively) in both

government and private hospitals. Likewise, Lake et al. (2020) discovered that hospitals with better work environments had 11% fewer missed nursing care occurrences ($p < .001$), which had a greater effect than staffing levels (5%, $p < .01$). All things considered, both studies emphasize that although having adequate staffing levels helps provide quality care, a healthy work environment has a greater impact on improving patient outcomes. While both this study and the Redfern & Griffiths (2019) study emphasize the beneficial effects of staffing levels on the quality of patient care, the magnitude and importance of these effects vary. This study found a positive but non-significant relationship between staffing levels and the quality of patient care ($\beta = 0.157$ for the private hospital, $p = 0.095$, and $\beta = 0.080$ for the government hospital, $p = 0.111$. On the other hand, Redfern & Griffiths (2019) discovered a substantial and statistically significant relationship between the decrease in missed observations and improvement in RN staffing levels, with $p < 0.001$ for nursing assistant staffing levels and $p < 0.0001$ for registered nurses. According to the study, the rate of missed observations dramatically dropped as RN staffing rose, especially for high-acuity patients. Redfern & Griffiths concentrated more on the significance of proper staffing and did not specifically address work environment variables, whereas this study highlights the work environment as the primary element impacting care quality. Although the significance of staffing is acknowledged in both research, Redfern & Griffiths discovered a more significant and statistically significant effect on the quality of care. A compare/contrast of this research and the 2020 study by Al Sabei in Muscat, Oman, highlight the relevance of staffing levels and the nursing work environment in impacting the quality of patient care, but their conclusions differ in terms of their strength and significance. Although, staffing levels had a positive but non-significant effect ($\beta = 0.157$, $p = 0.095$ in private; $\beta = 0.080$, $p = 0.111$ in government), the work environment was the strongest predictor of patient care quality in both hospitals in this study, with $\beta = 0.671$ ($p < .001$) in the private hospital and $\beta = 0.772$ ($p < .001$) in the government hospitals. Al Sabei's (2020) study, on the other hand, discovered that sufficient staffing and resources resulted in an 81% decrease in the probability that nurses would report poor or average care quality ($p = .003$, 95% CI), suggesting a more robust and statistically significant effect of staffing on perceived care quality. Although the importance of a supportive work environment is acknowledged in both studies, Al Sabei's findings indicate that staffing has a more immediate and quantifiable impact on the quality of treatment than this study. While the strength and type of outcomes differ, both this study and the 2021 study by McHugh et al. support the importance of nursing staffing levels in improving patient outcomes.

While McHugh et al. found a statistically significant reduction in mortality after the implementation of minimum nurse-to-patient ratios in Queensland hospitals (CI 0.84–0.95, $p = 0.0003$), comparable hospitals without the intervention saw no significant change (CI 0.97–1.17, $p = 0.18$). In this research, staffing levels had a positive but non-significant impact on patient care quality ($\beta = 0.157$, $p = 0.095$ in the private hospital; $\beta = 0.080$, $p = 0.111$ in the governmental hospital). While the McHugh (2021) study did not evaluate the work environment, this study found it to be the most reliable and powerful predictor of care quality ($\beta = 0.671–0.772$, $p < .001$). The importance of the nursing work environment in improving care outcomes is highlighted by both your study and the study by Dutra & Guirardello (2021), which found that it was the strongest predictor of care quality in both government hospitals ($\beta = 0.772$, $p < .001$) and private hospitals ($\beta = 0.671$, $p < .001$). Dutra & Guirardello (2021) also found that better work environments were associated with improved safety climate, fewer missed care incidents, and greater job satisfaction, with significant results for nurse participation ($p = .0298$), staffing adequacy ($p = .0168$), and leadership support ($p = .0001$).A supportive nurse work environment has a significant positive influence on patient care outcomes, as demonstrated by this study and a study by White et al. (2020). In both government ($\beta = 0.772$, $p < .001$) and private ($\beta = 0.671$, $p < .001$) hospitals, this research study found that the work environment was a significant predictor of care quality.

According to White et al., improved work conditions in nursing homes were linked to considerably reduced levels of job dissatisfaction and burnout among nurses (both $p < .001$), as well as 1.8% fewer

pressure ulcers (p =.02) and 16% fewer hospitalizations per 100 residents yearly (p =.05). White et al. focused on the larger work environment rather than staffing specifics.

CONCLUSION

The study highlights the critical role and impact of two important variables work environment and nursing staffing levels on patient care quality in both private and government hospitals. Across both settings, an appropriate and favorable work environment emerged to be a strong predictor of high quality patient care. While the levels of nursing staffing had a positive impact on patient care quality too, it was not statistically significant, suggesting that a better organized and appropriate work environment play a more significant role in providing high quality care to the patients for better outcomes.

STRENGTHS

This research study emphasizes on the impact of variables like nursing staffing levels and work environment on patient care quality in two healthcare setting i.e. government and private hospitals. The study comprises of the following strengths.

- The study compares the impact of variables in two different healthcare settings i.e. government and private hospitals.
- The study focuses on two central factors that largely determine the patient care quality i.e. work environment settings and nursing staffing levels.
- The study uses statistical analysis methods like multiple regression test and compares it between two different healthcare settings to analyze the impact on patient care quality by levels of nursing staffing and work environment.
- The study provides standardized coefficients and significance levels describing the relationship and its direction among variables.
- This study might help students and researchers in further studies relating to the impact of work environment settings and levels of nursing staffing on patient care quality.

This study highlights the importance of good working conditions in hospitals along with better nursing staffing levels in underdeveloped countries such as Pakistan.

LIMITATIONS

- The study is only limited to two hospitals (one private and one government hospital) which may not represent the diversity of other hospitals in other regions.
- The data was collected at a single point in time (cross-sectional design) limiting the causality between nursing staffing, work environment and patient care quality.
- The study only focuses on two main variables that determine the effect on patient care quality while excluding other factors that may affect quality of care.
- While the study shows statistical analysis, it represents a positive but weak and insignificant relation between nursing staffing levels and patient care quality, which limits the strength of conclusions.
- Other uncontrolled factors may also affect patient care quality but are not accounted for in this study.

RECOMMENDATIONS

This section points towards further research in the related area to further replicate the results and add to the body of knowledge.

- Nurse's job responsibilities should be focused primarily on nursing responsibilities like patient assessment, medication administration, patient management and education, clinical procedures and interventions, thus providing a direct contact with the patient and promoting patient care quality.
- A positive work environment could prove helpful in creating a positive work culture and could increase the chances for further professional development of the nursing personnel.
- Activities such as administrative work, ward management and stock management in a healthcare facility should be delegated to other personnel who can manage such responsibilities much more effectively and therefore take off some work load off of nurses so for them to make most of their time in patient care.
- Improved staffing levels and better work environment could play a significant role in increasing patient care quality through timely assessment and interventions and bringing a multidisciplinary approach for the patient care.
- Adequate staffing and an appropriate work environment could serve for decreased chances of medication errors and decreased length of stay of the patient contributing to a reduced financial burden on the patient
- Adequate nursing staffing could lead to better patient care experiences thus improved patient retention.
- Better patient care quality can lead to enhanced reputation of the healthcare facility promoting the amount of hospital admissions which could prove financially beneficial for the healthcare organization.
- Future research should incorporate other influential variables that might affect patient care quality such as nurse's educational level and organizational policies among others.
- Using a longitudinal design may help in better causal relationship building among work environment, staffing levels and patient care quality.
- Future studies should be conducted with multiple hospitals across different regions for better generalizability.

Further studies should take into account the effects of departmental differences (ICU, Surgery, and Medicine) to identify unit specific needs and strategies.

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