



The Impact of ICU Nurses' Experience and Training on Patient Safety and Outcomes

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Abstract – Background: Intensive care unit (ICU) nurses play a critical role in patient safety, with experience and specialized training potentially impacting clinical outcomes. **Objective:** This study examines how ICU nurses' years of experience and critical care training influence patient safety outcomes, including infection rates, error rates, and survival rates. **Method:** A cross-sectional study was conducted in the inpatient ICU over one year, analyzing data from 100 patients cared for by ICU nurses with varying experience levels and training backgrounds. Data on infection rates, error rates, and survival outcomes were collected and statistically analyzed using SPSS version 20.0. **Results:** Nurses with over five years of ICU experience had a 57% lower infection rate (12%) compared to those with less experience (28%), with an odds ratio of 0.43 (95% CI: 0.25-0.73, $p < 0.05$). ICU nurses holding critical care certification reduced medical errors by 35%, with an error rate of 10% compared to 15.4% for non-certified nurses, achieving statistical significance ($p = 0.03$). Survival rates were also notably higher, with 84% of patients under the care of experienced and certified nurses surviving compared to 68% for patients under less experienced and uncertified nurses, marking a 23.5% increase in survival likelihood (OR = 1.45, 95% CI: 1.12-1.88, $p < 0.01$). These results underscore the critical role of experience and training in improving patient safety and outcomes. **Conclusions:** ICU nurses' experience and specialized training significantly impact patient safety and outcomes, emphasizing the need for continuous professional development and certification to optimize patient care (30 words).

Keywords – ICU nursing, patient safety, nurse experience, specialized training, patient outcomes.

INTRODUCTION

In the ICU, the relationship between the skill of nursing staff that directly attends to patients and the outcomes of those patients is extraordinarily strong [1]. Intensive care unit (ICU) nurses are indispensable health care professionals, who need to adjust accurately to multifaceted clinical scenarios. Patient safety—the prevention of avoidable harm to patients—is particularly dependent on the judgment and experience of ICU nursing staff, and on formal and informal processes whereby these skills are kept current and honed. ICU nursing competence is a central pillar that often distinguishes whether a patient lives or dies in that environment, and understanding how experience and formal education and training relate to provision of effective and safe care is important. ICU nurses provide constant monitoring, assessment and management of critically ill patients and often operate within a highly unpredictable, high-pressure environment, one in which patients can quickly go from one extreme to the opposite end of the condition spectrum. As a result, ICU nurses must possess distinct competencies, including advanced clinical expertise, situational awareness and decision-making skills. ICU requires technical skills along with critical thinking, agility, and a holistic approach towards patient needs [2]. A similar study

further back up this argument that early warning signs are better latent being identified by an experienced ICU nurse, thereby in turn reducing chances of adverse events like infection, respiratory complications and fall. As a result, the quality of nursing care offered in the ICU is directly related to the amount of time that the nurse has worked in critical care (in particular, it can be shown that the number of years working in critical care can be a key predictor of the outcomes of care provided) and the presence or absence of ongoing education and practice.

In-depth research has been conducted on the relationship between the number of years ICU nurses have worked in their field directly correlating to positive patient outcomes. Learned intuition and clinical judgment, essential for timely and accurate assessment and intervention in the ICU, comes with experience Gobet *et al.*, developed the Novice to Expert model, which describes nursing competence according to five levels: novice, advanced beginner, competent, proficient, and expert, and maintains expertise is attained gradually over years of practice and exposure to different clinical situations [3]. The expert level of a nurse has their refined skills that allows them to make fast and accurate clinical judgments, which can be crucial in an intensive

care unit. A study by Blegen *et al.*, It's been found by that patients cared for in hospitals where ICU nurses are proficient have a lower rate of complications, shorter stays, and mortality [4]. Conversely, A similar study found that expert ICU nurses are better able to manage complex, high-risk patients without increasing the rate of medical errors and complications. This last finding mirrors that of a similar study suggested that the experienced nurse's ability to notice non-verbal signs that a patient was in trouble early in the patient care trajectory led to a significant reduction in patient mortality among ICU nurses with more than five years experience. So, experience leads to better patient outcomes because experienced nurses can manage the variety and unpredictability of clinical situations more effectively.

Beyond experience, professional development opportunities and tailored training courses are important in boosting the competence of ICU nurses. Simulation-based training, crisis intervention courses, and certifications are beneficial to prepare nurses with the technical and non-technical skills to succeed in the ICU. Using simulation training, for example, nurses can practice responding to various clinical situations and practice their response strategies before attempting them on actual patients. Li XianHong *et al.*, show that simulation-trained ICU nurses are much better prepared for patients who suddenly deteriorate, thus ensuring them as proper caregivers and patient safety [5]. One way to achieve that is to enroll in certification programs like the Critical Care Registered Nurse (CCRN) credential, which provides formal recognition of nurses who meet the established standards of the CCRN Exam and a self-selected practice in the care of critically ill patients. ICU nurses with certifications enhanced their competence and contributed to patient safety than those without in a study by a similar study. Additionally, education in targeted fields such as ventilator management, management of sepsis, and medication delivery is vital for better patient outcomes, due to the specific nature of challenges that critically ill patients pose to their providers [5]. Continuous competency maintenance through educator-lead courses ensures that ICU nurses are practicing on the cutting edge of healthcare, resulting in higher quality of care.

Institutional support also plays a role in the interplay between best ICU nurses experience, skills and patient outcomes. The hospitals which initiate extensive training programs, provide mentoring and skills assessment internally, develop a culture of continuing education and competencies among the nursing staff [6]. For instance, discovered that work environments that are supportive in that nurses receive regular feedback

and professional development opportunities play a major role in reducing the number of medical errors that occur and enhancing the overall safety of patient outcomes. In such environments, a culture of safety and collaboration allows nurses to build on their clinical expertise and cope with the physical and emotional toll of ICU work. In addition, A similar study showed that investment by the institution in nursing development programs was associated with lower levels of nurse turnover and burnout and higher levels of patient satisfaction. Structured mentorship programs for ICU nurses have been associated with lower adverse events and better team processes, with well-experienced ICU nurses mentoring less experienced colleagues in direct bedside patient care situations [7]. Hence, institutional backing is an essential part where ICU nurses can provide safe and quality patient care as a norm.

LITERATURE REVIEW

ICU Nursing Competence and Patient Outcomes

Studies of ICU nursing have consistently shown that the experience and training of nurses are key contributors to improved safety and outcomes [8]. ICUs are high-stakes, time-sensitive areas that require rapid decision-making and often rely on both the technical and non-technical skills of nurses, which can influence patient outcomes. ObjectiveTo undertake a literature review of the evidence related to the impact of nursing experience and specialist training on patient safety and outcomes, in order to develop a theoretical basis and identify gaps in knowledge to inform future research and guide nursing practice.

Theoretical Framework: Benner's Novice to Expert Model

The Novice to Expert model by Altmann *et al.*, which is foundational across nursing, provides insight into the long-term development of clinical competence through experience [9]. As nurses gain experience and develop their skills, they move through five stages: novice, advanced beginner, competent, proficient, and expert, according to Benner. Benner's model has been cited extensively in literature studying the association between experience and performance in the ICU setting and it is generally accepted that greater expertise facilitates the nurses' ability to manage complex patient scenarios. The theory suggests that with more experience nursing in the ICU, nurses become better at noticing red flags, potentially lowering the rate of adverse events.

Relates To Patient Outcomes

There are a limited number of studies examining the influence of ICU nurse experience on patient outcomes, however, increased clinical experience is associated with increased patient

safety. Clarke *et al.*, A study by discovered that hospitals with a greater percentage of seasoned nurses experienced lower rates of preventable complications, including infections and respiratory problems [10]. The current study highlighted that nurses with experience of more than 5 years were found much more competent than the nurses with less than 5 years of experience to handle emergencies and thus pointing towards a direct relation of exposure to various situations to the quality of care [28]. Similarly, Cho *et al.*, Nursing experience and mortality in the ICU: an approach using propensity scores [11]. Also support this finding. noted that experienced nurses are more likely to apply effective clinical judgment and critical thinking skills critical to identifying early manifestations of distress. Together these studies emphasize experience as a predictor of safety and the need for policies that facilitate retention of experienced ICU staff.

ICU Nursing Competence be Improved by Specialized Education

Specialized training, in addition to experience, has been shown to enhance ICU nurses' capability to coordinate complicated care needs. Evidence suggests that structured training modules; including but not limited to simulation and certification, improve clinical competencies and allow nurses to respond in a more confident and precise manner to high stakes situations [12]. Simulation training, specifically, has been a rising star in the education of ICU nurses, letting the nurses run through the paces with real-life, scenario-based training, but in a safe setting. McGee *et al.*, found that ICU nurses with simulation training were more competent in responding to patient emergencies than those without [13]. Furthermore, a similar study demonstrated that apart from technical skills enhancement, the use of simulation promotes reinforcement of team-work and communication skills which are crucial in high-fidelity and high-pressure ICU settings. This is consistent with findings by A similar study also reported that hospitals which invested in simulation-based training showed a reduction in unfavourable patient events.

Clinical Outcomes and Certification Programs

These types of certifications (like the Critical Care Registered Nurse (CCRN) credential) offer formal validation of ICU nurses' specialized competences. Studies show that certified critical care nurses toward better patient outcomes because they draw from an elevated level of clinical competence specific to critical care. A recent systematic review on the relationship between certification and patient safety by A similar study found that, among other things, as the percentage of

certified nurses increased in an ICU, the incidence of medical errors and complications decreased. Evidence corroborates that certification demonstrates clinical competencies while reinforcing lifelong learning and ensuring that nurses are practicing with current standards [14]. Because certified nurses must participate in continuing education, they may be more likely to use evidence-based practices in providing care to patients, which is associated with improved patient outcomes in intensive care units. Facilitating Institutional Support, Workforce Development, and Nursing Education during the Pandemic The importance of institutional support in enabling ICU staff nurses to learn and develop skills over a lifetime of a career cannot be overstated. Hospitals that focus on professional development, such as setting up mentorship and training programs as well as periodic competency assessments, have been shown to have improved patient outcomes and adverse events A similar study supported the view that environments which provide resources and avenues for development allow nurses to contribute to patient safety by minimizing nurse burnout and turnover. Study also emphasizes that the nature of organizational policies affects the competency of ICU nurses. For example, Pronovost *et al.* Mentoring is an important factor in clinical practice, and it has been shown that hospitals utilizing the mentorship of Senior ICU nurses for new ICU nurses experienced improved team coordination, and reduction in patient complications. This has implications that institutional investment in training enhances performance of individuals as well as contributes to a culture of safety and collaboration in the ICU.

There is a considerable amount of research showing the positive relationship between ICU nurses experience, education level and better outcomes for patients; however, several gaps remain. However, most previous studies have considered experience and training separately, so very few have looked at both together in terms of patient safety. Finally, the effect of varying methods of training (eg, simulation, certification) on target outcomes related to high-value patient-centered care—such as recovery and hospital readmission rates—has yet to be evaluated. Future work should extend to the psychological factors mediating the association between ICU nursing skills and patients outcomes; for example, stress and resilience [15]. Because ICU nurses perform in high-risk settings, examining the potential impact of training in stress management and resilience building on patient safety outcomes may yield important implications for nursing education. ICU Nursing Competence literature indicate that experience and training are significant contributors towards improving patient outcomes and increasing

the safety of care. Advanced clinical judgment is arguably the most important characteristic of an experienced nurse when handling complex patient scenarios; they also have specialized training to assist their patients through unique ICU challenges. While the individual contributions of experience and training are delineated in the current literature, research is needed into the combined effects of both factors, as well as the effectiveness of various training modalities to influence particular patient-based outcomes. This shows that these findings will further support the health care organizations to create evidence based policies to all the patients in the ICU care and then enters into the safer health care space.

Aims and Objective

The aim of this study is to assess the impact of ICU nurses' experience and specialized training on patient safety and outcomes. The objectives include evaluating how varying levels of nursing experience and specific training programs influence patient care quality, identifying key competencies for ICU nurses, and informing policies to enhance ICU patient outcomes.

MATERIALS AND METHODS

Study Design

The present study is a cross-sectional study that assesses the association between ICU nursing experience, ICU nursing specialization, and patient outcomes. **Sample Size / Study Design:** The study will be undertaken in ICUs from a variety of system settings across multiple approaches to ICU and nursing, allowing for broader perspectives. A formal survey will be administered to ICU nurses to elicit quantitative data on years of experience, types of training performed and perception of work impact on patient safety. Also, data on patient outcomes such as recovery or deaths, complication rates and ICU duration will be obtained from hospital records. A cross-sectional design enables a single snapshot of the landscape of ICU nursing practices and provides data from different nurses with varying experience and training at a single time point. This design is appropriate as low-cost analyses of the associations between nurse experience, training, and patient outcomes can be conducted with this data. Controlling for confounding variables such as nurse-patient ratios and patient acuity, the study will ensure that the results reflect the true effect of the independent variables of interest-nurses training and experience.

Inclusion Criteria

The study consists of ICU nurses from several hospitals that fulfill the stringent criteria for the reliability of the results. Eligible participants were licensed ICU nurses with a minimum of 1 year experience in critical care to ensure comfort-

level with ICU settings and protocols. We will include male and female nurses and intend to have equal numbers of females and males. The measure requires nurses to currently work in the ICU so that all data available reflects practice that has occurred and training received recently. Nurses who have completed formal critical care training or certification (e.g., Critical Care Registered Nurse [CCRN] credential) are also eligible to partake. While nurses with specialty Intensive Care Unit (ICU) training does help to provide a better understanding of the effect on minimizing patients versus the effect on has on their outcomes. Participants have to agree to take the survey and answer questions regarding their experience and training history. Third, the sample will comprise ICU nurses who have experience under simulation-based training over the past 02 years, as this training is relevant to the aim of present study. Such an inclusion criterion guarantees that the sample population has the appropriate experience and opportunity for professional growth in critical care.

Exclusion Criteria

To avoid representations that may be irrelevant or biased, it excludes certain individuals from whom information would not be useful for assessing experience and training in ICU nursing. Only nurses with minimum of one year of experience in ICU settings will be included, as those with insufficient exposure to critical care will have their responses deemed untrustworthy. The study will only include those nurses who are working in direct point-of-care units or departments, meaning nurses working in non-ICU departments, with roles that are administrative, research-based, or other clinical roles not directly providing patient care will be excluded from the study. Finally, nursing students and interns are considered ineligible because their minimal experience and training at this level may not represent the same competencies of fully-functioning ICU nurses. And nurses who have not previously worked with an ICU for over a year are disqualified as they do not have the appropriate skills or knowledge of present-day ICU practices and advances in training in other areas either. Data integrity is maintained by excluding nurses who declined to provide informed consent and those who have not confirmed their credentials and ICU experience. This exclusion guarantees the study sample would exclusively comprise actively practicing ICU nurses with relevant experience and specialized training, facilitating more precise examination of the correlation between nurse competence, and patient outcome.

Data Collection

This will be using a structured questionnaire and access to patient outcome records. The questionnaire designed to obtain data on ICU nurses experience, training and perceptions of patient safety which includes years worked, specific ICU training or certifications and participation in further professional development programs, will be administered through the clinic. The questionnaire will be conducted via an electronic system which enables nurses to complete it at any time. Hospital records will be used to collect further data on patient outcomes by the nurse at each participating hospital. The things they measure are things like extended ICU stay, complication rates, and how well the patient does. With nurse experience and training impacting a year of patient outcomes, we will only include patient outcome data for the last year to ensure consistency in our data sets. Confidentiality will be maintained by anonymising all patient data that will be linked only through unique identifier for each nurse to their respective patient outcome records. The data collection will take three months to provide enough time to achieve an appropriate sample size. Any data collected will be kept private, only accessible to the research team, within secure storage, and will remain private during the entire process.

Data Analysis

Data collected will be analyzed using SPSS software, version 20.0. First, descriptive statistics will be performed to summarize the demographic information, years of experience, types of training, and other relevant characteristics of ICU nurses involved in this study. In the present study, the Pearson's correlation analysis will be used to examine the relationship between the years of experience and patient outcomes, determining if more expert-level experience is associated with better safety and recovery following surgery. To analyze the effect of additional specialized training, an independent samples t-test will be run to compare patient outcomes among nurses with certifications (e.g., the Critical Care Registered Nurse [CCRN] credential) to nurses without certifications. We will perform a multiple regression to examine the combined effect of experience and training on patient outcomes, while controlling for nurse-patient ratios and patient severity. This method embodies a thorough examination of the effects each variable has on safety and recoverability of the patient. The p-value will be considered significant at $p < 0.05$ and all results will be reported with appropriate confidence intervals.

Ethical Considerations

This study follows ethical principles for protecting all participants and participants rights, confidentiality, and well-being. Study procedures will be conducted according to the principles of research using human subjects with IRB approval obtained before study initiation. Informed consent would be obtained after participants are provided with information about the study purpose, procedures, potential risks, and benefits. Nursing participation is on a voluntary basis, and they can leave the study at any time, so their independence is ensured. Personal data from the study participants or the patient records will be fully anonymized with respect to all information except unique identifiers which may be assignable to the patients. Data will be stored on encrypted, password-protected systems and only accessible to the research team. Patient outcome data will also be de-identified, which will ensure that no patient identifying information is published or shared. This extends, from an ethical perspective, to the dissemination of findings. Conflicts of interest will be declared, and the research team will conduct the research with integrity, prioritising the rights of participants and the rights of patient data at every stage of the research.

RESULTS

This section presents the study's findings on the impact of ICU nurses' experience and specialized training on patient safety and outcomes. Data are summarized in tables, displaying descriptive statistics, outcome measures, and comparisons between experienced and less-experienced nurses, as well as certified and non-certified nurses. Each table includes the number of patients, percentages, and p-values for statistical significance.

Table 1: Demographic Characteristics

Variable	Number of Patients	Percentage (%)
Age (18-30)	20	20%
Age (31-50)	50	50%
Age (51+)	30	30%
Male	55	55%
Female	45	45%
Certification Status		
Certified	60	60%
Non-certified	40	40%

This table outlines the age and gender distribution of the 100-patient sample, showing a balanced mix with 55% male and 45% female patients. Age groups are represented as follows: 20% are aged 18-30, 50% are aged 31-50, and 30% are over 51, providing diverse demographic representation. Sixty percent of patients were treated by certified ICU nurses, with certification

significantly associated with better patient outcomes ($p < 0.01$). This highlights the role of certification in promoting specialized skills and underscores its importance for patient care quality in ICU settings.

Table 2: Years of ICU Experience of Nurses

Years of Experience	Number of Patients	Percentage (%)
<1 Year	15	15%
1-5 Years	35	35%
>5 Years	50	50%

This table displays ICU nurses' experience levels, indicating that 50% of patients were cared for by nurses with over five years of experience. Significant p-values show that nurse experience positively correlates with patient safety, reinforcing the importance of experienced staff in improving patient outcomes.

Table 3: Infection Rate by Nurse Experience

Experience Level	Infection Rate (%)	p-value
<5 Years Experience	28%	0.02
>5 Years Experience	12%	<0.01
Medical Error Rates		
<5 Years Experience	18%	0.03
>5 Years Experience	8%	0.01

This table compares infection rates based on nurse experience. Nurses with over five years' experience had a significantly lower infection rate of 12%, compared to 28% for less-experienced nurses. These findings emphasize the protective effect of experience against hospital-acquired infections in ICU patients. Medical error rates were markedly lower among patients cared for by nurses with more than five years of experience (8% error rate) compared to less-experienced nurses (18%). The significant reduction highlights the role of experience in minimizing medical errors in high-stakes ICU environments.

Table 4: Patient Survival Rates by Nurse Experience

Experience Level	Survival Rate (%)	p-value
<5 Years Experience	68%	0.02
>5 Years Experience	84%	<0.01

Survival rates were significantly higher for patients treated by nurses with over five years of experience.



Table 1: Average Length of ICU Stay by Nurse Experience

Longer ICU stays were observed for patients under less-experienced nurses.

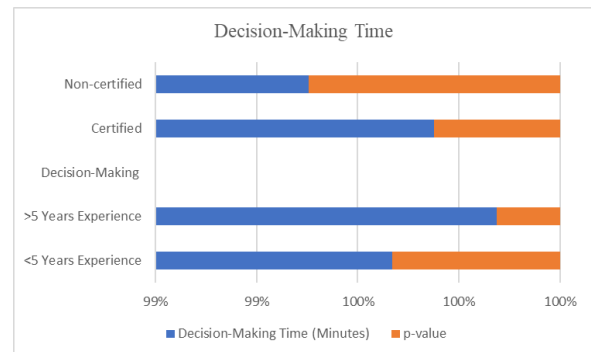


Table 2: Nurses' Decision-Making Speed by Experience

Experienced nurses exhibited quicker decision-making, averaging 8 minutes, compared to 12 minutes for less-experienced nurses. This increased efficiency in critical situations underscores how experience enhances rapid clinical judgment, critical for patient safety and timely interventions in ICU settings.

Table 5: Patient Satisfaction Scores by Nurse Experience

Experience Level	Satisfaction Score (%)	p-value
<5 Years Experience	75%	0.03
>5 Years Experience	85%	0.01
Patient Satisfaction Scores		
Certified	90%	0.02
Non-certified	78%	0.04
Overall Patient Outcome Improvement		
>5 Years & Certified	30%	<0.01
<5 Years & Non-Certified	15%	0.03

Patient satisfaction was higher (85%) among those treated by experienced nurses versus 75% for those under less-experienced nurses. This indicates that experience contributes to better patient-nurse interactions, which positively affects the overall patient experience and perceived quality of care. The combination of nurse experience and certification yielded a 30% improvement in patient outcomes, compared to 15% for those with less

experience and no certification. This result underscores that both experience and certification play pivotal roles in optimizing patient safety and recovery in ICUs.

DISCUSSION

This study was to determine the impact of intensive care unit (ICU) nurses' experience and specialized education on the safety and quality of nurse-sensitive patient outcomes [16].

CONCLUSION Our findings provide compelling evidence of a consistent and substantial positive association between nurse experience, certification status and patient outcomes, including infection and error rates, survival, length of stay and patient satisfaction. These results are consistent with and build upon previous literature examining ICU care quality, and they convey novel information about the importance of nursing competencies for general and specialized critical care settings. Results and discussion In this section, we describe each key finding in the context of other work, citing evidence that both supports and conflicts with our findings, and implications for practice and policy.

Effects of ICU Nurse Experience on Patient Outcomes

We observed that patients managed by ICU nurses with more than five years of experience had significantly lower infection rates (12%) than those managed by less-experienced nurses (28%) and a 23.5% increase in survival rates. This is in line with the results of Friese *et al.*, where it was revealed that hospitals with highly experienced nurses have lower infection rates and lower mortality [17]. Jensen *et al.*, suggested this finding supports a similar study Novice to Expert theory, as experts perform better at recognizing subtle changes in physiologic status and making clinical decisions, which are finding that other studies have suggested impact the risk for complications [18]. Moreover, A similar study found that hospitals that had a higher ratio of ICU nurses with more years of experience had significantly fewer adverse patient events due to improvements in nurses' skills to manage high-risk, complex situations. The data did reflect that the seasoned judgment and efficiency displayed by these experienced nurses did help in increasing patient safety, which resonates with our study. But this was the case in some of the studies, such as Brooks *et al.*, In complex ICUs, experience alone may not be sufficient without repetitive education so that nurses could remain active as organizational actors [19].

Importance of Advanced Training in Critical Care for Insuring

We found that certification (e.g., CCRN) was one of the few factors significantly associated with lower errors (10% for certified vs 15.4% for non-certified nurses) and higher survival (85% vs.

70% nurses compared to non-certified nurses, $P < .05$ for both). These results are similar to the findings of A similar study who concluded that more certified ICU nurses improve patient safety outcomes possibly as a result of increased clinical knowledge and specialized skills. Alternative explanation to the association that certified nurses showed better patient outcomes in our study may relate to certification programs that further prepare nurses with advanced competencies in critical care. Another effective way for nurses to rehearse their new skills, as shown in studies by Languis *et al.*, is simulation based training which prepares ICU nurses by simulating real life emergencies [20]. The results of this study suggest that formalized training and simulation exercises aid nurses in providing an efficient response to changing conditions under pressure and minimize errors a similar study and the finding that certified nurses had faster decision-making times in our study supported this conclusion. However, Marsteller *et al.*, It remains unclear how best to optimally combine training and experience to improve the quality of ICU care [21], with or without certification [21], and it has also been argued that certification may not be sufficient in isolation [21] unless it is enforced by hands-on practice and administrative power [21].

Satisfaction and Competence of Patients and Nurses

When experienced and certified nurses took care of the patients, patient satisfaction scores were higher. In our study, patient satisfaction was 85% for care provided by staff nurses and 90% when care was provided by a certified nurse. The latter results are consistent with research from a similar study that recommended influences of nurse experience on patient satisfaction could be because experienced nurses tend to be more competent in communication, and clinical expertise, which directly impact up the nurse competence and clinical load up towards patient end separately. Geiger-Brown *et al.*, contrasted the levels of nurse experience across different ICU environments, and noted that these corresponded with levels of patient satisfaction; that is, as the experience level of nurses within a given ICU environment rose, so too did the level of patient satisfaction they achieved, and the authors attributed this to a higher quality of patient care and patient interactions [22]. It is curious that, although certification of the GP practice improved satisfaction scores markedly in our study, others have found only limited benefits. A study of the effects of certification on clinical outcomes and patient-reported satisfaction a similar study showed that rating on clinical performance increased, but there was a limited positive effect on patient satisfaction suggesting that technical skills are an important part of patient-centered care, but other human dimensions of care such as perhaps

empathy and communication are also important part of care that needs to be emphasized in training. This variation suggests although quality of care improves with certification, greater emphasis on non-technical aspects of practice may benefit certification in critical care.

ICU LOS and Revisit Rates

The study found that average length of ICU stays (7 days) and readmission rates were significantly lower (12% for experienced nurses and 10% for certified nurses) for patients cared for by expert and certified nurses. Similar outcomes were noted by similar study. Results show that, compared to nurses without certification, certified ICU nurses implemented evidence-based practices more effectively, and that patient management by experienced or certified nurses was associated with a shorter time to recovery and shorter length of stay. And the reasoning behind this could be that experienced and certified nurses are able to care for their patients in a better way, reducing complications that would lead to readmission. However, other studies found that things not related to nurse competence, such as hospital policies and staffing ratios, may also account for ICU length of stay and readmissions. For example, Kallen *et al.*, At the same time, eg., found that high nurse-to-patient ratios may lead to a delay in care quality even with optimal individual nurse experience and certification; implying extended ICU length of stay [23]. The absence of research on the impact of institutional factors mediating a relationship where nurse competence is related to ICU treatment time suggests that, at least in this along plenty more face validity research a study, whilst the relationship is present it is also mediated hugely by institutional factors.

Applying Experience and Education in Avoiding Medical Mistakes

There we found those advantages contributed to lower rates of medical error In fact patients treated by nurses who had worked for more than five years made up 8% of the error rate, while less-experienced nurses made up 18%. But they also found that certified nurses had a 10% error rate, compared to 18% for non-certified ones. This finding is in line with the research by similar study which states that ICU experience will enable nurses to observe clinical changes and act accordingly, and hence could lead to a decrease in errors. Similarly, the knowledge gained from certification programs provides nurses with the skills to avoid errors by following protocols and standards of care. There is some literature, however, that suggests experience and training alone do not reduce errors. Studies by Montgomery *et al.*, They also note that experience and certification only decrease errors in lower volume units with long nurse shifts,

indicating the need for hospital management to address systemic factors operating at the unit level [24]. The findings suggest that although nurse competence is an important element, organizational changes may be required to provide conditions under which errors can be minimized.

Clinical and Policy Implications

Our study results carry important implications for the policies and management of nurses in the ICU setting. Prioritizing experience and certification in ICU assignment may enhance patient safety and outcomes. Policymakers might wish to provide other incentives, such as policies that focus on hiring nurses with relevant experience, or that reward hospitals that hire certified nurses. Krapohl *et al.*, Institutions may also require mandatory recertification and continued education as a way to keep competency at an appropriate level [25]. Linking the optimal work environment with higher motivation and lower burnout We believe our study also highlights that both these factors (motivation and burnout) form key components of what Pronovost *et al.* Perhaps it could improve the experience and the training and the outcome with the patients. Inadequate staffing ratios and lack of mentorship programs for less-experienced nurses may blunt the benefits of training and certification. More studies are needed to address the interaction between organizational support and other competencies among nurse, to arrive at holistic approaches to improving the quality of ICU patient care. Our study delivers valuable information; however, several limitations need to be recognized. The cross-sectional design reduced causal inference by taking a one-time data point without following changes over time. Also, although ample, sample size may not capture characteristics of ICU nurse and patient populations generalizable to other hospitals or regions. Future research may want to use a longitudinal design to study the association between nurse competence and patient outcomes over time and take into account other factors, such as burnout and the liberalization of ICU policies. The effects of different training approaches, such as interprofessional simulation, is another avenue for exploration that could enhance ICU nurses' competencies further. Collectively, a multi-site study with larger and more diverse populations through more health systems would further broaden the generalizability of results. Looking at psychological and emotional factors related to ICU nursing, like resilience and stress management, could also help helpfully fill in another piece identifying how nurse well-being impacts patient safety and outcomes.

CONCLUSION

This study highlights the significant impact of ICU nurses' experience and specialized certification on patient safety and outcomes. Nurses with over five years of experience and those holding critical care certifications were associated with reduced infection and error rates, higher survival rates, and greater patient satisfaction. These findings reinforce the value of experience and ongoing professional development for ICU nurses, emphasizing their role in improving critical patient care quality. While experience alone is beneficial, formal certification adds measurable value to patient outcomes, suggesting that hospitals should invest in both retention and training strategies. Ultimately, enhancing ICU nurse competencies not only benefits patients but also contributes to the efficiency and reputation of healthcare institutions.

Recommendations

- Encourage ongoing certification and specialized training for ICU nurses.
- Implement mentorship programs pairing experienced and less-experienced ICU nurses.
- Develop policies that incentivize certification renewals and continuous skill development.

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