ORIGINAL RESEARCH

A retrospective chart review to explore the impact of evening shift change admissions on safety events and handoffs

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Received: February 26, 2026 **Accepted:** May 28, 2026 **Online Published:** June 25, 2026
DOI: 10.63564/jnep.v16n7p31 **URL:** https://doi.org/10.63564/jnep.v16n7p31

ABSTRACT

Objective: This study's purpose was to provide valuable insights into patient outcomes at shift change to guide the development of future guidelines and protocols that enhance patient care during nursing shift changes at a 4-hospital healthcare system.
Methods: A retrospective case-control design assessed whether the timing of admissions during evening shift changes influenced patient care, including safety events and handoffs. The sample comprised of 150 patient records (75 cases transferred during the PM shift change and 75 controls transferred at other times, avoiding the shift change), matched on month, hospital unit, admitting diagnosis, age, and gender, between October 2023 and September 2024. Data collection, electronic reports, and individual patient chart review were de-identified for statistical comparison, and chi-square tests determined whether there was a significant difference between safety events and handoffs.
Results: The study found that admissions during evening shift changes were associated with a significant increase in Rapid Response Team (RRT) calls ($p = .043$) and post-transfer handoffs ($p = .003$), suggesting higher risk and communication challenges during these periods. These findings highlight the need for improved protocols, such as minimizing shift change admissions and enhancing handoff communication. Hospital throughput teams should consider these results, along with others, when developing plans to encourage discharges and admissions earlier in the day to avoid admissions during shift change.
Conclusions: Ongoing research on improved throughput to avoid shift-change admissions is paramount. Larger, prospective studies are recommended to validate and expand these results.

Key Words: Handoff, Safety events, Shift change admissions

1. INTRODUCTION

Temporarily pausing admissions and transfers during busy evening shift changes to reduce interruptions to bedside handoff has been considered in healthcare settings, and some organizations have implemented this approach. There is ongoing discussion about its impact on patient safety and outcomes, as well as whether admissions and transfers during shift change can be safely managed with appropriate training and coordination to help prevent delays in patient movement. However, admissions during shift transitions may increase the risk of communication breakdowns and errors due to the complexity and competing priorities present during this time.

Evidence suggests that concerns about continuity of care during nurse-to-nurse handoffs are associated with patient safety

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outcomes.[1] Studies have shown that ineffective handovers during shift changes can contribute to a higher rate of adverse events, such as medication errors, patient falls, and delays in care.[2–4] The low frequency of admissions during shift change brings into question whether delaying an admission really reduces interruptions to the shift change report or if a better-defined handoff process provides a better solution.[5,6] Bedside handoff challenges may be exacerbated by concurrent admissions, which force nurses to split their attention between a good shift-to-shift handoff and the administrative tasks associated with new admissions. Patient safety is also closely linked to continuity of care, particularly through thorough handoffs. Evidence suggests that ensuring a smooth handoff process, whether in person or via phone, can improve patient outcomes and reduce the likelihood of errors.[7] However, this is often difficult to achieve during a shift change, when time is constrained, and additional admissions place more pressure on the nursing team.

The impact of these shift-change admissions has not been sufficiently studied in the broader healthcare literature. There are studies examining the effects of delayed admissions in intensive care units (ICUs),[8,9] but few examine how shift-change admissions specifically impact patient safety across hospital units outside ICUs. This gap in the literature has made it challenging to draw evidence-based conclusions about the true risks and benefits of shift-change admissions.

2. METHODS

2.1 Study design

This study used a retrospective, case-control quantitative design to evaluate patient safety outcomes associated with transfers during nursing shift changes. The study sought to answer two research questions: (1) whether patients transferring during shift change experienced differences in safety events, measured by rapid response calls, within one hour of transfer, and (2) whether transfers during shift change were associated with differences in the number of handoffs occurring within one hour before or after the transfer. The study received exempt approval from the organization's institutional review board.

2.2 Measures

Patient safety outcomes were measured by the number of rapid response team (RRT) activations within 1 hour of patient transfer, which served as a proxy indicator of clinical deterioration and potential safety events. Transfer timing was categorized as occurring during nursing shift change or outside of shift change hours based on documented transfer timestamps in the electronic health record.

Continuity of care was measured by the number of nursing handoffs occurring within 1 hour before and after the patient transfer. Handoffs were identified through staffing assignments and transfer documentation within the electronic health record. Demographic and clinical variables, including patient age, gender, admitting source, hospital location, and primary reason for admission, were also collected to describe the sample and evaluate group comparability.

2.3 Sample and setting

A convenience sample of 150 patient records was reviewed. The sample included 75 patients in the case group who transferred during the evening shift change between 7:00 PM and 7:30 PM and 75 patients in the control group who transferred at other times during the day shift. The study was conducted within a 4-hospital community-based health care system in the southeastern United States and included patients meeting eligibility criteria during the study period. Hospital A is an 85-bed facility, Hospital B is a 50-bed facility, Hospital C is a 332-bed facility, and Hospital D is a 190-bed facility.

Patients were included if they experienced an intra-facility transfer during the designated timeframe. Case patients were defined as those transferring during shift change, while control patients were matched to cases based on predefined criteria, avoiding the shift change time. Patients were excluded if they were younger than 18 years of age, admitted to intensive care units or Women's Infants and Children (WIC) units, or transferred between separate facilities where transfer timing could not be controlled.

Sample matching

Patient records were retrospectively retrieved and matched by month of transfer between October 2023 and September 2024. Matching criteria required the same hospital, unit, and month of transfer. Cases were identified as transfers occurring between 1900 and 1930, and not during 0700 and 0730, due to the low volume of occurrences during the morning shift change. Control patients were matched to case patients using a hierarchical matching process. Diagnosis was matched as closely as possible, with similar diagnoses defined as those likely to require comparable treatment orders and clinical management. Age was matched within 10 years to promote similarity in care needs. Documented gender matching was attempted but not required when suitable matches were unavailable. Cases that could not be appropriately matched were excluded from analysis.

2.4 Data collection procedures

Patient data were extracted from the electronic medical record (EMR) based on the inclusion criteria. Extracted data included demographic characteristics, rapid response team calls (safety event), and handoffs that occurred within

an hour before and after transfer. All collected data were coded to protect patient confidentiality. Access to both electronic and any printed data was restricted to authorized study personnel.

2.5 Data analysis

Patient data were exported to Microsoft Excel and uploaded to SPSS for analysis. Descriptive statistics were used to analyze patient demographics and the frequencies of safety events and handoffs. Chi-square analysis was utilized to determine the statistical significance of safety events and handoffs between case and control groups. Alpha was set to 0.05.

3. Results

Table 1 displays the demographic and clinical characteristics of the case and control groups. Both groups included 75 patients. The average age of patients in the case group was 75 years, comparable to the control group's average of 74 years. Gender distribution was also similar between groups, with females representing 52% (n = 39) of the case group and 57% (n = 43) of the control group, while males accounted for 48% (n = 36) and 43% (n = 32), respectively.

Table 1. Sample demographics

Groups	Case	Control		Case	Control
	n = 75	n = 75		n = 75	n = 75
Age Average	75	74	Admit Reason		
Documented Gender			Altered Mental Status	4	4
Female	39	43	Cardiac	16	16
Male	36	32	Circulatory	3	3
Admitting From			Digestive	8	8
Emergency Department	65	68	Endocrine	1	1
Procedural	10	7	Fall/Syncope	4	4
Hospital		0.487	Neurological	1	1
Hospital A	15	15	Pulmonary	20	20
Hospital B	10	10	Renal	4	4
Hospital C	27	27	Skeletal/Peripheral	7	7
			Urinary	3	3
Hospital D	23	23	Weakness/Failure to thrive	4	4

Most patients in both groups were admitted from the Emergency Department, representing 87% (n = 65) of the case group and 91% (n = 68) of the control group. Admissions from procedural areas accounted for 13% (n = 10) of the case group and 9% (n = 7) of the control group.

Patients were distributed across four hospital locations, with equal representation in the case and control groups at each facility due to matching. Hospital C contributed the largest proportion of patients (36%, n = 27), followed by Hospital D (31%, n = 23), Hospital A (20%, n = 15), and Hospital B (13%, n = 10).

Admitting diagnoses were identical between the case and control groups due to the matching process. The most common admitting reason was pulmonary conditions (27%, n = 20), followed by cardiac conditions (21%, n = 16). Digestive conditions accounted for 11% (n = 8) of admissions, while skeletal/peripheral conditions represented 9% (n = 7). Altered mental status and fall/syncope each accounted for 5% (n = 4); circulatory and renal conditions each accounted for 5% (n = 4) and 4% (n = 3), respectively; and endocrine and neurological conditions each accounted for 1% (n = 1).

Overall, demographic and clinical characteristics were well matched between the case and control groups, supporting comparability for subsequent analyses.

Two questions for specific variables were answered. Question 1: Is there a difference in safety events within an hour of transfer? Table 2 shows that the case group that transferred during shift change had more rapid response team (RRT) calls than the control group, and the result was statistically significant (p = .043). Question 2: Is there a difference in handoffs an hour before or after transfer? Table 3 shows that there is no statistically significant difference in handoffs prior to transfer (p = .311), but there is a statistically significant difference in handoffs after transfer between the case and control groups (p = .003).

Table 2. Safety events

Groups	Case	Control
	n = 75	n = 75
RRT Call	4*	0
No RRT Call	71	75

*Chi Square $\chi^2(1, N = 150) = 4.110$, $p = .043$, Significant $p < .05$

4. Discussion

The results of this study suggest that shift-change admissions can affect patient outcomes and that the increased number of safety events and handoffs warrants greater focus. It found that patients transferred during shift changes had significantly more RRT calls than those transferred at other times, indicating that shift change admissions are associated with a higher risk of safety events. The reasons for the four RRT calls included symptomatic hyperglycemia, hypotension, tachypnea, and an electronic medical record sepsis alert. While the RRT activations were clinically appropriate, the timing of the transfer during shift change may have delayed the identification and treatment of these conditions on the receiving unit. This observation is consistent with previous research describing shift change as a period of increased vulnerability to communication challenges and delays in patient assessment,[3] underscoring the need for protocols to minimize admissions during shift changes to reduce the risk of safety events.[10]

Table 3. Handoffs

Groups	Case	Control		Case	Control
	n = 75	n = 75		n = 75	n = 75
Handoffs within an hour prior			Handoffs within hour after		
No	72	74	No	60	72
Yes	3*	1	Yes	15**	3

*Chi Square $\chi^2(1, n = 150) = 1.027$, $p = .311$, Not Significant; **Chi Square $\chi^2(1, n = 150) = 9.091$, $p = .003$, Significant $p < .05$.

In this study, most admissions were from the emergency department, which does not have a typical bedside reporting shift change like the inpatient unit. Their goal is to move the patient to the next level of care as soon as possible to free up room for incoming emergencies, regardless of timing. This can create friction between departments, prioritizing which patient safety concerns and needs should come first. Although transfers and admissions are part of a typical unit's day and may occur infrequently during shift change, this study suggests that, when possible, avoiding admissions during shift change may be better for the patient, given the emergency department's complex needs.

During the bedside shift report, nurses are present and attentive to one patient at a time, receiving detailed information from the outgoing nurse and the patient. This process is repeated for each assigned patient and is a critical component of patient safety, ensuring continuity of care. When a nurse is interrupted or pulled away during bedside shift report, their attention is divided, and communication and understanding may be impacted.[12] These interruptions can contribute to incomplete information transfer, missed clinical signs, reduced attention to detail, and increased mental load. As a result, the quality and effectiveness of the handoff process may be compromised, potentially affecting not only the newly admitted patient but also all patients assigned to the oncoming nurse during shift change. This study aligns with the literature, suggesting that interruptions and distractions during nurse handoffs are common barriers to effective communication and may increase the risk of communication errors and adverse patient outcomes.[11, 12]

The study found no significant difference in the number of handoffs before transfer but observed a significant increase in handoffs after transfer for patients transferred during shift change ($p = .003$). This indicates that the dayshift nurse was receiving a report from the transferring department nurse and then, within an hour, handing the patient to the nightshift nurse, increasing the potential for missed care and handoff communication errors, rather than handoff directly from the transferring department to the oncoming nightshift nurse. The dayshift nurse would have cared for the patient for less than an hour, limiting the care available in such a short time. This also increases the likelihood that information is missing during their handoff to the oncoming shift, highlighting the challenges expressed by The Joint Commission regarding communication and continuity of care, and the frequency of handoffs, suggesting that minimizing handoffs could improve patient outcomes.[1]

Limitations

Although many other patient variables were initially planned for comparison, inconsistent documentation limited further analysis. Other limitations include a small sample size of 150 patient records and potential confounding variables that may

have impacted the results. A larger sample and prospective design could enhance the validity of future studies.

5. Conclusion

Overall, the findings suggest that shift-change admissions may adversely affect patient outcomes, underscoring the need for further research to improve handoff protocols and the timing of transfers to support patient safety during shift transitions. The increased likelihood of safety events, particularly the higher frequency of RRT calls near shift changes, suggests that nursing leaders should consider strategies to reduce admissions during shift changes. While adequate training to manage distractions and interruptions as inevitable is one mitigation strategy,[11] other strategies include avoiding specific times for admissions, improving handoff processes, or ensuring that the nursing staff has adequate support during these critical periods. Future research should include prospective studies that implement a pause in admissions during shift change to determine the impact on both the receiving and transferring departments, especially the emergency department.

Acknowledgements

The study team would like to express sincere gratitude to Marissa Jamarik, DNP, RN, NEA-BC, for her unwavering leadership and encouragement of scholarly inquiry that supported the pursuit of this study. The authors also thank the Medical Society of South Carolina for its financial support through the Opportunity to Advance Knowledge (OAK) Fellows program, which funded Kaitlyn's time during the study.

Authors contributions

Dr. Alison Partridge was responsible for study design, guided data collection, interpretation of results, and drafting the manuscript. Kaitlyn Perkins completed data collection, contributed to interpreting results, and reviewed the manuscript. Dr. Tanya Lott assisted in study design and editing the manuscript. Dr. Emily Johnson completed the statistical analysis and contributed to the analysis and results section of the manuscript. All authors read and approved of the final manuscript.

Funding

This work in part was supported by financial contributions of the Medical Society of South Carolina.

Conflicts of Interest Disclosure

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Not applicable.

Ethics approval

The Publication Ethics Committee of the Association for Health Sciences and Education. The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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