

Clinical Handover at Hospital Night Shift: Review of Challenges and Impacts on Patient Safety and Staff Experiences

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Abstract

Safe patient care in hospitals at night is becoming increasingly elusive due to healthcare workers' exhaustion from long work hours, challenges in communication and coordination, and confusion from day-to-night handover. Among these challenges, clinical handover or the transfer of patient information and responsibility between healthcare workers has been among the most difficult issues to address. To develop a deeper understanding of the challenges and implications of clinical handover, we conducted a systematic literature review of clinical handovers during night shifts, highlighting critical issues such as inconsistent information and a lack of standard procedures, which leads to communication gaps and errors. Night shifts also increase stress and health problems for healthcare workers. Future studies should investigate the long-term effects of night shift handovers, the impact of training, and how technology can assist in improving these processes. Enhancing these areas will significantly boost patient safety and maintain workers' well-being.

Keywords: Digital Health, Clinical Handover, Clinical Handoff, Continuity of Patient Care, Patient Safety.

1. Introduction

The growing complexity of organizations means that desired-for outcomes are often dependent on the actions of multiple agents, whether individuals or groups. Such chains of interdependence rely on handovers or handoffs of incomplete "products" or "services" while they are being processed. Examples

of scenarios where handovers are found frequently include software development (Kroll et al., 2013) and service design (Leinonen & Roto, 2023). Fulfilling handovers with minimum error is critical for achieving high-quality outcomes, and digital technologies have often been developed to assist with this challenge, for example (Love & Matthews, 2019). One context in which handovers are a major issue is healthcare. Clinical handover is a common activity in contemporary healthcare systems and is defined as a process of communication during which one healthcare provider assumes accountability and responsibility for patient care from another provider (Kim & Seomun, 2020). This handover is vital to maximize and ensure continuity of care while maintaining patient safety (Malone et al., 2016). Effective communication and coordination are paramount for ensuring patient safety and continuity of care (Books et al., 2020). Communication breakdowns during handovers are a significant contributor to adverse patient events. For example, 1,744 patient fatalities in five years were associated with poor communication in US hospitals (Bailey, 2016). The Joint Commission has identified inadequate handovers (Commission, 2017) as contributing to several adverse events that occurred between 2012 and 2016, such as treatment delays, patient falls, and prescription errors.

Although clinical handovers are important for safe patient care in general, well-synchronized handovers between day and night shifts are particularly critical due to an increased risk of medical errors with detrimental outcomes to patient safety. These negative outcomes include higher rates of missed care (Cricoli et al., 2024), readmissions (Hervé et al., 2020), and mortality (da Silva et al., 2021; de Souza Barbosa et al., 2015; Vollam et al., 2022). Night shifts exacerbate

the challenges facing healthcare professionals, such as increased patient loads, time pressures, and the need for precise communication (Kowitlawakul et al., 2015). Disrupted biological systems or circadian rhythms, increased stress, and fatigue all take a toll on healthcare workers' physical and mental well-being, and could negatively impact the quality of care for patients (Ferri et al., 2016). In addition, night shifts often coincide with reduced staffing levels and higher patient workloads, creating a complex and risky environment (Rashwan et al., 2018), with potentially serious consequences. Studies have examined factors contributing to negative outcomes from handover. For example, (Bruton et al., 2016) stressed that poor communication during handovers can lead to negative patient experiences and safety issues. Furthermore, nurse handovers have been identified as a critical and dynamic interaction central to nurse communication, but also a point of daily risk (Bruton et al., 2016). The study highlights the significance of bedside handovers in patient care and the diversity of practices, which depend on individual nurse preferences, competence, and confidence. Other studies point to misunderstandings and potential patient harm from inefficient handovers (Vinu & Kane, 2016).

The clinical handover for night shifts, further aggravated by stress and fatigue associated with these shifts, complicates the process and increases the risk for patients' safety (Books et al., 2020; Rashwan et al., 2018). Hospital shift patterns, especially 12-hour nursing shifts, put additional pressure on healthcare workers during handovers. The lack of overlap between shifts increases this pressure, potentially raising anxiety and lowering handover quality (Bruton et al., 2016). Distractions are common during handovers, often making them take longer (Kowitlawakul et al., 2015), with human factors being the most common sources of these distractions. Additionally, that study also pointed out that a critical issue- the *Do Not Resuscitate (DNR)* status- is rarely included in handovers, especially in intensive care units.

Fixing many of these problems is the key to improving handovers and patient care (Vinu & Kane, 2016). These findings highlight the need to focus on handover processes to improve patient safety and healthcare worker performance and well-being. Well-coordinated handovers can reduce risks during shift changes, reduce errors, and ensure consistent and quality patient care. Improving handover practices is crucial for maintaining high standards of patient care and supporting healthcare professionals in their challenging roles.

Despite existing studies on hospital handovers and night shifts, a significant knowledge gap remains

regarding the systematic analysis and synthesis of challenges faced during these handovers and their impacts on patient safety and staff performance and well-being. Previous research, such as (Bruton et al., 2016) and (Kowitlawakul et al., 2015), has highlighted various aspects of handovers in general but has not fully explored the unique difficulties of night shifts and the comprehensive effectiveness of proposed solutions in practice.

Therefore, our study is guided by the research questions: *What are the primary challenges affecting hospital handovers during night shifts?* and *How do these challenges impact patients and hospital staff?* This review aims to systematically examine the unique challenges faced by healthcare professionals during night shifts, and the impact of these challenges on patient safety and staff well-being. By examining existing research on clinical handover practices, patient outcomes, and staff experiences, we also identify areas for improvement and ultimately enhance the quality of care provided during night shifts.

2. Research Method

We conducted a systematic review of the literature (SLR) by following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Xiao & Watson, 2019). The SLR is a method recommended by (Grant & Booth, 2009) for integration or comparison of the results of previous investigations. Our SLR process is illustrated in Figure 1.

The SLR search was conducted in the Scopus, IEEEExplore, Google Scholar and PubMed databases by two researchers, using the following search terms and their synonyms: hospital, at night, after hours, care at night, handover, shift, handoff and overnight. The searching query was constructed to drive the review process: ((handover* OR handoff*)) AND (Hospital) AND (overnight OR night* OR "after hour" OR "care* at night"). We searched for the presence of these search terms in the title, abstract, and keywords of English articles from 2010 to 2024. Table 1 shows the full list of inclusion and exclusion criteria.

To extract information from the 40 studies, we performed a thematic analysis, using *NVivo*, a qualitative data analysis software applying deductive and inductive reasoning (Yi, 2018) to identify topics from the literature that were then collated into themes which are reported next.

Inclusion Criteria	Exclusion Criteria
Human studies	Animal studies
English-language publications	Non-English publications
Nighttime studies	Daytime studies
Publications from 2010 to 2024	Publications before 2010
Peer-reviewed journal articles	Citations only
Peer-reviewed conference papers	Letters to editors and Government reports
	Books, theses and Opinion pieces

Table 1. Inclusion and exclusion criteria for the systematic literature review

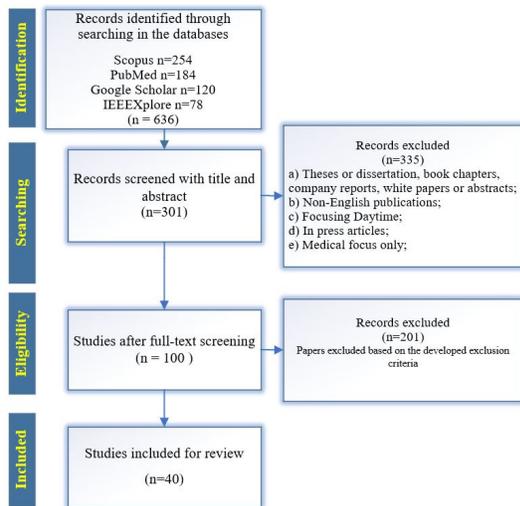


Figure 1. Systematic literature review process.

3. Findings

Our analysis revealed that communication-related, information-related, and organization-related factors contribute to the challenges of clinical handover practices during night shifts with cascading effects on patients, clinical staff, and healthcare organizations. These contributing factors can be classified into three main themes, presented in Figure 2.

The identified issues highlight critical areas where handover processes may fail during night shifts. These failures have significant impacts, including increased errors, adverse events, compromised decision-making, and overall compromised patient safety and care quality. The literature consistently underscores the need for systematic improvements in handover practices to mitigate these risks. Addressing these issues through improved communication strategies, structured handover protocols, and comprehensive training for healthcare providers is essential to improve patient outcomes and ensure continuity of care in hospital settings.

3.1. Primary Challenges Affecting Hospital Clinical Handover During Night Shifts

3.1.1. Communication-Related Factors Poor or failed communication during handovers is extensively documented in the literature as a prevalent issue during clinical handovers at night. Communication breakdown or failure occurs when clinical personnel do not communicate with all relevant individuals in the team (Henriksen et al., 2008). For example, (Johner et al., 2013) argues that communication breakdown is one of the most common causes of adverse events in medicine, including major injuries to surgical patients. Unclear communication of patient information can lead to misunderstandings, mismanagement, and ultimately higher error rates and adverse events (Bruton et al., 2016; Khan et al., 2021; Lee et al., 2017). Unlike communication breakdown, unclear communication refers to cases in which the content of the communication is not consistently complete and accurate (Henriksen et al., 2008). This can manifest as incomplete or unclear transmission of patient information. Several studies have highlighted potential issues in passing information during handovers between night and day staff, such as inconsistent details, varying terminologies, and different levels of detail (Choi et al., 2024; Khan et al., 2021; Rattray et al., 2019). These inconsistencies create communication gaps and pose a significant threat to patient safety. For example, (Bruton et al., 2016) has shown the serious impact of poor handovers on patient safety due to medical errors resulting from poor communication during these transitions.

Stress has been found to worsen communication during night shifts (Gaballah et al., 2021), leading to misunderstandings and a breakdown of information exchange, jeopardizing patient safety and continuity of care. In addition, high cognitive load reported in (Militello et al., 2018) could also lead to poorly organized handoff communications among clinical staff. More specific issues in communication are provided in

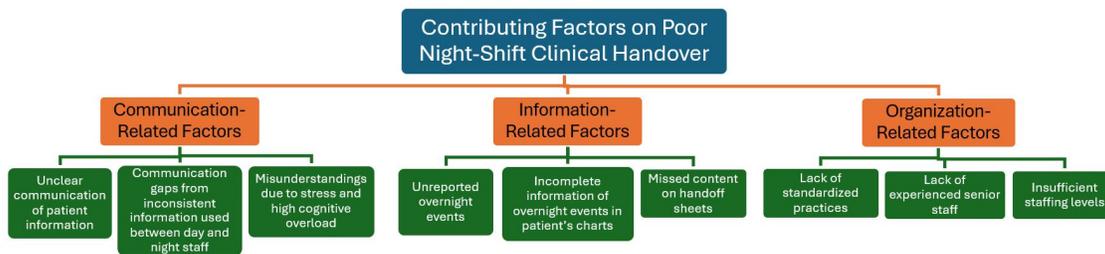


Figure 2. Contributing factors in poor clinical handover in night-shift

Table 2.

Communication-Related Factors	Selected References
Unclear communication of patient information	(Higgins et al., 2017; Kowitlawakul et al., 2015; Lee et al., 2017)
Communication gaps from inconsistent information used between day and night staff	(Devlin et al., 2014; Khan et al., 2021; Lee et al., 2017; Rattray et al., 2019)
Misunderstandings due to stress and high cognitive load	(Dutra et al., 2018; Gaballah et al., 2021; Militello et al., 2018; Shiffer et al., 2018),

Table 2. Communication-related factors in night shift clinical handover

3.1.2. Information-Related Factors Failure to report overnight events is another significant issue affecting patient safety and care quality. It can lead to under-reporting of critical changes in a patient's condition overnight (Devlin et al., 2014). Critical changes in a patient's condition that occur during the night may go unreported (Yazici et al., 2013), potentially impacting patient care and outcomes. Healthcare providers may miss critical follow-up actions, potentially leading to patient health deterioration.

Incomplete and omitted essential patient information during handovers (Devlin et al., 2014; Tam et al., 2018), often due to a lack of documentation or missing content (Devlin et al., 2014; Yazici et al., 2013) in handover sheets, can lead to inadequate care and delayed treatment. This missing information can be vital for ongoing patient care. It can result in inadequate patient care and delayed treatment. Healthcare providers might be unaware of important patient needs or changes in their condition, leading to lapses in care and potential harm to patients. More specific issues in information

loss are provided in Table 3.

Information-Related Factors	Selected References
Unreported overnight events	(de Cordova et al., 2016; Devlin et al., 2014; Militello et al., 2018; Yazici et al., 2013)
Incomplete information of overnight events in patients' charts	(de Cordova et al., 2016; Devlin et al., 2014; Rattray et al., 2019; Tam et al., 2018; Yang et al., 2011; Yazici et al., 2013)
Missed content on handover sheets	(Huth et al., 2016; Johner et al., 2013; Tam et al., 2018; Yazici et al., 2013)

Table 3. Information-related factors in night shift clinical handover

3.1.3. Organization-Related Factors Effective handovers rely heavily on well-defined organizational processes and strong management practices. Communication errors are almost twice as common as inadequate practitioner skills as a cause of adverse events (Vinu & Kane, 2016). This shows that organizational factors are crucial to establish clear communication protocols, ensuring adequate staffing levels with appropriate skill sets, and fostering a culture of safety.

Studies comparing rotating night and day shifts highlight the consequences of staffing challenges on patient care during nights (Ferri et al., 2016). The absence of experienced senior staff members and specialists can lead to gaps in expertise, reduced oversight, and delayed decision-making, ultimately affecting the quality of patient care. Insufficient staffing levels during specific shifts, including nights, have been linked to an increased risk of errors, compromised patient safety, and reduced quality of care. Moreover, a review of the evidence concerning shift work and quality (de Cordova et al., 2016) shows

how errors and decreased performance during night shifts can be worsened by a lack of senior staff and specialists. Insufficient staffing levels during specific shifts, including nights, have been associated with an increased risk of errors, compromised patient safety, and reduced quality of care. Distractions, including those from staff, patients, or family members, further add to the complexities of night handovers (Kowitlawakul et al., 2015). Issues related to organization and staffing are presented in Table 4.

Organization-Related Factors	Selected References
Lack of standardized practices	(Devlin et al., 2014; Huth et al., 2016; Johner et al., 2013; Khandelwal et al., 2014; Militello et al., 2018; Rattray et al., 2019; Tam et al., 2018)
Lack of experienced senior staff	(de Cordova et al., 2016; Ferri et al., 2016; Hamilton-Fairley et al., 2014; Johner et al., 2013)
Insufficient staffing levels	(Geiger-Brown et al., 2016; Kowitlawakul et al., 2015; Rashwan et al., 2018)

Table 4. Organization-related factors in night shift clinical handover

3.2. Adverse Impacts on Patients, Clinical Staff and Hospital System

The identified challenges associated with night shift handovers have a significant impact on patients, clinical staff and the overall healthcare system. These impacts manifest in various ways, affecting different aspects of healthcare delivery and patient outcomes.

3.2.1. Impacts on Healthcare Systems One of the primary areas of concern is the impact on healthcare systems. Night shift work has been shown to adversely affect clinical staff well-being, leading to a disruption of work-life balance, increased stress and fatigue, and an overall decrease in quality of life (Ferri et al., 2016; Sun et al., 2019). Moreover, night shift work has been associated with an increased risk of mental health issues, such as depression (Garde et al., 2020). These issues can impact staff performance (de Cordova et al., 2016). For example, fatigue, a common consequence of night shift work (Ferri et al., 2016), can impair cognitive function, leading to decreased alertness, slower reaction times, and difficulty concentrating. This can significantly

impact the ability of clinical staff to process information, make accurate decisions, and perform tasks effectively during night shifts (**books' night' 2020**).

The systemic impacts on healthcare systems are equally concerning. Ineffective handovers can lead to duplicated investigations, wasting valuable time (Arabadzhiyska et al., 2013) and resources. This not only delays patient care but also increases the burden on healthcare systems. Poor handovers can contribute to increased length of hospital stay due to delayed diagnoses, treatment delays, and adverse events. This, in turn, can increase costs for both healthcare systems and patients. Furthermore, incomplete or inaccurate information transfer during handovers can delay diagnoses or treatment, leading to poorer patient outcomes and increased costs.

3.2.2. Medical Errors and Patient Safety Risks

The issue of medical errors and patient safety risks is particularly critical. The adverse effects on clinical staff, such as fatigue, further exacerbate communication problems during handover, resulting in increased medical errors and risks to patient safety (de Cordova et al., 2016). Night shift workers experiencing sleep deprivation are more prone to performance lapses during critical activities such as handovers (de Cordova et al., 2016). Studies have shown that high stress and burnout increase the chances of medical errors, which can harm patient safety and lead to other negative outcomes (Gaballah et al., 2021). For example, one study involving hospital nurses found that shift workers had a significantly higher mean score of committing errors compared to non-shift workers (de Cordova et al., 2016). Observational evidence suggests that patients admitted over the weekend have a higher risk of in-hospital death compared to those admitted midweek. This trend has been noted in several studies (Good et al., 2016). Additionally, night shifts disrupt natural sleep patterns, leading to increased risks of errors due to fatigue and decreased alertness (Shiffer et al., 2018).

The disruptive nature of shift work can lead to breaks in continuity of care (Hamilton-Fairley et al., 2014; Thomson & McDermott, 2021; Yazici et al., 2013), as healthcare providers struggle to maintain consistent patient management across shift changes (Yazici et al., 2013). This fragmentation in care delivery can result in increased errors and compromised patient safety, as critical information may be lost or misinterpreted during transitions (Darbyshire et al., 2013). Furthermore, surgical patients are at particular risk, with studies indicating a higher incidence of injuries and complications when procedures are performed by fatigued night shift workers (Johner et al.,

2013). Observational evidence suggests that patients admitted over the weekend have a higher risk of in-hospital death compared to those admitted midweek. This trend has been noted in several studies (Good et al., 2016). Additionally, night shifts disrupt natural sleep patterns, leading to increased risks of errors due to fatigue and decreased alertness (Shiffer et al., 2018).

3.2.3. Uncertainty in Medical Decision Making

Uncertainty in medical decision making is another significant concern arising from night shift handovers. This uncertainty in medical decisions often arises from incomplete or ambiguous handover information. Such uncertainty can be detrimental, especially in critical care settings where timely and accurate decisions are crucial. Incomplete or ambiguous information during handover can also compromise decision-making and jeopardize patient safety. It can also result in incorrect or delayed treatments, thereby adversely affecting patient outcomes. Staff shortages and the absence of experienced senior staff during night shifts are likely linked with reduced oversight and delayed decision-making, contributing to lower quality of patient care (Ferri et al., 2016).

3.2.4. Patient Care Interruption

Patient care interruption is a critical issue identified by several studies as one of the most adverse impacts of improper clinical handover at night. Continuity of care is crucial to improving patient outcomes, satisfaction, and safety through consistent coordinated treatment (Haggerty et al., 2012). The breakdown occurs when essential patient information is not adequately communicated during handovers, leading to increased errors and compromised patient safety. Specifically, the interruption in the flow of critical patient information can result in improper or delayed treatment decisions, which may cause harm to patients. The Australian Resource Center for Healthcare Innovations and the National Clinical Effectiveness Committee have highlighted the link between poor handover practices and patient safety incidents (Vinu & Kane, 2016). Additionally, the Joint Commission on Accreditation of Healthcare Organizations has emphasized that the transfer of accountability during handovers directly affects patient outcomes (Vinu & Kane, 2016). Studies comparing rotating night shifts and day shifts have examined the consequences of staffing challenges on patient care during night shifts (Ferri et al., 2016). These studies highlight how the absence of experienced senior staff and specialists can lead to gaps in expertise, reduced oversight, and delayed decision-making, ultimately affecting the quality of patient care.

Research on nurse handovers (Bruton et al., 2016) has shown the serious impact of poor handovers on patient safety due to medical errors resulting from poor communication during these transitions. The interaction between inadequate communication and stress affect communication among staff, particularly during critical handovers, which are essential for patient safety and continuity of care (Gaballah et al., 2021).

4. Discussion and Conclusion

This SLR highlights the critical role of clear requirements in designing effective technology interventions for handover processes. Our analysis revealed three key themes contributing to the difficulties of night shift clinical handovers and their cascading effects on patients, staff, and healthcare organizations (Figure 2). Based on the findings, Communication gaps, incomplete information, and the lack of a well-designed handover process (Khan et al., 2021) can lead to severe consequences on the quality of patient care and healthcare staff's work experience due to the lack of appropriate continuity of care (Haggerty et al., 2012). When essential patient information is not adequately communicated during handovers, this continuity is broken, leading to increased errors and compromised patient safety. For example, the Australian Resource Centre for Healthcare Innovations and the National Clinical Effectiveness Committee (Vinu & Kane, 2016) reinforce the link between poor handover practices and patient safety incidents.

The adverse impacts of these contributing factors—such as increased medical errors, uncertainty in medical decision-making, and interruptions in care continuity—underscore the need for systemic improvements in handover practices. Healthcare organizations must recognize the importance of handovers and prioritize interventions that address the identified challenges. First, it is important for hospitals to foster a culture of safety and continuous improvement, ensuring adequate staffing levels, and providing ongoing education and training. By doing so, hospitals can enhance patient outcomes, reduce errors, and improve overall care quality, particularly during night shifts when the risks are heightened. Second, hospitals should develop policies to mandate structured handover protocols and regular training for healthcare providers. Third, since fatigue induced by unreasonable work schedule is one of the contributing factors of poor handover, managers and administrators should review current work scheduling policies to ensure sufficient resting time between shifts, which is indirectly related to patient safety (Min et al., 2019).

The mix of information, communication and organizational factors that precede poor handovers during night shifts highlight the need to adopt a sociotechnical view of the issue (Sarker et al., 2019). While communication gaps, incomplete information, and a lack of well-designed processes are established challenges (Khan et al., 2021) existing research offers limited guidance on the specific functionalities technology should address (Haggerty et al., 2012). This highlights a critical gap in the existing research and underscores the novelty and necessity of clear requirements for technology interventions in improving handover practices. Although traditional solutions focus on cultural change, standardized protocols, and training, technology offers a promising avenue for improvement. However, existing research on technology for handovers (such as (Johnson & Cowin, 2013) and (Higgins et al., 2017)) primarily identifies a lack of technology access and inadequate handover tools, rather than detailing the specific functionalities needed. This suggests a crucial next step – defining clear and specific requirements for technology interventions in handover processes.

Therefore, future research should focus on identifying suitable technology interventions and evaluating the effectiveness of various strategies aimed at enhancing handover quality. Studies could investigate the impact of standardized communication tools, digital solutions, and training programs on handover quality and patient outcomes ((Desmedt et al., 2020; Robertson et al., 2014). Additionally, exploring the role of organizational culture in facilitating effective handovers and identifying best practices for fostering a supportive environment would provide valuable insights. Longitudinal studies examining the long-term effects of improved handover practices on patient safety, care quality, and staff experience are also warranted.

Investing in technology that supports effective communication, seamless information transfer, and real-time updates can significantly enhance handover quality. For instance, the implementation of electronic handover tools that integrate with existing electronic health record systems can ensure that all relevant patient information is readily available and accurately communicated during shift changes. Furthermore, real-time updates and alerts can help maintain the continuity of care and enable quick responses to any changes in patient status. Electronic patient record systems are an example of systems that act as "information feeders" to applications that support handovers (Flemming & Hübner, 2013).

The novelty of integrating clear technological requirements into handover practices lies in its potential to transform how information is communicated and

managed during shift changes. By employing advanced digital solutions, hospitals can overcome many of the traditional barriers to effective handovers. Technologies such as mobile applications, cloud-based systems, and AI-driven analytics can facilitate real-time data sharing, streamline communication processes, and provide decision support to healthcare providers. This can lead to more efficient handovers, reduced errors, and improved patient safety outcomes, especially when studied in the overall context of the operations of hospitals after hours, which could be manifested as digital twins (Han et al., 2023). Moreover, the integration of such technologies can contribute to creating a culture of continuous improvement and innovation within healthcare organizations, ultimately leading to better patient care and staff satisfaction.

Compared to previous reviews of handovers, this paper has contributed by surfacing the specific difficulties of night shift handovers and the range of consequences, from the individual staff and patient levels to systemic outcomes. Addressing the challenges of night shift clinical handovers requires a multifaceted approach that includes fostering a culture of safety, implementing structured handover protocols, ensuring adequate rest for healthcare providers, and investing in advanced technology solutions. By focusing on these areas, healthcare organizations can significantly improve handover practices, enhance patient safety, and create a more supportive and efficient working environment for healthcare staff. Future research should continue to explore and refine these strategies, ensuring that technological advancements are effectively leveraged to address the critical issue of handover quality in healthcare settings.

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