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Nurses' Perceptions of Teamwork in Code Blue Teams at Urban Hospitals in West Java, Indonesia

Dewi Aryanti [1], Yudi Triguna[2], Tetet Kartilah[3], Akmal Hanafi[4]

[1,2,3,4]Nursing Department, Tasikmalaya Health Polytechnic, Tasikmalaya, West Java, Indonesia.
Corresponding Author: * dewiaryanti9@gmail.com

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ABSTRACT

Background: Effective Code Blue systems are essential for improving survival outcomes following in-hospital cardiac arrest. Success depends not only on individual clinical skills but also on coordinated teamwork, communication, and organizational support. Limited evidence exists regarding nurses' perceptions of Code Blue performance in Indonesian hospital settings. **Methods:** This mixed-methods study investigated nurses' perceptions of teamwork in Code Blue teams in urban hospitals in West Java, Indonesia. A total of 106 nurses completed a structured questionnaire that measured perceptions of procedural understanding, activation readiness, role clarity, and training adequacy. Quantitative data were analyzed descriptively, and qualitative data from open-ended responses were examined using thematic analysis supported by NVivo. **Results:** Quantitative findings revealed high levels of perceived readiness: 96.2% of respondents reported knowing how to activate Code Blue, 88.7% had received adequate resuscitation training, and over 85% agreed or strongly agreed that they understood team roles and Code Blue procedures. However, qualitative analysis identified four central themes reflecting systemic challenges: (1) limited equipment and resource availability, (2) inconsistent access to standardized and simulation-based training, (3) communication and coordination barriers during emergencies, and (4) positive teamwork experiences and professional development through Code Blue involvement. These findings indicate a discrepancy between strong perceived individual readiness and insufficient organizational support infrastructures. **Conclusion:** Nurses expressed confidence in participating in Code Blue responses; however, operational limitations hinder optimal performance. Strengthening Code Blue implementation requires system-level interventions including dedicated response teams, routine simulation training, structured communication protocols, resource reliability, and performance monitoring. Enhancing these components is essential to translating perceived readiness into improved patient outcomes and safety.

1. INTRODUCTION

Nurses play a vital role as frontline responders in hospital emergency situations such as Code Blue, where teamwork directly impacts patient outcomes. In urban hospitals in West Java, Indonesia, nurses' perceptions of teamwork within Code Blue teams are critical to understand because effective communication, collaboration, and decision-making among team members can determine the success of resuscitation efforts and ultimately save lives. Existing evidence suggests that communication and teamwork significantly influence nurses' ability to activate Code Blue teams timely and coordinate care efficiently, yet challenges in

interprofessional interactions and resource constraints may affect these processes. This research showed that exploring nurses' perceptions analytically can reveal underlying factors shaping teamwork quality, including communication dynamics, leadership, and organizational culture, which are essential for improving Code Blue response effectiveness and patient safety in this specific setting (Ekwantoro, Putra, & Setyoadi, 2020, 2021; Ekwantoro, Rusca Putra, & Setyoadi, n.d.; Galleryzki, Hariyati, Kuntarti, & Jainurakhma, 2022).

Despite global recognition of teamwork's importance in emergency care, there remains a sharp gap in research specifically focused on how nurses in urban Indonesian hospitals perceive and experience teamwork during Code Blue events. Most studies tend to generalize healthcare teamwork or focus on physicians' perspectives, overlooking nurses who often lead initial resuscitation efforts and coordination. Additionally, Indonesian healthcare settings face unique challenges—such as cultural communication norms, hierarchical structures, staffing shortages, and varying levels of training—that may distinctly influence teamwork dynamics. Thus, this study introduces novelty by centering on the nurses' perspective within the specific sociocultural and healthcare organizational context of West Java's urban hospitals (Apriyanto, Winarni, & Setyoadi, 2020; Ekwantoro et al., 2020; Galleryzki et al., 2022).

Furthermore, emerging evidence highlights that positive teamwork perceptions among nurses correlate with better clinical outcomes and increased job satisfaction, underpinning the critical need to understand and enhance these perceptions. This investigation fills a vital knowledge gap by providing context-specific insights to guide tailored interventions including teamwork training, communication protocols, and leadership strategies designed to boost Code Blue team performance. Ultimately, the research aims to empower nurses and promote safer, more effective emergency responses in Indonesian hospitals, contributing both locally relevant findings and advancing broader discussions on nurse-led teamwork in critical care environments (Degroot, Callis, & Mesa, 2016; DeGroot & Callis, 2023).

2. METHODS

A mixed-methods approach with a quantitative dominant design was applied to investigate nurses' perceptions regarding the implementation of Code Blue procedures in rural hospitals in West Java, Indonesia. The quantitative component employed a cross-sectional survey to measure knowledge, self-confidence, teamwork, and perceived barriers. Complementing this, focus group discussions (FGDs) were conducted to explore contextual experiences and deeper insights related to Code Blue participation. The study population consisted of registered nurses directly involved in Code Blue events. Using a population proportion formula with a 95% confidence interval, the required sample size was calculated as 106 nurses. Proportional stratified sampling ensured proportional representation across key clinical departments including the emergency department, intensive care unit, operating theatre, and general wards (approximately 20–25 participants per stratum). Eligible participants met the following inclusion criteria: active involvement in Code Blue management, at least one year of clinical experience, minimum Diploma in Nursing qualification, and completion of Code Blue training within the previous two years. Nurses currently on extended leave, those without emergency duties, or with communication or visual impairments affecting participation were excluded. Data were collected using a structured questionnaire comprising demographic characteristics, knowledge items (multiple-choice format), and Likert-scale measures for perceptions and barriers.

The instrument underwent pilot testing to assess clarity and reliability, and revisions were made based on respondent feedback. Quantitative data were analyzed using descriptive statistics and inferential tests (chi-square and independent t-test), with statistical significance

set at $p < 0.05$. Qualitative data from quitionaire were analyzed using inductive thematic analysis supported by NVivo software. Ethical approval was obtained from Universitas Padjadjaran ethics committee No. 253/UN6.KEP/EC/2025, and written informed consent was secured from all participants. Confidentiality and anonymity were strictly maintained. The study was completed within six months, covering instrument development, pilot testing, data collection, analysis, and dissemination.

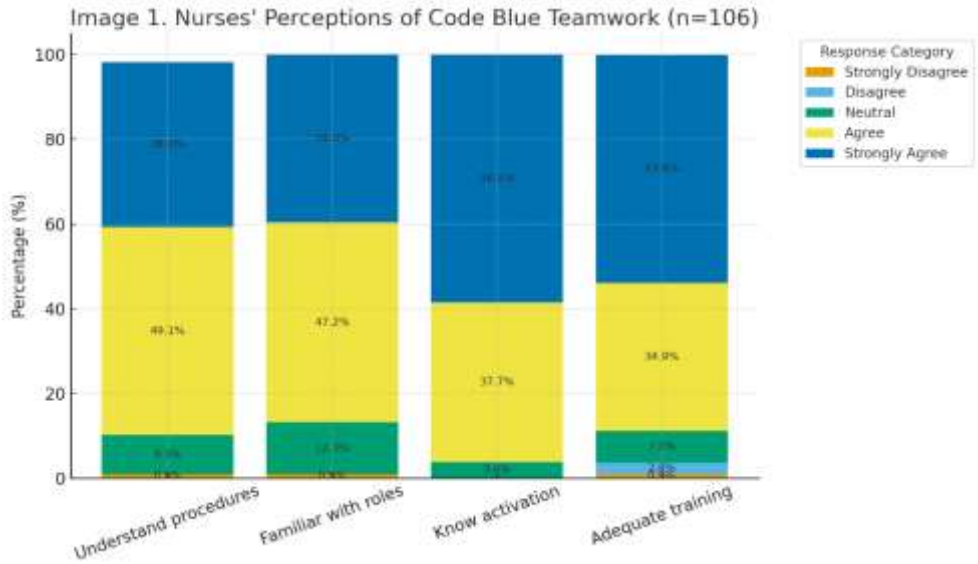
3. RESULTS AND DISCUSSIONS

Characteristics of Participants

A total of 106 nurses from several urban hospitals in West Java participated in this study. The majority of respondents were female (72.6%) and predominantly aged 24–29 years (72.6%). Most respondents had 1–3 years of experience participating in code blue teams (91.5%), held an Associate Nursing Degree (72.6%), and worked primarily as bedside nurses (86.8%). Regarding clinical placement, 41.5% were assigned to inpatient wards, followed by intensive care units (28.3%) and emergency departments (22.6%). Nearly all respondents had participated in emergency response training, with Basic Trauma Cardiac Life Support (BTCLS) being the most common (83.3%).

Nurses' Perceptions of Teamwork in Code Blue

The findings demonstrate a generally positive perception among nurses regarding teamwork and preparedness for code blue activation (Image 1.). Nearly half of the respondents (49.1%) agreed that they understood the procedures involved in code blue situations, supported by 38.9% who strongly agreed. A similar pattern was observed regarding familiarity with team roles, with 47.2% agreeing and 39.6% strongly agreeing. The majority of nurses (96.2%) reported knowing how to activate the code blue system, indicating high operational readiness. In terms of resuscitation skills, 88.7% perceived having received adequate training; however, a small yet notable proportion (2.8%) reported insufficient training, reflecting potential variability in training accessibility or quality across hospital settings.



Overall, the quantitative findings indicate that nurses working in urban hospitals in West Java perceive themselves as knowledgeable and well-prepared for code blue responses, particularly in understanding procedural steps, team-role coordination, and activation

mechanisms. Nevertheless, the presence of respondents who remain neutral or disagree regarding procedural understanding and preparedness suggests that standardized and continuous training programs may still be necessary to optimize code blue team performance and reduce variability in clinical response capabilities.

Qualitative Findings

The qualitative component of this study explored nurses' open-ended responses regarding barriers, suggested improvements, positive experiences, and challenges encountered during Code Blue implementation in urban hospitals in West Java, Indonesia. A thematic analysis generated four major themes: (1) Structural and resource limitations, (2) Training and competency gaps, (3) Communication and coordination challenges, and (4) Positive professional growth and teamwork experience.

Theme 1: Structural and Resource Limitations

Participants frequently identified limited resources as a primary constraint affecting Code Blue performance. Insufficient emergency equipment—including ventilators, laryngoscopes, complete emergency trolleys, and manual ventilation devices—and inadequate staffing distribution during busy shifts were repeatedly reported. Several respondents also mentioned delays caused by geographic distances between units and the absence of dedicated Code Blue personnel. These findings underscore critical system-level barriers that may compromise the timeliness and effectiveness of resuscitation response in time-sensitive clinical events.

Theme 2: Training and Competency Gaps

The need for consistent, standardized, and ongoing practical training emerged strongly across responses. Nurses expressed concerns that resuscitation skills diminish without frequent reinforcement, simulation-based practice, and equitable access to specialty training. Participants also highlighted the necessity for training that includes pediatric and neonatal resuscitation and stressed that not all staff have equal opportunities to participate. These insights illustrate a disparity between perceived readiness and actual procedural competency, indicating continuing educational needs.

Theme 3: Communication and Coordination Challenges

Breakdowns in communication and role clarity during emergency activation were reported as significant obstacles. Respondents noted that suboptimal coordination between departments, unclear task delegation, and delays associated with family decision-making during consent discussions can impede rapid intervention. These communication-related issues increase the risk of treatment delays and may negatively affect patient outcomes during critical moments.

Theme 4: Positive Professional Growth and Team Collaboration

Despite the challenges, nurses also described Code Blue involvement as a meaningful and rewarding professional experience. Many participants expressed pride and emotional fulfillment when contributing to successful Return of Spontaneous Circulation (ROSC) events, gaining enhanced confidence, strengthening teamwork, and advancing clinical judgment under pressure. These accounts highlight the developmental and motivational value of participating in high-stakes emergency responses.

Overall, the qualitative findings reveal a paradox between strong individual commitment and systemic insufficiencies within the hospital environment. Although nurses perceived Code Blue teamwork as essential to professional growth and patient survival, persistent weaknesses—particularly resource shortages, training gaps, and communication barriers—continue to limit optimal response performance. These findings emphasize the need for policy and structural strategies addressing equipment readiness, standardized simulation-

based education programs, dedicated and fully staffed Code Blue teams, and improved interprofessional communication systems.

The mixed-methods findings provide a comprehensive understanding of nurses' perceptions and experiences related to Code Blue implementation in urban hospitals in West Java. Quantitative results indicated generally positive perceptions of procedural knowledge, role clarity, and Code Blue activation readiness, with 88.7% of nurses reporting adequate resuscitation training and 96.2% indicating that they knew how to activate the Code Blue system. These findings suggest perceived individual preparedness and familiarity with emergency coordination mechanisms.

However, the qualitative analysis revealed that positive perceptions did not fully reflect actual operational conditions within hospital environments. Respondents repeatedly identified significant systemic barriers, including limited emergency equipment, inadequate staffing levels, insufficient standardized training, and inconsistent communication during emergency events. These structural challenges, particularly shortages of ventilators, laryngoscopes, and emergency trolleys, as well as delays caused by limited personnel availability, often hindered optimal response during Code Blue activations. Participants also described communication breakdowns and unclear task delegation as contributors to treatment delays and reduced efficiency in high-pressure situations.

Despite these challenges, qualitative data showed meaningful positive professional experiences, with many respondents describing strong teamwork and emotional fulfillment when successful Return of Spontaneous Circulation (ROSC) occurred. Many nurses reported increased confidence, improved interprofessional collaboration, and enhanced critical-thinking skills through Code Blue participation.

Taken together, these mixed-methods findings illustrate a contrast between high perceived readiness at the individual level and persistent systemic limitations in organizational support, indicating that Code Blue effectiveness depends not only on clinical knowledge but also on resource availability, well-coordinated communication, and institutionally structured training.

The integrated findings of this mixed-methods study reveal a notable discrepancy between nurses' perceived readiness to respond to Code Blue events and systemic barriers that hinder optimal implementation within urban hospitals in West Java. The high levels of self-reported procedural understanding and role clarity align with existing evidence showing that individual preparedness contributes to confidence and efficiency in cardiopulmonary resuscitation performance (Koželj, Strauss, Poštuvan, Strauss Koželj, & Strnad, 2024; Zaheer et al., 2021). Moreover, strong perceptions of leadership and interprofessional collaboration echo findings from Hunziker et al.,(2011; 2013), who demonstrated that teamwork and leadership quality significantly influence CPR effectiveness.

However, qualitative insights from this study exposed persistent operational challenges—including limited equipment availability, inadequate staffing, inconsistent training access, and communication breakdowns—that constrain the ability to translate perceived readiness into effective clinical performance. Similar systemic constraints have been described in global research, which concludes that emergency response outcomes depend heavily on institutional infrastructure and process reliability rather than individual competence alone (Hosseini, Heydari, Reihani, & Kareshki, 2022; Kujabi et al., 2022; Lauridsen, Schmidt, Adelborg, & Løfgren, 2015). The importance of organized teamwork structures and well-defined leadership roles is strongly supported by simulation-based training research that shows substantial improvements in clinical performance when emergency teams operate within standardized protocols (Hunziker et al., 2013; Maas et al., 2022).

Studies from Saudi Arabia, Malaysia, and Europe demonstrate that hospitals with dedicated resuscitation teams, communication discipline, and performance audit systems achieve significantly higher ROSC rates and reduced response delays (Azimirad et al., 2022; Zaheer et al., 2021). Consistent with these findings, the present study confirms that communication failures and unclear delegation contribute to treatment delays—reflecting a need for structured team models, not merely increased training volume.

This evidence suggests that improving Code Blue performance in Indonesian hospitals requires system-level change, including governance frameworks, standard operating procedures, routine simulation, resource optimization, and structured debriefing, consistent with international guidelines such as AHA and ILCOR.

Implications for Policy and System Improvement

The findings underscore the need for strategic organizational reforms aimed at enhancing Code Blue system reliability and team response efficiency: establishment of dedicated Code Blue teams with clearly defined responsibilities and staffing not tied to routine unit assignments; routine simulation-based and interprofessional training programs, supported by standardized competency assessment and refresher cycles; strengthening of emergency equipment readiness, including availability, maintenance, and distribution aligned with response time standards; implementation of structured communication protocols, such as SBAR-based resuscitation communication and closed-loop verification; development of performance dashboards, incorporating metrics such as response time, ROSC rate, equipment failure incidence, and post-event review outcomes; integration of family communication policies, minimizing delays related to decision-making during cardiac arrest scenarios. These recommendations align with AHA and ILCOR guidance endorsing institutional accountability and evidence-based governance in Code Blue operations to improve survival and reduce preventable mortality.

CONCLUSION

This mixed-methods study reveals a clear gap between nurses' perceived readiness for Code Blue response and organizational barriers that limit optimal implementation in urban hospitals in West Java. Although most nurses reported strong procedural knowledge, role clarity, and confidence in responding to cardiac arrest situations, qualitative findings underscored persistent limitations related to inadequate equipment, staffing shortages, inconsistent training access, and ineffective team communication. These systemic constraints indicate that successful Code Blue performance requires more than individual competence—it depends on robust institutional support.

To address this gap, hospitals should prioritize establishing dedicated and adequately staffed Code Blue teams, implementing standardized and simulation-based training programs with regular refresh cycles, ensuring reliable availability of emergency equipment, and strengthening structured communication and leadership protocols. Integrating performance monitoring, post-event debriefing, and clear family-communication policies may further enhance response efficiency and patient survival outcomes. Moving forward, a coordinated systems-level strategy is essential to convert perceived preparedness into consistently effective clinical results and improved patient safety.

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