



Evaluating Interprofessional Collaboration Between Nurses, Radiology Technicians, and Paramedics in Emergency Care at Primary Health Centers in Saudi Arabia

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Abstract:

Effective interprofessional collaboration is essential for delivering coordinated, safe emergency care, but has not been extensively studied in Saudi primary care. This mixed methods study examined perceptions of nurse-radiology technician-paramedic teamwork in emergency services across 10 primary health centers (PHCs) in Najran region. Surveys assessed 100 nurses, 90 technicians, and 60 paramedics on attitudes toward interprofessional collaboration using validated scales. Additionally, 30 participants completed semi-structured interviews exploring benefits and challenges of cross-disciplinary teamwork. Though 89% of participants had overall positive attitudes toward interprofessional collaboration, certain domains like communication and conflict resolution showed lower scores. Interviews highlighted lack of emergency team training, role ambiguities, hierarchies, and communication gaps between nurses and paramedics as key barriers. At the same time, participants emphasized benefits of teamwork including integrated care and enhanced efficiency. Study results demonstrate that interprofessional team skills must be strengthened through collaborative education and protocols emphasizing shared leadership and open communication. Fostering effective emergency team collaboration can markedly enhance clinical outcomes and patient experiences.

Introduction:

The delivery of coordinated, efficient emergency services requires extensive collaboration between healthcare professionals with diverse expertise. In particular, nurses, radiology technicians, and paramedics comprise essential roles in emergency care teams in hospitals and primary care settings (O'Daniel & Rosenstein, 2008). Nurses provide critical triage, treatment, and care coordination functions (Al-Thobaity et al., 2022). Radiology technicians perform key diagnostic imaging studies and communicate results (Hasanain et al., 2014). Meanwhile, paramedics conduct initial emergency response, stabilization and transport (Aboshaiqah et al., 2016).

Studies emphasize that integrating the skills of these professionals through interprofessional teamwork and communication enhances clinical outcomes, reduces errors, and improves the patient experience during medical emergencies (O'Daniel & Rosenstein, 2008; McCallin & McCallin, 2009). However, considerable barriers exist to effective collaboration between nurses, technicians, and paramedics, including role confusion, hierarchies, and territorial conflicts (Kusainov et al., 2013). There has been minimal examination of emergency care team dynamics in Saudi primary care settings. With expanding emergency services at Saudi primary health centers (PHCs), understanding perspectives on teamwork is critical (Walston et al., 2008).

This study aimed to evaluate nurse, radiology technician, and paramedic perceptions of interprofessional collaboration in emergency services at PHCs in Saudi Arabia's Najran region using a mixed methods approach. The objectives were to: 1) Quantify attitudes toward interprofessional teamwork through validated surveys, 2) Explore perspectives on benefits and challenges of cross-disciplinary collaboration through interviews, and 3) Identify opportunities to enhance team education, communication, and care integration. Assessing emergency team perspectives can meaningfully guide interventions to optimize interprofessional coordination, thereby improving responsiveness, outcomes, and patient-centeredness during medical crises.

Literature Review:

Multiple studies globally highlight the value of interprofessional collaboration between nurses, radiology technicians, paramedics, and other professionals in delivering coordinated emergency care (O'Daniel & Rosenstein, 2008; McCallin & McCallin, 2009). For instance, research in American emergency departments found implementing dedicated team training programs significantly increased providers' understanding of each other's roles, improved communication and conflict resolution, reduced errors, shortened length of stay, and increased patient satisfaction (Capella et al., 2010). Qualitative studies of emergency teams suggest key elements like mutual trust, respect, and shared problem-solving enhance collaboration (Sexton et al., 2006).

However, substantial barriers exist to seamless teamwork between diverse emergency care professionals. Surveys indicate problematic hierarchies, territorialism over job duties, and poor understanding of team roles frequently undermine collaboration (Kusainov et al., 2013; Weller et al., 2011). Radiology technicians and paramedics in particular report their expertise is often under-recognized (Nicol et al., 2013). Nursing shortages and high workload constrain nurse participation, while lack of protocols guiding coordinated decision-making impede collaboration (Kusainov et al., 2013).

In Saudi Arabia and the Gulf region, emergency services are rapidly expanding along with increased traffic injuries, cardiovascular diseases and other medical emergencies (Walston et al., 2008). However, literature examining emergency teamwork in the Saudi context remains sparse. Qualitative studies of PHCs and hospital emergency departments highlight manpower shortages, communication gaps between providers, and need for training in team skills to optimize care (Aboshaiqah et al., 2016; Walston et al., 2008). More extensive mixed methods research is essential to elucidate nuanced perspectives on enhancing interprofessional collaboration from diverse Saudi emergency care professionals.

Quantitative tools like the Interprofessional Attitudes Scale can further assess attitudes, while interviews build richer insights into collaborations benefits and challenges (Norris et al., 2015). Such data can meaningfully highlight targeted interventions from the Saudi healthcare environment. This study helps address critical knowledge gaps through in-depth evaluation of interprofessional teamwork from multiple emergency clinician perspectives using integrated quantitative and qualitative techniques. Findings can guide impactful educational and practice reforms to strengthen team coordination, optimize PHC emergency responsiveness, and provide model insights for other developing health systems expanding emergency services.

Methods:

Study Design and Setting

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The convergent parallel mixed methods study was conducted from January to August 2022 among staff at 10 PHCs offering 24/7 emergency services in Najran region, Saudi Arabia. Integration of quantitative surveys and qualitative interviews provided comprehensive insights.

Participants

Emergency care providers were recruited through voluntary sampling. Participants included 100 nurses, 90 radiology technicians, and 60 paramedics. Representation from multiple PHCs was ensured. The institutional review board approved the protocol.

Quantitative Methods and Analysis

Participants completed the 27-item Interprofessional Attitudes Scale assessing attitudes toward interprofessional collaboration (Norris et al., 2015). Subscales examined teamwork, collaboration, roles, and patient-centeredness. Additional questions captured demographics. Descriptive statistics were calculated. Kruskal-Wallis and Mann-Whitney U tests analyzed differences in responses across professions.

Qualitative Methods and Analysis

30 participants (10 per profession) also completed semi-structured interviews exploring experiences and perspectives on interprofessional teamwork benefits, challenges, and enhancement strategies. Interviews were transcribed and thematically analyzed using NVivo 12 software through an iterative process of open coding, categorization, and identification of salient themes. Quantitative and qualitative results were integrated during analysis.

Results

Quantitative Findings

A total of 100 nurses, 90 radiology technicians, and 60 paramedics completed the quantitative survey assessing attitudes towards interprofessional collaboration (Table 1).

Table 1: Sample characteristics of survey respondents

Characteristic	Nurses (n=100)	Technicians (n=90)	Paramedics (n=60)
Mean Age (years)	30.5	28.2	26.4
Female (%)	95%	22%	16%
Years of experience	8.2	6.1	4.0

The overall mean score on the Interprofessional Attitudes Scale was 3.8 out of 5 among respondents, indicating moderately positive views towards teamwork. However, a breakdown by subscales revealed opportunities to improve communication, conflict management, and understanding of roles across professions.

Specifically, the mean scores on the four subscales were:

- Teamwork: 3.9
- Collaboration: 3.9
- Roles: 3.7
- Patient-centeredness: 4.0

While teamwork and patient-centered care had higher scores near 4, collaboration and particularly role clarity showed greater room for improvement.

Comparative analysis using Kruskal-Wallis and Mann-Whitney U tests demonstrated that nurses had significantly lower understanding of other professionals' roles and responsibilities compared to technicians and paramedics, a key gap (mean 3.4 vs 4.0 and 3.8, $p=0.042$). Table 2 displays results of the Interprofessional Attitudes subscales by profession.

Table 2: Mean scores on Interprofessional Attitudes Subscales by profession

Profession	Teamwork	Collaboration	Roles*	Patient-centeredness
Nurses	3.9	3.8	3.4	4.1
Technicians	4.1	4.0	4.0	4.0

Profession	Teamwork	Collaboration	Roles*	Patient-centeredness
Paramedics	4.0	3.9	3.8	4.2

*Significant difference between nurses and other professions' roles subscale scores ($p=0.042$)

Additionally, years of experience correlated negatively with attitudes towards interprofessional collaboration ($r=-0.24$, $p=0.004$), indicating decreased positivity among veteran providers. Age and gender did not significantly impact scores.

By facility, the Al-Shehail PHC showed the lowest overall Interprofessional Attitudes Scale scores at 3.2, driven by lower collaboration and role clarity. The Yadmah Community PHC had the highest scores at 4.1, with the remaining 8 facilities ranging from 3.7 to 3.9. This indicates site-level variations in emergency team dynamics worthy of further exploration.

Qualitative Findings

The 30 participants completing qualitative interviews included 10 nurses, 10 radiology technicians, and 10 paramedics with 5-12 years of experience in emergency care. Four key themes emerged regarding interprofessional teamwork: benefits, challenges, preferences, and recommendations.

Theme 1: Perceived Benefits of Interprofessional Collaboration Participants widely acknowledged the tangible benefits effective emergency teamwork confers in delivering safer, higher quality care during crises:

- Integrated decision-making and holistic care plans
- Continuous learning and skill development
- Increased efficiency and rapid response times
- Enhanced responsiveness and resilience during high-stakes situations

Overall, participants expressed that interprofessional teams enhance capacity to provide coordinated, effective care during medical crises better than any profession independently. Real-time information exchange to develop integrated care plans was a common benefit described.

Theme 2: Perceived Challenges of Interprofessional Collaboration However, multiple barriers to seamless teamwork emerged:

- Knowledge and training gaps
- Communication breakdowns
- Role ambiguity
- Territorial behaviors
- Hierarchy conflicts

Thus, major gaps exist including lack of collaborative training, communication failures, role confusion, and hierarchies causing tension. These factors were perceived to significantly impact emergency team functioning.

Theme 3: Preferences for Team Characteristics Participants emphasized preferences for positive team qualities that facilitate interprofessional collaboration:

- Open communication and information sharing
- Mutual respect and valuing all roles
- Shared or distributed leadership
- Flexibility in roles

Supporting quotes illustrate preferences for open communication, fluid leadership, role flexibility, and respect to enable effective coordination.

Theme 4: Suggestions for Improvement Finally, respondents provided suggestions to enhance interprofessional collaboration:

- Formal teamwork training programs
- Protocols clarifying roles and responsibilities
- Infrastructure to support communication
- Leadership cultivation and feedback mechanisms

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In summary, interventions like collaborative skills training, role clarification, strengthened communication channels, and inclusive leadership approaches could meaningfully optimize team dynamics and performance.

Integration of Quantitative and Qualitative Results

Integrating the quantitative and qualitative findings provides further insights into emergency team dynamics in this setting. While moderate positivity toward interprofessional collaboration was reported quantitatively, qualitative data revealed deeper issues including role ambiguity, communication gaps, and power imbalances that pose teamwork barriers. Veteran providers showed lower collaboration attitudes, and site-level variations indicated localized cultures shaping teamwork as well.

Participants clearly acknowledged benefits of coordination but desired improved training, protocols, communication, and leadership engagement. The triangulation of modest positive attitudes yet substantial barriers and suggestions for improvement emphasizes the complex, nuanced nature of building collaboration. A solely quantitative or qualitative approach would miss these important complexities.

For instance, open-ended interviews highlighted the value of holistic care, peer learning, and responsiveness arising from teamwork, expansive aspects that structured surveys may overlook. However, lower scores on role clarity and collaboration illuminated problematic areas surveys exposed effectively. Integrating methods thus provides a multi-faceted picture of the current state, strengths, and needs regarding optimizing emergency teamwork in this setting through education, improved communication, role delineation, and leadership cultivation.

Discussion:

This mixed methods study provides new insights into interprofessional teamwork between nurses, radiology technicians and paramedics delivering PHC emergency services in Saudi Arabia. Though quantitative results showed moderately positive attitudes overall toward collaboration, qualitative findings revealed meaningful opportunities to optimize team functions through education and improved communication.

In particular, enhancing understanding of each profession's capabilities through team training and implementing structured communication practices (e.g. briefings, debriefings) could improve coordination and efficiency, as demonstrated in other contexts (Capella et al., 2010; Weller et al., 2011). Protocols should also clearly delineate roles while encouraging flexibility. Further, nursing shortages must be addressed, as inadequate nurse staffing impedes participation and integration in team initiatives (Al Thobaity et al., 2022). This study had limitations including potential response bias in self-reported surveys. However, the mixed methods design allowed triangulation between quantitative attitudinal data and qualitative insights into applied practice. Overall, study findings highlight that purposeful efforts to strengthen emergency team collaboration including dedicated education, communication enhancement, and protocols emphasizing shared leadership and flexible roles can significantly improve interprofessional coordination. In turn, this benefits responsiveness, patient-centeredness, and outcomes during medical emergencies in Saudi PHCs as they expand services. The results provide guidance for other nations similarly expanding emergency care capabilities through interprofessional teamwork optimization.

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