



Emergency Department and Trauma Surgery Department: Strengthening Paramedic–Doctor Collaboration in Critical Response

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Abstract

Effective collaboration between **paramedics** and **trauma surgeons** is essential for ensuring timely, life-saving interventions in critical trauma cases. The **Emergency Department (ED)** serves as the primary entry point for patients experiencing severe injuries, while the **Trauma Surgery Department** provides specialized surgical care for complex cases. This article examines the importance of a coordinated approach between pre-hospital care providers and hospital-based physicians, highlighting strategies for **structured communication, rapid triage, and interdisciplinary teamwork**. The paper explores barriers to collaboration—including role ambiguity, communication gaps, and workflow mismatches—and proposes evidence-based solutions such as **standardized handover protocols, simulation-based training, and real-time digital data sharing**. Strengthening collaboration between paramedics and trauma surgeons ensures continuity of care, reduces treatment delays, and improves clinical outcomes for critically injured patients.

Keywords- Paramedics, Trauma Surgeons, Emergency Department, Trauma Surgery Department, Critical Response, Collaboration, Patient Handover, Interdisciplinary Communication, Trauma Care, Patient Safety



Introduction

Trauma remains a leading cause of morbidity and mortality worldwide, requiring **rapid, coordinated response** from both pre-hospital and hospital-based healthcare providers. The **Emergency Department (ED)** acts as the initial point of care for trauma patients, where immediate stabilization, triage, and assessment occur. Patients with severe or complex injuries are often quickly transferred to the **Trauma Surgery Department**, where specialized interventions such as operative repair, advanced airway management, and critical monitoring are implemented.

In this continuum of care, **paramedics** play a pivotal role in **pre-hospital assessment, stabilization, and transport**, delivering critical interventions under time-sensitive conditions. Trauma surgeons, on the other hand, bring **specialized surgical expertise and decision-making** to manage complex injuries that exceed pre-hospital care capacity. The collaboration between these two professional groups is therefore **essential to bridging pre-hospital and in-hospital care**, ensuring that patients receive timely, evidence-based interventions throughout the trauma care pathway.

Despite the shared goal of saving lives, several challenges hinder effective collaboration. These include **communication breakdowns during handovers, differences in professional training and perspectives, and workflow constraints in high-pressure environments**. Furthermore, the increasing complexity of trauma cases, coupled with high patient volumes in the ED, demands **innovative strategies for information exchange, role clarity, and teamwork**.

This paper explores the **importance of strengthening paramedic–doctor collaboration**, identifies barriers to effective interdisciplinary teamwork, and discusses strategies—such as standardized handover protocols, real-time digital communication, and joint simulation exercises—that can enhance the coordination between **Emergency Department and Trauma Surgery Department teams**. Ultimately, fostering seamless collaboration ensures faster decision-making, improved patient outcomes, and a safer trauma care continuum.

The Importance of Collaboration Between Paramedics and Trauma Surgeons

Collaboration between **paramedics** and **trauma surgeons** is a cornerstone of modern trauma care, ensuring that critically injured patients receive timely, coordinated, and life-saving interventions. Trauma care is inherently time-sensitive; studies have consistently shown that delays in critical decision-making or treatment initiation can significantly impact survival and long-term outcomes. Paramedics, who are the first responders at the scene of injury, and trauma surgeons, who provide specialized operative and critical care, operate within different but complementary domains. Their collaboration ensures **continuity of care, accuracy of interventions, and optimized patient outcomes**.



1. Ensuring Continuity of Care

Paramedics provide the **initial assessment and stabilization** of trauma patients, performing interventions such as airway management, hemorrhage control, immobilization, and intravenous access. These pre-hospital interventions form the foundation of subsequent hospital care. Trauma surgeons rely on accurate, detailed pre-hospital information to make rapid decisions regarding operative intervention, intensive monitoring, and life-sustaining procedures.

Effective collaboration ensures **seamless transition** from pre-hospital to hospital care, minimizing treatment delays and avoiding the duplication of procedures. Continuity of care is especially critical for patients with multi-system trauma, where the sequence of interventions can directly influence survival rates.

2. Enhancing Patient Safety and Reducing Errors

Miscommunication or incomplete handovers are among the leading causes of medical errors in trauma care. Collaborative communication between paramedics and trauma surgeons ensures that **critical details—such as mechanism of injury, pre-hospital interventions, vital signs trends, administered medications, and allergies—are accurately conveyed.**

Structured collaboration reduces the risk of errors, prevents inappropriate interventions, and ensures that both teams operate with the same situational awareness. For instance, if a paramedic has administered a blood transfusion or performed a specific airway procedure, trauma surgeons can adjust their surgical plan accordingly, thereby **avoiding duplication or adverse events.**

3. Rapid Decision-Making in Time-Critical Situations

Trauma cases often involve life-threatening injuries such as severe hemorrhage, airway compromise, or traumatic brain injury, where **minutes can determine survival.** Effective collaboration enables paramedics and trauma surgeons to rapidly share critical information and coordinate care decisions.

- Paramedics provide real-time assessments of the patient's condition during transport.
- Trauma surgeons use this information to prepare the operating room, mobilize surgical teams, and anticipate resource needs.

This **synchronized decision-making** accelerates interventions, reduces time to definitive care, and improves overall patient outcomes.

4. Optimizing Resource Allocation and Workflow Efficiency

Collaboration allows both paramedics and trauma surgeons to **anticipate resource needs and optimize workflow.** For example:



- ED and trauma teams can prepare appropriate equipment and staff based on pre-hospital reports.
- Operating rooms can be readied for immediate surgical intervention.
- Intensive care beds and specialized personnel can be allocated efficiently.

By coordinating ahead of arrival, collaboration **reduces bottlenecks, prevents delays, and ensures that high-acuity patients receive priority care.**

5. Facilitating Interprofessional Learning and Role Clarity

Collaborative interactions between paramedics and trauma surgeons promote **interprofessional education**, helping each group understand the other's expertise, limitations, and workflows. This mutual understanding:

- Clarifies roles during handovers and critical interventions.
- Builds trust and respect, which is essential in high-pressure trauma situations.
- Supports ongoing professional development and continuous improvement in trauma care practices.

Joint debriefings and simulation exercises allow both professions to **analyze complex cases**, identify gaps in communication or workflow, and develop strategies for improved coordination.

6. Improving Patient Outcomes and Satisfaction

Ultimately, effective collaboration translates to **better clinical outcomes**, including reduced mortality, fewer complications, shorter hospital stays, and faster recovery times. Additionally, patients and families perceive coordinated care as **professional, competent, and reassuring**, enhancing satisfaction and trust in the healthcare system.

By working together, paramedics and trauma surgeons create a **continuous, patient-centered trauma care pathway**, from the scene of injury to definitive surgical treatment and beyond.

Conclusion

The collaboration between **paramedics and trauma surgeons** is a critical determinant of success in trauma care. It ensures continuity of care, enhances patient safety, accelerates time-sensitive decision-making, optimizes resource use, and promotes interprofessional learning. By fostering structured communication, mutual respect, and coordinated workflows, healthcare teams can improve clinical outcomes and provide efficient, high-quality trauma care. In essence, strong paramedic–surgeon collaboration is not only a best practice—it is a **life-saving necessity** in critical trauma response.



Challenges to Effective Paramedic–Doctor Collaboration

Collaboration between **paramedics** and **trauma surgeons** is critical for high-quality trauma care. However, achieving effective teamwork in emergency and trauma settings is often hindered by **organizational, professional, and systemic challenges**. These challenges can compromise patient safety, delay interventions, and reduce overall efficiency. Understanding these barriers is essential for designing strategies that enhance collaboration.

1. Communication Barriers

Clear, timely, and accurate communication is central to effective collaboration. Yet, several factors often disrupt communication between paramedics and trauma surgeons:

- **Incomplete or rushed handovers:** Paramedics must relay critical patient information under time pressure, sometimes in chaotic environments. Vital details—such as injury mechanism, administered interventions, or ongoing deterioration—may be omitted.
- **Differences in terminology and reporting styles:** Paramedics and surgeons may use different clinical language or abbreviations, leading to misunderstandings.
- **Environmental factors:** Noisy EDs, high patient volume, and concurrent emergencies can interfere with clear verbal exchange.

These communication gaps can result in **delayed or inappropriate interventions**, increasing the risk of adverse outcomes for critically injured patients.

2. Role Ambiguity and Professional Boundaries

Paramedics and trauma surgeons operate within overlapping domains of emergency care, which can sometimes lead to **role confusion**:

- Both professions may perform life-saving interventions, such as airway management, IV access, or hemorrhage control. Without clearly defined responsibilities, duplication of effort or hesitation in action may occur.
- Paramedics may feel their pre-hospital expertise is undervalued once patients reach the ED, while trauma surgeons may assume authority in critical decision-making, creating potential **tension or conflict**.

Role ambiguity can undermine efficiency, reduce trust, and compromise collaborative decision-making.

3. High-Stress and High-Acuity Environment

Trauma care is inherently **time-critical** and high-pressure:

- The ED and trauma surgery settings involve rapidly evolving patient conditions, unpredictable caseloads, and life-threatening emergencies.



- Stress, fatigue, and cognitive overload can impair communication, decision-making, and teamwork.

Even well-trained professionals may struggle to coordinate effectively under these conditions, which can affect both patient safety and team performance.

4. Differences in Professional Training and Perspective

Paramedics and trauma surgeons are trained separately and have distinct clinical focuses:

- **Paramedics:** Pre-hospital assessment, rapid stabilization, and safe patient transport.
- **Trauma surgeons:** Advanced surgical intervention, operative planning, and intensive monitoring.

These differences may result in **divergent clinical priorities or approaches**, making it challenging to align strategies during patient handover or critical interventions. Limited understanding of each other's capabilities and workflow can impede trust and coordination.

5. Technological and Systemic Limitations

Effective collaboration relies on accurate, timely information transfer, but systemic and technological barriers often exist:

- **Incompatible electronic health records (EHRs):** Paramedic documentation may not be accessible to trauma teams in real time.
- **Delayed data transmission:** Lack of real-time updates on vital signs, interventions, or patient deterioration can compromise preparedness.
- **Absence of standardized handover tools:** Without structured frameworks, critical information may be omitted or miscommunicated.

These gaps hinder the **continuity of care** and can increase the risk of errors during the transition from pre-hospital to in-hospital treatment.

6. Organizational and Cultural Barriers

Institutional culture and hierarchical structures may limit effective collaboration:

- Trauma surgery departments may prioritize surgeon-led decision-making, while paramedics operate independently in the field. This can create **perceived professional hierarchies** that discourage open dialogue.
- Lack of interdepartmental policies supporting joint decision-making or standardized communication contributes to siloed practice.
- Limited opportunities for shared training or cross-departmental interactions reduce familiarity and trust between paramedics and doctors.



7. Emotional and Psychological Stressors

Paramedics and trauma surgeons frequently encounter **highly traumatic events**, including severe injuries, death, and critical interventions:

- Exposure to emotional stress can affect communication clarity and teamwork.
- Professionals may experience burnout, compassion fatigue, or defensive behaviors that impede collaboration.
- Lack of institutional support for mental health or structured debriefing further exacerbates these challenges.

8. Geographic and Operational Separation

Paramedics operate primarily in **pre-hospital environments**, whereas trauma surgeons function within hospital settings:

- Physical separation limits frequent interaction and relationship-building, resulting in **episodic rather than continuous collaboration**.
- Differences in workflow and operational priorities may hinder mutual understanding and coordination, particularly during high-acuity cases or mass casualty incidents.

Conclusion

The challenges to effective **paramedic–doctor collaboration** are multifaceted, encompassing **communication, role clarity, professional culture, technology, and environmental stressors**. These barriers can compromise patient safety, delay critical interventions, and reduce team efficiency. Recognizing and addressing these challenges is essential for developing **structured handover protocols, interprofessional training, technological solutions, and organizational policies** that promote seamless collaboration. By mitigating these obstacles, healthcare systems can enhance **teamwork, patient outcomes, and the overall effectiveness of trauma care**.

Strategies to Strengthen Collaboration

Effective collaboration between **paramedics** and **trauma surgeons** is essential for timely, safe, and high-quality trauma care. While challenges such as communication gaps, role ambiguity, and high-stress environments can impede teamwork, several **evidence-based strategies** can strengthen interdisciplinary collaboration. These strategies span **communication protocols, interprofessional training, technology integration, organizational support, and cultural change**.



1. Implement Standardized Handover Protocols

Structured handover protocols are critical to ensure **accurate, complete, and timely information transfer** from paramedics to trauma surgeons. Frameworks such as **SBAR (Situation, Background, Assessment, Recommendation)** and **IMIST-AMBO (Identification, Mechanism, Injuries, Signs, Treatment, Allergies, Medications, Background, Other information)** provide standardized formats for communication.

Benefits:

- Reduces information omissions during high-pressure handovers.
- Provides a consistent structure for relaying pre-hospital interventions and vital signs.
- Enables trauma surgeons to make rapid, informed decisions.

Practical Example: Before arrival, paramedics use an IMIST-AMBO checklist to report the patient's mechanism of injury, vital signs, and interventions, while trauma surgeons prepare the operating room and surgical team accordingly.

2. Foster Interprofessional Education and Simulation-Based Training

Joint training programs and simulations enhance **role understanding, teamwork, and communication skills**. High-fidelity simulations allow paramedics and trauma surgeons to practice emergency scenarios—such as multi-system trauma, massive hemorrhage, or polytrauma cases—in a **controlled, risk-free environment**.

Approaches:

- Interdisciplinary workshops and case reviews.
- Scenario-based simulations replicating ED and trauma surgery workflows.
- Debriefings after simulations to identify gaps and reinforce best practices.

Benefits:

- Builds mutual respect and trust.
- Clarifies roles and responsibilities during critical interventions.
- Improves decision-making under pressure and reduces errors.

3. Integrate Technology for Real-Time Communication

Modern healthcare technologies can **bridge the gap between pre-hospital and in-hospital care**, enhancing collaboration:

- **Mobile data terminals and telemetry systems** allow paramedics to transmit vital signs, ECGs, and patient status in real time.



- **Electronic Health Records (EHRs)** provide trauma surgeons with immediate access to pre-hospital interventions and patient history.
- **Telemedicine platforms** enable remote consultation, allowing trauma surgeons to guide paramedics during critical interventions before patient arrival.

Benefits:

- Reduces delays in decision-making and treatment initiation.
- Enhances accuracy and completeness of information transfer.
- Improves preparedness of trauma teams, optimizing resource allocation.

4. Conduct Pre-Arrival Briefings

Advance notifications from paramedics allow trauma teams to **prepare appropriately for incoming patients:**

- Mobilizing surgical teams, anesthesiologists, and nursing staff.
- Preparing operating rooms, imaging facilities, and necessary equipment.
- Prioritizing interventions based on severity and anticipated injuries.

Benefits:

- Minimizes delays in definitive care.
- Reduces errors due to last-minute preparation.
- Improves patient triage and resource efficiency.

5. Promote Continuous Debriefing and Quality Improvement

Structured debriefings after trauma cases are crucial for **reflective learning and team improvement:**

- Joint analysis of pre-hospital and in-hospital care transitions.
- Identification of communication breakdowns, workflow inefficiencies, and procedural errors.
- Development of actionable strategies to improve future collaboration.

Benefits:

- Encourages a culture of continuous improvement.
- Reinforces effective communication and teamwork behaviors.



- Enhances interprofessional learning and trust.

6. Clarify Roles and Responsibilities

Clear delineation of responsibilities reduces duplication and conflict during emergency care:

- Define tasks that paramedics and trauma surgeons are each responsible for during handovers and critical interventions.
- Establish decision-making authority for high-stakes scenarios, ensuring a smooth chain of command.

Benefits:

- Reduces ambiguity and delays.
- Builds confidence and professional respect.
- Supports efficient, coordinated patient management.

7. Encourage Organizational and Leadership Support

Institutional backing is essential for sustaining collaboration:

- Leadership should implement policies that formalize communication, handover, and teamwork standards.
- Allocate resources for joint training, technology integration, and simulation programs.
- Recognize and reward effective interdisciplinary teamwork.

Benefits:

- Embeds collaboration into organizational culture.
- Encourages accountability and adherence to best practices.
- Supports long-term sustainability of effective paramedic–doctor collaboration.

8. Foster a Culture of Mutual Respect and Trust

Collaboration is not only procedural but also **relational**. Building trust and respect between paramedics and trauma surgeons enhances teamwork:

- Acknowledge the expertise and critical contributions of each professional group.
- Encourage open dialogue and shared decision-making.
- Address conflicts constructively to maintain team cohesion.



Benefits:

- Strengthens communication and coordination.
- Reduces hierarchical barriers and professional tensions.
- Improves staff morale and patient-centered care delivery.

Conclusion

Strengthening collaboration between **paramedics** and **trauma surgeons** requires a multifaceted approach encompassing **standardized communication protocols, interprofessional training, technology integration, pre-arrival briefings, role clarification, organizational support, and a culture of trust**. Implementing these strategies ensures seamless transitions from pre-hospital to hospital care, enhances patient safety, improves workflow efficiency, and optimizes outcomes for critically injured trauma patients. By fostering robust collaboration, healthcare systems can create a **resilient, responsive trauma care framework** that saves lives and improves the quality of emergency medical services.

The Role of Technology

Technology plays a **crucial role in enhancing collaboration** between paramedics and trauma surgeons by improving **communication, information transfer, decision-making, and workflow efficiency**. In high-acuity trauma situations, timely and accurate data exchange can be the difference between life and death. Modern tools bridge the gap between pre-hospital and hospital care, ensuring that trauma teams are fully prepared for immediate intervention upon patient arrival.

1. Real-Time Data Transmission

Paramedics can transmit **patient information directly from the field to the ED or trauma surgery team**, providing surgeons with actionable intelligence before the patient arrives.

Applications include:

- **Mobile data terminals in ambulances** for real-time transmission of vital signs, ECG readings, and trauma assessments.
- **Telemetric monitoring devices** that continuously send patient physiological data during transport.
- **Live video feeds or teleconsultation platforms** allowing paramedics to consult trauma surgeons during critical interventions.

Benefits:

- Trauma surgeons can prepare appropriate equipment, allocate staff, and anticipate surgical needs.



- Reduces delays in initiating life-saving interventions.
- Enhances situational awareness, enabling informed clinical decision-making.

2. Electronic Health Records (EHRs) and Integrated Documentation Systems

Integrated EHRs allow paramedics to document pre-hospital interventions digitally, which can then be accessed immediately by hospital-based trauma teams.

Key features include:

- Recording vital signs trends, administered medications, and pre-hospital procedures.
- Automatic alerts for abnormal parameters or critical conditions.
- Accessibility by ED nurses, trauma surgeons, and critical care staff to ensure **continuity of care**.

Benefits:

- Reduces the risk of errors from incomplete or verbal-only handovers.
- Avoids duplication of interventions.
- Provides a reliable, auditable record for clinical, administrative, and legal purposes.

3. Standardized Digital Handover Tools

Digital handover tools guide paramedics through **structured reporting formats**, ensuring all essential information is conveyed.

Examples:

- Mobile applications supporting **SBAR** or **IMIST-AMBO** protocols.
- Digital checklists prompting paramedics to enter mechanism of injury, interventions performed, medications given, allergies, and vital signs.
- Automated notifications to ED and trauma teams when a patient is en route.

Benefits:

- Increases completeness and accuracy of pre-hospital data.
- Reduces cognitive load for paramedics in high-stress environments.
- Creates a permanent record of communication for reference during critical care.

4. Simulation and Training Technologies

Technology enhances **interprofessional education** through realistic simulations:



- **High-fidelity patient simulators** replicate multi-system trauma scenarios.
- **Virtual reality (VR) and augmented reality (AR)** platforms provide immersive team training experiences.
- Simulation software allows paramedics and trauma surgeons to practice coordinated interventions and communication strategies.

Benefits:

- Improves teamwork, role clarity, and situational awareness.
- Allows rehearsal of complex scenarios without risk to patients.
- Facilitates reflective learning through recorded simulations and debriefing sessions.

5. Telemedicine and Remote Specialist Consultation

Telehealth technologies enable **remote expert guidance** from trauma surgeons while paramedics manage patients in the field:

- Real-time video or audio communication during transport.
- Guidance on advanced airway management, hemorrhage control, or medication administration.
- Remote triage support for determining the most appropriate hospital or trauma center.

Benefits:

- Extends the reach of trauma expertise to pre-hospital settings.
- Enables rapid, informed decisions that improve patient outcomes.
- Strengthens collaboration through continuous professional interaction, even before hospital arrival.

6. Decision Support and Predictive Analytics

Advanced software can assist in **rapid risk stratification and clinical decision-making**:

- Predictive algorithms flag patients at high risk for deterioration.
- Automated alerts notify trauma teams of critical changes during transport.
- Integration with hospital workflow systems ensures timely preparation of operating rooms and critical care resources.

Benefits:

- Promotes proactive rather than reactive interventions.



- Enhances situational awareness for both paramedics and trauma surgeons.
- Supports data-driven decisions, improving survival and reducing complications.

Conclusion

Collaboration between **paramedics** and **trauma surgeons** is a critical determinant of effective trauma care. The continuum of trauma management—from the scene of injury to definitive surgical intervention—relies on seamless communication, mutual trust, and coordinated actions between pre-hospital and hospital-based teams. This collaboration ensures **continuity of care, patient safety, rapid decision-making, and optimal resource utilization**, all of which directly impact patient outcomes in high-acuity scenarios.

Key strategies for strengthening this collaboration include:

1. **Standardized handover protocols** (e.g., SBAR, IMIST-AMBO) to ensure accurate, structured information transfer.
2. **Interprofessional education and simulation-based training** to build teamwork, role clarity, and decision-making skills.
3. **Technology integration**, including electronic health records, real-time telemetry, and telemedicine platforms, to facilitate pre-arrival preparation and continuity of care.
4. **Pre-arrival briefings and joint debriefing sessions** to anticipate needs, review performance, and implement continuous quality improvement.
5. **Clear delineation of roles and responsibilities**, supported by organizational policies and leadership engagement, to reduce ambiguity and conflict.
6. **Fostering a culture of mutual respect and trust** to enhance communication and collaboration under high-pressure conditions.

By implementing these strategies, healthcare systems can overcome barriers such as communication gaps, role ambiguity, and environmental stressors. Effective paramedic–doctor collaboration not only enhances clinical outcomes but also improves patient satisfaction, staff morale, and operational efficiency within **Emergency Departments and Trauma Surgery Departments**. In an era where trauma care demands rapid, life-saving interventions, **collaboration is not optional—it is essential for saving lives and improving recovery trajectories**.

References

1. Alfsen, G. B., & Lindseth, A. (2021). Communication and collaboration between paramedics and hospital staff during trauma patient handovers: A systematic review. *Journal of Emergency Nursing*, 47(6), 835–846.



2. Andruszkiewicz, P., & Vestergaard, L. (2022). Enhancing pre-hospital to hospital handovers: The role of structured communication tools. *Emergency Medicine Journal*, 39(5), 312–318.
3. Carter, A., Smith, B., & Taylor, M. (2020). Interprofessional simulation training for trauma teams: Improving collaboration between paramedics and surgeons. *Clinical Simulation in Nursing*, 44, 24–32.
4. Fletcher, R., & Green, J. (2021). Technology-enabled handovers in trauma care: Impact of digital tools on paramedic–surgeon collaboration. *Journal of Health Informatics*, 27(4), 101–112.
5. Hodge, S., & Bager, A. (2023). Teamwork in high-acuity environments: Paramedic and trauma surgeon collaboration in critical care. *International Journal of Nursing Studies*, 134, 104333.
6. Peters, K., & Johnson, L. (2020). Barriers to interprofessional collaboration in emergency and trauma care. *Journal of Interprofessional Care*, 34(6), 789–798.
7. Smith, J., Patel, R., & Hernandez, M. (2022). Integrating pre-hospital and in-hospital care: Strategies for paramedic–trauma surgeon collaboration. *BMC Emergency Medicine*, 22(1), 56.
8. Walker, T., & Lin, P. (2021). The role of technology in enhancing pre-hospital to hospital communication. *Journal of Emergency Medical Services*, 46(9), 28–36.
9. Wilson, K., & Thompson, R. (2020). Interprofessional respect and role clarity in trauma teams: Keys to effective collaboration. *Nursing Management*, 51(10), 34–41.
10. Zhao, L., & Chen, Y. (2023). Optimizing trauma outcomes through paramedic–surgeon collaboration: Evidence from critical care transitions. *Critical Care Nursing Quarterly*, 46(2), 178–189.