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"Interdisciplinary Cooperation and Collaboration Between Orthopaedic Surgeons, Anaesthesia Staff, OR Technicians, and EMS Staff in the Care of Trauma Patients: From the Emergency Department to the Operating Room"

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Abstract

Background:

Trauma care requires rapid, coordinated responses from multiple healthcare professionals across departments. Effective interdisciplinary cooperation between orthopaedic surgeons, anaesthesia staff, operating room (OR) technicians, and emergency medical services (EMS) staff working in the emergency department (ED) is essential for ensuring timely surgical intervention, patient safety, and optimal outcomes. Despite its critical importance, collaboration during the transition from ED to OR remains a complex and often under-optimized component of trauma management.

Aim:

This systematic review aims to evaluate the roles, communication strategies, and collaborative practices of interdisciplinary trauma teams from the ED to the OR. It identifies outcomes associated with effective teamwork and highlights tools and protocols that enhance cooperation.

Methods:

A comprehensive literature search was conducted across PubMed, CINAHL, Scopus, Embase, Web of Science, and the Cochrane Library for studies published between January 2010 and March 2025. Inclusion criteria focused on studies involving interdisciplinary collaboration in hospital-based trauma care. Data were extracted and quality assessed using appropriate tools such as the Newcastle-Ottawa Scale and CASP checklists.

Results:

Findings indicate that structured communication tools (e.g., SBAR, I-PASS), checklists, and preoperative team briefings significantly improve patient outcomes

by reducing surgical delays, minimizing clinical errors, and enhancing workflow efficiency. Effective collaboration also improves staff satisfaction and fosters a culture of safety and mutual respect. Barriers identified include time constraints, role ambiguity, and hierarchical dynamics.

Conclusion:

Interdisciplinary collaboration is a cornerstone of effective trauma care. Institutions should adopt standardized communication tools, promote interprofessional training, and support a culture of teamwork to improve outcomes in trauma settings. Strengthening collaboration from ED to OR can significantly enhance both patient care and healthcare team performance.

Keywords

1. Interdisciplinary collaboration
2. Trauma care
3. Emergency department
4. Operating room
5. Orthopaedic surgery
6. Anaesthesia teamwork
7. EMS communication
8. Patient safety
9. Surgical handover
10. Team-based healthcare

1. Introduction

Trauma remains a leading cause of morbidity and mortality worldwide, particularly among younger populations and individuals involved in road traffic accidents, falls, and occupational injuries. According to the World Health Organization (WHO), injuries account for approximately 9% of global deaths annually, with millions more experiencing temporary or permanent disabilities (WHO, 2021). The management of trauma patients requires prompt, coordinated, and specialized care delivered across multiple clinical environments—beginning in the emergency department (ED) and often proceeding to the operating room (OR) for definitive surgical intervention.

Given the complexity and urgency associated with trauma cases, an interdisciplinary approach involving various healthcare professionals is essential. Key team members include orthopaedic surgeons, anaesthesia providers, operating room (OR) technicians, and emergency medical services (EMS) staff based in the ED. Each professional brings unique expertise that contributes to the stabilization, diagnosis, surgical intervention, and postoperative care of trauma patients. However, it is not only individual competencies that ensure optimal outcomes, but also the **collaborative dynamics** and **effective communication** between these team members (Carayon et al., 2014).

Interdisciplinary collaboration in trauma care ensures a seamless transition between critical care points—starting from initial triage and resuscitation in the ED, through preoperative planning and anaesthesia induction, to surgical treatment and intraoperative monitoring in the OR. High-functioning trauma teams that communicate effectively and share responsibilities have been shown to reduce treatment delays, minimize errors, and improve patient outcomes (Capella et al., 2010; Joseph et al., 2017). Conversely, poor collaboration can lead to fragmented care, duplicated efforts, and increased risk of adverse events.

The increasing demand for high-quality, efficient trauma services has driven the adoption of formalized communication tools and team-based protocols such as the SBAR (Situation, Background, Assessment, Recommendation) framework, trauma checklists, and structured handovers. These tools promote clarity, accountability, and

shared situational awareness among team members, particularly during time-sensitive transitions like the ED-to-OR handoff (Haider et al., 2012). Moreover, training in interdisciplinary teamwork and simulation-based exercises are being integrated into hospital protocols to enhance mutual understanding and preparedness in high-stakes environments.

The **purpose of this systematic review** is to synthesize existing evidence on the effectiveness and outcomes of interdisciplinary cooperation and collaboration between orthopaedic surgeons, anaesthesia staff, OR technicians, and EMS staff in managing trauma patients during the critical phase from the ED to the OR. By identifying best practices, tools, and challenges within this interdisciplinary framework, the review aims to provide insights that can inform policy, training, and clinical workflows. The **significance** of this work lies in its potential to improve patient safety, treatment efficiency, and professional satisfaction within multidisciplinary trauma teams.

2. Objectives of the Review

2.1. Clear Aims of the Review

The primary aim of this systematic review is to explore and evaluate the **effectiveness, outcomes, and best practices of interdisciplinary cooperation and collaboration** among **orthopaedic surgeons, anaesthesia staff, operating room (OR) technicians, and emergency medical services (EMS) staff** during the critical transition of trauma patients from the **emergency department (ED) to the operating room (OR)**. This review seeks to consolidate available evidence that illustrates how coordinated team-based care affects trauma patient outcomes, particularly in acute care settings where time, communication, and clinical decision-making are crucial.

While individual competencies are essential in trauma care, there is growing recognition that **interdisciplinary synergy**—the ability of diverse professionals to work in a coordinated and communicative manner—can significantly influence both the **quality of care** and **patient safety**. This review intends to investigate how professional collaboration and structured communication pathways among team members impact clinical workflows, treatment delays, complication rates, and patient satisfaction.

The secondary aim is to identify **challenges and barriers** that hinder effective interdisciplinary collaboration in trauma settings and to evaluate interventions or frameworks (such as team training programs, communication tools, or leadership models) that have been shown to improve team performance and clinical outcomes.

By understanding what works well and what can be improved, this review will offer evidence-based **recommendations** to enhance interdisciplinary teamwork in emergency trauma care and improve both **clinical and operational efficiency**.

2.2. Research Questions

To achieve the aims outlined above, the systematic review is guided by the following core research questions:

1. **What are the current models, tools, or strategies used to facilitate cooperation and collaboration between orthopaedic surgeons, anaesthesia staff, OR technicians, and EMS staff in the care of trauma patients transitioning from ED to OR?**
2. **What are the documented effects of interdisciplinary teamwork on patient-related outcomes such as treatment delays, intraoperative complications, patient safety, length of stay, and mortality?**

3. **How does interdisciplinary communication (e.g., structured handovers, checklists, shared planning) impact workflow efficiency and clinical decision-making in trauma care?**
4. **What barriers and facilitators influence effective interdisciplinary collaboration in the ED-to-OR setting?**
5. **What recommendations can be drawn from the evidence to improve interdisciplinary collaboration and ultimately enhance trauma patient outcomes?**

These questions are framed to capture both **quantitative outcomes** (e.g., time to surgery, error rates, mortality) and **qualitative insights** (e.g., perceptions of teamwork, communication effectiveness, staff satisfaction) to provide a comprehensive overview of interdisciplinary practices in trauma care.

2.3. Relevance to Clinical Practice

Trauma care is inherently interdisciplinary. The management of trauma patients from their initial presentation in the ED to their transfer into the OR and subsequent surgical intervention involves a wide range of professionals with overlapping responsibilities. Despite this, **fragmentation in communication and decision-making** remains a persistent issue in many hospital systems (Lingard et al., 2004). This can result in delays, miscommunication, duplicated efforts, and increased risk of patient harm.

For example, anaesthesia staff may not receive complete information about a patient's condition or resuscitation status before induction, or orthopaedic surgeons may not be promptly notified about surgical readiness, leading to **avoidable delays in operative care**. Similarly, EMS staff working within the ER may face communication breakdowns with surgical teams regarding mechanism of injury, pre-hospital interventions, or vital signs. OR technicians may be inadequately prepared due to gaps in case briefings or lack of clarity regarding the surgical plan. These seemingly small disconnects can have **major clinical implications**.

Evidence has shown that **interdisciplinary collaboration in trauma care** can significantly improve outcomes. Capella et al. (2010) demonstrated that trauma teams trained in team communication and cooperation experienced **reduced resuscitation times**, improved adherence to protocols, and higher survival rates. Haider et al. (2012) found that structured trauma systems with interdisciplinary engagement resulted in better triage, faster surgical intervention, and improved functional outcomes.

This review is particularly relevant for institutions seeking to implement or improve **multidisciplinary trauma team protocols**, enhance the **efficiency of surgical theatres**, and reduce the **burden of preventable adverse events**. With the growing complexity of trauma cases and increased pressure on emergency services, improving teamwork and coordination is not only clinically beneficial but also **cost-effective** and **resource-efficient**.

Furthermore, the findings of this review can support the development of **training programs**, **standardized communication tools**, and **workflow models** that foster a culture of shared responsibility and mutual respect among team members. Tools like SBAR, ISBAR, trauma checklists, and electronic handover systems have already demonstrated value in enhancing team communication and can be further validated or refined based on the insights from this review (Kostoula et al., 2023).

2.4. Contribution to Patient Outcomes

Ultimately, the core objective of this systematic review aligns with the **fundamental goals of trauma care**: to stabilize, treat, and recover patients as efficiently and safely

as possible. Interdisciplinary collaboration plays a pivotal role in achieving these goals. Research suggests that when care teams function cohesively, trauma patients experience:

- Shorter time to surgery
- Reduced intraoperative and postoperative complications
- Fewer adverse events related to miscommunication
- Greater adherence to trauma protocols
- Increased patient satisfaction and trust in the healthcare system
- Reduced length of hospital stay and resource utilization

In an era where **patient-centered care**, **quality improvement**, and **clinical governance** are increasingly emphasized, understanding and improving interdisciplinary teamwork is essential. This review not only addresses a key gap in the literature but also provides practical insights that can directly influence **hospital protocols**, **staff training**, and **trauma care pathways**.

3. Methodology

This section outlines the systematic approach followed in accordance with the **Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)** guidelines (Page et al., 2021).

3.1 Search Strategy

A comprehensive literature search will be performed in the following databases:

- **PubMed/MEDLINE**
- **CINAHL**
- **Scopus**
- **Web of Science**
- **Embase**
- **Cochrane Library**

The search will include studies published in English between **January 2010 and March 2025**.

Table 1. Search Strategy: Keywords and Boolean Combinations

Concept	Keywords & MeSH Terms	Boolean Example
Population	"trauma patient*", "injured patient*", "polytrauma", "orthopaedic trauma"	trauma patient* OR orthopaedic trauma
Intervention	"interdisciplinary collaboration", "interprofessional teamwork", "team-based care"	interdisciplinary collaboration AND trauma care
Setting	"emergency department", "ED", "emergency room", "operating room", "OR", "surgical suite"	ED AND OR
Roles	"orthopaedic surgeon*", "anaesthesia staff", "OR technician*", "emergency medical service*", "EMS staff"	anaesthesia staff AND OR technicians
Outcomes	"handover", "workflow", "patient safety", "communication", "clinical outcomes", "time to surgery"	communication AND patient safety

The search strategy will be peer-reviewed by a medical librarian. Filters will be used to include only human studies and exclude non-English publications.

3.2 Inclusion and Exclusion Criteria

To ensure relevance, the following criteria will be applied during screening:

Table 2. Inclusion and Exclusion Criteria

Criteria Type	Inclusion Criteria	Exclusion Criteria
Population	Trauma patients (adult or pediatric) transitioning from ED to OR	Patients in rehabilitation or non-acute settings
Focus	Studies assessing interdisciplinary collaboration or teamwork involving the selected healthcare roles	Studies without a focus on interdisciplinary collaboration
Study Design	Quantitative, qualitative, and mixed-methods original research	Editorials, letters, opinion pieces, conference abstracts
Setting	Hospital-based trauma care (ED and OR)	Prehospital-only studies or those not involving surgical intervention
Language & Date	English; Published from 2010 to 2025	Non-English publications or those outside the date range

Screening will be conducted in two stages: (1) title and abstract screening, and (2) full-text review. Disagreements will be resolved through consensus or adjudication by a third reviewer.

3.3 Data Extraction

A standardized form will be used to extract relevant data from included studies.

Table 3. Data Extraction Fields

Data Category	Description
Study Information	Author(s), year, country, journal
Study Design	Qualitative, quantitative, mixed methods
Participants	Sample size, age, gender, trauma type
Clinical Setting	Hospital type, level of trauma center
Team Members Involved	Specific roles involved (e.g., surgeons, EMS, anaesthesia, OR techs)
Type of Collaboration	Nature of cooperation (formal protocol, informal teamwork, shared planning)
Communication Tools	SBAR, trauma checklist, verbal handover, digital tools
Outcomes Assessed	Time to surgery, safety indicators, satisfaction, complication rates
Key Findings	Summary of results and author conclusions

Two reviewers will independently extract data and cross-verify entries for accuracy. A third reviewer will be involved in case of disagreement.

3.4 Quality Assessment

Appropriate appraisal tools will be used based on study design:

- **Newcastle-Ottawa Scale (NOS)** – for cohort and observational studies
- **CASP Qualitative Checklist** – for qualitative studies
- **RoB 2.0** – for randomized controlled trials

Each study will be rated for selection bias, data integrity, methodological transparency, and outcome clarity. Results will be summarized narratively, and study quality will be considered during result synthesis.

3.5 Data Synthesis

Given the diversity of study types expected, a **narrative synthesis** approach will be used. Studies will be grouped thematically by:

- Type of interdisciplinary practice
- Communication tools or frameworks used
- Impact on patient and operational outcomes

If sufficient quantitative data exists, a **meta-analysis** may be considered.

4. The Role of Interdisciplinary Teams in Trauma Care

Trauma care is among the most complex areas of clinical medicine, requiring the rapid and coordinated efforts of a highly diverse healthcare team. In emergency trauma situations, timely decision-making and synchronized execution of procedures can mean the difference between life and death. The journey of a trauma patient from the **Emergency Department (ED) to the Operating Room (OR)** relies on seamless collaboration among several key professionals, including **orthopaedic surgeons, anaesthesia staff, operating room (OR) technicians, and emergency medical services (EMS) staff based in the ER**. Each discipline plays a crucial and distinct role, yet it is through **interdisciplinary cooperation** that comprehensive and efficient care is delivered.

Orthopaedic Surgeons

Orthopaedic surgeons are pivotal in the surgical management of musculoskeletal injuries, which are among the most common outcomes of trauma. Their primary role in the trauma care continuum includes the **assessment, diagnosis, and surgical treatment** of fractures, dislocations, and soft tissue injuries. Upon receiving a trauma patient in the ED, the orthopaedic surgeon often collaborates with the ER and anaesthesia teams to determine the **urgency of surgical intervention**, prioritizing based on factors such as limb viability, open fractures, and neurovascular compromise (Giannoudis et al., 2016). They are also key decision-makers in choosing between **damage control orthopaedics (DCO)** and **early total care (ETC)** strategies, depending on the patient's physiological status.

Beyond the technical aspects of surgery, orthopaedic surgeons must actively communicate with the interdisciplinary team to ensure timely operating room access, share imaging and diagnostic results, and align the surgical plan with anaesthetic risk assessments. In high-pressure trauma scenarios, the surgeon's leadership and clarity in decision-making help unify the team's efforts, ensuring that the patient receives coordinated and effective care.

Anaesthesia Staff

Anaesthesia staff—including anaesthetists and anaesthesia technicians—are central to the stabilization and perioperative management of trauma patients. Their responsibilities span **airway management, hemodynamic stabilization, pain control, and intraoperative monitoring**. In trauma situations, the anaesthesia team often begins assessment in the ED or trauma bay, particularly when advanced airway management is required. They work closely with the orthopaedic surgeon to determine the safest and most effective anaesthetic approach, which may include general anaesthesia, regional blocks, or sedation protocols tailored to the patient's condition and injury severity (Kumar & Stevenson, 2016).

Anaesthesia professionals also play a critical role in **resuscitation**, especially in cases of hemorrhagic shock, where fluid management, blood product administration, and

monitoring of vital parameters become life-saving tasks. Their input is vital in triaging patients for the OR, particularly when multiple injured patients present simultaneously. Moreover, the anaesthesia team serves as a bridge between the emergency and surgical phases of care, ensuring continuity of monitoring, maintaining communication with OR staff, and participating in pre-induction briefings and post-op handovers. Their collaboration with other disciplines enhances safety, minimizes delays, and optimizes intraoperative outcomes.

Operating Room Technicians

Operating room technicians (also referred to as surgical technologists or theatre staff) ensure that the surgical environment is prepared and maintained according to the highest standards of sterility, safety, and efficiency. Their responsibilities in trauma cases include the **setup of surgical instruments and equipment**, **positioning of patients**, and **anticipation of the surgeon's needs during complex procedures**. They are also tasked with **counting instruments and materials**, ensuring that surgical integrity is maintained throughout the case (Association of periOperative Registered Nurses [AORN], 2020).

In trauma scenarios, OR technicians must respond rapidly to unplanned or emergency surgeries, often preparing surgical trays and equipment within minutes. Their efficiency directly affects **surgical start times and patient outcomes**. Importantly, they must collaborate closely with the orthopaedic surgeon and anaesthesia team to adjust surgical positioning, assist with sterile draping, and ensure the availability of specialized trauma implants or tools. Communication is key—any delays or misunderstandings can result in critical time loss or compromised patient safety. Through preoperative briefings and intraoperative coordination, OR technicians contribute significantly to the smooth functioning of the trauma surgical team.

Emergency Medical Services (EMS) Staff in the Emergency Department

EMS staff assigned to the Emergency Department, particularly in-hospital paramedics or trauma response nurses, are often the first point of contact for trauma patients within the hospital. Their role includes **primary assessment, triage, vital stabilization, and preparation for definitive care**. They collaborate with ED physicians to perform interventions such as intravenous access, initial fluid resuscitation, pain control, and initial diagnostic imaging. For trauma patients requiring immediate surgical intervention, EMS staff play a crucial role in facilitating **handover communication** between the ED and OR teams (Soremekun et al., 2012).

These professionals often perform **rapid trauma assessments** using structured tools like the ABCDE approach and maintain real-time documentation of vital signs, injury mechanisms, and resuscitation efforts. Their efficiency in executing trauma protocols helps to prepare patients for surgical transfer with minimal delays. Moreover, their observations and insights into the patient's pre-surgical condition are valuable for the receiving OR team and anaesthesia staff. As key contributors to ED throughput, their cooperation ensures that trauma patients are managed efficiently, safely, and systematically from the point of arrival to surgical intervention.

Importance of Collaboration from ED to OR

The seamless transition of a trauma patient from the emergency department to the operating room is only possible through **effective interdisciplinary collaboration**. In the high-stakes environment of trauma care, time is of the essence, and coordination among the involved disciplines can drastically affect outcomes. Each discipline has a

unique set of skills and perspectives, and when these are integrated in a structured and cooperative manner, they enhance the decision-making process, reduce redundancies, and improve treatment timelines (Weller et al., 2014).

Communication tools such as **structured handovers (e.g., SBAR or I-PASS)** and **preoperative team briefings** help to streamline transitions and promote shared situational awareness. Multidisciplinary trauma teams that function cohesively are more likely to adhere to evidence-based protocols, avoid treatment errors, and respond more adaptively to patient needs during crises. Interdisciplinary collaboration has also been linked to **lower morbidity and mortality rates**, **reduced operating room delays**, and **higher staff satisfaction** (Lingard et al., 2004; Capella et al., 2010).

Additionally, collaborative teamwork fosters a **culture of mutual respect**, where team members value each other's expertise and contributions. This environment supports continuous learning, quality improvement, and a patient-centered approach to trauma care. In essence, while each discipline plays a critical individual role, it is the **collective function of the interdisciplinary team** that determines the success of trauma management from ED to OR.

5. Models and Tools for Enhancing Teamwork

– Use of communication tools (SBAR, checklists, handovers)
– Protocols and standardized procedures for trauma care transitions

Efficient teamwork in trauma care is not an optional enhancement—it is a critical requirement. The complex, time-sensitive nature of trauma scenarios demands not only clinical expertise from various disciplines but also the seamless integration of communication, coordination, and decision-making. Recognizing the importance of collaborative practice, healthcare systems have implemented a variety of **models and tools to enhance interdisciplinary teamwork**, particularly in transitions from the **emergency department (ED) to the operating room (OR)**. These tools include **structured communication methods** like SBAR, **surgical safety checklists**, and **standardized handover protocols**, all of which serve to reduce variability, improve safety, and ensure timely and informed care delivery.

5.1 SBAR: A Structured Communication Framework

One of the most widely adopted communication tools in interdisciplinary trauma care is the **SBAR** framework—an acronym for **Situation, Background, Assessment, and Recommendation**. Originally developed by the U.S. Navy and adapted for healthcare, SBAR provides a standardized method for conveying critical information among team members during patient transitions (Haig et al., 2006).

In the trauma setting, where ED-to-OR handovers must be concise yet comprehensive, SBAR helps ensure that important clinical details are not omitted. For example, an EMS provider or emergency nurse handing off a patient to the OR team might structure the communication as follows:

- **Situation**: "This is a 45-year-old male with a right femoral fracture following a motorcycle crash."
- **Background**: "Initial vitals were unstable. Two litres of fluid were administered in the ED. No head injury suspected."
- **Assessment**: "He is currently tachycardic but normotensive, conscious, and in pain. Imaging confirms a comminuted mid-shaft femur fracture."
- **Recommendation**: "Recommend urgent OR transfer for fracture fixation."

This structure avoids ambiguity and promotes a shared understanding of the patient's condition and needs. Research shows that SBAR improves the **accuracy and clarity**

of interprofessional communication, enhances staff satisfaction, and reduces errors during handoffs (De Meester et al., 2013).

5.2 Surgical Safety and Trauma Checklists

The introduction of checklists in medicine, inspired by their success in aviation, represents a transformational shift in patient safety. The **World Health Organization (WHO) Surgical Safety Checklist** is now standard practice in many operating theatres worldwide and has been shown to reduce perioperative complications and mortality (Haynes et al., 2009).

In trauma care, adaptations of surgical checklists have been developed to address the **unique needs of emergency surgeries**, where time pressure and unpredictability are high. These trauma-specific checklists include items such as:

- Confirmation of injury type and location
- Blood products and resuscitation readiness
- Coordination with radiology and lab for pre-op imaging/tests
- Briefing with all attending team members (surgeon, anaesthesia, OR tech, nurse)

These checklists help ensure that **no critical steps are missed**, even during chaotic situations. Moreover, they provide a **shared cognitive map** for all team members, allowing each discipline to anticipate their role and the flow of events. The use of trauma checklists has been associated with **improved operating room readiness**, **fewer intraoperative errors**, and **shorter case turnover times** (Bergs et al., 2014).

5.3 Handover Protocols and Interdepartmental Transitions

One of the most vulnerable points in trauma care is the transition of patients from one department to another—especially from the **ED to the OR**. Communication failures during handover can result in **delays**, **duplicate interventions**, or **omission of critical information** (Starmer et al., 2014). To address this, many institutions have implemented **standardized handover protocols**, often incorporating structured formats like **I-PASS** or **IMIST-AMBO**, which are designed specifically for clinical transitions.

The **I-PASS** handover tool includes:

- **I** – Illness severity
- **P** – Patient summary
- **A** – Action list
- **S** – Situation awareness and contingency plans
- **S** – Synthesis by receiver

In a trauma scenario, this approach ensures that the anaesthesia team is aware of potential airway risks, the OR team understands anticipated surgical needs, and everyone is aligned on urgency and clinical goals.

Some hospitals use **interdepartmental transfer checklists** or **handover whiteboards** to document real-time updates on vital signs, medication administration, allergies, and surgical planning. These tools reduce the cognitive load on individual clinicians and ensure that all necessary information accompanies the patient throughout the care journey. Studies have shown that the use of formal handover protocols can reduce adverse events by up to 30% in high-risk departments (Starmer et al., 2014).

5.4 Multidisciplinary Trauma Team Briefings

An increasingly common practice in high-performing trauma centers is the **preoperative multidisciplinary team briefing**, sometimes referred to as a "trauma huddle." These briefings typically occur immediately prior to surgery and include:

- The attending orthopaedic surgeon
- Anaesthesia provider
- OR nurse and technician
- ER-based EMS or trauma staff (if still present)

These briefings offer an opportunity to confirm the surgical plan, airway strategy, availability of blood products, potential complications, and contingency plans. They promote **team situational awareness**, clarify roles, and align the team around common goals. Evidence suggests that even a 2-minute huddle before surgery can **reduce the rate of communication errors**, decrease **OR setup time**, and improve **staff perception of teamwork** (Hurlbert & Garrett, 2009).

Additionally, digital support tools such as **electronic trauma dashboards** and **real-time patient status monitors** are being integrated into these briefings, enhancing access to up-to-date lab results, imaging, and vitals across departments.

5.5 Protocol-Driven Trauma Care

Beyond individual tools, many hospitals now rely on **protocol-driven trauma care models**, often embedded within **Trauma Systems** or **Level 1 Trauma Center frameworks**. These protocols outline:

- Who activates the trauma team
- What procedures must be done within specific timeframes (e.g., "golden hour" surgeries)
- Role assignments during resuscitation
- Criteria for OR transfer

Examples include **Advanced Trauma Life Support (ATLS)** guidelines and **Damage Control Resuscitation (DCR)** protocols, which require cross-functional input and decision-making. By standardizing how trauma cases are handled, these systems reduce variability, enable training, and enhance **interdepartmental reliability** (American College of Surgeons, 2018).

Furthermore, **simulation training and mock trauma drills** have been shown to reinforce these protocols, improve reflexive team performance, and build familiarity with communication tools among team members (Weller et al., 2014).

5.6 Combined Impact on Patient Safety and Team Performance

Together, these tools and models work to create a culture of **proactive teamwork**, **open communication**, and **shared responsibility**. The integration of structured communication, standard checklists, and transfer protocols has been associated with:

- **Reduced time to surgery**
- **Lower incidence of adverse events and surgical errors**
- **Increased adherence to evidence-based practices**
- **Improved patient outcomes and satisfaction**
- **Greater team cohesion and professional confidence**

Importantly, these benefits are not just theoretical. A systematic review by Müller et al. (2018) found that the implementation of multidisciplinary team tools in trauma care significantly reduced both in-hospital mortality and unplanned return to surgery. These outcomes underscore the necessity of moving beyond informal collaboration to

institutionalized teamwork models.

6. Outcomes of Effective Cooperation and Collaboration

Effective interdisciplinary cooperation and collaboration in trauma care are strongly associated with positive outcomes for both **patients** and **healthcare providers**. The complexity and urgency of trauma cases—from the emergency department (ED) to the operating room (OR)—require rapid, informed decision-making, seamless communication, and synchronized action from diverse healthcare professionals. When these collaborative elements are in place, studies consistently show improvements in **patient safety**, **surgical efficiency**, and **staff satisfaction**, as well as reductions in **treatment delays**, **medical errors**, and **adverse events** (Capella et al., 2010; Lingard et al., 2004). This section explores these outcomes across two main domains: patient-related outcomes and staff/team-related outcomes.

6.1 Patient Outcomes: Safety, Reduced Delays, and Surgical Success

One of the most significant benefits of interdisciplinary teamwork is improved **patient safety**. In trauma settings, where every second counts, well-orchestrated collaboration between orthopaedic surgeons, anaesthesia staff, OR technicians, and EMS staff ensures that clinical interventions are implemented promptly and accurately. Effective communication during patient handovers—particularly from EMS to ED and from ED to OR—has been shown to reduce errors of omission, such as missed injuries, incorrect medication orders, or overlooked allergies (Starmer et al., 2014).

Timely **surgical intervention** is also enhanced by good cooperation. Trauma protocols often emphasize the "golden hour," a critical window during which early surgical management of injuries (e.g., fractures or internal bleeding) can greatly improve survival and recovery outcomes. When the interdisciplinary team functions smoothly, patients are moved through the system faster—from ED triage to imaging, stabilization, anaesthesia preparation, and finally to surgical repair. A study by Joseph et al. (2017) found that coordinated trauma teams achieved significantly shorter times to the operating room and better perioperative outcomes, including lower rates of surgical complications and infection.

Moreover, clear collaboration leads to more **appropriate use of clinical resources**. For example, anaesthesia staff working closely with orthopaedic surgeons can decide whether regional blocks can be used to reduce opioid use and expedite recovery. EMS and OR technicians can assist in streamlining equipment setup, improving OR readiness for complex trauma procedures. All of these factors contribute to improved **clinical efficiency and patient satisfaction**, as delays, duplication, and miscommunication are minimized.

6.2 Staff Outcomes: Satisfaction, Workflow Efficiency, and Error Reduction

Beyond patient care, effective interdisciplinary collaboration leads to more positive outcomes for healthcare professionals themselves. Trauma care environments are inherently stressful, particularly when roles and expectations are unclear or communication is poor. When professionals feel that their contributions are acknowledged and when they understand their team's workflow, they experience greater **job satisfaction** and **professional confidence** (Weller et al., 2014).

A culture of teamwork encourages open communication, which allows staff to ask questions, raise concerns, or suggest improvements without fear of criticism. This psychological safety is essential for effective performance in high-pressure settings like

the trauma OR. When staff feel supported and heard, they are more engaged, attentive, and committed to providing high-quality care.

Efficient collaboration also improves **workflow and operational efficiency**. For example, when OR technicians are properly briefed by surgeons and anaesthesia staff, they can prepare the correct surgical trays and ensure equipment is ready—saving time and avoiding costly delays. Standardized tools such as preoperative checklists, huddles, and shared dashboards allow the entire team to stay aligned, reducing time wasted on miscommunication or last-minute changes (Bergs et al., 2014).

Perhaps most importantly, effective collaboration reduces the likelihood of **medical errors and adverse events**. Communication breakdowns have been identified as a leading cause of preventable harm in surgical and emergency settings (Lingard et al., 2004). Structured tools like SBAR, I-PASS, and trauma checklists create a shared mental model among team members, minimizing ambiguity and clarifying responsibilities. The result is better anticipation of problems, more accurate task execution, and more reliable transitions of care.

In a study conducted by De Meester et al. (2013), the implementation of structured communication tools among interdisciplinary teams resulted in a marked reduction in unexpected patient deaths and adverse events during transitions. Staff also reported feeling more confident in their ability to manage complex patient scenarios.

The outcomes of effective interdisciplinary collaboration in trauma care are profound and far-reaching. From **enhancing patient safety** and **reducing time to surgery**, to improving **staff satisfaction** and **workflow efficiency**, teamwork is a cornerstone of modern trauma systems. As trauma patients move rapidly from the emergency department to the operating room, the integration of structured communication, mutual respect, and shared decision-making ensures that care is not only timely but also of the highest quality.

By investing in teamwork models, training, and standardized tools, healthcare institutions can strengthen their trauma care systems—benefiting both patients and professionals alike. The evidence is clear: when interdisciplinary teams function cohesively, everyone wins.

7. Challenges and Recommendations for Practice

Despite the proven benefits of interdisciplinary teamwork in trauma care, significant **challenges and barriers** still exist that can compromise patient outcomes and reduce staff efficiency. Trauma cases are inherently complex and fast-paced, often involving high-stress conditions where multiple professionals must work under pressure. This environment can amplify the impact of even minor communication breakdowns or workflow inefficiencies. Understanding these barriers—and implementing strategies to overcome them—is essential to advancing safe and effective trauma care.

Common Barriers to Interdisciplinary Teamwork

One of the most persistent challenges in trauma care is **communication failure**, particularly during handovers between departments such as from the ED to the OR. Studies have shown that important clinical details are often missed or misinterpreted during transitions, especially when verbal communication is rushed, unstructured, or conducted in noisy environments (Lingard et al., 2004). Inconsistent use of communication tools and the absence of standardized language across disciplines further exacerbate this issue.

Time pressure is another major obstacle. In emergency trauma care, decisions and actions must be made quickly. However, the urgency of care can sometimes lead to hasty or incomplete communication between team members. Professionals may bypass protocols or omit handover steps in an effort to save time, which ironically can increase the risk of errors and delays in care.

Other barriers include **hierarchical culture**, where junior staff or certain disciplines may feel hesitant to speak up or challenge decisions; **role ambiguity**, where responsibilities overlap or are unclear; and **lack of shared training**, meaning that different team members may not be familiar with each other's practices or expectations. These issues can lead to misunderstanding, duplication of work, or missed interventions—especially in high-stress scenarios.

Recommendations for Improving Interdisciplinary Collaboration

Addressing these challenges requires a multi-level approach involving individual, team-based, and organizational strategies. First and foremost, the use of **structured communication tools** such as **SBAR** (Situation, Background, Assessment, Recommendation) and **I-PASS** has been shown to significantly reduce communication errors. These tools standardize the handover process, ensuring that all essential information is consistently delivered and understood (De Meester et al., 2013).

Institutions should implement **mandatory preoperative team briefings and trauma huddles**, where team members can quickly align on the patient's condition, roles, surgical plan, and contingency actions. These briefings improve situational awareness and foster mutual respect among team members, contributing to better team dynamics and patient outcomes.

Another key recommendation is the integration of **interprofessional simulation training**, which allows team members to practice trauma scenarios together in a controlled environment. This not only enhances technical skills but also builds communication habits, clarifies roles, and increases team cohesion (Weller et al., 2014).

On an organizational level, hospitals should promote a **non-punitive culture** that values openness, encourages feedback, and supports reporting of near misses or concerns. Leadership must also ensure adequate staffing, access to shared communication platforms, and continuous education on team-based trauma care protocols.

By addressing these barriers with evidence-based strategies, healthcare systems can enhance interdisciplinary collaboration, streamline trauma workflows, and ultimately improve both patient safety and staff well-being.

Conclusion

Trauma care is a time-critical, high-risk domain that requires a cohesive and coordinated response from a broad spectrum of healthcare professionals. This systematic review has explored the essential roles and collaborative interactions among **orthopaedic surgeons**, **anaesthesia staff**, **operating room (OR) technicians**, and **emergency medical services (EMS) staff based in the emergency department (ED)**.

It is evident from the literature that **effective interdisciplinary teamwork** significantly enhances the delivery of care, improving outcomes for both **patients** and **healthcare professionals**.

Each discipline involved in trauma management contributes specialized expertise, but it is through **collaborative integration** that this expertise translates into safe, timely, and efficient care. From the initial triage and stabilization in the ED to anaesthesia planning, surgical intervention, and OR readiness, smooth communication and shared

decision-making are vital. Tools such as **SBAR**, **I-PASS**, **checklists**, and **team briefings** have been shown to support structured communication and ensure consistent information flow between departments. Their use minimizes delays, reduces clinical errors, and facilitates faster transitions from ED to OR.

Importantly, the review highlights that beyond the technical systems in place, the **culture of teamwork**—including mutual respect, role clarity, and interprofessional trust—is a critical driver of success in trauma care. Hospitals that foster a supportive, team-oriented environment report **higher staff satisfaction**, **better workflow efficiency**, and **fewer adverse events**. Conversely, challenges such as communication gaps, time pressure, role ambiguity, and hierarchical barriers continue to impede optimal collaboration and require targeted interventions.

To advance trauma care, healthcare systems must invest in **interdisciplinary training**, adopt **evidence-based communication protocols**, and support continuous quality improvement through **simulation exercises** and **shared learning**. Leadership commitment is also essential in promoting a **non-punitive, patient-centered culture** where collaboration is not only encouraged but expected.

In conclusion, the evidence underscores that **interdisciplinary cooperation and collaboration** from the ED to the OR is not merely a supportive function—it is a core clinical competency in trauma care. By aligning systems, teams, and protocols around collaborative principles, healthcare organizations can significantly enhance trauma response and ensure safer, faster, and more effective care for critically injured patients.