

Customized Fellowship Curriculum: Trauma *& Acute Care Surgery*

Fellowship Site: Christian Medical College (CMC), Vellore

Primary Department: Trauma Surgery

Duration: 12 Months

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# Table of Contents

[Table of Contents 2](#_Toc205564524)

[1. Introduction 3](#_Toc205564525)

[1.1. Background 3](#_Toc205564526)

[1.1.1. Limitations in Trauma Care in Ethiopia 3](#_Toc205564527)

[1.2. Implications of the Fellowship 4](#_Toc205564528)

[2. Fellowship Objectives and Domains 4](#_Toc205564529)

[2.1. Main fellowship objectives 4](#_Toc205564530)

[2.2. Fellowship Core Domains 5](#_Toc205564531)

[3. Description and Scope of Work 5](#_Toc205564532)

[4. Duties and Teaching Methodologies 5](#_Toc205564533)

[5. Specific Learning Objectives 6](#_Toc205564534)

[A. Clinical Competency Development 6](#_Toc205564535)

[B. Systems Thinking & Contextual Adaptation 6](#_Toc205564536)

[C. Quality Improvement & Safety Integration 6](#_Toc205564537)

[D. Documentation and Research 6](#_Toc205564538)

[6. Fellowship Focus and Practical Skill Expansion 6](#_Toc205564539)

[7. Rotation Timeline (12 -Month Fellowship) 12](#_Toc205564540)

[8. LOGBOOK TEMPLATE FOR FELLOWSHIP PROCEDURES 13](#_Toc205564541)

[8.1. Procedures Performed (modifiable to the standard CMC logbook) 14](#_Toc205564542)

[8.2. CME / Academic Activities 14](#_Toc205564543)

[References 15](#_Toc205564544)

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# Introduction

## 1.1. Background

Ethiopia faces a growing burden of trauma and acute surgical crises, particularly from road traffic accidents, conflict injuries, and obstetric emergencies. Despite this, surgical care remains under-resourced: limited ICU beds, inconsistent electricity, minimal imaging, and constrained access to advanced surgical technology. This one-year fellowship has been adapted and designed to bridge these gaps by equipping the fellow with adaptable, evidence-based trauma and acute care surgical skills suitable for LMIC environments.

### 1.1.1. Limitations in Trauma Care in Ethiopia

Critical Care Infrastructure Deficits

A 2022 assessment of Ethiopian ICUs found most facilities categorized at WFSICCM (**World Federation of Societies of Intensive and Critical Care Medicine**) Level 1, lacking essential beds, ventilators, piped oxygen, and monitoring equipment like defibrillators or renal support. Public ICU budgets are rare, and few have dedicated financing for critical care (1).

Sparse Surgical Workforce & Low Surgical Volume

Nationwide surgical volume averages only 115 procedures per 100,000 population, far below LCoGS (Lancet Commission on Global Surgery) targets. Only 58% of hospitals surveyed had reliable electricity, and 38% had running water. Specialist surgeon/anesthetist density remains critically low at around 0.5 per 100,000 people (2).

Fragmented Service Delivery & Poor Access

Major surgery in regional public hospitals is rare, with only 13% coverage in primary hospitals. Patients often travel over 28 hours to access surgical care, and 41% are referred due to lack of blood, equipment, or personnel (3).

Failures in Prehospital & Referral Systems

There is no formal prehospital trauma protocol in Addis Ababa. Most patients are transported via taxis or private vehicles. Ambulance systems are uncoordinated, and referral communications are often ineffective, worsening trauma outcomes (4)

*Leadership, Coordination & Documentation Gaps*

Trauma centers lack structured leadership or coordinated protocols. Many facilities report patients lying on the floors without privacy. Documentation is often incomplete and fails to meet WHO registry standards.

Financial Burden & Patient Hardship

Despite subsidies, trauma care leads to catastrophic health expenditure (CHE) for many households. Approximately 60% of trauma patients face severe financial hardship related to travel and care expenses.

## 1.2. Implications of the Fellowship

Ethiopia currently has no formally trained trauma and acute care surgeons. While orthopedic and trauma surgeons exist, their training mostly focuses on bone and joint injuries, not on managing complex, multi-system trauma like abdominal bleeding, chest injuries, or shock. This leaves hospitals without experts who can lead emergency surgical teams, make fast decisions in life-threatening situations, and coordinate care across departments. As a result, patients with serious injuries often face delays, referrals, or incomplete treatment.

This gap is not unique to Ethiopia. Across Eastern Africa, many countries face similar shortages of trauma-trained surgeons, especially outside major cities. A review of trauma care in Sub-Saharan Africa found that rural areas and conflict zones in East Africa have some of the largest gaps in access to trauma care and trained providers. Building a fellowship program for trauma and acute care surgery in Ethiopia not only improves patient outcomes locally, it could also serve as a model for neighboring countries facing the same challenges. *(Alayande, B., Chu, K.M., Jumbam, D.T. et al. Disparities in Access to Trauma Care in Sub-Saharan Africa: A Narrative Review. Curr Trauma Rep 8, 66–94 (2022).* [*https://doi.org/10.1007/s40719-022-00229-1*](https://doi.org/10.1007/s40719-022-00229-1)*)*

# Fellowship Objectives and Domains

This fellowship trains surgeons for trauma and emergency surgical care in low-resource areas (LMIC) like Ethiopia. It teaches them to manage trauma and non-trauma emergency surgeries from start to finish, including prehospital care, surgery, ICU, and rehab. The program focuses on high-impact areas such as emergency orthopedic care, traumatic emergency neurosurgical cases, non-traumatic acute surgical conditions, cardiothoracic and vascular trauma, critical surgical care and prepares fellows to handle challenges like poor infrastructure and fragmented referrals. On completion of the fellowship, fellows will be ready to establish /strengthen trauma and critical surgical care systems, work on human resource development, lead trauma teams, shape surgical policy, and improve patient outcomes at facility, local and regional level.

## 2.1. Main fellowship objectives

* Train sub-specialists capable of managing trauma and non-trauma emergencies across prehospital, surgical, ICU, and rehabilitation domains.
* Build competency on high-impact trauma care like cardiovascular and thoracic trauma, given their time sensitiveness, fatal potential and low specialist availability.
* Empower and Prepare fellows to address system gaps: infrastructure, develop prehospital protocols, coordination, documentation, access, lead hospital-based trauma teams, monitor trauma outcomes and perioperative quality.

## 2.2. Fellowship Core Domains

The adapted curriculum focuses on four integrated domains with context-sensitive enhancements:

1. **Trauma & Emergency Surgery**: Primary care stabilization, regional trauma triage, documentation & scoring
2. **Surgical Critical Care**: ICU setup in low-resource settings, oxygen & ventilator management
3. **High**-**impact trauma surgery (Cardiothoracic & Vascular Trauma, head and spinal trauma, etc.):** Immediate resuscitation, repair skills, damage control strategies
4. **System Leadership & Policy**: Trauma team setup, referral networks, quality improvement protocols

# 3. Description and Scope of Work

The fellow will rotate across key trauma and acute care surgical services at CMC Vellore to acquire essential operative, critical care, triage, and perioperative skills adaptable to Ethiopia (LMIC). Training will focus on high-volume emergency cases, surgical acute and critical care, and damage-control surgery with context-oriented intervention alternatives. Where feasible, modules less applicable to LMICs (e.g., robotic surgery) will be replaced by simulation and hands-on practice in manual techniques and local innovations.

# 4. Duties and Teaching Methodologies

* **Clinical Exposure**: Operation theater (room), trauma bay, Emergency Department, ICU rotations, inpatient unit, and outpatient department
* **Teaching**:
	+ Participation in bedside rounds, morbidity and mortality meetings, trauma audits, and trauma calls
	+ Attends/presents the weekly journal Club and seminar
	+ Attend lectures by the faculty.
	+ Attends/participates/presents papers in state/zonal/national/international conferences.
* **Simulation**: Hands-on low-resource practice (e.g., hand-sewn bowel anastomosis, peritoneal packing, external fixators)
* **Research & Quality Improvement**: Engagement in an LMIC-adaptable QI project during the last quarter of the fellowship.

# Specific Learning Objectives

## Clinical Competency Development

* Master the initial evaluation, resuscitation, and operative management of trauma patients, including multisystem injuries.
* Gain hands-on experience in damage control surgery, critical care, and emergency general surgery.
* Develop proficiency in managing cardiothoracic and vascular trauma, including chest tube placement, thoracotomy, and hemorrhage control.

## Systems Thinking & Contextual Adaptation

* Understand how trauma systems function in high-volume Indian settings and extract lessons for contextual adaptation in (LMIC) Ethiopia.
* Participate in mass casualty protocols, triage systems, and interdisciplinary trauma teams to inform scalable models for Ethiopia’s referral hospitals.

## Quality Improvement & Safety Integration

* Learn to embed quality improvement (QI) into trauma workflows using tools like checklists, incident reporting, and surveillance.
* Explore innovations such as prehospital care delivery request methods, interfacility referral systems, pre-hospital communication tools.

## Documentation and Research

* Strengthen trauma documentation practices aligned with WHO / local trauma registry standards.
* Initiate a research or QI project during the fellowship focused on trauma care gaps in Ethiopia.
* Align clinical learnings with surgical care strategy, especially around trauma integration, equity, and sustainability.

# 6. Fellowship Focus and Practical Skill Expansion

This fellowship offers hands-on training in trauma and acute care surgery with a degree of contextualiztion for low-resource (LMIC) settings (e.g. Ethiopia). Fellows will focus on and master crucial skills, from airway control and damage control surgery to critical care and leading trauma teams. Preparing fellows for high-pressure situations, the program covers a variety of cases, including chest and cardiovascular trauma, burns, and obstetric emergencies. There is also a focus on special population groups such as pediatric and geriatric trauma, simulated learning and trauma system exposure, all to equip fellows to lead trauma response and improve care in LMIC regions. The following table lists areas of focus for practical skill learning.

Table 1: list of clinical skills with degree of focus during fellowship

|  |  |  |
| --- | --- | --- |
|  | Injury region  | List of procedures  |
| 1 | Head & Face\* | * Oral endotracheal intubation
* Cricothyroidotomy
* Nasal and oral packing for hemorrhage control
* Intermaxillary wiring
* Facial soft tissue repair (suturing, debridement)
* ICP monitoring (basic setup)
* Emergency cranial decompression
 |
| 2 | Neck \* | * Neck exploration
* Airway exposure and management in penetrating trauma
* Vascular control (carotid, jugular)
* Thyroidectomy (emergency indications)
* Tracheostomy (open and percutaneous)
 |
| 3 | Chest & Thorax and Cardiovascular\*\* | * Chest tube insertion and management
* Needle decompression for tension pneumothorax
* Emergency thoracotomy (resuscitative)
* Pericardiocentesis
* Diaphragm injury repair
* Rib fracture stabilization
* Bronchoscopy (diagnostic and therapeutic)
* Exposure & definitive management of cardiac injury, pericardial tamponade
* Exposure & definitive management of tracheo bronchial & lung injuries
* Definitive management of empyema: decortication (open and VATS)
* Emergency management of esophageal injuries & perforations
* Damage control techniques
* Temporary vascular shunting
* Exposure & definitive management of thoracic vascular injury
* Vascular control and repair (femoral, subclavian, axillary)
* Damage control vascular techniques (packing, clamps)
* Acute thrombo-embolectomy
* Hemorrhage control in unstable patients
* Basic echocardiography for trauma (FAST + cardiac views)
 |
|
| 4 | Abdomen & Pelvis \*\* | * Exploratory laparotomy
* Exposure & definitive management all grade injury of gastric, small intestine and colon.
* Exposure & definitive management all grade Liver and splenic trauma
* Exposure & definitive management of major abdominal and pelvic vascular injury
* Retroperitoneal hematoma exposure
* Abdominal compartment syndrome management
* Open abdomen techniques and VAC dressing
* Pelvic stabilization (external fixators, binders, packing)
* Laparoscopic techniques as they pertain to the above procedures
 |
| 5 | Extremities | * Fasciotomy (upper and lower limbs)
* Limb-saving orthopedic trauma (splints, traction pins, external fixators)
* Amputations (trauma-related)
* Vascular injury exposure,control and repair
* Soft tissue debridement for necrotizing infections
 |
| 6 | Burns & Blast Injuries  | * Initial burn assessment and resuscitation
* Escharotomy
* Wound debridement and dressing
* Basic burn ICU care (fluid management, infection control)
 |
| 7 | Emergency General Surgery  | * Appendectomy (ruptured/perforated)
* Peritonitis source control
* Acute cholecystectomy
* Hernia repair (strangulated/incarcerated)
* Abscess drainage (soft tissue, intra-abdominal)
* Bowel obstruction management
 |
| 8 | Critical Care & ICU Procedures \*\* | All tailored for surgical patients. * Central venous catheter insertion
* Arterial line placement
* Tracheostomy care
* Ventilator setup and troubleshooting
* Renal support coordination
* Nutritional support for critically ill surgical patients
 |
| 9 | Special Populations \* | * Pediatric trauma stabilization
* Trauma in pregnancy (resuscitation, surgical decision-making)
* Geriatric trauma considerations
* Brain death assessment and organ donation protocols
 |
| 10 | Systems & Simulation\*  | * FAST exam and trauma ultrasound
* ATLS protocol execution
* Mass casualty triage and field stabilization
* Trauma documentation aligned with WHO registry standards
* Simulation-based training (rib fixation, airway, hemorrhage control)
 |

Key- \*- procedures with emphasis during fellowship stay

\*\*- procedures with high level of focus and engagement during fellowship

Table 2: Expected level of competency to be achieved at the end of the Fellowship (Adapted from National Board of Examinations’ FNB TACS curriculum)

|  |  |  |
| --- | --- | --- |
| **Area/Procedure** | **Essential** | **Desirable** |
| **i. Airway** |   |   |
| Tracheotomy, open and/or percutaneous | X |   |
| Cricothyroidotomy | X |   |
| Oral endotracheal intubation | X |   |
|   |   |   |
| **ii. Head/Face** |   |   |
| Nasal Packing (ant. & post. ) and Oral packing | X |   |
| ICP Monitoring | X |   |
| Cranial decompression in dire emergencies when neurosurgeon not present |   | X |
| Intermaxillary wiring | X |   |
| Basic reconstruction techniques (suturing) for facial soft tissues | X |   |
|   |   |   |
| **iii. Neck** |   |   |
| Exposure & definitive management of vascular and aerodigestive injuries | X |   |
| Thyroidectomy | X |   |
|   |   |   |
| **iv. Chest** |   |   |
| Exposure & definitive management of cardiac injury, pericardial tamponade |   | X |
| Exposure & definitive management of thoracicvascular injury |   | X |
| Exposure & definitive management of tracheo-bronchial & lung injuries | X |   |
| Diaphragm injury, repair | X |   |
| Definitive management of empyema: decortication (open and VATS) | X |   |
| Bronchoscopy: diagnostic and therapeutic for injury, infection and foreign body removal |   | X |
| Emergency management of esophageal injuries & perforations | X |   |
| Damage control techniques | X |   |
|   |   |   |
| **v. Abdomen & Pelvis** |   |   |
| Exposure & definitive management of gastric, small intestine and colon injuries | X |   |
| Exposure & definitive management of gastric, smallintestine and colon inflammation, bleeding perforation & obstructions. | X |   |
| Gastrostomy (open and/or percutaneous) and jejunostomy | X |   |
| Exposure & definitive management of duodenal injury | X |   |
| Management of rectal injury | X |   |
| Management of all grades of liver injury | X |   |
| Management of splenic injury, infection, inflammation or diseases | X |   |
| Management of pancreatic injury, infection and inflammation | X |   |
| Pancreatic resection & debridement | X |   |
| Management of renal, ureteral and bladder injury | X |   |
| Management of injuries to the female reproductive tract |   | X |
| Management of abdominal compartment syndrome | X |   |
| Damage control techniques | X |   |
| Abdominal wall reconstruction following resectional debridement for infection, ischemia  |  X |   |
| Laparoscopic techniques as they pertain to the above |   | X |
| Exposure & definitive management of major abdominal and pelvic vascular injury | X |   |
|   |   |   |
| **vi. Extremities** |   |   |
| Radical soft tissue debridement for necrotizing infection | X |   |
| Exposure and management of upper extremity vascular injuries | X |   |
| Exposure and management of lower extremity vascular injuries | X |   |
| Damage control techniques in the management of extremity vascular injuries, including temporary shunts | X |   |
| Acute thrombo-embolectomy |   | X |
| Hemodialysis access, permanent |   | X |
| Fasciotomy, upper extremity | X |   |
| Fasciotomy, lower extremity | X |   |
| Amputations, upper and lower extremity | X |   |
| Reducing dislocations |   | X |
| Splinting fractures | X |   |
| Applying femoral/tibial traction | X |   |
| Pelvic stabilization with non-operative means | X |   |
| Pelvic stabilization with external fixators |   | X |
|   |   |   |
| **vii. Other Procedures** |   |   |
| Split thickness, full thickness skin grafting | X |   |
| Diagnostic Emergency ultrasound (FAST etc.) | X |   |
| Procedures required for Surgical Critical Care(Central Venous Line, Arterial Line etc.) | X |   |

# 7. Rotation Timeline (12 -Month Fellowship)

Table 3: (Proposed) Rotation Timeline (12 -Month Fellowship)

|  |  |  |
| --- | --- | --- |
| **Rotation units**  | **Duration**  | **Focus Areas**  |
| Emergency Department  | 2 weeks  | Triage, Resuscitation, ED Protocols |
| Trauma and Acute Surgery Unit and Trauma ICU | 7 months  | Trauma protocols, Airway management, Multisystem injuries, Damage control surgery and resuscitation, Chest trauma, thoracotomy, pericardial injuries Ventilation, hemodynamic monitoring, post-op care,Non-Trauma Surgery for unstable patients, Surgical Rescue for inpatients |
| Vascular Surgery  | 2 weeks  | Arterial repair, hemorrhage control, diagnostic angiography  |
| Pediatric Trauma / Special Populations  | 1 month (separated or integrated) | Trauma in children, pregnancy, geriatric emergencies  |
| Interventional Radiology | 2 weeks | Sonology and fluoroscopy guided procedures |
| Plastic Surgery | 2 weeks | Burns, Workhorse Flaps, Facial fractures |
| General Surgery | 1 month | Routine Surgical Emergencies |
| Elective  | 1 month | JPN Apex Trauma Center, AIIMS, New DelhiMission Network Hospitals in Rural India  |
| Mass Casualty Simulation & Systems  | Integrated  | Conducted via workshops and joint drills throughout the year  |

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# 8. LOGBOOK TEMPLATE FOR FELLOWSHIP PROCEDURES

Week/Month:

Clinical Rotations

* Rotation Site: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Consultant/Supervisor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Hours Completed: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## 8.1. Procedures Performed (modifiable to the standard CMC logbook)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date  | Procedure  | Trauma (T)/ Non-Trauma (NT) | Supervised By  | Comments  |
|   |   |   |   |   |
|   |   |   |   |   |
|   |   |   |   |   |

Clinical Insights / Reflections

* Case Complexity / Challenges:
* Lessons Learned:
* Follow-up / Audit Recommendations:

## 8.2. CME / Academic Activities

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity Type | Topic / Title | Date | Presenter / Faculty | Key Takeaways |
| Journal Clubs / Seminars Attended:  |  |  |  |  |
| Case Presentations Given:  |  |  |  |  |
| Simulation / Skills Labs:  |  |  |  |  |

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