OVERVIEW

- Emergency and Trauma Care Systems
- The DCP emergency components of essential packages
- WHO Emergency Care System Framework
- Emergency Care System Assessment Tool
PREVENTION

PREHOSPITAL & TRANSPORT

TRAUMA

EMERGENCY CARE SYSTEMS

SYSTEMS

REHABILITATION

FACILITY-BASED CRITICAL CARE
Of 45 million annual deaths in LMICs, 54% are due to conditions addressable by prehospital and emergency care.

1,023 million DALYs, 932 million years of life lost to premature mortality.
Figure 14.1 Burden of Disease Potentially Addressable by Prehospital and Emergency Care in LMICs

Total addressable deaths = 24.3 million
Total addressable DALYs lost = 1,023 million
Total addressable YLL = 932 million
Total addressable YLD = 91.4 million

Source: Data from WHO 2013.
Note: DALYs = disability-adjusted life years; LMICs = low- and middle-income countries; YLD = years lived with disability; YLL = years of life lost.
Emergencies occur everywhere, and each day they consume resources regardless of whether there are systems capable of achieving good outcomes.

Kobusingye, Bulletin of WHO
EMERGENCY COMPONENTS OF ESSENTIAL PACKAGES
Essential packages at each level of the health system include emergency components.

### Table 1.1 The Essential Surgery Package: Procedures and Platforms

<table>
<thead>
<tr>
<th>Type of procedure</th>
<th>Platform for delivery of procedure</th>
<th>Community facility and primary health center</th>
<th>First-level hospital</th>
<th>Second- and third-level hospitals</th>
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<td>Dental procedures</td>
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<td>1. Extraction</td>
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<td>2. Drainage of dental abscess</td>
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<td>3. Treatment for caries</td>
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<td>2. Vacuum extraction/forceps delivery</td>
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<td>3. Ectopic pregnancy</td>
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<td>4. Manual vacuum aspiration and dilation and curettage</td>
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<td>5. Tubal ligation</td>
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<td>6. Vasectomy</td>
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<td>7. Hysterectomy for uterine rupture or intractable postpartum hemorrhage</td>
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<td>8. Visual inspection with acetic acid and cryotherapy for precancerous cervical lesions</td>
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<tr>
<td>General surgical</td>
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<td>5. Drainage of superficial abscess</td>
<td>9. Repair of perforations: for example, perforated peptic ulcer, typhoid ileal perforation</td>
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<td>6. Male circumcision</td>
<td>10. Appendectomy</td>
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<td>11. Bowel obstruction</td>
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<td>12. Colostomy</td>
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<td>13. Gallbladder disease, including emergency surgery</td>
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<td>14. Hernia, including incarceration</td>
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<td>15. Hydrocelectomy</td>
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<td>16. Relief of urinary obstruction: catheterization or suprapubic cystostomy</td>
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*table continues next page*
## EMERGENCY COMPONENTS OF ESSENTIAL PACKAGES

### Obstetric, Gynecologic, Reproductive Health and Family Planning

#### Community Facility and Primary Health Centre
- Management of labour and delivery including initial treatment of complications
- Post-GBV care (prevention of STI/HIV, emergency contraception, support/counseling)
- Management of unintended pregnancy
- Management of miscarriage/incomplete abortion and post abortion care*
- Antibiotics for pPRoM
- Tetanus toxoid*
- Screening for complications of pregnancy
- Initiate antenatal steroids (as long as clinical criteria and standards are met)*
- Initiate magnesium sulphate
- Detection of sepsis

#### First Level Hospital
- Management of labour and delivery in high risk women
- Caesarean
- Vacuum extraction/forceps delivery
- Ectopic pregnancy
- Vacuum aspiration and dilatation and curette
- Hysterectomy for uterine rupture or intractable post-partum haemorrhage
- Antenatal steroids*
- Magnesium sulphate
- Treatment of sepsis
- Induction of labour post-term
- Ectopic pregnancy case management*
- *Detection and management of fetal growth restriction*

* Denotes that the intervention effect was included in the Lives Saved Tool (LiST).
## EMERGENCY COMPONENTS OF ESSENTIAL PACKAGES

### Obstetric, Gynecologic, Reproductive Health and Family Planning

### Child and Newborn Health

**Community Facility**
- Detect and refer severe acute malnutrition
- Detect and treat serious infections without danger signs
- Thermal care for preterm newborn
- Neonatal resuscitation
- Oral antibiotics for pneumonia

**Primary Health Centre**
- Treat severe acute malnutrition
- Detect and treat serious infections with danger signs*
- Kangaroo mother care
- Injectable and oral antibiotics for sepsis, pneumonia and meningitis

**First Level Hospital**
- Treat severe acute malnutrition associated with serious infection*
- Detect and treat serious infections with danger signs with full supportive care*
- Full supportive care for preterm newborn*
- Treatment of newborn complications, meningitis and other very serious infections*

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* Denotes that the intervention effect was included in the Lives Saved Tool (LiST).
EMERGENCY COMPONENTS OF ESSENTIAL PACKAGES

<table>
<thead>
<tr>
<th>Obstetric, Gynecologic, Reproductive Health and Family Planning</th>
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<tbody>
<tr>
<td>Child and Newborn Health</td>
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<tr>
<td>Injury</td>
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</tbody>
</table>

**Community Facility and Primary Health Centre**
- Resuscitation with BLS measures
- Suturing laceration
- Management of non-displaced fractures

**First Level Hospital**
- Resuscitation with advanced life support measures, including surgical airway
- Tube thoracostomy (chest drain)
- Trauma laparotomy
- Fracture reduction
- Irrigation and debridement of open fractures
- Placement of external fixator; use of traction
- Escharotomy/fasciotomy (cutting of constricting tissue to relieve pressure from swelling)
- Trauma-related amputations
- Burr hole
## EMERGENCY COMPONENTS OF ESSENTIAL PACKAGES

### Obstetric, Gynecologic, Reproductive Health and Family Planning

### Child and Newborn Health

### Injury

### General Surgical

#### Community Facility and Primary Health Centre
- Drainage of superficial abscess
- Drainage of septic arthritis
- Debridement of osteomyelitis

#### First Level Hospital
- Repair of perforations: for example, perforated peptic ulcer, typhoid ileal perforation
- Appendectomy
- Bowel obstruction
- Colostomy
- Gallbladder disease, including emergency surgery
- Hernia, including incarceration
- Relief of urinary obstruction: catheterization or suprapubic cystostomy
# Emergency Components of Essential Packages

## Obstetric, Gynecologic, Reproductive Health and Family Planning

- Obstetric, Gynecologic, Reproductive Health and Family Planning

## Child and Newborn Health

## Injury

## General Surgical

## Mental, Neurological, and Substance Abuse Disorders

### Community Facility and Primary Health Centre
- Management of prolonged seizures or status epilepticus (neurological disorders)
- Emergency management of poisoning (suicide and self-harm)

### First Level Hospital
- Diagnosis and management of acute psychoses (mental health disorders)
- Management of severe dependence and withdrawal (alcohol and illicit drug use)

### Specialised Care
- *Electroconvulsive therapy for severe or refractory depression* (mental health disorders)
<table>
<thead>
<tr>
<th>Topics</th>
<th>Community Facility and Primary Health Centre</th>
<th>First Level Hospital</th>
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<td>Obstetric, Gynecologic, Reproductive Health and Family Planning</td>
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<td>General Surgical</td>
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<td>Mental, Neurological, and Substance Abuse Disorders</td>
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<td>Cancer Care</td>
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<td>Detect and refer severe acute malnutrition</td>
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<td>Detect and treat serious infections without danger</td>
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<td>Thermal care for preterm newborn</td>
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<td>Neonatal resuscitation</td>
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<td>Oral antibiotics for pneumonia</td>
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<td>Treat severe acute malnutrition</td>
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<td>Injury resuscitation with BLS measures</td>
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<td>Suturing laceration</td>
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<td>General Surgical</td>
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<td>Mental, Neurological, and Substance Abuse Disorders</td>
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<tr>
<td>Community Facility and Primary Health Centre</td>
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<td>Hep B vaccination (including birth dose)</td>
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<td>First Level Hospital</td>
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<td>Emergency surgery for obstruction</td>
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WHO EMERGENCY CARE SYSTEM FRAMEWORK
EMERGENCY CARE SYSTEM FRAMEWORK

• Document of consensus-based essential components of emergency care systems.
• Designed for ministries, policy makers, health system administrators, and general advocacy
• Facilitates the identification of system gaps to aid in priority setting.
## WHO EMERGENCY CARE SYSTEM FRAMEWORK

### Site
<table>
<thead>
<tr>
<th>Primary Function</th>
<th>Components</th>
<th>Human Resources &amp; Training</th>
<th>Essential Medical Products, Technologies &amp; Infrastructure</th>
<th>Information and Research</th>
<th>Leadership and Governance</th>
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</thead>
<tbody>
<tr>
<td><strong>Bystander Response</strong></td>
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<tr>
<td>System Activation</td>
<td>Bystander wi-community-based training (including first aid, education on system activation and care-seeking behaviour)</td>
<td>Universal access number or activation system, centralised call processing</td>
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<td>Legislative mandate for universal activation of system; legislation regarding telephone company responsibility for UAN calls</td>
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<tr>
<td>Bystander Care</td>
<td>Patient protection</td>
<td>Limited assistance for immediate life threats</td>
<td>Basic lay provider kit of local materials</td>
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<td>Laws on the liability of the injured</td>
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<td><strong>Dispatch</strong></td>
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<tr>
<td>Instructions to bystanders</td>
<td>Information to aid patient</td>
<td>Dispatch operator</td>
<td>Communication technologies, including a form of centralised call processing; system should be redundant for design.</td>
<td>Data collection for performance metrics (time to public and private call, time to dispatch, time to ambulance services)</td>
<td>Protocols, regulations and guidelines for dispatch (including jurisdiction, remote care direction, destination triage, coordination of resources)</td>
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<td><strong>Scene</strong></td>
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<td>Dispatch of personnel</td>
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<td><strong>Provider Response</strong></td>
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<td>Scene Control (managing hazards)</td>
<td>Patient and provider safety</td>
<td>Initial assessment</td>
<td>Providers may include formally trained lay responder (e.g. EMT, police, professional responders, e.g. Nurses, EMT, Paramedic, Doctor);</td>
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<td>Scene Care</td>
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<td>Packaging of patient</td>
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<td><strong>Emergency Unit Care</strong></td>
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<td>Monitoring &amp; Reassurance</td>
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<td>Detailed Assessment</td>
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<td><strong>Transport</strong></td>
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<td>Patient Transport</td>
<td>Transport patient</td>
<td>Driver, Technical staff</td>
<td>Patient (with ambulance and personnel, space to give care)</td>
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<td>Laws and regulation pertaining care of emergency transport</td>
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<td>Transport Care</td>
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<tr>
<td>Registration</td>
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<td>Clinical Staff</td>
<td>Information system</td>
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<td>Laws addressing access to emergency care (required to provide surprise evaluation and management, regardless of ability to pay)</td>
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<td>Screening</td>
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<td>Case definitions, patient</td>
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WHO EMERGENCY CARE SYSTEM FRAMEWORK

Scene
- Bystander Response
- Dispatch
- Provider Response

Transfer
- Patient Transport
- Transport Care

Facility
- Reception
- Emergency Unit Care
- Disposition
- Inpatient Care
WHO EMERGENCY CARE SYSTEM FRAMEWORK

Site

Primary Functions

Bystander Response

Components

- System Activation
- Bystander Care
WHO EMERGENCY CARE SYSTEM FRAMEWORK

Site

Primary Functions
Bystander Response
Dispatch

Components
System Activation
Bystander Care
Instructions to Bystanders
Dispatch of Personnel
WHO EMERGENCY CARE SYSTEM FRAMEWORK

Site

Primary Functions

Bystander Response

Dispatch

Provider Response

Components

System Activation

Bystander Care

Instructions to Bystanders

Dispatch of Personnel

Scene Control

Scene Care

Field to Facility Communication

Destination Triage

SCENE
WHO EMERGENCY CARE SYSTEM FRAMEWORK

Site

Primary Functions

TRANSFER
WHO EMERGENCY CARE SYSTEM FRAMEWORK

Site

Primary Functions

TRANSFER

Patient Transport
WHO EMERGENCY CARE SYSTEM FRAMEWORK

Site

Primary Functions

TRANSFER

Patient Transport

Transport Care
WHO EMERGENCY CARE SYSTEM FRAMEWORK

Primary Functions
- Reception

Components
- Registration
- Screening
- Triage
- Handover
WHO EMERGENCY CARE SYSTEM FRAMEWORK

Site

Primary Functions

Emergency Unit Care

Components

Registration
Screening
Triage
Handover
Initial Assessment & Resuscitation
Monitoring and Revaluation
Detailed Assessment
Diagnostic Studies
Additional Therapeutics
Establishing Diagnoses
WHO EMERGENCY CARE SYSTEM FRAMEWORK

Primary Functions

Reception

Emergency Unit Care

Disposition

Components

Registration
Screening
Triage
Handover

Initial Assessment & Resuscitation
Monitoring and Revaluation
Detailed Assessment
Diagnostic Studies
Additional Therapeutics
Establishing Diagnoses

Communication System with Protocols
WHO EMERGENCY CARE SYSTEM FRAMEWORK

Primary Functions

- Reception
- Emergency Unit Care
- Disposition
- Inpatient Care

Components

- Registration
- Screening
- Triage
- Handover
- Initial Assessment & Resuscitation
- Monitoring and Revaluation
- Detailed Assessment
- Diagnostic Studies
- Additional Therapeutics
- Establishing Diagnoses
- Communication System with Protocols
- Early Operative Care
- Early Critical Care
WHO EMERGENCY CARE SYSTEM FRAMEWORK

Scene
- Bystander Response
- Dispatch
- Provider Response

Transfer
- Patient Transport
- Transport Care

Facility
- Reception
- Emergency Unit Care
- Disposition
- Inpatient Care
### WHO EMERGENCY CARE SYSTEM FRAMEWORK

**Site** | **Primary Function** | **Components** | **Human Resources & Training** | **Essential Medical Products, Technologies & Infrastructure** | **Information and Research** | **Leadership and Governance**
--- | --- | --- | --- | --- | --- | ---
**Bystander Response** | System Activation | Bystander v-c, community-based training (including first aid, education on system activation and care-seeking behaviour) | Universal access number or activation system, centralized call processing | Legislative mandate for universal activation of system, legislation regarding telephone company responsibility for 911 calls | Laws on the relief of the injured |
| Bystander Care | Patient protection | Limited assistance for immediate life threats | Basic lay provider kit of local materials | Training accreditation for lay providers | Bystander Protection (Good Samaritan Law) |

**Dispatch**

**Instructions to Bystanders** | Information to aid patient | Dispatch operator | Communication technologies, including a form of centralization; call processing; system should be robust for design. | Protocols, guidelines for dispatch (cell) jurisdiction, remote care direction, triage coordination. |

**Scene**

**Scene Control (managing hazards)** | Patient and provider safety | Providers may include formally trained lay responder (e.g., EMTs) | Basic principles of patient care | Data collection for performance metrics (time to public and private call, time to dispatch, time to ambulance services). |

**Provider Response**

**Scene Care** | Initial assessment | Providers may include formally trained lay responder (e.g., EMTs) | Basic principles of patient care |
| Initial resuscitation & stabilization | Professional responders (e.g., Nurses, EMT, Paramedic, Doctor) | Basic principles of patient care |
| Packaging of patients | Field and facility-based providers, technical experts | Comm field unit |

**Destination Triage** | Field to Facility Communication | Field and facility-based providers, technical experts |

**Patient Transport** | Transport patient | Driver, Technical support director | Vehicle (with ambulance functionality, space to give care) | Laws and regulations governing use of emergency vehicles |

**Transfer**

**Transport Care** | Positioning (primary & secondary) | Monitoring (ABCD, O2 delivery, pain control) | Provider | Transport care kit | Clinical documentation (including chief complaint and diagnosis), process measurements, performance metrics |

**Facility**

**Initial Assessment & Resuscitation** | Syndromic intervention & ABCD interventions | Provider (i.e., in-house, independent contractor) | Basic evaluation and acuity-based resuscitation (ABCD) kit | Basic study into, process metrics (time to provide), Time to intervention, clinical acuity, early response to therapy, utilization data | Good practice and documentation guidelines, evidence-based, externally validated resuscitation guidelines |

**Monitoring and Resuscitation** | Monitoring and resuscitation intervention | Provider, Allied Health Professional | Acuity-based monitoring kit | Disease time course and progression |

**Detailed Assessment** | Clinical evaluation | Provider | Radiology and laboratory equipment, system for results reporting |

**Diagnostic Studies** | | Provider | | LOS, time to diagnose, time to consult |

**Emergency Unit Care** | | | |
EMERGENCY CARE SYSTEM ASSESSMENT TOOL
EMERGENCY CARE SYSTEM ASSESSMENT TOOL

• An instrument for internal or external assessment of national or sub-national emergency care systems.
• Survey structure in which answers represent progressive stages of system development
• Creates roadmap functionality to guide priority setting.
• Goal is to generate priority action plans
8.12 Is there an organized system for determining the right destination for injured patients?

Choose one of the following answers

- [ ] There are no destination triage protocols or system. Decisions are made based on provider or patient preference.
- [ ] An advisory service (e.g., staffed telephone) is available for advice regarding patient destination; however, there are no protocols governing destination triage.
- [ ] Some protocols regulate destination triage, however these are not system-wide or reliably monitored. There is not a reliable back-up advisory system to provide clinical support where required.
- [ ] System-wide protocols regulate destination triage and are centrally monitored. However there is not a reliable back-up advisory system to provide clinical support where required.
- [ ] System-wide protocols regulate destination triage and are centrally monitored. There is a reliable back-up advisory system to provide clinical support where required.
- [ ] I don’t know.
- [ ] Cannot answer for another reason (explain):

8.13 What proportion of the population has effective coverage (see box) by a formal pre-hospital ambulance system?

**Note:** Effective coverage refers to reliable access to timely on-scene emergency care followed by transport with a provider when needed.

Access to ambulance services implies geographic availability, but also includes functional availability (e.g., financial access).

Where private ambulance services exist, coverage estimate should be adjusted to take financial barriers into account.
Emergency unit staffing in first-level referral facilities:

First-level referral facilities are the lowest level of facility that receives referrals. In many countries, these are district hospitals. An emergency unit is any dedicated intake area for acutely ill and injured patients. This may be referred to as the Emergency Department/Room/Ward, Accident and Emergency, Casualty, etc.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>There are no dedicated emergency units or no providers with specific responsibility for emergency unit patients until they are admitted.</td>
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<tr>
<td>2</td>
<td>There are non-doctor staff that register and direct patients from the emergency unit to inpatient areas (the unit has a sorting function, but minimal care is provided).</td>
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<td>3</td>
<td>Doctors from inpatient services have on-call responsibility to cover emergency unit patients, but are not assigned to be in the emergency unit.</td>
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<tr>
<td>4</td>
<td>Doctors from inpatient services are assigned to be in the emergency unit, rotating through for limited intervals (e.g. 1 month blocks).</td>
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<tr>
<td>5</td>
<td>There are non-rotating providers that permanently staff the emergency unit.</td>
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<tr>
<td>☐</td>
<td>I don't know.</td>
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<tr>
<td>☐</td>
<td>Cannot answer for another reason (explain):</td>
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</table>
## WHO EMERGENCY CARE SYSTEM FRAMEWORK

<table>
<thead>
<tr>
<th>Site</th>
<th>Primary Function</th>
<th>Components</th>
<th>Human Resources &amp; Training</th>
<th>Essential Medical Products, Technologies &amp; Infrastructure</th>
<th>Information and Research</th>
<th>Leadership and Governance</th>
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<td>Bystander</td>
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<td>Bystander</td>
<td>Patient protection</td>
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<td>Care</td>
<td>Limited assistance for immediate life threats</td>
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<tr>
<td>Dispatch</td>
<td>Instructions to bystanders</td>
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<td>Information to aid patient</td>
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<td>Dispatch of personnel</td>
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<td>Provider</td>
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<td>Response</td>
<td>Scene Control (managing hazards)</td>
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<td>Initial resuscitation &amp; stabilization</td>
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<td></td>
<td>Providers may include formally trained lay responder (eg, EMT, paramedic, RN)</td>
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<td>Packaging of patient</td>
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<td>Preliminary diagnoses</td>
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<td>Field to Facility Communication</td>
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<td>Destination Triage</td>
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<td>TRANSFER</td>
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<td>Vehicle (with ambulance functionality, space to give care)</td>
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<td>Minimum standards for transport care</td>
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<td>Laws and regulation governing role of emergency vehicles</td>
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<td>FACILITY</td>
<td>Initial Assessment &amp; Resuscation</td>
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<td>Synoptic intervention &amp; ABCD interventions</td>
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<td>Basic evaluation and acuity based resusciation (ABC)</td>
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<td>Basic study into process metrics (time to provide)</td>
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<td>Disease classifications</td>
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### Scene
- Scene Control (managing hazards)
- Initial assessment
- Initial resuscitation & stabilization
- Provider
- Scene Care
- Packaging of patient
- Preliminary diagnoses
- Field to Facility Communication
- Destination Triage

### Transfer
- Patient Transport
- Transport patient
  - Driver, Technical support staff
  - Vehicle (with ambulance functionality, space to give care)
- Minimum standards for transport care

### Facility
- Initial Assessment & Resuscitation
- Synoptic intervention & ABCD interventions
- Provider (EMT, Independent doctor)
- Basic evaluation and acuity based resuscitation (ABC)
- Basic study into process metrics (time to provide)
- Time to intervention, clinical protocol
- Disease classifications
- Establishment of guidelines for delivery of patients in hospitals
- Procedure for specific interventions
- Good practice and documentation guidelines
PREVENTION

PREHOSPITAL & TRANSPORT

TRAUMA

EMERGENCY CARE SYSTEMS

FACILITY-BASED CRITICAL CARE

SYSTEMS

REHABILITATION
SUSTAINABLE DEVELOPMENT GOALS

Ensure healthy lives and promote well-being for all at all ages

Make cities and human settlements inclusive, safe, resilient and sustainable
625,000 RTI deaths

SDG 3.6 RTI fatality reduction target

Mock et al. (2012) An Estimate of the Number of Lives that Could be Saved through Improvements in Trauma Care Globally. WJS
Lives potentially saved every year in LMIC by improvements in trauma care

562,000 RTI deaths

SDG 3.6 RTI fatality reduction target

Mock et al. (2012) An Estimate of the Number of Lives that Could be Saved through Improvements in Trauma Care Globally. WJS
Emergency Care and SDG Targets

3.1: Reduce by three quarters, between 2015 and 2030, the maternal mortality ratio
   **Treatment for obstetric emergencies**

3.2: Reduce by three quarters, between 2015 and 2030, the under-five mortality rate
   **Treatment for diarrhea and pneumonia**

3.3: Reverse the incidence of malaria and other major diseases and ensure that deaths caused by these diseases are reduced by a half in 2030
   **Treatment of acute infections and sepsis**

3.4: By 2030, reduce by one-third premature mortality from NCDs
   **Treatment of exacerbations of NCDs**

3.5: Strengthen the treatment of substance abuse
   **Emergency unit care and harm reduction interventions**

3.6: Halve the burden due to global road traffic crashes by halving the number of fatalities and serious injuries by 2030 compared to 2010.
   **Post-crash emergency care**

3.8: Achieve universal health coverage including financial risk protection and access to quality essential healthcare services
   **Emergency care is an essential component of health care**

11.5: By 2030, significant reduce the number of deaths and people affected caused by disasters
   **Disaster preparedness and response for resilient health systems**
The **WHO Emergency Care System Framework** and associated assessment tool are designed to characterize system gaps, set planning and funding priorities, and establish monitoring and evaluation strategies for system strengthening and development.

Emergency care system strengthening will be essential for increasing global capacity for the emergency procedures DCP essential packages at each level of the health system include.

Need to summarize and synthesize evidence of the effectiveness of emergency care interventions and provide comparative economic evaluation of policies to implement those interventions.
Figure 1 Burden Addressable by Prehospital Care

Regional Distribution of Deaths Addressable by Prehospital and Emergency Care in LMICs

- Sub-Saharan Africa, 21
- East Asia and the Pacific, 29
- Europe and Central Asia, 12
- Latin America and the Caribbean, 7
- Middle East and North Africa, 4

Total addressable deaths in LMICs = 24.3 million

*Note: All figures are percentages. These graphs include all deaths and DALYs avertable by prehospital care, not just those from road traffic injuries.

Regional Distribution of DALYs Potentially Addressable by Prehospital and Emergency Care in LMIC

- Sub-Saharan Africa, 32
- East Asia and the Pacific, 21
- Europe and Central Asia, 8
- Latin America and the Caribbean, 6
- Middle East and North Africa, 4

Total addressable DALYs in LMICs = 1,023 million