وزارة الصحة
Ministry of Health

Inter-facility Critical Care Transportation Policy

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Table of Contents

1 Summary:

This document summarizes the recommended policy to transport patients between health care facilities. It is written to describe clinical, administrative and logistic standards needed to achieve safe critical care transport.
What is critical care transport? There are multiple factors that determine the acuity of a medical case. These factors cannot be measured at all times, however, the provider clinical judgement is an important tool that can distinguish critical and non-critical case presentation. There are multiple definitions found in medical literature and we think numerical score that measure care needed during transport can be more practical to determine define the acuity of medical cases. Implementing clear policy can standardize the variation observed in Saudi critical care transport practice. The mode, transport teams and clinical care provided during transport are important factors and can directly impact the patient outcomes.
This document is intended to address policies pertaining to patients' selection, mode of transport, team composition, logistics and clinical care provided during transfer. It outlines the patient journey from transport decision to patient arrival to designated facility.

2 Introduction:

Care regionalization and specialist care services have increased the demand for moving critically-ill patients between hospitals (interfacility transport). Interfacility transfers carry risks to the patient, especially when the patient's vital functions are dependent on external devices such as ventilators. In 2020, Saudi Ministry of Health (MOH) through the medical referral center EHALA processed 391988 requests of transfer between MOH facilities, of which 23654 were life-saving requests that need to be transferred urgently within 24 hours.

3 Aim & scope:

To assist medical facilities and health care providers determining the most appropriate method of critical care transport, team composition and to achieve a safe patient journey. The policy addresses administrative, logistics and clinical standards recommended during critical care transports. This document doesn't address the acceptance policy as this will continue via the medical referral center EHALA system.

4 Targeted end users:

This policy is intended for all stakeholders within the ministry of health, other governmental health care facilities and private sector. Regional health directorates, emergency disaster and ambulatory transportation departments, hospital directors, clinical managers and medical practitioners. It applies to all stages of Inter-facility critical care transfers (IFCT).

5 Conflict of interest:

The authors have no conflicts of interest to declare. All co-authors have seen and agree with the contents of the manuscript and there is no financial interest to report.

6 Definitions:

6.1 Critical care transport

The definition of critical care transfer is variable. The Risk Score for Transported Patient (RSTP) should be the standard to determine the critical care transport patient. The RSTP is a score system developed to identify patients at higher risk of developing complications during inter-facility transfer[1]. Patients with RSTP > 6 were defined as critically-ill patients. The complete RSTP is provided in appendix1.

Clinical judgment always surpasses the policy after discussion with 1937 lifeline consultant considering risk benefit ratio.

7 Procedure:

Safe patient journey is dependent on many factors. On top of this list is the proper communication and administrative coordination. It can be disastrous to move a patient without prior administrative coordination. The first thing to be done after transport decision is to start a systematic administrative coordination.

7.1 Initiation:

This policy doesn't address the acceptance of patients within hospitals, as this will remain through the medical referral center EHALA system and the current practice. The decision to transfer a patient can be divided into two categories: clinical or administrative. Clinical reasons are usually connected to care provided to patients and administrative are concerning internal coordination to preserve medical services to those in need or for social purposes, for example an administrative initiation of transfer can be granted to preserve Intensive Care Unit (ICU) beds to assure continuity of services to certain hospital.

Initiation of transfer either clinical or administrative should be systematic and simple. The transfers should be initiated after the discussion has been made by the managing team, a referral should be initiated via EHALATI electronic system, after acceptance the referring team should contact the lifeline (1937) to confirm the fulfillment of the safety requirements, this can be via the primary nurse or other clinical team member deemed appropriate by the most responsible physician. It is critical to ensure that a transfer team is available or can be formed in timely fashion as time critical diseases such as Myocardial Infarctions (MI) and strokes may occur at any time. Transport services must be available 24 hours.

7.2 Stability:

Unstable patients must be stabilized first before transfer to another hospital/facility, unless the transferring physician decides (should be documented in the patient's record) that the medical benefits provided to another facility outweigh the increased risk of the transfer. The receiving hospital physician must approve the transfer, and the patient/relatives must agree to the transfer.

7.3 Communication and coordination:

Communication should be centralized. The referral should be logged in the Medical Referral Center (MRC) electronic system and the conformation should be via the Life line 1937. The Life line 1937 is the designated communication center that will facilitate coordination. The center will review the case and medical acceptance can be issued through the center. The referring physician is responsible for all turnover information needed to assure safe transfer.
Reliable communication between receiving and sending facility should be maintained at all stages of transfer. The receiving facility will receive notification prior to patient departure. The transport team can establish communication with receiving facility for care queries and recommendation during transfer.

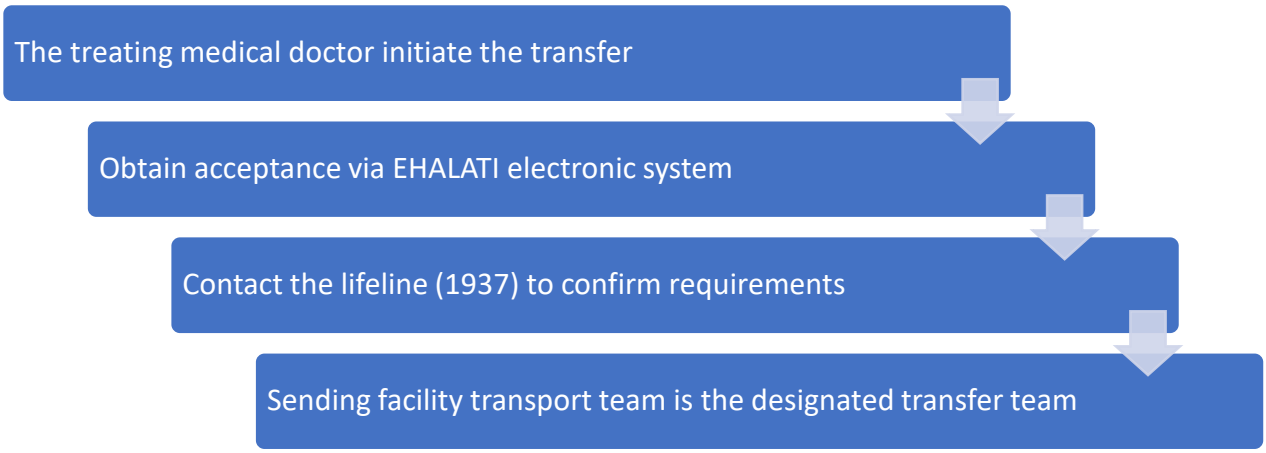


Figure 1 Flow chart of transfer

7.4 Documentation:

Standardized clinical form to transfer must be filled by the transporting team. The transport team must document clinical status before, during and after transfer. Patient past medical history including diagnostics (Labs & images), the The procedures and others interventions, interventions, the continuing patient needs. and adverse effect/complication during transfer must be documented.

8 Mode of transport:

Mode of transport can be ground, air or sea. Determining the mode of transport can be challenging. The first and foremost factor should be the patient status, urgency, stability and required medical support needed. The mode need to be chosen in relation to the urgency of transfer, staff required, range and speed of vehicle, weather condition, and cost.

8.1 Ground transport is the standard mode of transportation. Ground transportation is usually the least expensive, most stable, rapid mobilization, familiar to staff, less potential to physiological disturbances and easier for patient monitoring.\

8.2 Rotary (Helicopters) vary in size, accommodation and range. They generally provide a less comfortable environment than a road ambulance or pressurized fixed wing aircraft. Vibration and acceleration / deceleration forces significantly adversely affect patient hemodynamics and monitoring. In addition, they are expensive and have a poorer safety record than fixed wing aircraft and ground. Due to expense, they are not usually available to return staff and equipment to the base hospital and alternative arrangements will have to be made. If the decision is to use rotary method, the sending facility need to arrange with medical evacuation air management (Ministry of Defense-Armed forces medical service)

8.3 Fixed wing air medical transport can be considered to geographic distances more than 150 km. Fixed wing usually considered the most expensive mode. If the decision is to use fixed wing aircraft method, the sending facility need to arrange with medical evacuation air management (Ministry of Defense-Armed forces medical service)

9 Staffing:

A designated critical care transport team is recommended. It is recognized that not all facilities can secure such teams. Thus, the team needs to have adequate clinical understanding of the patient's medical condition and potential transport complications (that is, altitude, temperature, movement, etc.). The team must also be aware of the treatment options available to them prior to and during transport of the patient. The recommendation of critical care transport team staff is:

9.1 The highest qualified, licensed medical provider is the designated team leader and responsible person. Transferring teams consist of various combinations of providers that include: Nurses, respiratory therapist, paramedics, and physicians. The highest qualified, licensed medical provider shall assess and arrange the interdisciplinary team and transportation need of the patient

9.2 Critical care transport must be accompanied by a qualified medical team with the patient (at least two).

9.3 The qualifications of the staff member should be appropriate for the patient's condition (Advanced Life Support vs. Basic Life Support).

9.4 When treating special patient populations (e.g. high-risk obstetric, pediatric, neonatal, ECMO), additional clinical experience, training, equipment and technology must be incorporated into the team and its delivery of critical care as appropriate to the medical conditions of the patient.

9.5 On extended journeys, sufficient staff should be available to allow maintenance of high standards of patient care, and to allow for staff rest.

10 Equipment's:

Equipment during critical care transport should be selected based on patient condition, the duration of transportation, the patient's diagnosis, severity of illness and the level of therapeutic intervention required. A special attention must be given to size, weight, volume, battery life, oxygen consumption and durability, as well as to suitability for operation under conditions of transport. Supplies, including oxygen and medications, should be in excess of that estimated for the maximum transport time.

Patient stretchers and all equipment must be restrained. Electrical and gas supply fittings of all equipment must be compatible with those of the transport vehicle. Specialized equipment is sometime required, for example, for neonatal and pediatric transport, as well as for patients requiring extra-corporeal life support. Equipment that should be considered includes:

10.1 Respiratory support equipment

- Airways (range of oral and nasopharyngeal airways and a range of laryngeal mask airways).
- Oxygen, masks, nebulizer.
- Self-inflating bag for hand ventilation.
- Positive end-expiratory pressure valve.
- Suction equipment of appropriate standard.
- Portable ventilator with disconnect and high-pressure alarms.
- Intubation equipment and endotracheal tubes.
- Emergency surgical airway set
- Difficult airway equipment (Supraglottic airways, bougie intubation and video laryngoscopy)
- Pleural drainage equipment.

10.2 Circulatory support equipment

- Monitor/defibrillator/external pacer combined unit.
- Pulse oximeter.
- Automatic sphygmomanometer with a range of cuff sizes.
- Vascular cannula, peripheral and central.
- Intravenous fluids and pressure infusion set.
- Infusion pumps.
- Arterial cannula and pressure transducer kit.
- Syringes and needles.
- Pericardiocentesis and thoracotomy equipment.
- A sharps disposal container and a bag for biological waste.

10.3 Other equipment

- Nasogastric tube and bag.
- Urinary catheter and bag.
- Nasal decongestant spray.
- Instruments, sutures, dressing, antiseptic lotions, gloves.

- Thermal insulation and temperature monitor.
- Splints and equipment for spinal and limb immobilization.
- Neonatal/pediatric/obstetric transport equipment when applicable.
- Dressings, bandages, slings, splints and tape.
- Cutting shears and portable torch.
- Gloves and glasses for staff protection.
- Consideration should be given to: Alternative vascular access such as intraosseous devices for adults and children. Blood for transfusion when indicated.

10.4 Pharmacological agents

All drugs should be checked and clearly labelled prior to administration. The range of drugs available should include all drugs necessary to manage acute life-threatening medical emergencies (ACLS drugs are mandatory) and those specific to the patient's clinical condition. Close attention must be paid to drugs that require refrigeration to maintain effectiveness.

10.5 Infection control

For infection control, please refer to attached Ministry of Health Emergency Medical Services (EMS) infection control guidelines.

11 Monitoring

11.1 Monitoring of certain physiological variables

Should be carried out before and during transport. The transferring team shall reassess patient clinical status prior to transfer and document on the ambulance flow sheet, the monitoring done all throughout the transfer process and be prepared for the immediate management in case a change of patient clinical status occurs. Some or all of these basic recommendations will need to be exceeded routinely depending on the physical status of the patient.

11.2 Clinical patient monitoring

11.2.1 Circulation:

The circulation must be monitored and recorded at frequent and clinically appropriate intervals by detection of the arterial pulse, measurement of the arterial blood pressure and assessment of peripheral perfusion.

11.2.2 Respiration:

Respiratory rate should be assessed and recorded at frequent and clinically appropriate intervals.

11.2.3 Oxygenation:

The patient's oxygenation should be assessed at frequent and clinically appropriate intervals by observation and use of pulse oximetry.

11.2.4 Level of consciousness by Glasgow Coma Scale and pupil reaction.

11.2.5 Pain score:

Patients' pain should be monitored including regular assessment of pain scores and managed appropriately.

11.2.6 Patient comfort:

Even deeply-sedated patients should be provided with appropriate noise, eye and environmental protection.

11.2.7 Pressure care, including invasive devices, is essential for all patients who are unconscious, immobilized or have impaired movement, sensation and/or perfusion. Ventilated patients in particular require continuous attention to eye care and effects of the ETT and other invasive devices.

11.3 Equipment monitoring

11.3.1 Pulse oximeter and capnography:

A pulse oximeter must be used for every critically ill patient during transport. All patients undergoing artificial ventilation (for example, via a tracheal tube or supraglottic airway) must have a form of capnography, ideally waveform. Waveform capnography should also be considered for sedated patients.

11.3.2 Alarms for breathing system disconnection or high pressure and ventilator failure:

When an automatic ventilator is in use, a device capable of warning promptly of low and high pressure in the breathing system should be in continuous operation.

11.3.3 Electrocardiograph:

Equipment to monitor and continually display the electrocardiograph must be used for every critically ill patient during transport.

11.3.4 Physiological pressures:

Equipment for the invasive or non-invasive recording of blood pressure must be used. Where clinically indicated, other physiological pressures should be available for all critically ill transported patients.

11.3.5 Other equipment:

When clinically indicated, equipment to measure other physiological variables, such as temperature and point of care blood analysis should be available. Portable ultrasound is recommended where appropriately trained and credentialed personnel are available.

11.3.6 Equipment alarms:

Equipment should incorporate audible and visual alarms

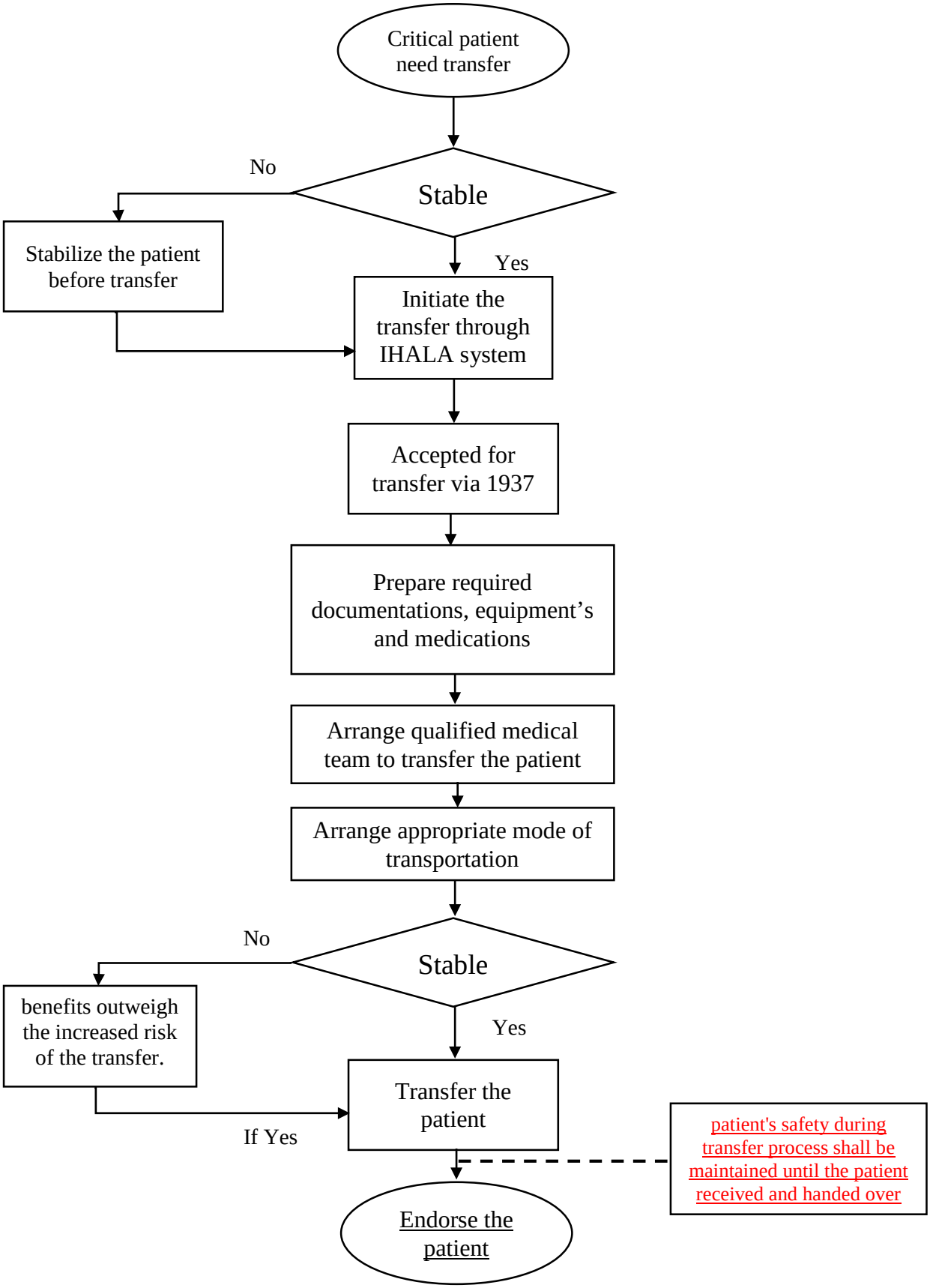
12 Responsibilities:

The sending facility and their transport team is the designated care provider during transfer, Medical care and interventions are under the responsibility of the transport team.

Responsibilities of the sending physician and facility

- Immediate patient assessment and resuscitation according to ATLS, ACLS, PALS, BLS protocols, also the necessary medical interventions to stabilize the patient before and during transportation.
- The decision of patient referral is made by the referring physician based on the patient's needs and available resources in the referring hospital.
- Arrangement of the appropriate medical team, ambulance and equipment's needed to accompany the patient in the ambulance during the transportation.
- All notes, radiological studies, investigations and any other relevant information should be endorsed to the receiving hospital.
- The referring physician is responsible for care and patient's safety during transfer process, until the patient received and handed over to the other physician in the accepting facility. When patient become unstable during transfer, the transfer team need to call 1937 and divert to the nearest appropriate medical facility. In case of patient arrival to destination in unstable condition, the sending facility transfer team is the responsible providers.
- The transferring team shall obtain signature from the receiving hospital on the transfer-out form with the original copy provided to the receiving hospital and duplicate copy to attach to patient medical record, after complete endorsement or hand over of patient is done.

13 Transfer pathway:



14 Updating:

Regular review and updates as clinical evidence reveals is mandatory. Improvement in medical technology and clinical practice guidelines can regularly incorporated through the annual update.

15 Appendix 1 Risk score for transport patient:

Risk score for transport patients*	
1. Hemodynamics	
Stable	0
Moderately stable (requires volume <15 ml/min in adults)	1
Unstable (requires volume >15 ml/min or inotropic or blood)	2
2. Arrhythmias (existing or probable)	
No	0
Yes, not serious (and AMI after 48 hours)	1
Serious (and AMI in the first 48 hours)	2
3. ECG monitoring	
No	0
Yes (desirable)	1
Yes (essential)	2
4. Intravenous line	
No	0
Yes	1
Pulmonary artery catheter/Central venous	2
5. Provisional pacemaker	
No	0
Yes (not invasive). AMI in the first 48 hours	1
Yes (Invasive)	2
6. Respiration	
Respiratory rate between 10 and 14 breaths/min in adults	0
Respiratory rate between 15–35 breaths/min in adults	1
Apnea <10 or >36 or irregular breathing	2
7. Airway	
No	0
Yes (Oropharyngeal/nasopharyngeal tube)	1
Yes (intubation or tracheostomy)	2
8. Respiratory support	
No	0
Yes (oxygen therapy)	1
Yes (mechanical ventilation)	2
9. Assessment	
GCS = 15	0
GCS 8–14	1
GCS < 8 and/or neurological disorder	2
10. Prematurity	
Newborn .2000 g	0
Newborn between 1200 and 2000 g	1
Newborn ,1200 g	2
11. Technopharmacological support (see medication group table)	
None	0
Group I	1
Group II	2

*Adopted from Markakis C et al.

16 Appendix 2 Medication group table:

Group I	Inotropic Vasodilator Antiarrhythmics Bicarbonate Analgesics Antiepileptic Steroids Mannitol 20% Thrombolytics Naloxone Thoracic tube Suction
Group II	Two or more inotropics Infant incubator General anesthetics Uterine relaxants

17 References:

[1] Markakis C, Dalezios M, Chatzicostas C, Chalkiadaki A, Politi K, Agouridakis PJ. Evaluation of a risk score for interhospital transport of critically ill patients. Emergency Medicine Journal. 2006;23(4):313-7.