Department of Emergency Medicine Manual

June 2010
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MESSAGE FROM THE CHAIRMAN

I have the singular privilege of being associated with this department as its medical director/chairman at a time when it is going through a drastic transformation. During the past years, a lot of progressive changes have evolved. Some of these positive changes include its transformation into an academic department. This further expanded the department’s primary mandate of rendering fast efficient emergency care to our patients, and to provide a scientifically conducive educational environment for all trainee and also motivated us to invest more effort in undergraduate and postgraduate training in addition to expanding our frontier in research.

Due to the strong confidence we have built, Our DEM has been and being over-flooded with high number of patients. To this end, the University has agreed with the proposal to expand the DEM in order to meet with the ever increasing demand of our community. We have met concerted efforts to install a more suitable environment in the new DEM.

To the nurses care in particular, I have always held the view that nurses are the necessary pivot around which any hospital could effectively revolve and function. They have endured to accommodate patients on the hallways and corridor in the face of imbalance in the nurse-patient ratio, and sometimes, outside the established scope of their practice. The pilot sponsorship of nurses to the advanced trauma care for nurses ATCN & PALS have paid good dividend as most of them who attended the courses have passed.

EMS services have been re-invigorated under the leadership of EMS Director, and they deserve our commendations. They have lived up to their responsibility of responding to calls from the housing, the university, and quite often from accident scenes. Their services at the main door as well as their complementary involvement in resuscitations within the department have been highly appreciated. In view of the dynamics of the operations of this unit, we intend to further develop it well enough to live up to the societal expectations.

We will continue to support the staff to partake in relevant courses and training.

Finally, I wish to recognize the unrivalled contribution of the Dean of medical college, professor Musaed Al Salman, both in the day-to-day smooth administration as well as for his wisdom and supporting efforts. The department and the specialty owe him a lot for this.

Dr. Zohair Al Aseri FRCPC EM & CCM
Chairman, Department of Emergency Medicine
Section 1: Administration.

1  Vision, Mission and Values of the Department
• **Vision**
  ▪ Department of Emergency Medicine at King Saud University will be the leader in the Middle East in providing Emergency Medical Care, Research and Education

• **Mission**
  ▪ We are committed to provide effective quality emergency medical care for all patients with acute and potential life threatening condition according to their acuity level.
  ▪ We conduct high quality studies to enhance research in the field of Emergency Medicine
  ▪ We are committed for professional development at all levels through conducting courses, workshops, case studies, and continues medical education
  ▪ We are committed to Undergraduate & Postgraduate education in emergency medicine program and other related programs
  ▪ We are committed to Emergency Medicine Science development in the Kingdom and the gulf region through Postgraduate and Undergraduate Education and participation in different health organizations
  ▪ We are committed to provide Emergency Medical Services to KSU and the surrounding area.

• **Values**
  ▪ Patient focused
  ▪ Transparency
  ▪ Trust
  ▪ Patient autonomy
  ▪ Professionalism
  ▪ Responsibilities
  ▪ Team Work
  ▪ Multicultural values

2 **Scope of Service**

2.1. Clinical Services
The DEM provides a comprehensive emergency service to all patients presenting to the department on a 24 hours a day 7 days a week basis. **The services include:**

- **Patient care:**
  - Accepts all patients with acute illness for treatment.
  - Triage patients according to a 5-level Canadian Triage Acuity Scale system (CTAS); ensuring patients are assessed and sorted according to acuity.
  - Plan for Assessment, diagnosis, treatment & medical referral for all patients as necessary.
  - Perform emergency medical intervention and resuscitation.
  - Provides advanced Trauma Care to trauma patients.
  - Liaise with all hospital departments for patient admission and follow up.
  - Provides care in case of disaster to the community.
  - Operates an Urgent Care Center almost continuously to meet the needs of less acute presentations.
  - Receives and assesses the stability of direct admissions, including MediVac patients en route to critical care areas within the hospital.

- **Patient Presentations include:**
  - **Respiratory Emergencies**
    - Acute airway obstruction
- Acute respiratory failure
- Exacerbation of COPD, asthma, broncheactasis ….

- **Cardiovascular Emergencies**
  - Cardiac heart failure
  - Arrhythmias
  - Acute Coronary Syndrome
  - Post cardiac surgery complications
  - VTE

- **Gastrointestinal Emergencies**
  - GI Bleed
  - Bowel Ischemia
  - Biliary tree diseases
  - Bowel obstruction
  - Gastroenteritis
  - Malnutrition
  - Vomiting/diarrhoea
  - Food poisoning

- **Neurological Emergencies**
  - Infections
  - Stroke
  - Seizure disorders
  - Head injury
  - Spinal injury
  - Acute rise of ICP
  - Acute pain presentation

- **Oncological Emergencies**
  - Spinal cord compression
  - Infection in immunocompromised patient
  - Haemmorhage
• Tumour lysis syndrome
• Chemo and/or radiation complications

■ Genitourinary Emergencies
  • Infection
  • Trauma
  • Acute urinary obstruction
  • Torsion testes
  • Priapism

■ Trauma (any types)
  • Thermal injury
  • Motor vehicle accident
  • Explosion injury
  • Orthopedic fracture
  • Chemical exposure

■ OB/GYN
  • Infection
  • Early pregnancy emergencies
  • Precipitous Delivery
  • PV haemmorhage

■ Environmental & Toxicology
  • All type of intoxication
  • Heat related diseases
  • Occupational diseases
  • Marine Medicine
  • Aviation Medicine

■ Frequent Procedures/Services/Functions:
The DEM utilizes numerous diagnostic and therapeutic modalities to facilitate patient care, including the following:
  • Procedure Sedation and Analgesia
  • Rapid sequence intubation
• Mechanical ventilation
• Defibrillation
• Synchronized Cardio-version
• Provision of Advanced Cardiac Life Support
• Provision of Paediatric Advanced Life Support
• Haemodynamic support: inotropes, anti-arrhythmics
• Emergency Nursing Process
  • Primary Survey and Secondary Survey
  • Initiation of life-saving measures
  • Recognition of pathophysiological basis to emergency
  • Articulation of Trauma Nursing Process
  • Ongoing assessment of nursing care
  • Review of nursing efficacy
  • Patient advocacy
  • Cardiac monitoring and rhythm interpretation
  • Recording of 12-lead ECG’s
  • IV cannulation
  • Ongoing nursing management of critically ill patients, unable to transfer to CCU/ICU
  • Management of intravenous therapy including blood transfusion
• Placement of chest tubes
• Placement of central lines including haemodynamic monitoring lines
• Initiation of cervical immobilisation and spinal precautions
• Placement of nasogastric tubes
• Placement of urinary catheters
• Assessment, reporting and treatment of pressure ulcers
• Family health education
• Acute/acute-on-chronic pain management
• Emergency childbirth
• End of life care

2.2 Education: Training of medical, nursing, paramedical and administrative staff
  ▪ Non Formal Teaching

In terms of teaching, we provide 24 hour/day, 7 day/week on-site training.
Formal Teaching

Educational Rounds

There are a number of educational rounds as follow:

1. **Adult Morning Report Rounds**: Daily 8:00-9:00 Department's Education mini-conference Room. Discussing Interested Cases

2. **Half Day Academic Activities "Adult"**: Monday, 8:00-11:00 (2nd week of each Gregorian month)

3. **Half Day Academic Activities "Pediatric"**: Each 1st & 2nd Sundays of each Gregorian month

4. **Residency Program Half-Day Academic Activities "Adult"**: Monday, 8:30-12:30 (3rd & 4th week of each Gregorian month)

5. **Journal Club/Literature Review**: The journal club is held in a less formal event every fourth Tuesday evening of each Gregorian month with the goal of teaching an organized method to evaluate the literature, analyze research design and examine important topics in Emergency Medicine.

6. **Quality day**: 1st Monday of the Gregorian month 8:00-11:00. This is a mini conference that discussed all quality issues related to the department including Mortality and morbidity when a discussion of patient with difficult management problems or complex presentation, also new guideline and policies been discussed in this day and other related quality issues like infection control. All Emergency Staff are required to attend.

2.3 **Research**

The DEM contributes to enhance research in all aspects of emergency medicine through the followings:

- Encouraging the consultant to have a minimum of 2-3 publications per year.
Recruit research assistants
Create research committee
Conducting clinical research, randomized controlled trials, and prospective registry.
Coordinate with other departments to accomplish national clinical trials

2.4 Administrative Services

- Training & Education
- Clinical services
- Research

3 Client & Supplier

- Client
  - All patients presented to Emergency Department with acute illness
• **Adult Unit:** patients of 12 years old and above will be directed to the Adult emergency Unit

• **Pediatric Unit:** patients under 12 years of age will be directed to pediatric emergency Unit

• All patients with risk to life, sight or limb are treated in the DEM, regardless of eligibility status.
  - All patients needs transfer from/to the hospital
  - Residents
  - Students

**Supplier**

- Clinical Support services
- Laboratory Services
- Diagnostic Medical Imaging
- Medical Records
- All hospital’s departments’
- Nutrition
- Medical supplies
- IT

4 **Goals and Objectives**

**Goals**

- Provide multidisciplinary patient care to all patients presented to DEM with acute illness
- Improve the quality of care to all patients through compliance with KSU & University Hospitals (KSUHs) quality management policy and procedures
- Ensure that standards for professional practice, as defined by International societies, Ministry of Health codes, and Evidence Based practice are implemented, evaluated and monitored
- Provide an environment conducive to the educational needs of the medical, nursing, healthcare professional, students (from healthcare institutions), patients and families
- Improve DEM contribution for clinical researches
- Improve Cardiac, Trauma and Oncology care in KKUH

**Objectives**

- Develop and update 10 policies and procedures annually
- Develop 10 new clinical pathways over the next year
- Certify & Update all medical staff with life support courses to achieve 100% by February 2010
- Monitor multidisciplinary compliance to the referral policy (appendix 1) (revised 13-01-2008)
- Decrease door to ECG, door to needle, and/or door to balloon time for all patients with ST elevation MI
- Establish chest pain unit
- Update the Trauma code and system
- Adopt electronic Emergency filing system within 2 years.
- Achieve 70% attendance rate for medical, nursing and paramedic for the following:
  - Weekly academic activates
  - Journal club
  - KKUH Emergency Conferences, and workshops
- Conduct 5 courses per year: ACS, ECG, Airway, Toxicology & Emergency Residency Review
- Conduct and participate in randomize control trails
- Encourage faculty to have 2-3 published articles per year
- Conduct community mission and keep file of all community related missions
- Achieve the staff and equipment requirement for the DEM expansion within one year

5 Organizational Chart
1. Department of emergency medicine organizational charts with position
2. Department of emergency medicine organizational charts with layout
3. Department of emergency medicine organizational charts with names
6 **Hours of Operation**

- 24 hours a day, 7 days a week
- Shifts should be scheduled, whenever possible, in a manner consistent with circadian principles. For most settings, scheduling isolated night shifts or relatively long sequences of night shifts is recommended.
- Avoid long shifts, whenever possible. Shifts should not last more than twelve hours. Schedulers should take into consideration the total number of hours worked by each MD and the intervals of time off between shifts.
- The minimum number of hours during the off time between the shifts are 24.
- Rotating shifts in a clockwise manner (day to evening to night) is preferred. This applies even when there are intervening days off.
- Night shift workers' schedules must be designed carefully to provide for anchor sleep periods.
- Groups should consider various incentives to compensate those working predominantly night and afternoon shifts.
- Schedules for emergency staff should take into account factors such as DEM volume, patient acuity levels, and individual physician's age.

7 **Staffing plan**
- The Emergency Chairman and the associate director of emergency nursing is assessing staffing needs on a regular basis according to patient census, injury/illness severity, and availability of ancillary services and support staff.
- Staffing patterns should accommodate the potential for the unexpected arrival of additional critically ill or injured patients (Emergency Operation Plan).
- DEM staff are specialized emergency healthcare providers who have advanced qualifications and experience.
- The clinical services will be covered by an Emergency physicians and a registered nurse according to the number and the acuity of the patient's cases.
- The actual number of consultants covering the Department of Emergency Medicine (Adult & Pediatric Units) before the DEM expansion is 11 consultants, which is 19 consultants less according to the International standards. To reach the international standards and to cover the DEM 24 hours a day, 7 days a week by consultant there is a need for 45 new consultant positions.
- The actual number of Registrars and Senior Registrars in (Adult & Pediatric Units) before the expansion is 20. Where the need is to have 51 new positions to cover the DEM 24 hours a day, 7 days a week.
- The actual number of nursing in the DEM (Adult & Pediatric Units) before the expansion is 91 nurses. To be able to cover phase two from the expansion we have to have 126 nurses. The actual number of EMT in the DEM before the expansion is 14 EMTs. The required number of EMT's to cover the service is 24. There is a need for 10 new positions to covet the DEM 24 hours a day, 7 days a week.
- The needed number of x-ray staff to cover the DEM after the expansion is 26 x-ray specialist and 4 Consultants.
The actual number of Health Care Technicians in the DEM before the expansion was 4. The needed number is 24 positions to cover the DEM 24 hours a day, 7 days a week.

The actual number of security guard before the expansion is 10. The needed number of security guard to cover the DEM 24 hours a day, 7 days a week is 38.

The actual number of Medical secretaries is 2. While the needed number to cover the department's work load is 6 secretaries.

The actual number of porters in the DEM before the expansion is 4. While the needed number of porters to cover the DEM 24 hours a day, 7 days a week is 15 porter.

The DEM need to establish 5 new positions for Respiratory Technicians to cover the DEM 24 hours a day, 7 days a week.

7.1. Physicians

7.1.1 General Policies:

- Number of the physicians per shift will be determined by the expected number of patients to keep the ratio at least 2-3 patients to be seen per physician per hour.
- The physicians work 8 hours shifts.
- DEM is staffed with educated and qualified emergency care professionals.
- All working hours of operation are supervised by the team leader.
- Junior residents, interns, and medical students will function under supervision at all times, and will review management plans with the DEM team leader.
- At shift change, all outgoing and incoming DEM team members including charge nurses will have a formal hand over report of all
patients in the DEM, inpatient bed availability, and any expected arrivals.

- All physicians who staff the DEM should be subject to the hospital’s credentialing process.
- All Emergency physicians should have signed their privileges, responsibilities and the job descriptions.

7.1.2 Chairman

- The chairman of the Emergency Department and the medical director shall direct the medical care provided in the DEM.
- The chairman of the Emergency Department should:
  - Be certified in Emergency Medicine or Pediatric Emergency Medicine by a board recognized and accredited by the Saudi Commission of Health Specialties.
  - Possess competence in management and administration of the clinical services in DEM
  - Be a voting member of the executive committee of College Council
  - Be knowledgeable about EMS operations, MOH regulation and the Red Crescent Commission
  - Be responsible for assessing and making recommendations to the hospital’s credentialing body related to the qualifications of emergency physicians with respect to the clinical privileges granted to them
  - Ensure that the emergency staff is adequately qualified and appropriately educated to provide high standard of care
  - Establish a mechanism of monitoring practice in the DEM, enforcing policies, procedures and guideline, and applying an effective quality management program
7.2 Nursing

7.2.1 General Policies:

- The required number of nurses will be determined by the number and the acuity of the patients' cases to keep the following ratio: one nurse to one resuscitation patient, one nurse for each 3 acute patients, and one nurse for every 4 observation bed.
- Each unit of the department should have a charge nurse 24 hours a day, 7 days a week.
- Each unit should have a floater nurse.
- The nurses are covering the department by 12-hour shifts.
- The nursing care provided in the DEM shall be directed by a registered nurse (RN).
- Each nurse working in the DEM should:
  - Provide evidence of adequate previous DEM or critical care experience or have completed an emergency care education program.
  - Demonstrate evidence of the knowledge and skills necessary to deliver nursing care in accordance with the Standards of Emergency Nursing Practice at KSUHs.
  - RN must be involved in an ongoing teaching program in emergency medicine.

7.2.2 ADON

- The associate director of emergency nursing should:
  - Demonstrate evidence of substantial education, experience, and competence in emergency medicine nursing.
  - Be a voting member of the executive committee of the department.
Show evidence of competence in management and administration of the clinical services in DEM.

Ensure that the nursing and support staff are appropriately adequate for the clinical services needed.

Ensure that the nursing and support staff are educated and certified to provide high standard of care.

Maintain a leadership role in monitoring practice in the DEM, enforcing DEM policies and guideline, and applying an effective quality management program.

7.3 EMTs & Paramedics

7.3.1 General Policies:

- DEM shifts should be covered by at least 2 teams. Each team should be covered by one paramedic and 2 EMTs. For more details refer to responsibility for the continuity of patient Pre-hospital Care
- EMT & Paramedics work 12 hours shifts.

7.3.2 Head of EMS Unit

- The head of Emergency Medical Services Unit should:
  - Be board certified in Emergency Medicine or Pediatric Emergency Medicine by the Saudi Council for Health Specialties, the Canadian Royal College of Physicians & Surgeons, the American Board of Emergency Medicine, the American College of Emergency Physicians or possess comparable qualifications
  - Demonstrate evidence of substantial education, experience, and competence in emergency medicine services, trauma and pre-hospital care.
  - Show evidence of competence in management and administration of the clinical services at the scene
- Ensure that the Paramedic and EMT are appropriately adequate for the clinical services needed.
- Ensure that the Paramedic and EMT are educated and certified to provide high standard of care.
- Maintain a leadership role in monitoring practice in the EMS, enforcing DEM policies and guideline, MOH & Red Crescent Regulations
- Applying an effective quality management program.

8 Communication and Reporting
8.1 Intra-Departmental

The Department of emergency medicine has the following meetings:

8.1.1 Departmental Board Meeting
- **Chaired by:** Dr. Zohair Al-Aseri
- **Members:** Department's Professor, Associate, and Assistant Professors. The consultants could be invited.
- **Meeting:** once a month
- **Reports to:** Dean, College of Medicine and Supervisor for hospital affairs

8.1.2 Clinical Board Meeting
- **Chaired by:** Dr. Zohair Al-Aseri
- **Members:** all DEM Staff, ADON & HN
- **Meeting:** once a month
- **Reports to:** Vice dean for hospital affairs
- **Coordinated by:** Ms. Tahani Moawad

8.1.3 ED Education Committee
- **Chaired by:** Dr. Abdullah Al-Sakka
- **Members:** selected Team Leaders and chief resident
- **Meeting:** once a month
- **Reports to:** Chairman for Emergency Medicine
- **Coordinated by:** Ms. Tahani Moawad

8.1.4 ED CQI Committee
- **Chaired by:** Dr. Hosam Hassan
Members: selected DEM Physicians
Meeting: once a month
Reports to: Chairman for Emergency Medicine
Coordinated by: Ms. Analyn Dacal

8.1.5 Adult Emergency Unit Meeting
Chaired by: Dr. Tawfiqe Al Mezieny.
Members: DEM Adult Physicians & ADON
Meeting: once a month
Reports to: Chairman for Emergency Medicine
Coordinated by: Ms. Monal Al-jehani

8.1.6 Pediatric Emergency Unit
Chaired by: Dr. Mohamed Alothman.
Members: DEM pediatric Physicians & ADON
Meeting: once a month
Reports to: Chairman for Emergency Medicine
Coordinated by: Ms. Mariam Khalifah

8.1.7 Research Committee
Chaired by: Dr. Sami Qashqary.
Members: Selected pediatric & adult physicians and nurses
Meeting: once every 2 months
Reports to: Chairman for Emergency Medicine
Coordinated by: Ms. Analyn Dacal

8.1.8 Recruitment and Promotion Committee Meeting
Chaired by: Dr. Mohammed Al-Othman
- **Members**: selected DEM Physicians
- **Meeting**: as per needed
- **Reports to**: chairman for Emergency Medicine
- **Coordinated by**: Ms. Mariam Khalifah

### 8.1.9 Mortality & Morbidity Meeting
- **Chaired by**: Dr. Jalal Al Noor.
- **Members**: all DEM Physicians and invite KKUH M&M committee representative
- **Meeting**: once a month
- **Reports to**: chairman for Emergency Medicine
- **Coordinated by**: Ms. Analyn Dacal

### 8.1.10 EMS Meeting
- **Chaired by**: Dr. Hani Albrahim
- **Members**: EMT, Paramedic, Drivers
- **Meeting**: once a month
- **Coordinated by**: Ms. Mariam Khalefah

### 8.1.11 Resident Meeting
- **Chaired by**: Dr. Abdallah Al Sakka
- **Members**: all Residents & Demonstrators
- **Meeting**: once every month
- **Coordinated by**: Ms. Tahani Moawad

### 8.2 Communication with other Departments & multidisciplinary team
#### 8.2.1 Trauma Meeting
- A monthly Meeting with the general surgery unit within the academic activity to discuss and review trauma patient's management, pitfalls and recommendations.

### 8.2.2 Cardiology Meeting

- A regular Meeting with the cardiology unit within the academic activity to discuss and review cardiology patient's management, pitfalls and recommendations.

### 8.2.3 Mortality and Morbidity

- A Monthly Meeting with the Hospital's M & M Committee to discuss and review management, pitfalls and recommendations for M&M cases.

## 9 Equipment

9.1 All the following are mandatory equipments that should be available all time and checked periodically by the head nurses.
Check list should be apparent and available in the department.

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<th>Equipment</th>
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<tr>
<td>• Central station monitoring capability</td>
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<tr>
<td>• Physiological monitors</td>
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<td>• Blood flow detectors</td>
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<tr>
<td>• Defibrillator with monitor and battery</td>
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<tr>
<td>• Thermometers</td>
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<tr>
<td>• Pulse oximetry</td>
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<tr>
<td>• Nurse-call system for patient use</td>
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<tr>
<td>• Portable suction regulator</td>
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<tr>
<td>• Infusion pumps to include blood pumps</td>
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<tr>
<td>• IV poles</td>
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<tr>
<td>• Bag-valve-mask respiratory and adult and pediatric size mask</td>
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<tr>
<td>• Portable oxygen tanks</td>
</tr>
<tr>
<td>• Blood/fluid warmer and tubing</td>
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<tr>
<td>• Nasogastric suction supplies</td>
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<tr>
<td>• Nebulizer</td>
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<tr>
<td>• Gastric lavage supplies, including large-lumen tubes and bite blocks</td>
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<td>• Urinary catheters, including straight catheters, Foley catheters, Coude</td>
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<td>cateheters, filiforms and followers, and appropriate collection equipment</td>
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<tr>
<td>• Intravenous needles.</td>
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<td>• Lumbar puncture sets (adult and pediatric)</td>
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<td>• Blanket warmer</td>
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<tr>
<td>• Tonometer</td>
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<tr>
<td>• Slit lamp</td>
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<tr>
<td>• Wheelchairs</td>
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<tr>
<td>• Medication dispensing system with locking capabilities Pyxis</td>
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<td>system is good example</td>
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<tr>
<td>• Separately wrapped instruments (specifics will vary by department)</td>
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<td>• Availability of light microscopy for emergency procedures</td>
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<td>• Weight scales (adult and infant)</td>
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<td>• Tape measure</td>
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<td>• Ear irrigation and cerumen removal equipment</td>
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<tr>
<td>• Vascular Doppler</td>
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<tr>
<td>• Anoscope</td>
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<td>• Adult and Pediatric “code” cart</td>
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<tr>
<td>• Suture or minor surgical procedure sets (generic)</td>
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<tr>
<td>• Portable sonogram equipment</td>
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<td>• ECG machine</td>
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<tr>
<td>• Point-of-care testing</td>
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<tr>
<td>• X-ray view box and hot light</td>
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<td>• Film boxes for holding x-rays</td>
</tr>
<tr>
<td>• Chart rack</td>
</tr>
</tbody>
</table>
9.2 General Examination Rooms

Examination tables or stretchers appropriate to the area. (For any area in which seriously ill patients are managed, a stretcher with capability for changes in position, attached IV poles, and a holder for portable oxygen tank should be used. Pelvic tables for GYN examinations.)

<table>
<thead>
<tr>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Step stool</td>
</tr>
<tr>
<td>• Chair/stool for emergency staff</td>
</tr>
<tr>
<td>• Seating for family members or visitors</td>
</tr>
<tr>
<td>• Adequate lighting, including procedure lights as indicated</td>
</tr>
<tr>
<td>• Cabinets</td>
</tr>
<tr>
<td>• Adequate sinks for hand-washing, including dispensers for germicidal soap and paper towels</td>
</tr>
<tr>
<td>• Wall-mounted oxygen supplies and equipment, including nasal cannulas, face masks, and venturi masks.</td>
</tr>
<tr>
<td>• Wall-mounted suction capability, including both tracheal cannulas and larger cannulas</td>
</tr>
<tr>
<td>• Wall-mounted or portable otoscope/ophthalmoscope</td>
</tr>
<tr>
<td>• Sphygmomanometer/stethoscope</td>
</tr>
<tr>
<td>• Oral and nasal airways</td>
</tr>
<tr>
<td>• Televisions in waiting areas</td>
</tr>
<tr>
<td>• Reading material for patients</td>
</tr>
<tr>
<td>• Biohazard-disposal receptacles, including for sharps</td>
</tr>
<tr>
<td>• Garbage receptacles for non-contaminated materials</td>
</tr>
</tbody>
</table>
9.3 Resuscitation Room

All items listed for general examination rooms plus:

<table>
<thead>
<tr>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Adult and Pediatric “code cart” to include appropriate medication charts</td>
</tr>
<tr>
<td>• Capability for direct communication with nursing station, preferably hands free</td>
</tr>
<tr>
<td>• Radiography equipment</td>
</tr>
<tr>
<td>• Radiographic view boxes and hot light</td>
</tr>
<tr>
<td>• Airways needs</td>
</tr>
<tr>
<td>• Bag-valve-mask respirator (adult, pediatric, and infant)</td>
</tr>
<tr>
<td>• Cricothyroidotomy instruments and supplies</td>
</tr>
<tr>
<td>• Endotracheal tubes, size 2.5 to 8.5 mm</td>
</tr>
<tr>
<td>• Fiberoptic laryngoscope</td>
</tr>
<tr>
<td>• Laryngoscopes, straight and curved blades and stylets</td>
</tr>
<tr>
<td>• Laryngoscopic mirror and supplies</td>
</tr>
<tr>
<td>• Laryngeal Mask Airway (LMA) and combi tube</td>
</tr>
<tr>
<td>• Oral and nasal airways</td>
</tr>
<tr>
<td>• Tracheostomy instrument and supplies</td>
</tr>
<tr>
<td>• Breathing</td>
</tr>
<tr>
<td>• BiPAP Ventilation System, we should have our own 2 at least in adult Ed</td>
</tr>
<tr>
<td>• Closed-chest drainage device</td>
</tr>
<tr>
<td>• Chest tube instruments and supplies</td>
</tr>
<tr>
<td>• Emergency thoracotomy instruments and supplies at least 2</td>
</tr>
<tr>
<td>• End-tidal CO2 monitor18</td>
</tr>
<tr>
<td>• Nebulizer</td>
</tr>
<tr>
<td>• Peak flow meter</td>
</tr>
<tr>
<td>• Pulse oximetry</td>
</tr>
<tr>
<td>• Ventilator</td>
</tr>
<tr>
<td>• Automatic physiological monitor, noninvasive</td>
</tr>
<tr>
<td>• Blood/fluid infusion pumps and tubing</td>
</tr>
<tr>
<td>• Blood/fluid warmers</td>
</tr>
<tr>
<td>• Cardiac compression board</td>
</tr>
<tr>
<td>• Central venous catheter setups/kits (the kit we have is not practical and violate infection control recommendation)</td>
</tr>
<tr>
<td>• Central venous pressure monitoring equipment</td>
</tr>
<tr>
<td>• Cutdown instruments and supplies</td>
</tr>
<tr>
<td>• Intraosseous needles</td>
</tr>
<tr>
<td>• IV catheters, sets, tubing, poles 14,16 are mandatory for adult</td>
</tr>
<tr>
<td>• Monitor/defibrillator with pediatric paddles, internal paddles, appropriate pads, and other supplies</td>
</tr>
<tr>
<td>• Pericardiocentesis instruments</td>
</tr>
</tbody>
</table>
- Temporary external pacemaker
- Transvenous and/or transthoracic pacemaker setup and supplies
- 12-Lead ECG machine

### 9.4 Trauma and Miscellaneous Resuscitation

**Equipment**
- Blood salvage/autotransfusion device
- Emergency obstetric instruments and supplies
- Hypothermia thermometer
- Infant warming equipment
- Peritoneal lavage instruments and supplies
- Spine stabilization equipment to include cervical collars, short and long boards
- Warming/cooling blanket

### 9.5 Other Special Rooms

All items listed for general examination rooms plus:

**Equipment**
- Orthopedic
- Cast cutter
- Cast and splint application supplies and equipment
- Cast spreader
- Crutches
- Extremity-splinting devices including traction splinting and fixation pins/wires and corresponding instruments and supplies
- Halo traction or Gardner-Wells/Trippe-Wells traction
- Suture instrument and supplies
- Traction equipment, including hanging weights

### 9.6 Eye/ENT

Eye chart

**Equipment**
- Ophthalmic tonometry device
- Other ophthalmic supplies as indicated, including eye spud, rust ring remover, cobalt blue light
- Slit lamp
- Ear irrigation and cerumen removal equipment
• Epistaxis instrument and supplies, including balloon posterior packs
• Frazier suction tips
• Headlight
• Laryngoscopic mirror
• Plastic suture instruments and supplies

9.7 **OB-GYN**

<table>
<thead>
<tr>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fetal Doppler and ultrasound equipment</td>
</tr>
<tr>
<td>• Obstetrics/Gynecology examination light</td>
</tr>
<tr>
<td>• Vaginal specula in pediatric through adult sizes</td>
</tr>
<tr>
<td>• Sexual assault evidence-collection kits (as appropriate)</td>
</tr>
<tr>
<td>• Suture material</td>
</tr>
<tr>
<td>• Miscellaneous</td>
</tr>
<tr>
<td>• Nitrous Oxide equipment</td>
</tr>
</tbody>
</table>
1.0. CONDITIONS:

This (hand-off) communication policy and procedure applies to all physicians and nurses in the Department of Pediatrics.

2.0. PURPOSE:

The Department of Pediatrics is committed to ensure patient safety whenever there is a change in the patient’s caregivers.

3.0. POLICY:

3.1. Hand-off communication will take place whenever there is:

3.1.1 A physician transfers complete responsibility for a patient.

3.1.2 Physicians and nurses are transferring patient’s to another level of care within or outside the organization.

3.1.3 Physicians are transferring on-call responsibilities.

3.1.4 At the change of shift between nurses.

3.1.5 A nurse leaves the unit for a period of time, such as lunch or to accompany a patient to another unit or diagnostic department.

4.0. PROCEDURES:

4.1. When a physician is transferring complete responsibility for a patient or when transferring a patient to or another level of care within or outside the organization, the physician or his designee will:

4.1.1. Write a detailed summary of the patient illness and course including:

a. patient name, sex and age
b. date of admission
c. presenting symptoms and reason for admission
d. diagnosis
e. patient problem list
f. patient medication and when they last given, IVF & O₂
4.1.2. Patient past medical and surgical history

- wound dressing, drains, central line, etc.
- recent or anticipated charges in the patient condition
- treatment, care and services that need to be completed (to-do-list)
- any other information which is important to the patient’s care.

4.2. At the change of shift between nurses or when the patient’s nurse leave the unit for a period of time, the patient nurse will report as follows:

4.2.1. Find a quiet area to give a verbal report (hand-off communication) to ensure accurate, clear and concise information is given with a minimum of interpretation.

4.2.2. Caregiver will give each other opportunity to ask questions, answer questions and read book or repeat book information, as needed.

4.2.3. Information provided during hand-off communication will include at a minimum:

- Patient’s name and location
- Patient’s physician
- Date of admission
- Diagnosis
- Summary of the patient’s comment, physical and mental condition including:
  - medication and when were last given
  - IV present: heplock /or solution rate infusion
  - O2 when applicable
  - wound dressing, drains, etc.
  - allergies
  - emotional status
  - pain assessment and management
  - treatment care and services that need to be completed (to-do-list)

4.3 Any other information which is important to the patient’s care

5.0. REFERENCES:

- Inter-unit and Inter-departmental transfer checklist
- Nursing Department Policy
- Hospital Regulations
- MCN Guidelines
1.0. **CONDITIONS:**

1.1 DEM Staff
1.2 Cardiology staff

2.0. **PURPOSE:**

2.1 Improve the quality of care of patients presenting to DEM with chest pain.
2.2 Prevent inadvertent discharge of acute Myocardial Infarction or unstable angina patients from DEM.
2.3 Minimize unnecessary admissions.
2.4 Standardize the management of patients presenting with acute coronary syndromes.

3.0. **POLICY:**

3.1 All chest pain patients with age above 35 years will have ECG done and read by the DEM team leader within ten minutes of patient arrival.
3.2 Bed 40 at the triage area shall be designated to be the ECG bed.
3.3 All chest pain patients with ECG finding consistent with STEMI should be categorized as CTAS #1.
3.4 All patients with symptom suggestive of ACS will be managed according to their history, physical exam, risk stratification and cardiac biomarkers. (Figure 2).
3.5 DEM team leader will evaluate all patients with chest pain and determine the risk stratification and the differential diagnosis. (Figure 1).
3.6 For patient with possible or diagnosed ACS the DEM team should start the protocol of the treatment immediately if no contraindications.
3.7 All STEMI patients should be taken to the Catheterization lab. For PTCI to achieve door to balloon time in less than 90 minutes.
3.8 All STEMI patients will receive fibrinolytic (if no contraindications Table1) to achieve door to needle time less than 30 minutes if the PTCI is not available within 90 minutes from patient arrival.

4.0. **DEFINITIONS**

4.1 **ANGINA:** Chest pain at rest, compatible with ischemic cardiac pain:> 15–20 minutes duration or multiple short episodes. Last chest pain within past 12 hours.
4.2 **STEMI (ST Elevation Myocardial Infarction):** Diagnostic criteria > 1mm ST elevation in 2 or more contiguous limb or precordial leads. Left bundle branch block not known to be old.
4.3 NSTEMI: Non ST Elevation Myocardial Infarction.
4.4 ACS: Acute Coronary Syndrome and include STEMI, NSTEMI and unstable angina.
4.5 CTAS: Canadian Triage and Acuity Scale.
4.6 Estimating the likelihood of Coronary Artery Disease (CAD):

4.6.1 **Low Likelihood:** (e.g., 1-14% likelihood)
- Chest pain, ‘probably not angina’ in patients with one or no risk factors, but not Diabetes.
- T wave flat or inverted < 1mm.
- Normal EKG.

4.6.2 **Intermediate Likelihood:** (e.g., 15-84% likelihood)
- “Definite angina” in patients with no risk factors for CAD.
- “Probable angina” in patients with 1 or more risk factors.
- “Probably not angina” in patients with Diabetes or with two or three risk factors.
- Patients with extracardiac vascular disease.
- ST depression 0.5 to 1mm.
- T wave inversion of ≥ 1mm.

4.6.3 **High Likelihood:** (e.g., 85-99% likelihood)
- Known history of prior MI or CAD.
- “Definite angina” in male ≥ 60 or females ≥ 70.
- Transient hemodynamic or EKG changes during pain.
- ST elevation or depression of ≥ 1mm in leads with dominant R waves.
- Marked symmetrical T wave inversion ≥ 2mm in multiple leads.

5.0 **PROCEDURE**

5.1 Once a patient showed with chest pain or angina equivalent, the triage nurse will immediately do the following:
- **5.1.1** Vital signs
- **5.1.2** ECG and hand it immediately to Emergency team leader.
- **5.1.3** Random Blood Sugar check by finger prick.
- **5.1.4** Weigh patient.

5.2 For a patient with abnormal vital signs and/or hemodynamically unstable then triage nurse will shift the patient immediately to the Resuscitation area for further management.

5.3 Once the patient enters the acute care or resuscitation unit then the nurse will do the following:
- **5.3.1** Insert two G18 IV Cannula
- **5.3.2** Extract blood for CBC, platelet count, renal function test, electrolytes, CKMB, troponin, PT/PTT/INR and Blood typing/cross matching.
- **5.3.3** Obtain urine for pregnancy test (for child-bearing age female only)
- **5.3.4** CXR

5.4 The DEM physician must order 15 lead ECG if right ventricular or posterior wall MI is suspected.

5.5 The DEM physician must check the inclusion and exclusion criteria for ACS before starting the treatment.
5.6 For STEMI or Cardiogenic Shock the DEM team leader will contact Cardiology for PTCI.

5.7 If the patient is a candidate for Tenecteplase (TNK), and cannot go to the Catheterization lab within 90 minutes of arrival, the physician should discuss the risks and potential benefits of the therapy with the patient or family if available. After this discussion. If the patient/family elect to proceed with fibrinolytic therapy, give the patient TNK. Vital signs and neurovital signs are monitored as follows:

5.7.1 Q15 minutes during infusion
5.7.2 Minutes x 2 hours post infusion
5.7.3 Minutes x in the next 6 hours post infusion.
5.7.4 Q1 hour X in the next 16 hours post infusion.

5.8 TNK is considered a fibrinolytic of choice for reperfusion of all types of STEMI patients and should be available in the DEM all the time. (Figure 3).

5.9 If bleeding complications arise follow the critical actions for suspected ICH or systemic bleeding after TNK administration.

5.10 No IM injection, arterial puncture, Foley catheter insertion, no IV extraction (except when necessary when bleeding complications develop) within 24 hours post TNK administration.

5.11 All patients with chest pain or angina equivalent and possible ACS should receive Aspirin 300mg., Clopedigril or Plavix 500mg. (600mg. if patient is going for PCI within 90 minutes), Beta-blocker (hold if SBP <90mmHg, symptomatic bradycardia, severe reactive airway disease, DHF), Enoxaparin for patient with intermediate to high risk 1mg/kg (max 100mg), LMWH and lipid lowering medication immediately if no contraindication. N.B. ACE inhibitor to be started by Cardiologist.

5.12 DEM Physician will contact Cardiology team for all patients with symptoms suggestive of ACS and fit the criteria for intermediate risk and elevated cardiac markers or fit the high risk category for hospital admission.

5.13 Patients with intermediate risk but with normal biomarkers will be evaluated further in the DEM in conjunction with Cardiology Team. (Figure 1).

5.14 Patients with low likelihood of CAD will be discharged home with follow-up appointment in Cardiology triage clinic.

5.15 For NSTEMI and unstable angina, emergency team will page the Cardiology team after the initial evaluation.

5.16 If aortic dissection or pulmonary embolism is suspected in any patient, these diagnoses should be ruled out or in without any delays especially when ST elevation is present in order to prevent any unnecessary delay in establishing reperfusion treatment.

5.17 Document the incident, procedure and treatment and patient’s condition in the progress notes.

5.18 For all non-cardiac chest pain patients, DEM Physician will treat these patients according to the diagnosis.
Chest Pain & normal ECG & CE Pathway in ED

Observe for 6 hours with continuous 12 lead ECG monitoring

Repeat CK, troponin & ECG in 6 to 8 hours

Any one of the following
• Recurrent pain
• ECG changes ST depression or elevation or t inversion or
• arrhythmia
• Positive Enzymes

High Risk

CCU Admission

All of the following
• No further pain
• No ECG changes ST depression or elevation or t inversion or
• No arrhythmia
• Negative Enzymes

Yes

Stress Test

- ve

Discharge

No

+ ve

High Risk

CCU Admission
MEMO
(Tenecteplase- Metalyse®)

- Tenecteplase is added to the hospital formulary.
- It is Restricted to the Cardiologist as a first line treatment for Emergency cases of Acute Myocardial Infarction (AMI).
- It is given Intravenous single bolus over 5-10 seconds based on weight:

<table>
<thead>
<tr>
<th>Patient's weight (kg)</th>
<th>Tenecteplase Dose (units)</th>
<th>Tenecteplase Dose (mg)</th>
<th>Volume of reconstituted solution (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 60</td>
<td>6,000</td>
<td>30</td>
<td>6</td>
</tr>
<tr>
<td>≥ 60 to &lt; 70</td>
<td>7,000</td>
<td>35</td>
<td>7</td>
</tr>
<tr>
<td>≥ 70 to &lt; 80</td>
<td>8,000</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>≥ 80 to &lt; 90</td>
<td>9,000</td>
<td>45</td>
<td>9</td>
</tr>
<tr>
<td>≥ 90</td>
<td>10,000</td>
<td>50</td>
<td>10</td>
</tr>
</tbody>
</table>

- The pharmacy will provide three injections at the same time, & it'll be replaced each time for refill.

Drug & Poison Information Centre,
Material Management & inventory Control,
Rajah 1428
### Absolute contraindications to the use of fibrinolytic agents

- History of cerebrovascular hemorrhage at any time.
- Nonhemorrhagic stroke or other cerebrovascular event within the past year.
- Marked hypertension (reliably determined systolic arterial pressure $>180$ mmHg and/or a diastolic pressure $>110$ mmHg) at any time during presentation.
- Suspicion of aortic dissection.
- Active internal bleeding (excluding menses).

### Relative contraindications to fibrinolytic therapy

- Current use of anticoagulants (INR 2).
- A recent (<2 weeks) invasive or surgical procedure or prolonged (10 min) cardiopulmonary resuscitation.
- Known bleeding diathesis.
- Pregnancy.
- Hemorrhagic ophthalmic condition.
- Active peptic ulcer disease.
- History of severe hypertension that is currently adequately controlled.

*Table 1*
Non-STEMI / UA (high risk):
Glycoprotein IIb, IIIa, receptor antagonist.
Yes □
No □ why? ____________

GLYCOPROTEIN IIb, IIIa RECEPTOR ANTAGONIST DOSES:
□ Tirofiban: Loading dose: __________ mcg/kg/min (Recommendation: 0.4 mcg/kg/min.
   for 30 minutes, reduce to 0.2 mcg/kg/min for CrCl ≤ 30 ml/min)
   * Can be started upstream or in cardiac catheterization Lab.

□ Abciximab: Loading dose: 0.25 mcg/kg IV bolus
   Infusion: 0.125 mcg/kg/min. IV (reserve only for patients with planned PCI
   within 12 hours)
   Maintenance dose: 0.1 mcg/kg/minute (reduce to 0.05 mcg/kg/min) if crcl ≤ 30 mg/min.
RISK STRATIFICATION

□ High-risk: elevated cardiac biomarkers, ST depression, transient ST elevation, >20 minutes of rest pain hemodynamic instability, signs of CHF → EARLY INVASIVE PROTOCOL

OR

□ Moderate-risk: no high-risk features, prior M.I. prior CABG, T-wave inversion, rest angina <20 minutes relieved promptly with nitroglycerin, age >70 years → EITHER EARLY INVASIVE OR EARLY CONSERVATIVE PROTOCOL

OR

□ Low-risk: No high- or moderate-risk features, progressive angina without prolonged rest pain, normal cardiac markers, normal ECG with pain → EARLY CONSERVATIVE PROTOCOL

TIMI RISK SCORE FOR (NON-STEMI)

- Age ≥ 65 years.
- Documented prior coronary stenosis > 50%.
- Three or more conventional cardiac risk factors, other than age.
- Use of aspirin in the preceding 24 hours.
- Two or more angina events in the preceding 24 hours.
- ST-segment deviation (transient elevation or persistent depression).
- Increased cardiac biomarkers.
TIMI RISK SCORE FOR (STEMI)

III. CRITICAL PATHWAYS IN THE HOSPITAL

![TIMI Risk Score Graph]

**Discharge medicine:**

1. **Aspirin**
   - Yes □ _____________ mg/day
   - No □ why? ___________

2. **Clopidogrel**
   - Yes □ 75 mg PO OD for ____ month.
   - No □ why? ___________

3. **Beta Blocker**
   - Yes □
   - No □ why? ___________
   - • Bisoprolol _____________ mg/day
   - • Carvidolol _____________ mg/day
   - • Metoprolol _____________ mg/day
- Atenolol ________________ mg/day

4. ACEI / ARBS
- Captopril ________________ mg TDS
- Lisinopril ________________ mg OD
- Atacad ________________ mg OD
- Apronl ________________ mg OD

5. Statin
- Lipitor ________________ mg/day
- Zocor ________________ mg/day
- Ezil ________________ mg/day

6. Nitrate ________________ mg/day

7. Aldaclon ________________ mg/day

8. Lasix ________________ mg/day

9. Others ________________

Dr. Name ________________ Signature ________________

References:

4. ACLS guidelines
5. Implementation of acute coronary syndromes guidelines in Australia - update 2009
1.0. **CONDITION:**

ED staff

2.0. **PURPOSE:**

To assure that the patient's rights of privacy are maintained.

3.0. **POLICY:**

3.1 ED staff should protect all patients' rights of privacy.

3.2 The right of privacy must be weighed and balanced against competing situations.

4.0 **PROCEDURE**

4.1 Consent must be obtained from the patient to release information to third parties. When referring to release of written information, personnel are to contact the Health Information Management Department and refer the requesting individual to that department.

4.2 When receiving inquires regarding a patient's condition by family members, friends and visitors, the following must be observed:

4.2.1 The individual requesting information must provide evidence of his/her identity, upon which time if the patient is able to consent, verbal consent will be obtained from the patient and documented in the medical record.

4.2.2 The information verbally provided by personnel will consist only of brief description on the patient's current condition in terms of "stable", "improving", etc. The clinical healthcare provider must use their judgment in providing additional information and prudence is required.

4.3 If the patient is unable to provide verbal consent due to physical or mental incapacitation and there is an assigned surrogate decision maker for the patient, consent for release of verbal information will be obtained from the surrogate and documented in the medical record.

4.4 If the patient is unable to provide verbal consent due to physical or mental incapacitation and there is no assigned surrogate decision maker, verbal
information, as outlined in this policy, may be provided to the following individuals:

4.4.1 Husband/wife
4.4.2 Adult children
4.4.3 Children (as appropriate to age)
4.4.4 Siblings
4.4.5 Legal Next of Kin
4.4.6 Caregiver/Guardian

4.5 Any other individuals requesting information regarding the patient must receive authorization from the patient's physician.

4.6 As a condition of employment, all personnel are cautioned not to discuss any information regarding patients with others. Casual comments with fellow co-workers throughout the institution may be overheard and violate the trust others have placed in our personnel and facility.

4.7 As required by law, information pertaining to victims of abuse/violence/sexual assault will be released to regulatory agencies.

4.8 As appropriate to law, any patient information requested by government agencies will be released accordingly.

4.9 Information related to insurance benefits that may relate clinically to the patient will be released only upon proper identification of the requesting individual. All requests for patient information related to insurance coverage will be cleared through the Utilization Management team.
1.0. CONDITION:

1.1 AOD

1.2 Emergency team leader

1.3 ED RN in charge

2.0. PURPOSE:

2.1 To set forth guidelines when a patient or patients legal representative chooses to sign out against medical advice.

3.0. POLICY:

3.1 The competent patient has the right to leave the hospital against the medical advice if he/she does not a post a danger to others.

3.2 All competent patients have the right to refuse the medical care if he/she does not post a danger to others.

3.3 Relatives cannot consent to the refusal of care for their non-competent patients unless he/she is legally designated as representative.

3.4 The most senior emergency physician on duty will determine the competency of the patient

4. DEFINITIONS

4.1 AMA – Against Medical Advice: Refers to those situations when a patient or their legal representative refuses medical care contrary to the Judgment of health team personnel and that care is recommended and tells to be necessary.

4.2 DAMA – Discharge Against Medical Advice: Refers to the patients refuses to stay in the hospital for medical care.

4.3 Medical Care: Medical care includes evaluation, treatment and/or transportation
4.4 Competency: Competency is defined as the ability to understand and to demonstrate an understanding of the nature and consequences of refusing medical care.

4.5 AOD – Administrator On Duty

5. **PROCEDURE**

5.1 Whenever a competent individual refuses medical care, Emergency physician should take the following steps to document the circumstances of the refusal.

5.1.1 Evaluate the patient as much as possible or allowed.

5.1.2 ED Physician/Registered Nurse describes the medical care to the patient, in easy understandable terms.

5.1.3 Document the history and physical on the ED Form, including medical care that is refused.

5.1.4 If the patient continues to refuse medical care, the following steps should be taken and documented.

5.1.5 Attempt to determine and address reason for refusal

5.1.6 Make every reasonable attempt determined and addressed the patient of the need for further medical care including the potential consequences of medical care refusal.

5.1.7 Contact the AOD

5.1.8 The physician will answer questions and assist in the informed consent process.

5.1.9 The nurse should request the patient to sign DAMA form (figure1) if the patient refuses to stay for treatment.

5.9.1 If the patient is incompetent, the AOD should take the necessary action to prevent patient departure.

1.9.2 The AOD & Security will make sure that the patients leave the department after signing the DAMA.

1.9.3 A request by a family member that the patient not be allowed to leave the hospital AMA will not be honored if the patient is believed to be competent

1.9.4 ED Staff will allow the child to leave if no reason of suspicion of child abuse.

1.9.5 If the physician believes that the child should not be released to the parents, then the AOD should be informed to process the child protection in the Court.
6.0 **Forms and Attachments:**
   Figure 1 attached

7.0 **Reference:**

---

**Figure 1**

---

**REFUSAL OF TREATMENT**

This is to certify that I,

have refused treatment and/or am leaving the Hospital against the advice of the attending physician and the Hospital Administration.

I acknowledge that I have been informed of the risk involved and hereby release the attending physician and the Hospital from all responsibility and any ill effects which may result from this action.

(Signature of Patient or Nearest Relative)

(Relationship to Patient)

DATE AND TIME .................................................................

WITNESS: ........................................................................

This certification must be signed by the Patient or nearest relative if the former was a minor, or physically or mentally unfit.

RELEASE FROM RESPONSIBILITY
1.0. **CONDITIONS:**

1.1 DEM MD, Nurses

1.2 AOD

2.0. **PURPOSE:**

2.1 To ensure that patients are given adequate information regarding their post hospital care.

2.2 To ensure maximum level of care is given to the patient.

3.0. **Definition**

3.1 Discharge guidance: The appropriate information and instructions given to patient and/or family. This includes but is not limited to:

- Medications, dosage and amount and duration.
- Diet

3.2 Duty status and activity instructions.

Any special advisement or precautions as appropriate.

3.3 Follow Up: The recommendation to be seen by designated specialty including time date and any special preparation.

4.0. **POLICY:**

4.1 All discharged patient should be seen by DEM consultant before discharge.

4.2 Discharged patients will receive post-hospital care instructions from the ED staff.

4.3 Discharge and follow up instructions shall be documented in the ED medical record.

4.4 Education and leaflet instructions will be given to patients who's complain in ER includes but not limited to:

- Head injury.
  - Wound care.
  - Gastroenteritis management.
- Fever management.
- Cast care.
- Chest pain
- Bronchial asthma

4.5 Non-eligible patients shall be advised to contact their own health care provider for follow-up.

4.6 ED staff shall monitor and ensure that patient and/or family understood post-hospital care discharge instructions and shall document patient teaching in the ED medical record.

5.0 **PROCEDURES:**

5.1 ED Physician shall:
- **5.1.1** Document and inform patient about discharge and educate him/her regarding required medical instructions
- **5.1.2** As per patient's eligibility, Liaises with specialist for follow up if needed.
- **5.1.3** Recommend patient to be provided with transport if appropriate.

5.2 ER Nurse shall:
- **5.2.1** Document and ensure that patient understands instruction given.
- **5.2.2** Ensure that patient received, prescription/medication, appointment, follow up instructions.
- **5.2.3** Ensure v/s are stable before patient leave the ed
- **5.2.4** Remove medical supplies that are not supposed to be applied to patient at the time of discharge.
- **5.2.5** Notify the EMS office of the need for transport when it's recommended by the discharging physician.
- **5.2.6** Return complete file to reception personnel to be sent to Medical Record.

6.0 **Reference:**
Institutional Handbook of Operating Procedures
1.0. CONDITION:

ED Physicians, Nurses, Security personnel and Reception

2.0. PURPOSE:

2.1 To guarantee timely, accurate reporting of indicated cases to KKUH & KAUH Chief of staff office for further action and follow up

2.2 Ensure compliance with MOH.

3.0 DEFINITIONS

Reportable cases: are those cases, occurring under unusual conditions which circumstances and sequences as matters of concern (as stated in policy) governmental departments and/or KKUH & KAUH.

4.0 POLICY:

4.1 All the Reported cases, after liaison between ED charge nurse and ED physician should be reported as soon as possible to AOD and the following cases shall be reported upon registration in ED:

4.2 Major trauma or serious industrial injuries, including major burns or electrocution.

All Motor Vehicle Collision including motorcycle and bicycle collisions.

4.3 Actual attempted or alleged suicide or homicide.

4.4 Injuries occurring under suspicious circumstances.

4.5 Deaths or stillbirths

4.6 Suspected cases of domestic violence including and not limiting to child/elderly abuse or neglect.

4.7 Injury inflicted by second party, e.g. fights, beatings, stabbings, or any form of physical abuse etc.

4.8 Abusive patients and/or families against medical staff.

4.9 Drowning/near drowning.

4.10 Animal bites, if the injured, intends to claim to authorities.

4.11 Unaccompanied Dependents under 15 years, who requires Emergency treatment.

4.12 Pregnancy or delivery in an unmarried female

4.13 Actual or attempted rape or sodomy

4.14 Any other complex or problematic case depending on physician’s judgment.
4.15 Alcohol and/or substance abuse.
4.16 Notifiable infectious diseases shall be reported to infection control (Epidemiology) according to Ministry of Health regulation through the coordination office.

5.0 Procedure:
5.1 Refer to the following table for reporting cases to relevant department.
5.2 For cases requiring reporting to the police always inform the security personnel at ED.
5.3 ER Physician shall:
   5.3.1 Liaises with ED charge nurse to ensure proper information delivery to ED coordination office.
   5.3.2 Notify ED Chairman, of reported cases of any unusual or potentially problematic cases.
   5.3.3 Record in 24 hour report, and indicate the designated department that has been notified.
5.3.4 ED Charge Nurse shall
   5.3.4.1 Notify ED coordination office.
   5.3.4.2 Record in the ED record and on the 24 hour report, and indicate the designated department that has been notified.
   5.3.4.3 Notify on-call Nursing shift coordinator/nursing supervisor/on-call supervisor of any unusual/suspicious cases, abusive patients/families, or other cases defined in this policy.
5.3.5 ER Coordinator shall report the above mentioned cases as follows:
   5.3.5.1 Inform Patient affairs as appropriate.
   5.3.5.2 Provide feedback to the ED consultant in charge about the outcome of any related issues.

6.0 5. Forms and Attachments:

<table>
<thead>
<tr>
<th>CASES</th>
<th>Authorities to be Inform</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Governmental Affairs</td>
</tr>
<tr>
<td>1.0 Major trauma or serious industrial injuries, including major burns or electrocution.</td>
<td>POLICE</td>
</tr>
<tr>
<td>2.0 All MVC including motorcycle and bicycle colusions.</td>
<td>Traffic police department</td>
</tr>
<tr>
<td>3.0 Actual attempted or alleged suicide or homicide</td>
<td>POLICE</td>
</tr>
<tr>
<td>4.0 Injuries occurring under suspicious circumstances</td>
<td>POLICE</td>
</tr>
<tr>
<td>5.0 Death or stillbirths</td>
<td>Inform Police of suspicious dead and stillbirth</td>
</tr>
<tr>
<td></td>
<td>Suspected cases of child/elderly abuse or neglect</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>6.0</td>
<td>Injury inflicted by second party, e.g. fights, beatings, stabbings, or any physical etc.</td>
</tr>
<tr>
<td>7.0</td>
<td>Abusive patients/families against staff, ED employees, etc. notify coordination office</td>
</tr>
<tr>
<td>8.0</td>
<td>Drowning/near drowning</td>
</tr>
<tr>
<td>9.0</td>
<td>Injurious inflicted by second party, e.g. fights, beatings, stabbings, or any physical etc.</td>
</tr>
<tr>
<td>10.0</td>
<td>Abusive patients/families against staff, ED employees, etc. notify coordination office</td>
</tr>
<tr>
<td>8.0</td>
<td>Pregnant or delivery in an unmarried female</td>
</tr>
<tr>
<td>11.0</td>
<td>Suspected or alleged cases of presentation</td>
</tr>
<tr>
<td>12.0</td>
<td>Alcohol and/or substance</td>
</tr>
<tr>
<td>13.0</td>
<td>Actual or attempted rape or sodomy</td>
</tr>
<tr>
<td>14.0</td>
<td>Any other complex or problematic case depending on physician’s judgment</td>
</tr>
<tr>
<td>15.0</td>
<td>Unaccompanied dependents who requires emergency treatment</td>
</tr>
<tr>
<td>16.0</td>
<td>Reference:</td>
</tr>
<tr>
<td>7.1</td>
<td>MOH</td>
</tr>
<tr>
<td>7.2</td>
<td>MHE</td>
</tr>
</tbody>
</table>
1.0. CONDITIONS:
   All MDs
   All RNs

2.0. PURPOSE:
   2.1 To outline the basic clinical principles underlying Pain Management practice.
   2.2 To assume safety of patient.
   2.3 To define necessary equipment & medications needed for Pain Management practice

3.0. POLICY:
   3.1 All patients have a right to assessment of pain and to appropriate intervention when pain is present or anticipated.
   3.2 All healthcare providers are responsible and accountable for ensuring effective pain management.
   3.3 Placebos shall not be used as part of any pain management plan.
   3.4 Proper documentation by the staff.
   3.5 Obtain informed consent.
   3.6 Healthcare providers in DEM are expected to be knowledgeable and skilled in pain assessment and management as applicable to their practice.
   3.7 Pain assessment and management shall be started at the triage area in the emergency department

4.0  DEFINITIONS
   4.1 Ramsay Scale: is a scale used commonly for assessing the severity of pain and level of sedation in critical ill patient.
   4.2 VAS: Visual Analog Scale.
   4.3 RASS: Richmond Agitation Sedation Scale

5.0  PROCEDURE
   5.1 The ED physician and/or RN will identify the patient needing pain management.
   5.2 Pain severity and pain relief shall be assessed and initiate management at the triage area by the triage physician and nurses where bed 40 is designated for pain initiating management and ECG.
   5.3 Pain severity and pain relief shall be assessed and reassessed at regular intervals, and this information shall be used in deciding the appropriate
intervention, which may include pharmacological and non-pharmacological techniques.

5.4 Pain assessment scales shall be selected based upon the patient’s developmental emotional and cognitive status.

5.5 The same pain scale shall be used every time the patient is assessed for pain.

5.6 The patient’s or guardian’s report is the most reliable indicator of pain and effectiveness of interventions.

5.7 All patients shall have a goal for pain relief (“comfort goal”) established upon admission by the physician in charge of the patient.

5.8 The comfort goal shall be determined based upon function and quality of life.

5.9 A pain management treatment plan shall be developed by the physician and nurses based on appropriate assessment, pain severity, and multidisciplinary evaluation and input.

5.10 Anticipated pain related to procedures (e.g.; dressing changes, circumcision, lumbar puncture) shall be included in the pain management plan.

5.11 Consultation with or referral to pain experts (Pain Service, Palliative Care Service) shall be pursued when appropriate.

5.12 The effectiveness of the pain management treatment shall be evaluated on an ongoing basis and modified based upon the assessment findings.

5.13 Persistent unrelieved/uncontrolled pain shall be communicated by the nurse/healthcare provider to the physician.

5.14 Pain ratings which continue to be at an unacceptable level post modification of the treatment regimen shall result in a referral/consultation with the Pain Service.

### Treatment

**Non-opioids**
- Acetaminophen
- NSAIDs

**Opioids Agonists**
- Combination products – opioid agonists and acetaminophen or NSAID
- Tramadol

**Topical/Local/Regional Anesthetics**
- Meperidine should not be considered as a first choice opioid in the treatment of pain

### Selection of pain medication

- Mild pain (1-3) may be treated with non-opioids.
- Moderate pain (4-6) may be treated with non-opioid and/or opioid.
- Severe pain (7-10) may be treated with non-opioid and/or opioid.
- The opioid selection and route of administration may vary from those selected for treatment of mild to moderate pain.

Oral and intravenous administrations are the preferred routes. Rectal and transdermal should also be considered before intramuscular injections. Anticipate common side effects of analgesics by early interventions.

### Non-pharmacologic measures incorporate multiple modalities and techniques.

**Types**
- Repositioning
- Heat or cold
- Non-nutritional sucking (pacifier)
- Active and/or passive physical/occupational therapy
- Distraction
- Should be selected based upon
- Patient preference
- Developmental age
- Effectiveness of prior use
- Pain and anxiety level of patient and guardian
- The ability and willingness of the patient and guardian to follow instructions and degree of pain relief obtained.

6.0 **Forms and Attachments:**

(Appendix 1): Numerical Pain Rating scale
(Appendix 2): Modified Wong Baker Faces Scale

(Appendix 3) FLACC behavioral pain assessment scale

<table>
<thead>
<tr>
<th>FLACC Behavioral Pain Assessment</th>
<th>0</th>
<th>Scoring 1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Categories</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face</td>
<td>No particular expression or smile</td>
<td>Occasional grimace or frown, withdrawn, disinterested</td>
<td>Frequent to constant groaning, clenched jaw</td>
</tr>
<tr>
<td>Legs</td>
<td>Normal position or relaxed</td>
<td>Uneasy, restless, tense</td>
<td>Kicking, or legs drawn up</td>
</tr>
<tr>
<td>Activity</td>
<td>Lying quietly, normal position moves easily</td>
<td>Squirming, shifting back and forth, tense</td>
<td>Arched, rigid or jerking</td>
</tr>
<tr>
<td>Cry</td>
<td>No cry, (awake or asleep)</td>
<td>Moans or whimpers; occasional complaint</td>
<td>Crying steadily, screams or sobbing, frequent complaints</td>
</tr>
<tr>
<td>Consolability</td>
<td>Content, relaxed</td>
<td>Reassured by occasional touching hugging or being talked to, distractable</td>
<td>Difficulty to console or comfort</td>
</tr>
</tbody>
</table>

Each of the five categories is scored from 0-2, resulting in a total score between 0 and 10.

The FLACC scale was developed by Sandra Mel这就是, MS, RN, Trent Veapel Lewis, MS, RN, and Shehza Malivo, MD, at C.S. Mott Children's Hospital, University of Michigan Health System, Ann Arbor, MI.

7.0 Reference:
- Procedural Sedation and Analgesia, IPP
- American College of Emergency Physicians, Policy Compendium 2009 Edition
- Australasian College for Emergency Medicine 2003
1.0. **CONDITION:**

Physician, nurse & paramedic

2.0. **PURPOSE:**

2.1 To outline the basic clinical principles underlying the practice of procedural sedation.
2.2 To assume safety of patient.
2.3 To define necessary equipment & medications needed for PSA.

3.0 **DEFINITIONS**

3.1 Procedural Sedation and Analgesia (PSA). It is a technique of administering sedative / analgesic agents to induce a state that allows the patient to tolerate unpleasant / painful procedures while maintaining cardiorespiratory function.

3.2 Appropriate companion: Competent adult person.

3.0 **POLICY:**

3.1 Pre PSA assessment
3.2 All patients should be identified and assessed prior to PSA.
3.3 Ensure the necessary equipment, medications, personnel (two physicians and nurse) and place, required for PSA are available.
3.4 Obtain informed consent.
3.5 Ensure adequate IV access.
3.6 Intra PSA assessment and monitoring
3.7 The physician should ensure continuous cardiopulmonary monitoring.
3.8 The physician should ensure the adequacy of PSA.
3.9 Proper documentation by the staff. PSA report sheet (appendix1) should be completed.
3.10 Post PSA assessment and monitoring
3.11 The continuous Cardio pulmonary monitoring until the patient discharge.
3.12 The patient should never be discharged unless the following are fulfilled:
3.13 Vital signs and level of consciousness have return to pre PSA level.
3.14 An appropriate companion and transport is available.
3.15 Appropriate discharge instructions.
3.16 Proper documentation by the staff.
4.0 Procedure:

4.1 The ED physician in-charge will identify the patient undergoing PSA.

4.2 Physician will assess medical history, including details of events leading to the current problem, co-existing medical conditions, past medical history, including anesthesia and surgery, medications, recreational drugs, allergies, and fasting status (seriously ill or injured patients should be assumed to have a full stomach) (appendix 1).

4.3 The physician will examine airway, cardiovascular and respiratory status, other systems identified by the history (appendix 1).

4.4 The ED physician should ensure that area for PSA has facilities for monitoring, equipment (appendix 2), medication (see appendix 3) and advanced cardiorespiratory resuscitation.

4.5 The ED physician will obtain an informed consent.

4.6 The ED physician and nurse will ensure that the clinical record should include the names of staff performing the procedure, with documentation of the history, examination, investigations, details of the medications and fluids administered (including time, dose, route) any resulting complications, as well as monitoring used, and data measured. Progress in the recovery phase should be similarly documented (appendix 1).

4.7 The ED physician and nurse will ensure appropriate doses of medications are calculated, drawn up and labeled prior to the procedure.

4.8 The ED physician will assess the patient prior to disposition. (appendix 1).

5.0 Forms and Attachments:

PSA Record Sheet
### Airway Assessment Procedures for Sedation and Analgesia
To be filled by Emergency Physician before the procedure

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Yes</th>
<th>No</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>History</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous problems with anesthesia or sedation</td>
<td></td>
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<tr>
<td>Stridor, snoring, or sleep apnea</td>
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<tr>
<td>Advanced rheumatoid arthritis</td>
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<tr>
<td>Chromosomal abnormality (e.g., trisomy 21)</td>
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<tr>
<td><strong>Physical Examination</strong></td>
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<tr>
<td>Significant obesity (especially involving the neck and facial structures)</td>
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<tr>
<td><strong>Head and Neck</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Short neck</td>
<td></td>
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<tr>
<td>Limited neck extension</td>
<td></td>
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<tr>
<td>Decreased hyoid–mental distance (≤ 3 cm in an adult)</td>
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<tr>
<td>Neck mass</td>
<td></td>
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<tr>
<td>Cervical spine disease or trauma</td>
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<tr>
<td>Tracheal deviation</td>
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<tr>
<td>Dysmorphic facial features</td>
<td></td>
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<tr>
<td><strong>Mouth</strong></td>
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<tr>
<td>Small opening (≤ 3 cm in an adult)</td>
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<tr>
<td>Edentulous</td>
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<td></td>
<td></td>
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<tr>
<td>Protruding incisors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loose or capped teeth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dental appliances</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High arched palate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macroglossia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tonsillar hypertrophy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonvisible uvula</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaw micrognathia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retrognathia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trismus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significant malocclusion</td>
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<td></td>
</tr>
</tbody>
</table>

**Summary of American Society of Anesthesiologists Preprocedure Fasting Guidelines**

<table>
<thead>
<tr>
<th>Ingested Material</th>
<th>Minimum Fasting Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear liquids</td>
<td>2 h</td>
</tr>
<tr>
<td>Breast milk</td>
<td>4 h</td>
</tr>
<tr>
<td>Infant formula</td>
<td>6 h</td>
</tr>
<tr>
<td>Nonhuman milk</td>
<td>6 h</td>
</tr>
<tr>
<td>Light meal</td>
<td>6 h</td>
</tr>
<tr>
<td>TYPE OF PROCEDURE</td>
<td>Yes</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----</td>
</tr>
<tr>
<td>VERY PAINFUL</td>
<td>☐</td>
</tr>
<tr>
<td>PROLONGED</td>
<td>☐</td>
</tr>
<tr>
<td>(I and D) needs strong sedation and analgesia</td>
<td>☐</td>
</tr>
<tr>
<td>SHORT PAINFUL</td>
<td>☐</td>
</tr>
<tr>
<td>(cardioversion, relocation, reduction)</td>
<td>☐</td>
</tr>
<tr>
<td>PAINLESS ; CT, MRI; mild sedation</td>
<td>☐</td>
</tr>
</tbody>
</table>

**INTRA-PROCEDURAL ASSESSMENT**

<table>
<thead>
<tr>
<th>Item/Time</th>
<th>GCS</th>
<th>O₂ Saturation</th>
<th>Hear rate</th>
<th>BP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

**Medication and Fluids**

<table>
<thead>
<tr>
<th>Name</th>
<th>Dose</th>
<th>Rout</th>
<th>Immediate Complication</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

**POST-PROCEDURAL ASSESSMENT**

**RETURN TO BASELINE (MENTALLY AND PHYSICALLY)**

- Patient is alert and oriented; or returned to baseline status. ☐ Yes ☐ No

**DISCHARGE INSTRUCTIONS**

- Sufficient time (up to 2 h) should have elapsed after the last administration of reversal agents (naloxone, flumazenil). ☐ Yes ☐ No ☐ NA
- Vital signs stable and within acceptable limits. ☐ Yes ☐ No
- Patient discharged in the presence of a responsible adult. ☐ Yes ☐ No

**Outpatients and their escorts should be provided with written instructions regarding. Post procedure diet, medications, activities, and a phone number to be called in case of emergency. Parents must be aware that pediatric patients are at risk for airway obstruction should the head fall forward while the child is secured in a car seat.**

☐ Yes ☐ No
## Appendix 2 Emergency Equipment for Sedation and Analgesia

Appropriate emergency equipment should be available whenever sedative or analgesic drugs capable of causing cardiorespiratory depression are administered. The lists below should be used as a guide, which should be modified depending on the individual practice circumstances. Items in brackets are recommended when infants or children are sedated.

### Intravenous equipment
- Gloves
- Tourniquets
- Alcohol wipes
- Sterile gauze pads
- Intravenous catheters [24-22-gauge]
- Intravenous tubing [pediatric “microdrip” (60 drops/ml)]
- Intravenous fluid
- Assorted needles for drug aspiration, intramuscular injection [intraosseous bone marrow needle]
- Appropriately sized syringes [1-ml syringes]

### Tape
- Basic airway management equipment
- Source of compressed oxygen (tank with regulator or pipeline supply with flowmeter)
- Source of suction
- Suction catheters [pediatric suction catheters]
- Yankauer-type suction
- Face masks [infant/child]
- Self-inflating breathing bag-valve set [pediatric]
- Oral and nasal airways [infant/child-sized]

### Lubricant
- Advanced airway management equipment (for practitioners with intubation skills)
- Laryngeal mask airways [pediatric]
- Laryngoscope handles (tested)
- Laryngoscope blades [pediatric]
- Endotracheal tubes
- Cuffed 6.0, 7.0, 8.0 mm ID
- Uncuffed 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0 mm ID
- Stylet (appropriately sized for endotracheal tubes)
- Pharmacologic Antagonists
  - Naloxone
  - Flumazenil
- Emergency medications
  - Epinephrine
  - Ephedrine
  - Vasopressin
  - Atropine
  - Nitroglycerin (tablets or spray)
  - Amiodarone
  - Lidocaine
  - Glucose, 50% [10 or 25%]
  - Diphenhydramine
  - Hydrocortisone, methylprednisolone, or dexamethasone
  - Diazepam or midazolam
# Appendix 3
## Commonly Used Agents for PSAA

<table>
<thead>
<tr>
<th>Agent</th>
<th>Recommended dosing</th>
<th>Onset</th>
<th>Duration</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Etomidate</td>
<td>Sedation in adults: 0.2 mg per kg over 30 to 60 seconds</td>
<td>Less than one minute</td>
<td>Three to five minutes</td>
<td>Advantages: single agent, reliable, no cardiovascular or respiratory depression, first-line agent in adults Disadvantages: limited data with PSAA, action too short for some procedures</td>
</tr>
<tr>
<td>Ketamine</td>
<td>Sedation in children: 1 to 2 mg per kg intravenously</td>
<td>One minute</td>
<td>10 to 20 minutes</td>
<td>Reliable, established safety in children, intramuscular route, first-line agent in children; not approved by the U.S. Food and Drug Administration for children younger than 16 years*</td>
</tr>
<tr>
<td></td>
<td>Sedation in children: 2 to 4 mg per kg intramuscularly</td>
<td>Five minutes</td>
<td>15 to 45 minutes</td>
<td>Nystagmus, hypersecretions, agitation, emergence delirium, vomiting, myoclonus, laryngospasm, cardiovascular stimulation, may require concurrent atropine sulfate in children younger than five years† Contraindications: hypertension, ischemia, increased intracranial or intraocular pressure, active respiratory infection, psychosis, infants younger than three months Use in children younger than five years to counteract vagal effects of ketamine.*</td>
</tr>
<tr>
<td>Atropine sulfate</td>
<td>Children: 0.01 mg per kg intravenously/intramuscularly Minimum: 0.1 mg Maximum: 0.5 mg</td>
<td>Less than one minute intravenously Five minutes intramuscularly</td>
<td>2 hours</td>
<td></td>
</tr>
<tr>
<td>Fentanyl</td>
<td>Initial dose in adults: 1 to 1.5 mcg per kg intravenously Titrate: 1 mcg per kg every three minutes intravenously</td>
<td>One to two minutes</td>
<td>30 minutes</td>
<td>Familiarity, availability, reversibility, proven safety record, minimal cardiovascular depression* Cough, hiccup, itching, vomiting, respiratory depression, requires another agent for sedation, poor reliability, repeat dosing usually required†</td>
</tr>
<tr>
<td>Midazolam</td>
<td>Initial dose in adults: 0.02 mg per kg Titrate: 1 mg intravenously</td>
<td>One to two minutes</td>
<td>30 minutes</td>
<td>Familiarity, availability, proven safety record* Requires another agent for</td>
</tr>
</tbody>
</table>
Every three minutes
Initial dose in children six months to five years of age:
0.1 mg per kg

Analgesia, poor reliability, repeat dosing usually required, respiratory depression, hypotension†

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Dosage</th>
<th>Onset of Action</th>
<th>Duration</th>
<th>Side Effects/Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naloxone</td>
<td>Adults: 0.1 to 2.0 mg intravenously</td>
<td>One minute</td>
<td>15 to 30 minutes</td>
<td>Opiate reversal, very safe, but routine use NOT recommended</td>
</tr>
<tr>
<td>Flumazenil</td>
<td>Adults: 0.2 mg per minute intravenously</td>
<td>One minute</td>
<td>45 minutes</td>
<td>Benzodiazepine reversal, use discouraged, potential for benzodiazepine withdrawal or status epilepticus</td>
</tr>
</tbody>
</table>

PSAA = procedural sedation and analgesia.
* - Benefits/advantages.
† - Side effects/disadvantages.

6.0 Reference:

- American College of Emergency Physicians, Policy Compendium 2009 Edition
- Australasian College for Emergency Medicine 2003
1.0. **CONDITION:**

This policy applies to all rapid sequence intubation in the department of emergency medicine

2.0. **PURPOSE:**

2.1 To standardize Rapid Sequence Intubation in Emergency Department

2.2 To ensure optimal care for patients need airway management

3.0. **POLICY:**

3.1 RSI should be performed by physicians processing training, knowledge, and experience in the techniques and pharmacologic agents used for RSI.

3.2 Neuromuscular blocking agents and appropriate induction agents should be available in the ED

3.3 Preparation of equipment, Medication, and appropriate patient, bed and intubator positions should take place before RSI.

3.4 Airway assessment for difficulty should be done before RSI.

3.5 Difficult airway cart should be available in the area where the RSI take place.

3.6 Crash carts should be available in the area where the RSI take place.

3.7 Anesthesia on-call should be notified for all anticipated difficult air way.

3.8 Anesthesia on-call should be consulted for all failed intubation.

3.9 Difficult Airway Algorithm should be followed for anticipated difficult airway

3.10 Anticipation of complication and immediate response should take place for all RSI.

3.11 All difficulties encountered during laryngoscope view should be documented in ED sheet.

3.12 RSI audit Form (Appendix 2) should be filled by the nurse in charge of the patient and signed by the team leader in charge of the shift.

3.13 Quality review and patient monitoring should be addressed and audited in regular bases by DEM Quality Management using Quality Audit Form

4.0. **Definitions:**

4.1 **Rapid Sequence Intubation (RSI)**: is an important technique by sedating and paralyzing the patient, allowing for easier intubation.

4.2 **Sellick's maneuver**: applying cricoid pressure

4.3 **ETT**: Endo-tracheal Tube

4.4 **ED**: Emergency Department

4.5 **Difficult Airway**: A clinical situation in which a conventionally trained Emergency Physician or anesthesiologist experiences difficulty with mask ventilation, tracheal intubation, or both.
4.6 **EDD**: Esophageal detector device.
4.7 **BVM**: Bag Valve Mask
4.8 **LMA**: Laryngeal mask airway

5.0. **Procedure:**

5.1 **Preparation of the following:**

5.1.1 Continuous ECG and SpO2, and BP monitoring.
5.1.2 Functional laryngoscope and BVM with high flow oxygen
5.1.3 Endotracheal tube(s), stylet, bouji & 10cc syringe
5.1.4 Alternate airway LMA and cricothyrotomy equipment available
5.1.5 All medications drawn up and labeled
5.1.6 Assess for difficult intubation (Appendix 1)
5.1.7 Suction on and ready
5.1.8 Tube confirmation equipment available (EtCO2 + EDD)
5.1.9 Secure intravenous access.
5.1.10 Positioning of bed should be at the level of intubator belt.

5.2 **Preoxygenation** –

- 100% oxygen x 5 minutes for unconscious patient or 8 vital capacity (deep) breaths on 100% O2 for conscious patient.

5.3 **Pretreatment**

- Use of medications for certain conditions (Table 1)

5.4 **Induction** –

- Use of induction agents according to (Table 2)

5.5 **Protection**

- Sellick’s maneuver: hold from pretreatment through proof of proper placement

5.6 **Paralysis** –

- Use of paralytic agent according to (Table 3)

5.7 **Placement with Proof**

- Place ETT, confirm with at least 3 Methods of the following:
  - Visualizing the vocal cords during the intubation
  - End-tidal CO2 color change or proper waveform
  - Breath sounds auscultated over lungs, no gastric sounds
  - EDD/ bulb aspiration
  - Oxygen saturations maintained > 95% at 1 min and 5 min

5.8 **Secure endotracheal tube**

5.9 **Discontinue attempt and ventilate with 100% O2 if:**

5.9.1 Thirty seconds has passed, and or O2 sat. falls below 91%
5.9.2 If a patient became a bradycardiac

- If intubation is unsuccessful, maintain cricoid pressure and provide BVM ventilation until the paralytic wears off, or consider use of the LMA and failed intubation algorithm.
5.10 Post intubation management
  5.10.1 Long-term paralytic (Table 3)
  5.10.2 Sedation: use the Order Sheet for Post Intubation
  5.10.3 Request chest x-ray and check for complication.

6.0 Forms and Attachments:

6.1 Appendix 1 Preparation for Intubation

<table>
<thead>
<tr>
<th>Mnemonic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Yankauer suction</td>
</tr>
<tr>
<td>B</td>
<td>Bag-valve-mask</td>
</tr>
<tr>
<td>A</td>
<td>Access vein</td>
</tr>
<tr>
<td>G</td>
<td>Get your team, get help if predict a difficult airway</td>
</tr>
<tr>
<td>P</td>
<td>Position patient (sniffing position if no contraindications) and place on monitor</td>
</tr>
<tr>
<td>E</td>
<td>Endotracheal tubes and check cuff with syringe</td>
</tr>
<tr>
<td>O</td>
<td>Oxygen, oropharyngeal airway available</td>
</tr>
<tr>
<td>P</td>
<td>Pharmacy: draw up adjunctive medications, induction agent, and neuromuscular blocker</td>
</tr>
<tr>
<td>L</td>
<td>Laryngoscope and blades: ensure a variety and that they are working</td>
</tr>
<tr>
<td>E</td>
<td>Evaluate for difficult airway: look for obstruction, assess thyromental distance &lt; 3 finger breadths, interincisor distance &lt; 2 finger breadths, neck immobilization</td>
</tr>
</tbody>
</table>

6.2 Table 1 Pretreatment

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lidocaine</td>
<td>1.5 mg/kg IV</td>
<td>To decrease bronchospasm and decrease intracranial pressure</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>3 μg/kg over 1 min</td>
<td>CAD, ICH, raised ICP, Aortic Dissection, High BP</td>
</tr>
<tr>
<td>Atropine</td>
<td>0.02 mg/kg (min 0.1 mg, max 0.5 mg)</td>
<td>To prevent bradycardia in children ≤ 10 years old who are receiving succinylcholine for intubation</td>
</tr>
</tbody>
</table>
### 6.3 Table 2 Induction agents

<table>
<thead>
<tr>
<th>SEDATIVES</th>
<th>IV DOSE (mg/kg)</th>
<th>ONSET (min)</th>
<th>Effect on BP</th>
<th>Effect on ICP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midazolam</td>
<td>0.2 – 0.4</td>
<td>1 – 2</td>
<td>Minimal</td>
<td>Minimal</td>
</tr>
<tr>
<td>Etomidate</td>
<td>0.2 – 0.4</td>
<td>&lt; 1</td>
<td>Minimal/↑</td>
<td>↓</td>
</tr>
<tr>
<td>Thipental</td>
<td>2 – 5</td>
<td>&lt; 1</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Ketamine</td>
<td>1 – 2</td>
<td>1</td>
<td>Minimal/↑</td>
<td>↑</td>
</tr>
<tr>
<td>Propofol</td>
<td>2 – 3</td>
<td>&lt; 1</td>
<td>↓</td>
<td>↓</td>
</tr>
</tbody>
</table>

### 6.4 Table 3 Paralytic agent

<table>
<thead>
<tr>
<th>Agent</th>
<th>Dose (mg/kg)</th>
<th>Onset (min)</th>
<th>Duration (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Succinylcholi</td>
<td>1.5</td>
<td>1</td>
<td>3–5</td>
</tr>
<tr>
<td>Pancuronium</td>
<td>0.1</td>
<td>2–5</td>
<td>40–60</td>
</tr>
<tr>
<td>Vecuronium</td>
<td>0.1</td>
<td>3</td>
<td>30–35</td>
</tr>
<tr>
<td></td>
<td>0.25</td>
<td>1</td>
<td>60–120</td>
</tr>
<tr>
<td>Atracurium</td>
<td>0.5</td>
<td>3</td>
<td>25–35</td>
</tr>
<tr>
<td>Mivacurium</td>
<td>0.15</td>
<td>2–3</td>
<td>15–20</td>
</tr>
<tr>
<td>Rocuronium</td>
<td>1.0</td>
<td>1–1.5</td>
<td>30–110</td>
</tr>
</tbody>
</table>
6.5 Appendix 2 Quality Audit Form

<table>
<thead>
<tr>
<th>Patient ID</th>
<th>Team Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Diagnosis</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Indication for RSI:</th>
<th></th>
</tr>
</thead>
</table>

| Patient estimated weight: ______ kg |   |

<table>
<thead>
<tr>
<th>Drugs used</th>
<th>Dose</th>
<th>Time Given</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Methods of tube confirmation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Breath sounds over lungs, none gastric</td>
</tr>
<tr>
<td>▪ End-tidal CO2 color change, proper waveform</td>
</tr>
<tr>
<td>▪ Bulb aspirator quickly inflates</td>
</tr>
<tr>
<td>▪ Pulse ox &gt; 95% at 30 sec, 1 min, 5 min</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chest x-ray requested post intubation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest x ray seen by __________________ MD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Complications (any time during or post-RSI):</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Desaturation (&lt; 90% SaO2)</td>
</tr>
<tr>
<td>▪ Bradycardia (&lt; 50)</td>
</tr>
<tr>
<td>▪ Inability to place tube on first attempt</td>
</tr>
<tr>
<td>▪ Esophageal intubation</td>
</tr>
<tr>
<td>▪ Post-intubation hypotension (SBP &lt; 90)</td>
</tr>
<tr>
<td>▪ Tube dislodgement</td>
</tr>
</tbody>
</table>

7.0 Reference:
American College of Emergency Physicians, Policy Compendium 2009 Edition
American society of anesthesia
1.0. **CONDITION:**

1.1 ED Nurse: 6.1 – 7

1.2 ED physician 5.2-5, 6.3, 6.7

2.0. **PURPOSE:**

2.1 To minimize the risk of tetanus infection in all emergency department patients.

2.2 Improve compliance with immunization protocols in ED for patients with wounds.

2.3 To implement recommendations for tetanus prophylaxis in wound management

3.0. **DEFINITIONS**

3.1 DTaP - Diphtheria and tetanus toxoid adsorbed and acellular pertussis vaccine for use in persons under seven years of age.

3.2 DTP - Diphtheria and tetanus toxoids adsorbed, and pertussis vaccine for use in persons over seven years of age.

3.3 DT - Diphtheria and tetanus toxoids adsorbed, for use in persons under seven years of age in whom acellular pertussis vaccine is contraindicated.

3.4 Td - Tetanus and diphtheria toxoids adsorbed (for adult use) for use in persons seven years of age and older

3.5 T - Tetanus toxoid adsorbed, for use when combined antigen preparations are contraindicated.

3.6 TIG - Human tetanus immune globulin.

3.7 Primary immunization - Three doses of a preparation containing tetanus toxoid, with the first two doses given at least four weeks apart and the third dose given six months after the second.

3.8 Clean minor wounds - wounds with minimal tissue damage or environmental contamination, in which the risk of tetanus exposure is felt to be minimal.

3.9 All other wounds - wounds in which there is a risk of tetanus contamination, such as, but not limited to, wounds contaminated with dirt, feces, soil, and saliva; puncture wounds; avulsions; and wounds resulting from missiles, crushing, burns, and frostbite.
4.0. **POLICY:**

4.1 The decision to initiate post-exposure prophylaxis depends on the type and condition of the wound and the patient's vaccination history.  
4.2 The emergency physician should determine the type of the wound as either clean minor wound, or all other wounds.  
4.3 The emergency physician should determine the two important factors about patient's vaccination history for all patients presented to ED with wound or burn:  
   4.3.1 Whether the patient has had a primary immunization series (ie, at least three doses of adsorbed tetanus toxoid).  
   4.3.2 Elapsed time period since the last vaccination dose.  
   4.3.3 ED physician should consider a patient not having any previous tetanus vaccinations if the history of past immunization is unknown or uncertain.  
4.4 ED Physician and nurses should document all the above information in the ED form.  
4.5 For clean minor wounds, it is recommended that a patient receives tetanus toxoid prophylaxis if 10 or more years have elapsed since the last tetanus toxoid-containing vaccine dose.  
4.6 For all other wounds, tetanus toxoid prophylaxis is recommended if 5 or more years have elapsed since the last dose.  
4.7 DTaP is indicated for primary and booster vaccination for children aged 6 weeks to 7 years.  
4.8 Post-exposure prophylaxis with TIG and tetanus toxoid should be given at the same time for patients with tetanus-prone wounds who are uncertain about their primary immunization history or who have received fewer than three prior tetanus toxoid doses in the past.  
4.9 TIG is categorized as a pregnancy category C drug and, when indicated, can be given to a pregnant patient. No dosage adjustment is necessary in patients with renal impairment.

5.0 **Procedure:**

5.1 Td is given (above age 7) as a 0.5-mL intramuscular dose into the deltoid muscle of the upper arm.  
5.2 DTaP is given (below age 7) as 0.5 ml intramuscular injection in the anterolateral aspect of the thigh.  
5.3 Contraindication:  
   5.3.1 A history of a neurologic reaction (e.g, encephalopathy) or an immediate anaphylactic reaction is a contraindication to further Td vaccinations.  
   5.3.2 Patients who have experienced a hypersensitivity reaction or a temperature greater than 39.4°C following a prior dose of tetanus toxoid. These individuals should not be given further routine or even emergency booster doses of Td more frequently than every 10 years.  
   5.3.3 DTaP is not recommended for administration in pregnant patients.  
   5.3.4 There is no evidence that Td is teratogenic, and it is the recommended tetanus toxoid-containing vaccine in pregnant patients.  
   5.3.5 The dose for TIG post-exposure prophylaxis is 250 U intramuscularly into the deltoid muscle or anterolateral aspect of the upper thigh muscles.
5.3.6 Tetanus Toxoid and TIG should not be administered at the same site or given by the same syringe.
5.3.7 TIG should not be given intravenously due to an increased risk for an anaphylactic reaction.
5.3.8 Document the incident, procedure and treatment and patient’s condition in the ED form.

6.0 **Forms and Attachments:**

Table 1. Guide to tetanus prophylaxis in wound management in persons less than 7 years old.

<table>
<thead>
<tr>
<th>History of Adsorbed Tetanus Toxoid (doses)</th>
<th>Clean Minor Wounds</th>
<th>All other Wounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown or less than three doses</td>
<td>Yes**</td>
<td>No</td>
</tr>
<tr>
<td>Three or more doses</td>
<td>No***</td>
<td>No</td>
</tr>
</tbody>
</table>

Use DT if pertussis vaccine is contraindicated (see Contraindications).

** The primary immunization series should be completed.

*** Yes, if the routine immunization schedule has lapsed (i.e. to make up for missed doses).

**** Yes, if the routine immunization schedule has lapsed, or if more than five years since last dose of tetanus toxoid.

Table 2. Guide to tetanus prophylaxis in wound management in persons 7 years or older.

<table>
<thead>
<tr>
<th>History of Adsorbed Tetanus Toxoid (doses)</th>
<th>Clean Minor Wounds</th>
<th>All other Wounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown or less than three doses</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Three or more doses</td>
<td>No***</td>
<td>No</td>
</tr>
</tbody>
</table>

*If only three doses of fluid toxoid have been received, then a fourth dose of toxoid, preferably an adsorbed toxoid, should be given.

** Yes, if >10 years since last dose.

*** Yes, if >5 years since last dose. (More frequent boosters are not needed and can accentuate side effects.

7.0 **Reference:**

• Centers for Disease Control and Prevention. Preventing tetanus, diphtheria, and pertussis among adults: use of tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccine. MMWR 2006;55 (RR-17):1–33.
1.0. **CONDITION:**

1.1 Emergency receptionist
1.2 Triage nurse responsibilities
1.3 Triage Physician responsibilities
1.4 Physician in charge responsibilities
1.5 AOD
1.6 EMS Personnel

2.0. **DEFINITIONS:**

2.1 **KSU:** King Saud University
2.2 **KKUH:** King Khalid University Hospital
2.3 **DEM:** Department of Emergency Medicine
2.4 **Physician in charge:** DEM senior consultant or the senior Emergency physician on duty who is in charge of the shift.
2.5 **Triage physician:** A physician (usually a consultant, assistant consultant or registrar) who is assigned to the triage area charged with the responsibility of triaging all registered CTAS categories three (3) to five (5) patients.
2.6 **CTAS:** Canadian Triage Acuity Scale is a triage system that categorizes patients to one of 5 categories where category 1 is the sickest.
2.7 **Eligible patients:** As per KKUH regulations, patients who have or can have an active file at KKUH e.g. KSU employees and their dependents or Saudi patients.
2.8 **Non-eligible patients:** any other patient who do not fit into the eligibility criteria
2.9 **EMS personnel:** emergency medical services personnel who are in charge for main door and, receive and assess all patients coming through ambulance door.
2.10 **AOD:** Administrative on duty covering the emergency room who shall be available 24 hour a day
2.11 **RU:** Resuscitation Units beds 1 to 9 at DEM a critical care designed bed
2.12 **ACU:** stand for Acute Care Unit which is 10 to 28 bed at DEM, a monitor equipped bed
2.13 **UCU:** Urgent Care Units is a fast track room where a physician sees patients who do not need monitoring or extensive investigations. The UCU, in this policy, does not include the triage room or the reception.
2.14 **Fast Track:** beds in triage area (beds 37, 38 and 39) can be utilized by the triage physician to evaluate and discharge patients who do not need any investigation or intervention
2.15 **ECG bed:** Bed 40 at the triage, equipped with ECG Machine.
3.0. PURPOSE:

3.1 To provide for a standardized protocol/process for ensuring that patients who presented at the DEM receive proper and adequate medical screening.
3.2 To provide for a consistent system of triage of patients who presented at ED
3.3 To minimize patient-to-physician time in order to meet with the international standards.
3.4 To ensure the judicious use of our acute care resources, and to avoid wastages on non urgent cases.

4.0. POLICY:

4.1 The triage area shall be an area, with a telephone, next to the Emergency Department with direct access to the Emergency Department (Beds 37 to 42 for adult patient).
4.2 The triage area shall have privacy for an initial assessment and vital signs.
4.3 The target patient-to-physician times per category are:

4.3.1 Immediately for category 1
4.3.2 15 minutes for category 2
4.3.3 30 minutes for category 3

4.4 For all patients who presented at the ED Reception:

4.4.1 All patients presented at the emergency reception shall be registered by the designated receptionist on duty after triaging.
4.4.2 All patients shall be assessed immediately by the triage nurse regardless of eligibility
4.4.3 The triage nurse shall categorize all assessed patients to one of five (5) acuity scale group according to CTAS.
4.4.4 The triage nurse shall immediately transfer all categories one (1) and two (2) patients to the acute care Unit (ACU) or resuscitation Unit (RU), without necessarily seeking permission from the triage physician or the team leader.
4.4.5 All eligible category three (3) patients shall be seen by the triage physician:

4.4.5.1 All eligible category three (3) patients on stretcher or whose condition(s) will require a procedure(s) shall be triaged to the Acute Care Unit
4.4.5.2 All non-eligible category three (3) patients shall be seen by the physician in charge who may redirect them to outside facility where they are eligible, or to the business center when arranged.

4.4.6 The triage physician shall assess all categories four (4) and five (5) patients then either triage them according to the case to

4.4.6.1 The urgent care unite
4.4.6.2 Fast track at the triage area
4.4.6.3 Advise them to seek medical care at the primary health care centers or PCC

4.4.7 For all patient with ENT or ophthalmology emergency that can’t be managed in KKUH
4.4.7.1 If Unstable shall be triaged to the RR, where the second on-call for either specialty at King Abdul-Aziz University Hospital shall come to evaluate the patients
4.4.7.2 If they are stable shall be advised to go to king Abdul-Aziz University Hospital

4.4.8 For any patient with chest pain, the triage nurse shall:
   4.4.8.1 Do ECG immediately after triage
   4.4.8.2 Show the ECG to the team leader of the shift immediately.

4.4.9 Bed 40 at triage area shall be utilized for ECG and initiating pain management only

4.4.10 Patients waiting to be seen shall be intermittently re-triaged if the target patient-to-physician times exceeded.

4.4.11 Where the triage physician advises categories four (4) and five (5) patients to seek medical care at the PCC, business centre or outside facilities, it shall be the duty of the AOD to further explain the policy to such patients and their relatives.

4.4.12 All patients coming via ambulance door shall be assessed by the EMS personnel who shall guide them to the triage room if their vital sign are stable.

4.4.13 The EMS personnel shall immediately transfer all category one or two patients to resuscitation area and notify the team leader.

5.0. PROCEDURE

5.1 The registered nurse will evaluate and categorize each patient upon arrival to the Emergency Department into either resuscitative, emergency, urgent, semi-urgent or routine categories based on CTAS.

5.2 Patients coming via ambulance door shall be assessed by the EMS personnel who will obtain brief history and a set of vital sign

5.3 The initial evaluation shall include:
   5.3.1 Patient's name
   5.3.2 Age
   5.3.3 Date and time of initial triage evaluation
   5.3.4 How the patient arrived, i.e., walk-in, wheelchair, car, ambulance
   5.3.5 Current medications, herbal supplements
   5.3.6 Allergies, include allergies to latex
   5.3.7 Chief complaint in the patient's own words
   5.3.8 Past Medical history
   5.3.9 Immunization status for patients 18 years and younger
   5.3.10 Last menstrual period for all women of child-bearing age
   5.3.11 Weight of the pediatric patient
   5.3.12 Vital signs
   5.3.13 Nursing observations
   5.3.14 Signature of Triage RN

5.4 All patient information is documented in the patient’s medical record.

5.5 Emergency Severity Index (ESI):

5.6 Resuscitative (Level 1) - immediate care, life-threatening conditions:
   5.6.1 Acute chest pain with dyspnea
   5.6.2 Airway and breathing difficulty
   5.6.3 Anaphylaxis
   5.6.4 Cardiac arrest
   5.6.5 Irregular pulse with symptoms
   5.6.6 Multiple trauma
   5.6.7 Open chest/abdominal wound
   5.6.8 Poisoning with neurological changes
   5.6.9 Profound shock
   5.6.10 Respiratory arrest
5.6.11 Seizure
5.6.12 Severe head trauma
5.6.13 Uncontrolled hemorrhage

5.7 Emergency (Level 2) - major injury or illness but stable; treatment and reassessment should occur within five (5) to 15 minutes:
5.7.1 Active labor
5.7.2 Acute asthma attack
5.7.3 Aggressive patient
5.7.4 CVA/TIA with neurological deficit
5.7.5 Drug overdose
5.7.6 Eye injury with loss of vision
5.7.7 Major burn
5.7.8 Major fractures
5.7.9 Pregnant patient with active bleeding
5.7.10 Severe headache
5.7.11 Sexual assault
5.7.12 Suicidal/homicidal behavior
5.7.13 Testicular pain

5.8 Urgent (Level 3) - treatment and reassessment should occur in 15-45 minutes:
5.8.1 Abdominal pain
5.8.2 Alcohol/drug intoxication
5.8.3 Bleeding, patient is stable
5.8.4 Closed fracture
5.8.5 Drug ingestion
5.8.6 Eye injury (no vision loss)
5.8.7 Laceration
5.8.8 Minor chest pain
5.8.9 Non-cardiac chest pain
5.8.10 Renal calculi
5.8.11 Urinary retention

5.9 Semi-Urgent (Level 4) - treatment and reassessment should occur in one to two (1-2) hours:
5.9.1 Abscess
5.9.2 Constipation
5.9.3 Cystitis
5.9.4 Earache
5.9.5 Minor bites
5.9.6 Minor burn
5.9.7 Sore throat
5.9.8 Sprains/strains
5.9.9 STDs
5.9.10 Vaginal discharge

5.10 Routine (Level 5) - treatment and reassessment should occur within four (4) hours:
5.10.1 Bruise
5.10.2 Cough, non-productive
5.10.3 Medication refill
5.10.4 Routine physical
5.10.5 Suture removal
5.11 Until the patient is triaged by the Triage RN and deemed to have a non-life-threatening condition, the Emergency Department Registration Clerk is not to obtain or request any financial information or demographic information.

5.12 The triage nurse shall do ECG for all patients with chest pain immediately after triage where bed 40 is preserved for ECG and pain management initiation.

5.13 The triage physician/nurse may request any or all of the following (if necessary) while the patient is in the waiting area:

   5.13.1 Open / trace file
   5.13.2 X-Ray
   5.13.3 Urine sample for pregnancy test and MSU
   5.13.4 Old charts

5.14 The triage physician/nurse should call physician in charge to assess category 3 non-eligible patients.

5.15 The triage physician/nurse should advice all other patients to seek medical care at primary health care centers or urgent care clinic if created and direct them to the AOD if they need more help or are not fully convinced.

5.16 The charge nurse in each area shall keep monitoring the waiting time of patients waiting to be seen in ACU/UCU and call them for re-triage if the waiting target time exceeded

6.0. Reference:

   6.2 Medical screening of emergency department patients, Ann Emerg Med. 2006; 48:510
1.0. **CONDITION:**

DEM STAFF
Trauma team members
EMS

2.0. **PURPOSE:**

2.1 To provide a standardized protocol/process for ensuring that patients who presented at the DEM receive proper and adequate medical screening.
2.2 To provide for a consistent system of triage of patients who presented at DEM.
2.3 To minimize patient to physician time in order to meet with the international standards.
2.4 To ensure the judicious use of acute care resources, and to avoid wastages on non-urgent cases.

3.0. **DEFINITIONS**

3.1 **Immediately available:** Responding without delay when notified; and being physically available to the DEM when the patient is delivered.
3.2 **On-call:** Available to respond to the trauma call in order to provide a defined service.
3.3 **Trauma team:** A multidisciplinary team responsible for the initial resuscitation and management of the trauma patient.
3.4 **HCA:** Health care assistant

3.4.1 **RP:** Resuscitation physician is the emergency senior registrar or senior resident till the arrival of the GS assistant consultant or senior resident.
3.5 **DEM:** Department of Emergency Medicine
3.6 **GS:** General surgery

4.0 **POLICY:**

4.1 For all trauma patients meeting trauma code criteria (appendix 1) shall be managed in the DEM by a trauma team.
4.2 **Trauma Code activation:**

4.2.1 The resuscitation team, including the emergency physician shall be in house and immediately available on a 24-hour/day, seven-day/week basis.
4.2.2 The ED Consultant will notify all members of the trauma team within two (2) minutes of receiving the initial trauma alert from EMS personnel or upon arrival of the trauma patient meeting trauma code criteria (appendix 1).

4.2.3 The ED Consultant in addition may initiate a Trauma Code Activation using clinical judgment, based on the EMS report and/or the initial assessment.

4.2.4 Trauma Code Activation may be upgraded or downgraded at any time as the patient’s condition dictates.

4.3 **Surgery Consultant**: capable of evaluating and treating trauma patients shall be immediately available for trauma team activation and promptly available to meet the patient within maximum of twenty (20) minutes.

4.3.1 Isolated penetrating head injuries may be admitted and evaluated exclusively by neurosurgery.

4.4 **Anesthesiologist**: An anesthesiologist will be promptly available upon arrival of the patient in the emergency or operating room.

4.5 **Other specialties** that are on-call and promptly available for consultation via telephone within twenty (20) minutes of time that the call is placed and able to meet the patient within a time that is medically prudent for the standard of care for that specialty:

- Neurosurgery
- Obstetric/gynecologic
- Ophthalmologic
- Oral or maxillofacial or head and neck
- Orthopedic
- Plastic
- Urologic
- Radiology

5.0 **PROCEDURE**

5.1 **The process of notifying**: To activate the system:

5.1.1 Page the Hospital Operator

5.1.2 Ask to have Trauma Code Activation

5.2 A process to document compliance with this policy, including time that the surgeon is notified, time of arrival of the trauma surgeon in the emergency department, and response times of other trauma team members.

5.3 The members of the Trauma Team and Emergency Department combine to form the Trauma Resuscitation Team.

5.3.1 **Supervision**

- GS Consultant & EM Consultant
- GS consultant will play the team leader role
- All major decision shall be agreed on by both

5.3.2 **Resuscitation**

- Resuscitation Physician (RP)
- Procedure Physician (optional)
- Anesthesia Physician
- Primary Registered Nurse
- Associate Nurse(s)
- Nursing Assistant
- Respiratory Therapy
- Radiology Technologist

5.3.3 **Support Personnel**
- Consulting physicians
- Security/Public Safety Officers
- ED Clerical Staff
- Social Worker

### 5.4 Trauma stabilization Procedures

#### 5.4.1 PHASE I: PRE-ARRIVAL

**5.4.1.1 Initial Contact and Activation of Trauma Team**
- DEM is contacted with information:
  - Pre-hospital information critical in planning the immediate care of the patient upon arrival includes:
  - Vital Signs, Level Of Consciousness (LOC), pupillary reactions
  - Trauma Score, Glasgow Coma Score
  - Treatments in progress, line, intubation, etc
  - Estimated time of arrival (ETA)
  - Patient age and sex
  - Mechanism of injury, circumstances and time of injury, extrication time
  - Obvious injuries
  - If Life Flight transport, obtain patient name and age.
  - Dispatcher will inform ED as soon as information is available.
  - The physician or nurse receiving the initial information must immediately contact the Emergency Medicine Consultant and charge nurse. The EM Consultant will activate the Trauma team as per the guidelines.
  - Determine Trauma Team role assignment and prepare for patient care needs. The resuscitating room doors should be closed and the room heated. Obtain and prepare needed equipment. Call for and obtain emergency release blood if needed.
  - Radiology technologists should be stationed outside the trauma room and be available to proceed with studies after the secondary survey is completed.
  - Clerical staff will contact the paging operator to page the Trauma Team, notify support personnel of ETA, obtain emergency release blood as instructed, and page consulting physicians as instructed.
  - Inform Security if mechanism of injury (MOI) is assault, gunshot wounds (GSW), or suspicious in any way so that security measures can be activated.

**5.4.1.2 Pre-Arrival Conference and Role Assignment**
- Available information is relayed to team members
- Trauma resuscitation team roles will be assigned
- All necessary personnel and equipment will be readied
5.4.2 **PHASE II: PATIENT ARRIVAL**

5.4.2.1 EMS will give a very brief report as patient is being transferred to gurney. Reporting items will include: Identity, age, Mechanism of injury, airway, breathing, circulation, LOC, IV access, injuries or illnesses known or suspected, and any immediate concerns.

5.4.2.2 RP will evaluate the patient and verbally relay findings to the trauma resuscitation team for care and documentation purposes. Standard principles of ATLS will be applied to trauma resuscitations.

5.4.2.3 Evaluation and treatment will proceed simultaneously in a step wise fashion. This should be done with oversight from the supervising physicians.

5.4.2.3.1 primary Survey

- **Airway with cervical spine control**
  - RP/Airway physician / RT – Evaluates airway, performs airway procedures as indicated for patency, protection and risk of decompensate.
  - Emergency Medicine Consultant – will provide back-up in obtaining definite airway
  - If needed additional airway management may be obtained by calling Anesthesia

- **Breathing**
  - RP/Airway physician / RT – Evaluates oxygenation and ventilation providing supplemental oxygen and ventilatory support as needed

- **Circulation with hemorrhage control**
  - RP – evaluate adequacy of perfusion and obvious hemorrhage for shock management
  - Nurses Left – Sets up monitor, obtain VS, establishes IV access
  - Nurse Right – IV access, obtains lab specimens
  - Circulating Nurse / HCA – Obtain warm IV fluids and blood as needed

- **Disability**
  - RP - evaluate neurological status including AVPU, PEARL & address need for Neurosurgery consult

- **Exposure**
  - Nurse Right / RP - completely undress the patient and then cover patient

  - **AMPLE History**
  - RP – Will obtain allergies, medications, past medical history, last meal / tetanus, and prior events. This information will be relayed to the team.
5.4.2.3.2 Secondary Survey

- The secondary survey is a head-to-toe, front-to-back exam that identifies potentially life threatening and other injuries.
- The secondary survey includes:
  - Vital signs: Respirations, Pulse Ox, Pulse, Temperature, and Blood Pressure
  - Head-to-toe / front-to-back assessment
  - Patient should be removed from hard back board
  - ‘Trauma Triple’ - chest, pelvis, and lateral c-spine x-rays as needed
  - FAST ultrasound as needed
  - Gastric tube, Foley (if no contraindications), and additional lines placed as needed

5.4.2.3.3 Initial Plan of Care

- At the conclusion of primary survey and secondary survey the following should occur:
  - RP - confirm findings and therapies of initial evaluation with the trauma resuscitation team to assure accuracy and completeness. The RP will present a plan of care to supervising physicians for discussion.

5.4.2.3.4 Documentation

5.4.2.3.4.1 Physician:
- The GS RP is responsible for Trauma Assessment History and Physical completion for all trauma patients.
- The EM RP is responsible for the Emergency Department history and physical documentation.

5.4.2.3.4.2 Nursing:
- Documentation on the Trauma flow sheet (appendix 2)
- Documentation must be completed according to established trauma documentation guidelines.

5.4.3 PHASE 3: DEFINITIVE CARE

5.4.3.1 Phase 3 includes consultations, diagnostics, definitive care, ongoing assessment, and disposition of the patient to the appropriate location.

5.4.3.2 The RP will coordinate efficient progression of plan of care.

- Notify consultants.
- Notify appropriate radiologist of specialty studies.
- Frequently reassess patient until disposition is made.

5.4.3.3 The Primary Nurse will assume nursing responsibility for the patient until disposition is made. (Nursing backup will be assigned as needed).

- Frequently reassesses patient and document findings and interventions until disposition is made.
- Routinely informs team members of patient condition and document action.
- Instruct HCA to return emergency release blood if not required.
5.4.3.4 Communication
   - There must be established a continuous flow of information between the RP, Primary Nurse, and Supervising physician. All must be up to date with information concerning assessment, diagnostic findings, condition changes, and alterations in the plan of care. Certain areas need early notification of the trauma victim.
     - CT Scanner
     - Intensive Care
     - Theatres

5.4.3.5 Consultations
   - Consultants should allow for completion of primary and secondary survey. Consultants will verbally communicate with the trauma resuscitation team regarding evaluation, plan of care and any changes to the plan. They will complete appropriate, mandated documentation of consultation.

5.4.3.6 Diagnostic Imaging
   - Radiology Resident/Assistant should be present for consultation and film review.

5.4.3.7 Transport
   - If diagnostic procedures require the patient to be transported out of the ED, the RP must immediately inform the Primary Nurse. A minimum of five minutes is needed for packaging the patient for transport. Preparing the patient for transport includes:
     - EMS Personnel
     - Monitoring hookup
     - Stabilization of cervical spine and immobilization if required
     - Transport pack with warm fluids to accompany patient
     - EMS Personnel will transport. Respiratory Therapist will be available to maintain adequate ventilation and oxygenation during transport as needed.
     - Patient stability must be established prior to transport out of the ED. If an unstable patient is to be transported, they must be accompanied by a RP.

5.4.3.8 Debriefing/Critique
   - Any member of the Trauma Resuscitation Team may call for a debriefing or critique.
   - A debriefing is helpful in dealing with the emotional responses to the victim or the circumstances of the injury.
   - A critique is a procedural review that provides a forum to discuss the positive aspects of the resuscitation and identify problems or a need for procedural changes.

5.5 Any physician who is providing trauma coverage shall have successfully completed an ATLS Course or approved ATLS equivalent course.
5.6 A minimum of one and preferably two registered nurses who have trauma nursing training shall participate in initial major trauma resuscitations.

5.7 Equipment and services for the evaluation and resuscitation of, and to provide life support for, critically or seriously injured patients of all ages shall include but not be limited to items in appendix3.

5.8 **CLINICAL LABORATORY SERVICE** (available 24 hours/day). Standard analyses of blood, urine, and other body fluids, including micro-sampling
- 5.8.1 Blood typing and cross-matching
- 5.8.2 Capable for immediate release of blood for a transfusion
- 5.8.3 Call Trauma hotline 91718 to obtain additional blood supply if needed.
- 5.8.4 Coagulation studies.

6.0 **RESPONSIBILITIES**

6.1 The Team Leader – The Team Leader should not touch the patient. Instead he/she acts as:
- 6.1.1 Obtain history from paramedics.
- 6.1.2 Direct team members in their actions.
- 6.1.3 Establish priorities for investigation and management.
- 6.1.4 Order or authorize investigations and procedures.
- 6.1.5 Keep track of whole state of the patient.
- 6.1.6 Receive and interpret all results of investigations.
- 6.1.7 Order fluid or blood administration.
- 6.1.8 Supervise spinal maneuvers.
- 6.1.9 Consult with other specialties.
- 6.1.10 Decide on appropriate disposition.
- 6.1.11 Talk to relatives.
- 6.1.12 Write in the notes.
- 6.1.13 Record audit information.
- 6.1.14 Dismiss and debrief team members.
- 6.1.15 Educate trauma team.

6.2 The Trauma and EM consultants work in tandem to oversee the resuscitation with regards to patient care and providing education to the trauma team.
- 6.2.1 GS Consultant
- 6.2.2 Respond per pre-established guidelines
- 6.2.3 Accepts transfer of care from EM Consultants

6.3 EM Consultant
- 6.3.1 Evaluates all trauma patients.
- 6.3.2 Transfers care and patient information to the GS Consultant
- 6.3.3 Provides ongoing patient surveillance while in the ED
- 6.3.4 Supervises and provides back-up for airway management

6.4 **RESUSCITATION** fig1

6.5 Resuscitation Physician (RP): is the EM assistant consultant till the arrival of the GS assistant consultant. If there is not enough personnel to fill all roles listed below then responsibilities will be combined.
- 6.5.1 Under the supervision of the Consultants provides guidance to the resuscitation team
- 6.5.2 Leads resuscitation according to ATLS Standards
- 6.5.3 Conducts primary and secondary survey
6.5.4 Obtains AMPLE history
6.5.5 Conducts secondary survey
6.5.6 Relays assessment information for documentation on trauma flow sheet
6.5.7 Document complete evaluation on Trauma H+P
6.5.8 Assures that assessment and management priorities are followed as delineated
6.5.9 Establishes and maintains communication with the patient
6.5.10 Directs, performs or delegates resuscitation procedures (IV central line access, femoral stick lab specimens, interventions)
6.5.11 Coordinates plan of care with nursing and medical staff
6.5.12 Determines need for consultations

6.6 Procedure MD: EM assistant consultant or GS assistant consultant.
   6.6.1 Perform diagnostics/ interventions as directed
   6.6.2 Assist with central IV access
   6.6.3 Obtain lab specimens (femoral sticks)

6.7 Airway Physician: EM assistant consultant
   6.7.1 Assesses airway
   6.7.2 Request RSI medications as needed
   6.7.3 Manages / directs airway management

6.8 Anaesthetist - The anaesthetist has a central role in the trauma team.
   Responsibilities are :
   6.8.1 Airway Control
   6.8.2 Cervical Spine Control
   6.8.3 Ventilation
   6.8.4 Monitoring of vital signs.
   6.8.5 Monitoring of fluid and drug administration.
   6.8.6 Analgesia
   6.8.7 Provide anaesthesia for surgical procedures.

6.9 Orthopaedic Surgeon
   6.9.1 Assessment of spine, pelvis.
   6.9.2 Application of external fixator.
   6.9.3 Assessment of limb injury.
   6.9.4 Dressing of wounds and stabilization of fractures.

6.10 Primary Nurse
   6.10.1 Assist with coordination of trauma team roles.
   6.10.2 Identifies essential team members for patient care in room.
   6.10.3 Directs ancillary staff for procedure completion. Oversees flow of activity
   6.10.4 Documents patient assessment data during patient arrival phase
   6.10.5 Calculates patient Trauma score based on first set of vital signs and neuro assessment
   6.10.6 Assumes care of patient after stabilization (unless otherwise delegated/assigned by charge nurse)
   6.10.7 Coordinates plan of care with MD
   6.10.8 Assure that the RN receives Trauma Sheet for Immediate Care’ and assures orders are followed completed
6.10.9 Ensure emergency release blood remains beneath ice pack in cooler
6.10.10 Discuss further need for uncross matched blood and HCA to return to transfusion services

6.11 Nurse Left (left side of patient)
6.11.1 Set up monitor (preferably with visual and auditory signals)
6.11.2 Assess initial BP with manual cuff.
6.11.3 Obtain complete vital signs within 3 minutes – HR, R, BP, and T.
6.11.4 Calls vital signs aloud to the trauma team ensuring awareness.
6.11.5 IV access and fluids
6.11.6 Obtain lab specimens as appropriate
6.11.7 Set up for diagnostic procedures (Central line, chest tube/pleurevac, etc.)

6.12 Nurse Right (right side of patient)
6.12.1 Obtains IV access and starts fluids
6.12.2 Obtain lab specimens as appropriate
6.12.3 Assist with patient exposure and covering
6.12.4 Foley insertion as instructed by RP
6.12.5 Continues reassessment and post-secondary survey
6.12.6 Guiac supplies
6.12.7 Document valuables on valuable envelope and secure in safe

6.13 Respiratory Therapist
6.13.1 Ongoing assessment of airway patency
6.13.2 Ongoing assessment of breathing
6.13.3 Assists with appropriate airway
6.13.4 Provides ventilatory support; makes changes in response to ABGs and communicates to patient care nurse for documentation in nurses notes.
6.13.5 Documents interventions and ongoing changes of therapy in response to ABG
6.13.6 May place gastric tube as instructed by MD
6.13.7 Establishes and maintains communication with patient as indicated for procedure

6.14 Circulating Nurse
6.14.1 A circulating nurse/nurse aide should be available to facilitate processing of lab specimens, obtaining equipment and additional blood, etc.

6.15 Nursing Supervisor
6.15.1 Responds to trauma page.
6.15.2 Coordinates departmental staffing to ensure care of patient and unit throughout resuscitation and relocation.
6.15.3 Provides communication link between trauma room and the rest of the hospital, including involvement in finding a ward bed, if required.
6.15.4 Coordinates phones and paging, if required.
6.15.5 In absence of Social Work staff, performs functions described for social workers.

6.16 HCA
6.16.1 CPR
6.16.2 Collect and label of urine specimen
6.16.3 Dip urine specimen for blood and report to primary nurse
6.16.4 Retrieval of trays, equipment, supplies  
6.16.5 Clean patient and room as directed by the primary nurse  
6.16.6 Secure and label clothing/articles  
6.16.7 Return uncross matched blood to transfusion services as directed  

6.17 ED Clerk  
6.17.1 Will enter the Trauma activation into the paging system  
6.17.2 Lab order entry for Trauma will include trauma panel:  
   6.17.2.1 Shock panel and Type and Screen,  
   6.17.2.2 PT/PTT, ABC, OP7, U/A  
   6.17.2.3 HCG pregnancy (all women of childbearing age)  
6.17.3 Trauma Triple (C-spine, CXR, pelvis radiographs)  
6.17.4 All other labs should be ordered as needed on an individual basis:  
   Amylase, Lipase, Ca, Mg, OP4, Lactic Acid, Toxicology screen, ETOH, and Type and Cross  
6.17.5 Ensuring all forms are included and identified with patient’s addressograph plate)  

6.18 The Radiographer  
6.18.1 Responds to all Trauma Pages within 5 minutes; informs team member he/she is present.  
6.18.2 Performs chest X-ray immediately. (X-rays of pelvis, cervical spine, thoracolumbar region and extremities can wait, if necessary, until the CT is done.)  
6.18.3 Remains with trauma team until told he/she is no longer required.  
6.18.4 The radiographer should also act as liaison to the CT scanning department.  

6.19 The flow of information and role assignments should begin with the notification by pre-hospital or referral hospital that a trauma patient is en-route. This sets up the continuum of care in the following sequences:  

6.19.1 Phase 1: Pre-Arrival  
   ▪ Trauma Team activation  
   ▪ Pre-arrival conference  
   ▪ Information sharing  
   ▪ Role assignment  
   ▪ Preliminary plan of care  

6.19.2 Phase 2: Patient Arrival – ATLS:  
   ▪ Primary survey  
   ▪ AMPLE History  
   ▪ Secondary Survey  
   ▪ Initial Plan of Care  
   ▪ Documentation  

6.19.3 Phase 3: Definitive Care  
   ▪ Ongoing reassessment primary/secondary surveys  
   ▪ Ongoing communication between team members  
   ▪ Consultation  
   ▪ Diagnosis  
   ▪ Comprehensive care and management  
   ▪ Operative intervention
- Stabilization and transfer

7.0 **Forms and Attachments:**

**PERFORMANCE IMPROVEMENT TEAM**

- a. Audit of trauma charts for appropriateness and quality of care.
- b. Documented evidence of identification of all deviations from trauma standards of care, with in-depth critical review.
- c. Documentation of actions taken to address all identified issues.
- d. Documented resolutions “loop closure” of all identified issues to prevent future recurrences.
- e. Special audit for all trauma deaths and other specified cases, including complications, utilizing age-specific criteria.
- f. Multidisciplinary hospital trauma PI committee structure in place.
- g. Multidisciplinary trauma conferences, continuing education and problem solving to include documented nursing and pre-hospital participation.
- h. Feedback regarding major/severe trauma patient transfers-out from the ED and in-patient units shall be obtained from receiving facilities.
- i. Documentation of severity of injury (by Glasgow Comma Scale, revised trauma score, age, injury severity score) and outcome (survival, length of stay, ICU length of stay) with monthly review of statistics.
### Appendix 1(Criteria)

<table>
<thead>
<tr>
<th>SN</th>
<th>CRITERIA</th>
<th>NO</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Trauma presenting with shock.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2)</td>
<td>Multi system Blunt injury.</td>
<td></td>
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<tr>
<td>3)</td>
<td>Respiratory distress / airway compromise OR mechanism of injury that could lead to airway compromise (this includes all intubated patients or where there is an inability to intubate).</td>
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<tr>
<td>4)</td>
<td>Penetrating injury of head, neck, torso, groin.</td>
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<tr>
<td>5)</td>
<td>Unresponsive (Glasgow Coma Scale &lt; 8) with multiple injuries.</td>
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<tr>
<td>6)</td>
<td>Penetrating trauma with arrest in ED</td>
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<tr>
<td>7)</td>
<td>Proximal amputations (above the knee, above elbow)</td>
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<td>8)</td>
<td>Crushed or pelvic ring fracture or crushed chest.</td>
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<tr>
<td>9)</td>
<td>Falls &gt;3 meters (Depending on Judgment of ED physician)</td>
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</tr>
<tr>
<td>10)</td>
<td>Auto/bike or auto/pedestrian, (Depending on Judgment of ED physician)</td>
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<tr>
<td>11)</td>
<td>Severe trauma mechanism as evidenced by severe deformity of the vehicle, death of an occupant etc, as judged by the ED consultant</td>
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<tr>
<td>12)</td>
<td>Pregnancy &gt; 20 weeks (to call also consultant OB &amp; gyno).</td>
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<tr>
<td>13)</td>
<td>Burn with trauma or involving the airway.</td>
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</table>
## Appendix 2 (Trauma Sheet)

### KKUH & KAOUH DEM

#### Trauma Resuscitation Record

<table>
<thead>
<tr>
<th>Triage Level</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
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<tbody>
<tr>
<td>Date of Birth</td>
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<tr>
<td>Trauma Team Activated</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Name</td>
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<tr>
<td>Time Called</td>
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<tr>
<td>Time Arrived</td>
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<td></td>
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<tr>
<td>Present upon patient arrival</td>
<td>Yes</td>
<td>No</td>
<td></td>
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<tr>
<td>Name</td>
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<td></td>
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<tr>
<td>Time called</td>
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<td>Time arrived</td>
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<td>Present upon patient arrival</td>
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<td>Time called</td>
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<td>Time arrived</td>
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</tr>
<tr>
<td>Present upon patient arrival</td>
<td>Yes</td>
<td>No</td>
<td></td>
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</tbody>
</table>

### Mechanism of Injury

- **Motor Vehicle**
  - Driver
  - Passenger - front
  - Passenger - back
  - Pedestrian struck by auto
  - Bicyclist struck by auto
  - Pedestrian
  - Bicyclist
  - Motorcyclist
  - Walker
  - Transfer from:
    - Mode:
      - Ambulance
      - Helicopter
      - Police
      - Scooter
      - Car

### Estimated Weight:

- Unknown
  - Last Titanum
  - Last PO.

### Primary Survey and Preliminary Interventions

- **Airway**
  - Patient is awake
  - Clear
  - Partially obstructed
  - Completely obstructed
  - Breathing sustained
  - Intubated
  - EMA
  - Time

- **Breathing**
  - Spontaneous
  - Abnormal
  - No effort
  - Tracheostomy:
    - Deviated
    - L
  - Chest wall:
    - Symmetrical
    - Asymmetrical
    - Emphysema
    - Crepitus
  - Lung sounds:
    - R:
      - Present
      - Clear
      - Diminished
      - Absent
      - Crepitations
    - L:
      - Present
      - Clear
      - Diminished
      - Absent
      - Crepitations

- **Circulation**
  - Skin:
    - Warm
    - Cool
    - Warm
    - Cyanotic
    - Diaphoretic
  - Pulse:
    - Central pulse present
    - Peripheral pulse present
    - No pulse
    - Strong
    - Thready
    - Capillary refill:
      - 6 sec
  - IV:
    - Time
    - Site
    - Size
    - Intubation
    - Tube size
    - RSI
    - Time
    - BP:
      - / mmHg
      - / min
    - Pulse:
      - / min
    - Resp:
      - / min
    - Temp:
      - / C
    - SaO2:
      - / %
    - A:
      - Awake and alert
    - V:
      - Verbal stimuli elicits response
    - P:
      - Painful stimuli elicits response
    - U:
      - Unresponsive to stimuli

### Burn

- Type:
  - Flame
  - Steam
  - Chemical
  - Radiation
  - Inhalation
  - Electrical
  - Voltage:

### Penetrating Injury

- Type:
  - Grass/dirt/earth
  - Stone
  - Concrete/block
  - Tire/Wood
  - Carpet
  - Water
<table>
<thead>
<tr>
<th>Disability</th>
<th>Glasgow Coma Scale – GCS* (infant)</th>
<th>Pupils</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Eye Opening</td>
<td>Motor</td>
</tr>
<tr>
<td>4 Spontaneous</td>
<td>4 Oriented* (Cries and hobbies)</td>
<td>L</td>
</tr>
<tr>
<td>3 To Verbal</td>
<td>4 Confused* (Intricate cries)</td>
<td>R</td>
</tr>
<tr>
<td>2 To Pain</td>
<td>3 Inappropriate response* (cries</td>
<td></td>
</tr>
<tr>
<td>1 None</td>
<td>(Means to pain)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Inappropriate response* (Means</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to pain)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 None/Intubated</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Obey* (Moves spontaneously and purposefully)</td>
<td>L</td>
</tr>
<tr>
<td>5 Localizes pain* (Withdraw to touch)</td>
<td>R</td>
</tr>
<tr>
<td>4 Withdraws from pain</td>
<td></td>
</tr>
<tr>
<td>3 Flexor posturing</td>
<td></td>
</tr>
<tr>
<td>2 Extensor posturing</td>
<td></td>
</tr>
<tr>
<td>1 None/Chemically paralyzed</td>
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<table>
<thead>
<tr>
<th></th>
<th>Secondary Survey</th>
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<tbody>
<tr>
<td>Head</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pain/Tenderness</td>
</tr>
<tr>
<td></td>
<td>Drainage from:</td>
</tr>
<tr>
<td></td>
<td>Ears</td>
</tr>
<tr>
<td></td>
<td>Nose</td>
</tr>
<tr>
<td></td>
<td>Mouth</td>
</tr>
<tr>
<td>Neck</td>
<td>Pain/Tenderness</td>
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<tr>
<td></td>
<td>Swelling</td>
</tr>
<tr>
<td></td>
<td>JVD (Jugular Vein Distension)</td>
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<tr>
<td>Chest</td>
<td>Pain/Tenderness</td>
</tr>
<tr>
<td></td>
<td>Dyspnea</td>
</tr>
<tr>
<td></td>
<td>Deformity</td>
</tr>
<tr>
<td></td>
<td>Paradoximal expansion</td>
</tr>
<tr>
<td>Abdomen</td>
<td>Pain</td>
</tr>
<tr>
<td></td>
<td>Tender</td>
</tr>
<tr>
<td></td>
<td>Rigid</td>
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<tr>
<td></td>
<td>Bowel sounds present</td>
</tr>
<tr>
<td></td>
<td>Guarded</td>
</tr>
<tr>
<td></td>
<td>Distended</td>
</tr>
<tr>
<td></td>
<td>Bowel Sounds present</td>
</tr>
<tr>
<td></td>
<td>Emetic +</td>
</tr>
<tr>
<td></td>
<td>Hematemesis +</td>
</tr>
<tr>
<td>Pelvis/Genital</td>
<td>Pain/Tenderness</td>
</tr>
<tr>
<td></td>
<td>Pelvis</td>
</tr>
<tr>
<td></td>
<td>Stable</td>
</tr>
<tr>
<td></td>
<td>Unstable</td>
</tr>
<tr>
<td></td>
<td>Blood at the meatus</td>
</tr>
<tr>
<td></td>
<td>Rectal tone</td>
</tr>
<tr>
<td></td>
<td>Present</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
</tr>
<tr>
<td>Extremities</td>
<td>Pain/Tenderness</td>
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<tr>
<td></td>
<td>Extremities warm and pink</td>
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<tr>
<td></td>
<td>Moves all extremities</td>
</tr>
<tr>
<td>Back</td>
<td>Pain/Tenderness</td>
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<tr>
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<td>Deformity</td>
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<table>
<thead>
<tr>
<th>Ongoing Monitoring</th>
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<tbody>
<tr>
<td>Time</td>
</tr>
<tr>
<td>BP</td>
</tr>
<tr>
<td>Pulse</td>
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<tr>
<td>Resp.</td>
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<td>SaO2</td>
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<td>%</td>
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<tr>
<td>GCS</td>
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<td>Temp.</td>
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<td>C°</td>
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<tr>
<td>ECG</td>
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<tr>
<td>FICO2</td>
</tr>
<tr>
<td>Pain Scale</td>
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<table>
<thead>
<tr>
<th>Medication</th>
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<tbody>
<tr>
<td>Drug/Procedure</td>
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## Notes

**Doctor's Note** (to be filled by the Trauma Team Leader):

<table>
<thead>
<tr>
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<th>Time</th>
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**Doctor's Orders** (to be filled by the Recording Nurse):

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**Name and Signature**

<table>
<thead>
<tr>
<th>Trauma Team Leader</th>
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<tbody>
<tr>
<td>Primary Nurse</td>
<td></td>
</tr>
<tr>
<td>Recorder</td>
<td></td>
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</tbody>
</table>
Acute pain in Sickle Cell Disease
Protocol & Guideline

Prepared by: Dr. Hani Al-Ibrahim
DEM Consultant
Date: 22/5/2010

Reviewed by: Dr. Salih Alhetela
Director QM, DEM
Date: 1/6/2010

Authorized by: Dr. Zohair Alaseri
DEM Chairman
Date:
Guideline for the Management of Acute Pain in Sickle Cell Disease

Triage:

When patients with sickle cell disease come to the emergency department with severe pain they should be triaged rapidly, and the physician responsible should be notified of their presence as soon as possible. Mild to moderate pain can be triage to less urgent area.

History:

- The most common clinical picture during adult life is vaso-occlusive crisis.
- The crisis begins suddenly, sometimes as a consequence of infection or temperature change, such as an air-conditioned environment during a hot summer day. However, often, no precipitating cause can be identified.
- Severe deep pain is present in the extremities, involving long bones. The abdomen is affected with severe pain resembling acute abdomen. Pain may be accompanied by fever, malaise, and leukocytosis.

Vaso-occlusive crises are often precipitated by the following:

- Cold weather (due to vasospasm)
- Hypoxia (flying in unpressurized aircraft)
- Infection
- Dehydration (especially from exertion or during warm weather)
- Acidosis
- Alcohol intoxication
- Emotional stress
- Pregnancy
- Exertional stress

Physical examination:

- Physical findings are not specific.
- Auscultate chest – note breath sounds and any added sound or decrease air entry.
- Palpate abdomen – check spleen and liver size and note any tenderness or increased pain.
- Check extremities for bone, joint or soft tissue pain. Note presence of inflammatory process including heat, redness, tenderness and swelling.
- Assess for neurological deficit – weakness on one side of the body including facial drooping, slurred speech, unsteady gait, changes in vision, numbness or tingling of an extremity, and/or paralysis. Ask if any seizures were noted.

**Investigation:**

**Laboratory Studies**

- Assess hemoglobin and hematocrit levels. Anemia is often identified; however, a major drop in hemoglobin (ie, more than 2 g/dL) from previously recorded values indicates a hematological crisis. If the reticulocyte count is normal, splenic sequestration is the probable cause. If the reticulocyte count is low, an aplastic crisis is the probable cause. If the reticulocyte count is high, hyperhemolytic crises is the probable cause.

- Obtain a leukocyte count. Leukocytosis is expected in all patients with sickle cell anemia. Major elevation in the WBC count (ie, >20,000 per mm$^3$) with a left shift raises suspicion for infection.

- Leucopenia is suggestive of parvovirus infection.

- The platelet count is often elevated. If low, consider of hypersplenism.

- Arterial blood gases (ABGs) may be obtained in patients who are in respiratory distress to supplement information provided by oxygen saturation monitoring. This will reflect the severity of pulmonary crisis.

- Obtain liver function tests in patients with abdominal pain. An elevated baseline indirect bilirubin level may be normal because of chronic hemolysis.

- Type and crossmatch in case transfusion is necessary.

- Perform urinalysis if the patient has fever or signs of urinary tract infection (UTI). Patients with sickle cell anemia often have hematuria. If signs of urinary tract infection are present, obtain a urine Gram stain and culture.

**Imaging Studies**

- Chest radiography
• Perform in patients with respiratory symptoms.
• Radiographic findings may initially be normal in patients with acute chest syndrome.

**Bone radiography**

• Perform in patients with localized bone tenderness.
• Do not differentiate between osteomyelitis and bone infarction in the early stages. Radiographic signs of osteomyelitis may not appear for 8-10 days.
• A view of the vertebral column shows typical fish-mouth appearance of vertebrae in patients with sickle cell anemia. This is due to expansion of the bone marrow.

**Ultrasonography**

• Use in patients with abdominal pain to rule out cholecystitis, cholelithiasis, or an ectopic pregnancy and to measure spleen and liver size.
• Cardiac echo should be performed for patients with dyspnea.

**Head CT or MRI**

• Is used if signs and symptoms of stroke are present.

**Management:**

- Oxygen
- Hydration
- Pain management
- Antibiotics

**Hydration:**

- If the patient is hypovolemic consider fluid boluses with normal saline.
- In the management of acute vaso-occlusive pain crises, intravenous fluids should not exceed 1.5 times maintenance. The fluid of choice is 5% dextrose in half normal saline.

**Pain management:**

- Severe pain is a medical emergency and should be treated accordingly.
- Analgesic use should be liberal, but tailored to the individual patient.
In the assessment of an acute painful event, the clinician should choose a simple measurement of pain intensity, reassess frequently, and record the measurement for treatment evaluation. Pain should be quantitated using a validated pain scale.

**Severe pain**

- Morphine is the drug of choice. Morphine dosing has to be individualized.
- It should be given intravenously. Once the effective dose is established, it should be administered every 3 hours via the intravenous regimen.
- For severe pain, intravenous administration is the route of choice, and opioids can be administered subcutaneously in patients with poor venous access.
- Intramuscular administration of medication should be avoided, if possible.
- After 24-48 hours, as pain is controlled, equivalent doses of sustained-release oral morphine should be given.
- Chronic pain is managed with long-acting oral morphine preparations and acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs).
- Meperidine should be avoided.
- Patient-controlled analgesia (PCA) should be started only after satisfactory pain relief has been achieved with an aggressive opioid titration schedule.

**Mild to moderate pain**

- Mild to moderate pain is usually controlled with NSAIDS. If pain persists or escalates, opioids should be added.
- When a patient is discharged from the emergency department he or she should be given enough analgesic doses of an oral opioid & NSAID to last until the follow-up visit a few days later.

**Pain killers which available in the department:**
- Morphine sulphate  I.V (3-5 mg every 10-15 minutes )
- Tramadol 50-100 mg I.V Q8 hrs
- Ketoprofin 100 mg IM Q 6 Hrs
- Paracetamol I.V 1gm Q 6 Hrs
- Tylenol NO. 3 two Tab. Q 6 Hrs
- Fentanyl I.V
- Fentanyl patches.

- Opioid tolerance and physical dependence can occur with lengthy treatment; this is not addiction. Addiction is psychological dependence characterized by continued craving for an opioid for other than pain relief. Addiction is rare in patients under proper care.

- Older children and adults with severe recurrent pain may be candidates for hydroxyurea, given daily under the careful supervision of a hematologist, internist or pediatrician thoroughly familiar with this form of treatment.
Infection Recommendations:
- The adult patient, all infections must be treated promptly with broad-spectrum antibiotics until a causative organism is identified and therapy is tailored according to its antibiotic sensitivity.
- All “toxic-looking” patients and those with meningismus should receive a lumbar puncture.
- In patients with bone pain and fever, cultures of subperiosteal or joint fluid should be obtained by aspiration of the suspected bone lesion prior to initiation of antibiotics.

Well-appearing patient with SCD and fever should still be admitted if any of the following are present:
- Infiltrate on chest x-ray or abnormal oxygen saturation
- White blood cell count > 30,000/μL or < 5,000/μL
- Hemoglobin < 5 g/dL

Patients with SCD and fever may be considered for outpatient therapy If:
- The patient is non-toxic appearing
- WBC, and hemoglobin counts are at baseline levels for that patient.
- The patient is appropriately trained and reliable
- There is a follow up program in place

Acute Chest Syndrome:
  Treatment should include:
  - oxygen as needed
  - Hydration with maintenance fluids - avoid over-hydration
  - Should receive antibiotics that cover typical and atypical microorganisms.
  - Transfusion for worsening respiratory distress, severe anemia or hypoxemia.

Splenic Sequestration:
Splenic dysfunction in sickle cell disease is the consequence of repeated infarctions and subsequent fibrosis of the spleen. Patients with sickle cell disease may develop sudden intrasplenic pooling of large amounts of blood, a condition known as acute splenic sequestration crisis (ASSC).

Presentation:
- Clinical signs can be pallor, sudden weakness, hypotension, tachycardia, tachypnea, and abdominal pain and enlargement
- ASSC must be recognized and treated with aggressive hydration and blood transfusion to prevent shock and death
- ASSC patients should be admitted.
**Priapism:**

- Upon arrival to the ED, if the patient has had priapism for less than 3 hours, conservative treatment with IV fluids, analgesics and blood transfusion should be initiated.
- Once priapism has been present for 3 hours, urology consultation for drainage and irrigation of the corpora cavernosa.
- In patients with priapism, if drainage and irrigation fail, exchange transfusion should be considered.

**Stroke:**

- In adults with ischemic stroke, tPA should be considered. Aspirin is recommended if tPA is not used.
- Transfusion is the treatment of choice for acute ischemic stroke in children with SCD. Exchange transfusion is preferred over simple transfusion; (tPA) is not recommended.

**Admission criteria:**

- Pulmonary, neurological, or infectious crisis
- Vaso-occlusive pain that does not resolve after 4-6 hours in the ED
- Inadequate pain control.
- Unable to tolerate oral fluid.
- Unstable vital signs
- Acute chest syndrome
- Pregnancy
- Stroke.
- Persistent priapism.
- Uncertain diagnosis

**Disposition:**

- If improvement is shown after 6 hours in the ED, patient may be discharged home with strict instructions to ingest large amounts of fluids and to return if pain recurs, temperature increases, or new symptoms develop.
- Mild to moderate pain patients can be discharge home after controlling their pain with close follow up with the hematology clinic.
• Sever pain or patient with persistent pain should be admitted for more pain control.
• All patients with complication should be admitted to the appropriate specialty.

Further Outpatient Care

• Arrange follow-up in a hematology clinic so that appropriate counseling can be given and new drugs, such as hydroxyurea, can be tried. Such drugs are believed to decrease the frequency of sickling crisis by increasing the percentage of fetal hemoglobin (HbF) in blood.

References:

1-GUIDELINES FOR THE TREATMENT OF PEOPLE WITH SICKLE CELL DISEASE,2002
2-SICKLE CELL DISEASE IN CHILDREN AND ADOLESCENTS: DIAGNOSIS, GUIDELINES FOR COMPREHENSIVE CARE, AND PROTOCOLS FOR MANAGEMENT OF ACUTE AND CHRONIC COMPLICATIONS
3-Current Guidelines For Sickle Cell Disease:Management Of Acute ComplicationsDecember 2009
Guideline for Atrial Fibrillation (A.F) management in DEM

Definition:

- An atrial tachycardia characterized by predominantly uncoordinated atrial activation with consequent deterioration of atrial mechanical function.
- Absence of consistent P waves

Presentation:

- No symptoms – opportunistic case finding leads to suspicion of AF.
- The patient may experience AF as palpitations, chest pain, dizziness, or in extreme cases loss of consciousness, Hypotension or embolism.

Classification:

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DURATION</th>
<th>FEATURES</th>
<th>RELATIVE PREVALENCE</th>
<th>SYMPTOMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paroxysmal AF</td>
<td>Longer than 2 min and shorter than 7 days</td>
<td>Intervening NSR, 30% recurs, 30% becomes chronic</td>
<td>1/4</td>
<td>Younger patients: Palpitations likely, often asymptomatic and circadian.</td>
</tr>
<tr>
<td>Chronic AF</td>
<td>Longer than 1 month</td>
<td></td>
<td>1/2</td>
<td>Older patients: Less symptomatic, dyspnea most common, 10% have prior thromboembolism.</td>
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<tr>
<td>Recent-onset AF</td>
<td>7 days or longer, but shorter than 1 month</td>
<td>First discovery of AF</td>
<td>1/4</td>
<td>Dyspnea is most common symptom.</td>
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<tr>
<td>(Persistent)</td>
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Causes of AF:

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<tr>
<th>Serious cardiopulmonary causes</th>
<th>Other causes</th>
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<tbody>
<tr>
<td>Acute myocardial infarction or acute coronary syndrome</td>
<td>Hyperthyroidism</td>
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<tr>
<td>Pulmonary embolism</td>
<td>Ethanol use (“holiday heart”)</td>
</tr>
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<td>Cardiomyopathy</td>
<td>Hypothermia</td>
</tr>
<tr>
<td>Restrictive heart disease</td>
<td>Drugs: sympathomimetics, cocaine, amphetamine derivatives, ephedra</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>Metabolic causes: hypokalemia</td>
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<tr>
<td>Sleep apnea</td>
<td>Idiopathic: lone AFa</td>
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<td>Hypertension</td>
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<tr>
<td>Valvular heart disease</td>
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<tr>
<td>Left ventricular hypertrophy</td>
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<td>Left ventricular diastolic dysfunction</td>
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<td>Congestive heart disease</td>
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<td>Sick sinus syndrome</td>
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<tr>
<td>Pericarditis</td>
<td></td>
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<tr>
<td>Post-cardiac surgery</td>
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</table>

Management of the patient with atrial fibrillation

Rx depends on:
- Acuity of onset
- Associated symptoms
- Stability (or instability) of vital signs
- Duration of the dysrhythmia.

Goals in Rx of AF:
- Ventricular rate control
- Restoration of NSR
- Maintenance of NSR
- Prevention of thromboembolism

Clinical Evaluation & Diagnosis:

1. History and physical examination:
   - The presence and nature of symptoms associated with AF
   - The type of AF (first episode, paroxysmal, persistent, or permanent)
   - The onset of the first symptomatic attack or date of discovery of AF
   - The frequency, duration, precipitating factors, and modes of termination
   - The prior response to drugs
   - The presence of any underlying heart disease or other reversible conditions (e.g., hyperthyroidism or alcohol consumption)

2. Electrocardiogram (ECG):
   - Rhythm (verify AF)
   - LVH
- Preexcitation
- Bundle-branch block
- Prior MI
- Other atrial arrhythmias
  measure & follow the QT, QRS, RR intervals of patients receiving anti-arrhythmic medications.

3. **Chest radiograph:**
If a pulmonary cause of AF is suggested or if other cardiac conditions are suspected (particularly CHF)

4. **Echocardiogram:**
- Valvular heart disease
- Left and right atrial size
- LV size and function
- Peak RV pressure (PHTN)
- LVH
- LA thrombus (low sensitivity)
- Pericardial disease

5. **Blood tests of thyroid function:**
For a first episode of AF, when the ventricular rate is difficult to control, or when AF recurs unexpectedly after cardioversion

6. **Toxicology screen or ethanol level**
may be appropriate to rule out acute intoxication.

**management categories:**
- Hemodynamically unstable patient
- Hemodynamically stable patient:
  Atrial fibrillation of < 48 hrs
  Atrial fibrillation of > 48 hrs

**Hemodynamically unstable patient**
- Unstable pt: MI, p.edema, hypotension, or decompensated heart failure or severe hemodynamic instability.
- Emergent synchronized cardioversion is indicated
- Admission and further cardiovascular evaluation
Hemodynamically stable patient

- Rate control versus Rhythm control
- Rhythm control: electrical cardioversion versus anti-arrhythmic drugs
- Anticoagulation
- Patient disposition: admission, observation, or outpatient management

Atrial fibrillation of < 48 hrs

- Cardioversion may be performed **electively** to restore sinus rhythm in pt with persistent AF.
  - First episode
  - Pts who have a high chance of remaining in long-term sinus rhythm (young patients, no hypertension, normal left atrium size, short preceding AF duration)
  - Pts who have AF caused by a reversible cause (e.g. hyperthyroidism)
- Administration of sedation is necessary for patient comfort and safety during elective cardioversion.

Cardioversion Options include:
Perform blind cardioversion (no echo) in low-risk patients; avoid in high-risk patients.

- Perform a TEE
  - if negative, cardiovert the patient without anticoagulation.
  - if positive, anticoagulate for three weeks with follow-up TEE.
- Anticoagulate all patients regardless of risk after cardioversion.

**Clinical Pathway: ED Cardioversion Of Stable Patients With Atrial Fibrillation**

1. **Contraindication for sedation?**
   - **Yes**
     - Arrange DCC when sedation possible (Class II)
   - **No**

2. **Contraindication to medical cardioversion?**
   - **Yes**
     - Lidocaine (Class II)
     - Procainamide (Class II)
     - Amiodarone (Class III)
     - Propranolol/Verapamil (Class I) (Only available PO in the U.S. lower in onset)
   - **No**

3. **Sedation and anesthesia (Class I)** followed by:
   - Direct current cardioversion
   - 200J monophasic (Class I/B)
   - 120J biphasic (Class I)

   May consider lower starting energy in AF with recent onset AF and those without suspected structural heart disease

- **Success?**
  - **Yes**
    - Reassess patient (Class indeterminate)
  - **No**
    - Increase energy level (Class I) to max 360J monophasic

4. **Success?**
   - **Yes**
   - **No**

**Risk Factors For Thromboembolism With Conversion Of Atrial Fibrillation**

- Advanced age
- Rheumatic mitral valve disease
- History of diabetes
- Previous stroke or transient ischemic attack
- History of hypertension
- Left ventricular dysfunction
- Prolonged atrial fibrillation
- Hypercoagulability
- Presence of clot on TEE

**Atrial fibrillation of > 48 hrs**
Try rate control first for patients with persistent AF:
- Fast atrial fibrillation
- Age over 65
- With coronary artery disease
- With contraindications to antiarrhythmic drugs
- Unsuitable for cardioversion

Try rhythm-control first for patients with persistent AF:
- Who are symptomatic
- Who are younger
- Presenting for the first time with lone AF
- Secondary to a treated/corrected precipitant
- No co-morbid disease

☐ If the precise duration of the atrial fibrillation cannot be determined or if duration of atrial fibrillation is longer than 48 hours, TEE should be used to guide cardioversion.
☐ Alternatively, if the patient is able to tolerate atrial fibrillation, anticoagulation for 3-4 weeks prior to cardioversion.
**Rate control Agents:**

**No accessory pathway, No heart failure**
- Beta Blockers (Class I)
- Calcium channel blockers (Class I)

**In accessory pathway.**
- Amiodarone (Class IIa)
- Procainamide (Class IIb)

**In heart failure and no accessory pathway.**
- Digoxin (Class I)
- Amiodarone (Class IIa)

**Beta Blockers**
- first-line agents for rate control in atrial fibrillation
- Benefit in the setting of concomitant ischemia or infarction
- Contraindications: COPD, Asthma, bradycardia & heart block

**Effective in**
- patients with thyrotoxicosis
- poor left ventricular ejection fraction, heart failure
- increased sympathetic tone

- **Metoprolol** 5 mg IV every 5 minutes up to 15 mg
- **Propranolol** 1 mg IV every 2 minutes to max of 5-8 mg
- **Esmolol** 0.5 mg/kg IV bolus over 1 minute, followed by a 0.05-0.2 mg/kg/min IV infusion

**Calcium channel blockers**
- first-line agents for rate control in atrial fibrillation
- used cautiously in the CHF with close monitoring for hypotension
- hypotensive effects of calcium channel blockers may be decreased with the use of parenteral calcium.

**DELTIAZEM**
0.25 mg/kg IV over two minutes followed by a second bolus of 0.35 mg/kg IV over two minutes if there is inadequate response at 15 minutes

**VERAPAMIL**
2.5-5.0 mg over 2-3 minutes followed by 5-10 mg in 15-30 minutes if necessary

**Digoxin**
- first-line treatment only in patients with CHF secondary to impaired systolic ventricular function
• Limited role in the acute rate control of AF in the ED because the onset of action (60min-6 hrs)
• The therapeutic window for digoxin as monotherapy for rate control is narrow and would typically yield toxic levels.
• Digoxin Load 0.5 mg IV and repeat 0.25 mg every 4-6 hours for three doses

Amiodarone

• has a Class IIa recommendation from the ACC/AHA/ESC for use as a rate controlling agent for patients who are intolerant of or unresponsive to other agents.
• Caution should be exercised in those not receiving anticoagulation as amiodarone can promote cardioversion.
• Amiodarone 150 mg IV over 10 minutes followed by infusion of 1 g over six hours. May repeat bolus if needed

Cardioversion
The decision of how and when to cardiovert involves:
1- HD
2- PT symptoms
3- duration
4- Prior attempts
5- echo data
6- risk assessment of of thromboemboli following cardioversion

- **Class I recommendation (definitely useful):**
  - Rapid ventricular response with HD instability synchronized DC is recommended

- **Class IIa recommendation (safe, accepted):**
  - Pretreatment with amiodarone, flecanide, ibutilide, propafenon or sotalol can enhance the success on DC
  - Amiodarone can be used for cardioversion

- **Class III recommendation (may be harmful):**
  - Digoxin toxicity
  - Hypokalemia

---

### Cardioversion: chemical versus electrical

<table>
<thead>
<tr>
<th>Pharmacological</th>
<th>Electrical DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Avoids the necessity for sedation</td>
<td>- Greater success rate</td>
</tr>
<tr>
<td>- It generally will take longer for</td>
<td>- Requires additional personnel for the conscious sedation &amp; for DC cardioversion</td>
</tr>
<tr>
<td>onset</td>
<td>- Biphasic waveform shock cardioversion has been shown to be more effective than the older monophasic cardioversion</td>
</tr>
<tr>
<td>- Has a proarrhythmic potential</td>
<td>- Should be aborted if there is a failure to convert despite maximum energy settings or if there is repeated rapid recurrence of AF despite initial successful cardioversion</td>
</tr>
<tr>
<td>(3%–5%)</td>
<td></td>
</tr>
<tr>
<td>- Often requires monitoring period of</td>
<td></td>
</tr>
<tr>
<td>up to 12 hours for dysrhythmias.</td>
<td></td>
</tr>
<tr>
<td>- Has a lower success rate (50%)</td>
<td></td>
</tr>
<tr>
<td>compared with electrical cardioversion (89%).</td>
<td></td>
</tr>
</tbody>
</table>

### Chemical cardioversion

- Pharmacologic cardioversion is selected for patients who are symptomatic, who have had a short duration atrial fibrillation, or as an adjunct in patients who have failed electrical cardioversion
- Hemodynamically stable patients with atrial fibrillation can be converted to sinus rhythm using oral or intravenous agents.
The American College of Cardiology/American Heart Association/European Society of Cardiology (ACC/AHA/ESC) Guidelines make the following recommendations:

- Conversion of AF less than or equal to 7 days
  - Agents with proven efficacy include dofetilide, flecainide, ibutilide, propafenone, and to a lesser degree, amiodarone and quinidine.
- Conversion of AF lasting greater than 7 days
  - Agents with proven efficacy include dofetilide, amiodarone, ibutilide, flecainide, propafenone, and quinidine.
- Conversion of AF lasting greater than 90 days - Oral propafenone, amiodarone, and dofetilide have been shown to be effective at converting chronic AF to normal sinus rhythm (NSR).

### Prevention of thromboembolism

- Aspirin
- Warfarine
- Dabigatran (110 mg BID)

### CHA2DS2-VASc Risk Score

<table>
<thead>
<tr>
<th>CHA2DS2-VASc Risk</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHF or LVEF &lt; 40%</td>
<td>1</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1</td>
</tr>
<tr>
<td>Age ≥ 75</td>
<td>2</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1</td>
</tr>
</tbody>
</table>
Stroke/TIA/Thromboembolism | 2  
Vascular Disease          | 1  
Age 65 - 74               | 1  
Female                    | 1  

- **score 0** are at **low risk** and may be managed with aspirin for prophylaxis
- **A score of 1 intermediate risk**, and the decision to anticoagulate with aspirin versus warfarin is left to the clinician’s discretion, weighing risks and benefits
- **A score > 2** is **high risk** and should be treated with warfarin in the absence of contraindication

A therapeutic bleeding risk stratification score for those on oral anticoagulants in atrial fibrillation

<table>
<thead>
<tr>
<th>Feature</th>
<th>Score if present</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension (Systolic ≥ 160mmHg)</td>
<td>1</td>
</tr>
<tr>
<td>Abnormal renal function</td>
<td>1</td>
</tr>
<tr>
<td>Abnormal liver function</td>
<td>1</td>
</tr>
<tr>
<td>Age ≥ 65 years</td>
<td>1</td>
</tr>
<tr>
<td>Stroke in past</td>
<td>1</td>
</tr>
<tr>
<td>Bleeding</td>
<td>1</td>
</tr>
<tr>
<td>Labile INRs</td>
<td>1</td>
</tr>
<tr>
<td>Taking other drugs as well</td>
<td>1</td>
</tr>
<tr>
<td>Alcohol intake at same time</td>
<td>1</td>
</tr>
</tbody>
</table>

A score of 3 or more indicates an increased one year bleed risk on anticoagulation which would be sufficient to justify caution or more frequent evaluation. The risk is the risk of an intracranial bleed, bleeding requiring hospitalization or a hemoglobin drop ≥ 2g/L or a bleeding episode that requires transfusion.

**Discharge Criteria**
- younger patients.
- patients without comorbid disease
- No clinical suspicion of PE or MI
• patients in whom the AF converts in ED or the rate is controlled.
• patients for whom close follow-up is ensured.
KING SAUD UNIVERSITY
King Khalid University Hospital
Department of Emergency Medicine & Department of Medicine

**DKA**
Protocol & Guideline

<table>
<thead>
<tr>
<th>Prepared by:</th>
<th>Date:</th>
<th>Reviewed by</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Hani Alibrahim</td>
<td>11/3/2010</td>
<td>Dr. Anwar Aljamah</td>
<td></td>
</tr>
<tr>
<td>DEM Consultant</td>
<td></td>
<td>Assistant professor of Medicine, DM &amp; Metabolism Division</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Authorized by:</th>
<th>Date:</th>
<th>Authorized by:</th>
<th>Date:</th>
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<tbody>
<tr>
<td>Dr. Zohair Alaseri</td>
<td></td>
<td>Dr. Abdulrahman Aljebreen</td>
<td></td>
</tr>
<tr>
<td>Assistant professor</td>
<td></td>
<td>Assistant professor of medicine</td>
<td></td>
</tr>
<tr>
<td>Chairman DEM</td>
<td></td>
<td>Chairman dept. of internal of medicine</td>
<td></td>
</tr>
</tbody>
</table>
DKA Protocol

**DEFINITION:**
DKA consists of the biochemical triad of hyperglycemia, ketonemia, and metabolic acidosis.

**DIAGNOSTIC CRITERIA:**
- Glucose > 14mmol
- VBG - PH < 7.35
- Hco3 < 15
- Ketonuria & Ketonemia.
- Anion gap > 14

**SYMPTOMS & SIGNS:**
- Dehydration.
- Tachycardia, tachypnea.
- Anorexia
- Abdominal pain.
- Nausea & Vomiting
- Decrease level of consciousness
- Acidotic breathing.

**Precipitating factors:**
- Infection (Pneumonia and UTI most commonly)
- Inadequate use of insulin
- New onset diabetes
- Medical, surgical or emotional stress
- Drugs: Corticosteroids, thiazide diuretics.
- Pancreatitis
**INVESTIGATION:**

- Cardiac monitor
- Vital signs q 2 hrs for 24 hrs
- Glucose level q 1 hr
- VBG, electrolytes q 2 hours and q 1h if K is >6 or <3.
- Input and output chart
- Urine analysis, Urine ketones.
- CBC with differentials.
- Renal functions.
- Chest x-ray (r/o pneumonia)
- Blood C&S (if needed)
- ECG, CK& Troponin (if ACS is suspected)
- Calculate anion gap = Na-(CL+Hco3), Normal value 8-14.

**CLINICAL ASSESSMENT:**

- Assess the level of Consciousness: Drowsy, Confused, or Comatose (record GCS)
- Look for signs of infections
- Assess the degree of dehydration:
  
  **Mild dehydration:**
  5% = dry mouth & reduced skin turgor.

  **Moderate dehydration:**
  7.5% = the above + poor capillary refill + sunken eyes.

  **Severe dehydration:**
  10% = shock; severally ill with poor perfusion and thready rapid pulse.

**MANAGEMENT:**

- Ensure that the airway is patent (intubate if comatose)
- Give 100% O2 by face mask if needed.
- Insert 2 IV canula & give bolus N.S

*Then 3 main areas need management:*
**FLUID:**
- Adult may have up to 6 liters deficits.
- Aim is to replace this with N/S over 48 hours in case of severe dehydration.
- Replace the urine output as additional fluid.

**If no evidence of heart failure or renal failure:**
- Give the first liter of N.S as a bolus over 30 minutes.
- Then 1 liter of N.S over 1 hr
- Then 500 cc of N.S over 1 hr x 2
- Then 150 cc/hr...then reassess.
- Change IV fluid to D5 NS when glucose is less than 14 mmol/L.
- If any evidence of heart failure, renal failure consider small boluses of IV fluid or slow the infusion rate
- In case of hypernatremia (Na>150mmol) give ½ N.S instead.
- *(If Patient weight is <60 kg): consider less fluid amount (e.g. 10-15ml/kg over the 1st hour then 2ml/kg/h then after.)*

**INSULIN:**
- Don’t start insulin immediately…it's better to give first bolus of fluid & to wait for K+ level.
- Start insulin infusion 0.1 units/Kg/hr
- The goal is to achieve a rate of decline of glucose between 3 and 4 mmol/hour.
- Maintain blood glucose level between 10 to 15 mmol/L in the first 24 hours, adjust the rate of the infusion according to the hourly glucose level.
- If glucose less than 5 mmol/L decrease the infusion rate by 2 units and give 25 ml D50 (repeat if needed). If needed leave the infusion @0.5 units/hour and continue to give D50. *(Do not stop insulin infusion)*

**Adjust the insulin infusion after giving the fluid boluses:**

- If glucose between 10-15 mmol/l no changes.
- If glucose between 5.1-10 mmol/l decrease the infusion rate by 1 unit/h.
- If the glucose between 15.1 – 18 increase the infusion by 1 unit/h.
- If the glucose between 18.1 – 20 increase the infusion by 2 unit/h.
- If the glucose more than 20 give 0.1 unit/kg I.V bolus and increase the insulin infusion by 2 units.
- Check glucose level by glucometer Q 1 hourly.
- If the of blood glucose falls below 14 mmol, change the IV fluid to D5 N.S
- Do not stop insulin infusion while Dextrose is being infused, as insulin required for switching off ketones production.
- Discontinue I.V insulin infusion **only** if the patient has **All** of the followings:

  - Anion gap less than 12
  - Bicarbonate more than 19
  - Tolerating oral feeding
  - Subcutaneous insulin initiated more than 2 hrs.

**POTASSIUM:**
Do not start K replacement if the patient has one of the following:

- K level more than 5.9
- Renal failure (Pt is not passing urine)
Adjust the K+ infusion rate based on K+ level Q 2 hourly:
- If the K level less than 3.0 add 60 mEq KCL/h. (need central line)
- If the K level 3.0 – 4.0 add 40 mEq KCL/ h
- If the K level 4.0 – 5.9 add 20 mEq KCL/ h
- Hold insulin temporarily (for <1h) if K+ level less than 3.

BICARBONATE:
- There is no evidence of routine use of bicarbonate in patients with DKA.
- Can only be given if the pH is less than 6.9 and the patient is shocked aiming to improve the cardiac contractility, Dose 1 mEq/kg IV over 1-2 hrs.
- Bicarbonate will precipitate hypokalemia so Add 20 mEq of KCl to bicarbonate infusion.

PHOSPHATE:
- There is no evidence that phosphate replacement has any clinical benefit and phosphate administration may lead to hypocalcaemia.

Transfer the patient to resuscitation area if any one of the following criteria presents:
- Coma or impaired level of consciousness
- Hemodynamic instability
- PH less than 7.1 or bicarbonate less than 5
- Potassium more than 6.5 or less than 3

THERAPEUTIC CONSIDERATIONS
- Ketone level is not very helpful in assessing clinical response. So use the pH, bicarbonate and anion gap instead.

DKA management complications:
- Cerebral edema
- Fluid over load
- Hyperkalemia
- hypokalemia
- hypoglycemia

Prepared and reviewed by:

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Protocol & Guideline

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Reviewed by: Dr. Salih Alhetela
date: 
Director QM, DEM

Authorized by: Dr. Zohair Alaseri
date: 
DEM Chairman
**Pulmonary Embolism Guideline**

**Definition:**
Occluding of pulmonary arterial bed lead to acute life-threatening but potentially reversible right ventricular failure.

**Predisposing Factors for VTE:**

<table>
<thead>
<tr>
<th>Strong predisposing factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fracture</td>
</tr>
<tr>
<td>Hip or knee replacement</td>
</tr>
<tr>
<td>Major general surgery</td>
</tr>
<tr>
<td>Major trauma</td>
</tr>
<tr>
<td>Spinal cord injury</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moderate predisposing factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthroscopic knee surgery</td>
</tr>
<tr>
<td>Central venous lines</td>
</tr>
<tr>
<td>Chemotherapy</td>
</tr>
<tr>
<td>Chronic heart or respiratory failure</td>
</tr>
<tr>
<td>Hormone replacement therapy</td>
</tr>
<tr>
<td>Malignancy</td>
</tr>
<tr>
<td>Oral contraceptive therapy</td>
</tr>
<tr>
<td>Paralytic stroke</td>
</tr>
<tr>
<td>Pregnancy/postpartum</td>
</tr>
<tr>
<td>Previous VTE</td>
</tr>
<tr>
<td>thrombophilia</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weak predisposing factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>bed rest &gt;3days</td>
</tr>
<tr>
<td>immobility</td>
</tr>
<tr>
<td>increasing age</td>
</tr>
<tr>
<td>laparoscopic surgery</td>
</tr>
<tr>
<td>obesity</td>
</tr>
<tr>
<td>pregnancy/anteparum</td>
</tr>
<tr>
<td>varicose veins</td>
</tr>
</tbody>
</table>
Clinical presentation

Symptoms

- Dyspnea
- Chest pain
- Apprehension
- Cough
- Wheezing
- Palpitations
- * Hemoptysis
- * Fever / Diaphoresis
- * Syncope
- * Leg pain, Leg swelling

Signs:

- Tachypnea > 16 breath/min
- Tachycardia > 100
- Signs of DVT
- Fever > 37.8°C
- Diaphoresis
- S3 or S4 gallop rhythm
- Cyanosis
- Hypotension
- Rales
- Wheezing
- Pleural friction rub

Diagnostic approach

Diagnostic tests

- pretest clinical probability( WELL'S, PERC)
- D.Dimer
- Spiral CT lung.
- V/Q
- pulmonary angiography

Adjunctive tests

- ECG
• ABG
• CXR
• Echocardiography
• Troponin

CXR
• Normal!
• Elevated diaphragm (both unilateral and bilateral)
• Pleural effusion
• Parenchymal infiltrates
• Atelectasis
• Enlarged mediastinum / hilum
• Cardiomegaly (in chronic PE)
• Prominent central pulmonary artery (Fleischner sign)
• Peripheral oligemia (Westermark’s sign)
• Pleural wedge-based density (Hampton’s hump)

ABG:

• ABG is not routine diagnostic work-up
• Normal results do not rule out PE
• Hypoxemia ↓ PaO₂
• Hypocapnia ↓ PaCO₂
• ↑(A-a) oxygen gradient / could be a more diagnostic for PE
  o A-a gradient = PAO₂ - PaO₂
  o PaO₂ = arterial PO₂ (measured in arterial blood gas)
  o Aa Gradient = \[F_lO_2*(P_{atm}-P_{H2O})-(P_{aCO2}/0.8)\] - PaO₂
  o On Room air (21%) and at sea level, a simplified version of the equation is:
    • Aa Gradient = (150 - 5/4(PCO2)) - PaO2

ECG:
• Sinus tachycardia
• Atrial flutter
• Atrial tachycardia
• PAC
• RAD/LAD
• RBBB
• P-Pulmonale
• T wave inversion in V1-3
• T wave inversion in lead III V2 & V3
• S1Q3T3
• Q wave in III & AV F

Wells Criteria for Assessment of Pretest Probability of P.E

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspected DVT</td>
<td>3.0</td>
</tr>
<tr>
<td>An alternate diagnosis is less likely than PE</td>
<td>3.0</td>
</tr>
<tr>
<td>Heart rate &gt; 100 beats/min</td>
<td>1.5</td>
</tr>
<tr>
<td>Immobilization or surgery in the previous four weeks</td>
<td>1.5</td>
</tr>
<tr>
<td>Previous DVT/PE</td>
<td>1.5</td>
</tr>
<tr>
<td>Hemoptysis</td>
<td>1.0</td>
</tr>
<tr>
<td>Malignancy (on treatment, treated in past six months)</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Score Mean probability % with range of PE this score of risk
0-2 points  ≤ 10% Low
3-6 points  20-45% moderate
> 6 points  ≥70% High

Pulmonary embolism rule out criteria rule  **PERC**

• Age <50
• Pulse <100
• Oxygen saturation >94%
• No unilateral leg swelling
• No hemoptysis
• No recent surgery or trauma
- No prior PE or DVT
- No hormone use

*If all present <2% risk of PE in low-risk groups*

**Diagnosis**

**Clinical Presentation**

Clinical signs, symptoms and routine laboratory tests do not allow the exclusion or confirmation of acute PE but increase the index of its suspicion.

**Assessment of Clinical Probability**

Clinical evaluation makes it possible to classify patients into probability categories corresponding to an increasing prevalence of PE, whether assessed by implicit clinical judgment or by a validated prediction rule.

**D-Dimer**

Sensitive to exclude PE only in patients with a low clinical probability.

**False positive**

- Trauma
- Post op.
- Sepsis
- Fibrinolysis
- M.I
- Cancer
- Pregnancy
- Preeclampsia
- Sickle cell crisis

**False negative**

- Distal Small thrombus
- Old thrombus ≥ 7 days
- Acute thrombus & impaired
Computed Tomography

- MDCT has become accepted both as the preferred primary diagnostic modality and as the criterion standard for making or excluding the diagnosis of pulmonary embolism.

- MDCTA is more likely to miss lesions due to multiple small emboli that have lodged in distal vessels, but these lesions also may be difficult to detect using conventional angiography.

- sensitivity 95%, specificity 90%

- needs contrast (risk of renal failure)

Ventilation-Perfusion Scintigraphy (V/Q Scan)

- Safe in renal failure & contrast allergy patient.

- Not available 24 hrs.

- Does 't provide definitive diagnosis 40–70%

- preexisting lung disease often have abnormal study

- A normal CXR → definitive scan

CT or V/Q scan?

- CT was superior to V/Q scanning and should be first-line imaging modality for patients suspected of PE.

- CT may identify alternative causes for a patient’s presentation whereas V/Q has no such benefit

- CT is more widely accessible and more often available after hours.

- Currently, the definitive primary role of V/Q scanning is in patients where CT is contraindicated as in severe renal impairment or history of iodine or contrast allergy

Pulmonary Angiography
• Pulmonary angiography is a reliable but invasive test and is currently useful when the results of non-invasive imaging are equivocal.

• Gold standard in the diagnosis of PE

• 100% sensitivity and specificity of 90%

• False-positive may result from mediastinal fibrosis and tumors

Echocardiography

• In a patient with suspected PE who is in a critical condition, bedside echocardiography is particularly helpful in emergency management decisions.

• In a patient with shock or hypotension, the absence of echocardiographic signs of right ventricular (RV) overload or dysfunction practically excludes PE as a cause of hemodynamic compromise.

Treatment:

• A, B, C.
• Anticoagulant regimen (heparin therapy UFH or LMWH)
• Thrombolytic Therapy
• Surgical /catheter embolectomy.
• Inferior Vena Cava Filters

*Haemodynamic and Respiratory Support*
Haemodynamic and respiratory support is necessary in patients with suspected or confirmed PE presenting with shock or hypotension.
**Anticoagulation**

Anticoagulation with unfractionated heparin or low-molecular-weight heparin (LMWH) should be initiated without delay in patients with confirmed PE and those with a high or intermediate clinical probability of PE while the diagnostic workup is still ongoing.

**Unfractionated or low-molecular weight heparin**
- Studies have shown no significant difference in recurrent thromboembolic events, major bleeding, or mortality
- American College of Chest Physicians (ACCP) recommend LMWH over UFH in acute non massive PE, *EXCEPT* sever renal failure

**Subcutaneous regimens of low molecular weight heparins approved for the treatment of pulmonary embolism**
- Enoxaparin 1.0 mg/kg Every 12 h or 1.5 mg/kg once daily

**Fibrinolysis**

Fibrinolytic therapy is the first-line treatment in patients with high-risk PE presenting with cardiogenic shock and/or persistent arterial hypotension, with no absolute contraindications.

**t-PA**
- 100 mg IV over two hours
- Imminent death 0.6 mg/kg bolus over 2min
- Hold heparin during TPA infusion
- Start heparin post infusion PTT< 80

**Streptokinase**:
- 250,000 U. IV over 15 minutes followed by
- 100,000 U IV over 12 hours

**Inferior Vena Cava Filters**
- Absolute contraindication to anticoagulant therapy
- Recurrent VTE despite adequate anticoagulation
- Patients who survive a massive PE
- Recurrent PE would likely prove fatal
N.B. Patients with IVC filter in place who present with clinical evidence of new PE should be anticoagulated if no contraindications exist

**Surgical Embolectomy**
- limited role in the management of massive, life-threatening PE
- Highly compromised patients & critical status
- Massive PE refractory to thrombolysis
- Better than repeat thrombolysis
- The results can be improved with the use of cardiopulmonary bypass; ECMO results remain poor, with operative mortality 20%-50%
Contraindications to Fibrinolytic therapy for Acute PE:

**Absolute**
- Previous history of hemorrhagic stroke at any time
- Known intracranial neoplasm
- Recent (< 1 month) intracranial surgery or trauma
- Active internal bleeding (does not include menses)

**Relative**
- Known bleeding diathesis, including thrombocytopenia
- Uncontrolled severe hypertension (blood pressure > 180/110 mmHg)
- History of previous nonhemorrhagic stroke
- Recent (< 1 month) surgery or trauma
- Noncompressible vascular puncture
- For urokinase or streptokinase, prior exposure
Contraindication to heparin use:

- Active bleeding
- Allergy to heparin
- Hereditary bleeding disorder
- History of heparin induce thrombocytopenia

Clinical Guideline

1- Clinical signs, symptoms and routine laboratory tests do not allow the exclusion or confirmation of acute PE but increase the index of its suspicion.

2- Clinical evaluation makes it possible to classify patients into probability categories corresponding to an increasing prevalence of PE, whether assessed by implicit clinical judgment or by a validated prediction rule.

Low clinical probability:

- Do not start heparin.
- Check the D-dimer level
- If D-dimer is positive then start heparin and ask for spiral CT.
- If spiral CT confirm the diagnosis continue the treatment and consult Internal Medicine.
- If spiral CT negative with positive D-dimer, look for other differential diagnosis and consider US Doppler lower limb in the absence of alternative diagnosis
- If D-dimer is Negative then it's safe to exclude PE in patients with a low clinical probability.

Moderate to high clinical probability:

- Anticoagulation should be initiated without delay in patients with high or intermediate clinical probability of PE while diagnostic workup is still ongoing.
- Spiral CT is the diagnostic of choice unless its contraindicated.
• If CT is negative and patient is not high risk for PE discontinue heparin and look for other differential diagnosis and consider US Doppler lower limb in the absence of alternative diagnosis

• If patient is high risk for PE and you still suspect PE despite negative CT continue heparin and admit the patient for further investigations as spiral CT can miss sub-segmental PE.
• If CT confirms your diagnosis continue your management.
• Systematic hypotension should be corrected to prevent progression of RV failure and death due to PE.
• Aggressive fluid challenge is not recommended unless the patient is hypotensive.
• Vasopressor drugs are recommended for hypotensive patients with PE not responding to IV fluid
• Fibrinolytic therapy should be used in patients with high-risk PE presenting with cardiogenic shock and/or persistent arterial hypotension
• Surgical pulmonary embolectomy is a recommended therapeutic alternative in patients with high-risk PE in whom Fibrinolysis absolutely contraindicated or has failed.

P.E. in Pregnancy:
• Postpartum > pregnancy x 5times
• Rapid onset of dyspnea should raise suspicion for PE
• D-dimer testing in pregnancy is controversial
• bilateral L.L Doppler is initial study of choice
• American College of Obstetrics and Gynecology and the American College of Radiology are in agreement that chest CTA is safe in pregnancy → less radiation than does V/Q scanning diagnostic test of choice for a pregnant patient
• pregnancy and lactating → LMWH
• Postpartum → heparin or LMWH then warfarin

Disposition
• Internal Medicine Consultation
• Patients with evidence of hemodynamic instability should be admitted to an ICU
• Several randomized trials have shown that LMWH may be safely used to treat selected patients with PE/DVT in the outpatient setting
Long-term treatment is generally carried out with warfarin therapy started on day 1 or 2 and given in a dose to maintain the INR at 2 to 3 for 6 months.