



# Clinical Guidelines for Operations

Joint Doctrine Publication 4-03.1

D-C-D-C



MINISTRY OF DEFENCE

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# Contents

## Introduction

**Contents**

Introduction

How to use this document.....	2
Title page .....	4
Authorisation and distribution.....	5
Joint doctrine publications .....	6
Record of amendments.....	7
Preface .....	9

## Emergency guidelines

**Section 1 Preparation**

**Section 2 Incident management**

**Section 3 Treatment guidelines**

**Section 4 Transport**

**Section 5 Pathways**

## Supporting guidelines

**Section 6 Toolbox**

**Section 7 Operational formulary**

**Section 8 Policies**

**Section 9 Documentation and audit**

**Section 10 Red card reporting**

# How to use this document

The icons below are used throughout this document to help communicate important messages. They have been separated into three categories; Medical (green), Informational (blue) and Personal protection/Safety (yellow). The following key explains exactly what these icons represent.

## Medical icons

The following three icons are used to denote the practitioner intended to action the guideline:



Doctor



Nurse

Medical Technician /  
Medical Assistant

The following four icons are used in conjunction with text relating to patient diagnosis and treatment:

Cardiac  
arrestPatient  
presentationMedical  
investigation

Treatment

The following icons are used to denote when transport to the next level of care should be considered and the means of transport:



Ambulance

Medical  
helicopter

## Informational icons



Communication



Information



Audit

### Icons

Introduction

The ‘Audit’ icon identifies aspects of care that are readily amenable to audit or where existing audit standards are in place. However, any aspect of care can be considered for operational audit if highlighted as a potential for improvement.

## Personal protection and safety icons

The following icons are used in conjunction with precautionary text to convey important messages regarding personal safety:

Particulate  
mask /  
Respirator

Mask



Gloves



Apron



Important

## The ‘Go to’ navigation system

The following navigation system is used for cross-referencing. In the example below the green lozenge tells you to ‘go to’ Section 2 by its colour, and the information within the lozenge takes you to Incident management 1b which is within ‘Section 2’.

Go to

1b

Incident  
management

You will see the navigational lozenges shown in the example opposite throughout this document. They are used to aid general navigation in conjunction with the ‘Go to’ system.

1b

Incident  
management

## The treatment timeline

The following icon is used as a treatment timeline indicator. It is representative of time taken for specific interventions and treatments from arrival at the facility, rather than time from onset of symptoms.



# Joint Doctrine Publication 4–03.1

## Clinical Guidelines for Operations

Joint Doctrine Publication 4–03.1 (JDP 4–03.1) dated September 2008, is promulgated as directed by the Surgeon General.



Director Medical Policy, Defence Medical Services Department

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## Authorisation

Introduction

# Authorisation

The Academic Department of Military Emergency Medicine at the Royal Centre for Defence Medicine produces Clinical Guidelines for Operations on behalf of Surgeon General under the direction of Defence Professor of Emergency Medicine.

The Development, Concepts & Doctrine Centre (DCDC) is responsible for publishing both Joint concepts and doctrine publications. Readers wishing to quote DCDC publications as reference material in other work should confirm with the DCDC Doctrine Editor whether the particular publication and amendment state remains authoritative. Comments on factual accuracy or proposals for amendment are welcomed and should follow the Red Card Reporting process outlined at the end of this document.

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# Joint doctrine publications

The successful conduct of military operations requires an intellectually rigorous, clearly articulated and empirically-based framework of understanding that gives advantage to a country's Armed Forces, and its likely partners, in the management of conflict. This common basis of understanding is provided by doctrine.

UK doctrine is, as far as practicable and sensible, consistent with that of NATO. The development of national doctrine addresses those areas not covered adequately by NATO; it also influences the evolution of NATO doctrine in accordance with national thinking and experience.

Endorsed national doctrine is promulgated formally in Joint Doctrine Publications (JDPs).<sup>1</sup> From time to time, Interim Joint Doctrine Publications (IJDPs) are published, caveated to indicate the need for their subsequent revision in light of anticipated changes in relevant policy or legislation, or future lessons arising out of operations.

Urgent requirements for doctrine are addressed in Joint Doctrine Notes (JDNs). JDNs do not represent an agreed or fully staffed position, but are raised in short order by the Development, Concepts and Doctrine Centre (DCDC) to establish and disseminate current best practice. They also provide the basis for further development and experimentation, and a doctrinal basis for operations and exercises.

Details of the Joint Doctrine development process and the associated hierarchy of JDPs are to be found in JDP 0–00 ‘Joint Doctrine Development Handbook’.

<sup>1</sup> Formerly named Joint Warfare Publications (JWPs).

## Record of amendments

## Amendments

Introduction

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# Preface

## Purpose

### Preface

#### Introduction

1. JDP 4–03.1 *Clinical Guidelines for Operations* (CGOs) are intended to guide clinicians<sup>2</sup> on deployed operations in the management of predictable clinical conditions so that the right interventions will be performed at the right time, in the right sequence, by the right person, in accordance with Clinical Governance (CG). This guidance is supported by evidence and best practice, and tempered by operational experience. CGOs replace *Casualty Treatment Regimes* (CTR)s that were produced in 1986 and 1993 with a similar overarching objective.
2. Clinical care on operations is delivered by a spectrum of care providers within variable single Service environments. These providers may be regular or reservist military personnel, or civilians under contract. A common understanding of clinical doctrine (as well as operational doctrine) is imperative to providing consistent care between individuals, both within operations and between operations.
3. The principal audience for *Clinical Guidelines for Operations* is primary care and secondary care clinicians and the principal purpose is to improve care at the point of contact with the patient. CGOs are, therefore, designed to provide a logical and consistent approach to emergencies in operational medicine and are to be used to guide critical decision making. The publication also has utility for those personnel who train and equip the clinicians, including those responsible for developing medical capability across the Defence Lines of Development (DLOD).<sup>3</sup>

## Scope

4. CGOs address the actions on preparing to respond forward to a casualty or to receive a critical casualty in a treatment facility. A generic incident management template guides the systematic actions at any scene involving casualties, with specific guidance for predictable hazards and action cards for a multiple casualty incident (a ‘major incident’).
5. A common gateway is provided for the treatment and evacuation (by any means) of all clinical emergencies<sup>4</sup> across the spectrum of threat that includes trauma, medical, environmental and toxicological emergencies in both conventional and CBRN settings. The *Emergencies* section is supported by a *Toolbox* of aids to diagnosis and treatment. Treatment is a continuum from point of wounding or illness, to either resolution or definitive treatment: guidelines are presented as a range of interventions for a given condition at each echelon of care.

<sup>2</sup> For the purpose of this publication, clinicians include doctors of all specialities, dental personnel, nurses, health care assistants and medical assistants/technicians. Some distinction is drawn regarding the responsibilities of particular professional groups, but this is not ubiquitous. What is more important is that the patient receives the right treatment in an appropriate timescale and that a clinician only undertakes those medical interventions for which he/she possesses the necessary training, skills and experience.

<sup>3</sup> Capability has a precise meaning in defence terms, and medical capability should follow DLOD long before the components arrive in theatre.

<sup>4</sup> Trauma refers to all injuries (battle and non-battle) which share a common approach to treatment. The traditional classification of ‘Battle Injuries’ vs ‘Disease Non-Battle Injury (DNBI)’ is appropriate for epidemiological and planning reasons; however, it has no clinical application when managing an individual patient where injury and illness share the same initial approach to treatment.

6. Non-critical conditions are largely excluded from this guidance: **there is deliberately no attempt to generate an all-inclusive textbook of military medicine.** The focus is primarily on clinical conditions and situations where immediate access to supporting guidance will impact on the outcome of the patient(s) being managed.
7. CGOs extend to policy statements to guide practising clinicians, which include extracts from existing tri-Service and single Service policy. There is an operational formulary and a ‘Red Card’ feedback system to shape the future structure and content of the publication based on continuing experience. ‘Audit tags’ appear throughout the guidelines where standards are commonly monitored in best practice: documentation to assist audit is reproduced. However it is emphasised that these guidelines do not constitute Patient Group Directions (PGDs) and it will remain a Unit responsibility to have appropriate PGDs in place to cover the activities as required. Individuals must likewise ensure that they are operating within the scope of their professional practice and registration.
8. Whilst it is current policy to treat non-entitled patients ‘within means’ only, a limited number of paediatric guidelines are issued where this is felt to be appropriate.

## Structure

9. The structure of this publication is as follows:

### Sections 1–4

The aim of Sections 1–4 is to provide a common system for the management of all medical emergencies that encompasses preparation, incident management, treatment and evacuation.

### Section 5

The aim of Section 5 is to present clinical pathways in relation to ballistic, blast, blunt and burn injuries that summarise the key features of management in relation to an injury mechanism and cross reference the user to specific detailed treatment guidelines.

### Section 6

The aim of Section 6 is to supplement the emergency treatment guidelines through a toolbox of normal values and clinical management support aids, together with ‘red card reporting’ procedures.

### Section 7

The aim of Section 7 is to allow rapid access to the dose and route of administration of drugs used in the guidelines within an operational formulary.

### Section 8

The aim of Section 8 is to provide the clinician with rapid access to those policies that impact on the early management of acute illness or injury.

### Section 9

The aim of Section 9 is to provide clinical documentation that will facilitate continuing clinical audit against existing best practice standards.

# Application

## Preface

Introduction

10. Clinicians will refer to this publication during the acute management of the patient. The design of this publication places the highest importance on this user interface: the clinician may progress sequentially through Sections 2–5 in an emergency, using the publication as a comprehensive *aide memoire*, or may simply select individual guidelines.
11. Trainers will find that existing medical programmes already fit within this structure, but that CGOs provide a unique overarching system that links these component fragments.<sup>5</sup>
12. Medical planners will appreciate the importance of preparing to support the spectrum of medical conditions and the time imperatives that exist in parallel to established time lines in major trauma.
13. Logisticians will appreciate the stepwise approach within the chain of evacuation to equipment and drugs required, the need to reflect NHS best practice where practical in the operational setting (and its implications with respect to equipment and drugs supplied), and the time lines that influence mortality and morbidity.

# Linkages

14. Doctrinally, JDP 4–03.1 flows from JDP 4–03 *Medical Support to Joint Operations* which itself is related to AJP–4.10 *Allied Joint Medical Support Doctrine* and JDP 4–00 (3rd Edition) *Logistics for Joint Operations*. Clinically, this publication flows from the Defence Health Change Programme’s Military Medicine Project and both consolidates and builds on guidelines from a range of national and international professional organisations and bodies.

<sup>5</sup> CGOs link the approaches undertaken in *Battlefield Casualty Drills*, *Military Acute Care*, *Battlefield Advanced Trauma Life Support*, *Advanced [Cardiac] Life Support*, *Advanced Burns Life Support*, *Advanced Paediatric Life Support* and *Major Incident Medical Management and Support*.

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# Section 1

# Preparation

# Preparation

## Introduction

### **PREP – Intro.1**

*Preparation* contains guidance on actions to take prior to deploying to the incident scene, supported by a structure for MEDEVAC mission orders (similar in concept to “Quick Battle Orders”).

### **PREP – Intro.2**

The activation criteria are listed for the military Trauma Team. Where time is available to assemble the team, check equipment and assign roles this is invariably time well invested. International standard criteria based on civilian experience have been enhanced to incorporate elements of the incident history and anatomical injury that are unique to the military operational setting.

### **PREP – Intro.3**

There are a variety of processes to notify the Trauma Team in daylight and silent hours. These include use of a loud-hailer, vehicle siren, public address system (tannoy), runners, radio pagers, UHF radios and mobile telephones. The method(s) chosen will depend on the size of the hospital footprint (taking into account if the alert can be reliably heard around the complex) and the maturity of the operation (early entry operations are unlikely to have sophisticated electronic communication systems).

### **PREP – Intro.4**

Guidance is given on the structure of the Trauma Team with details of individual responsibilities. This is a best practice model that cannot be replicated when multiple patients are received simultaneously: in this instance, there will be a serial division of the Trauma Team under the direction of the Consultant Emergency Medicine to optimally match the predicted requirements of individual patients. Trauma Team resuscitation should utilize the Trauma Chart within the *Documentation and Audit* section of this publication, which indirectly acts as a checklist for the Team Leader and is the cornerstone of the continuing audit of all seriously injured Service personnel on operations.

# Preparation

## Contents

Contents

Preparation

Actions on alert

Preparation **1**

MEDEVAC mission orders

Preparation **2**

Trauma team activation criteria

Preparation **3**

Trauma team roles & positions

Preparation **4**

Right turn Resuscitation

Preparation **5**

Intentionally blank

# Actions on alert

## Preparation 1

1

Preparation

### Deployment & Receiving Teams

#### Deploying Team

#### Receiving Team

#### Notification/Activation

- Record full details of task
- Activate personnel
- Mission brief  
(see *MEDEVAC Mission Orders*)
- Record full details of incident
- Activate personnel  
(see *Trauma Team Activation Criteria*)
- Team brief and assign roles  
(see *Trauma Team Roles*)

#### Preparation

- PPE
- Medical equipment check
- Weapons and personal military equipment (helmet/CBA/PLCE)
- Map/compass/GPS (sanitise kit / delete track history on GPS)
- PRR/radio communications
- Escape plan
- Collect refrigerated items
- Medical PPE (gloves, plastic apron, lead gown, visor where appropriate)
- Team brief
- Draw up analgesia +/- anaesthetic agents +/- antibiotics; run through fluids
- Pre-load chest X-ray plate and position portable X-ray machine
- Order universal donor blood or 'shock pack' if clinical information suggests immediate transfusion likely

Go to **Section 3** →

2d

Treatment guidelines

- Notify CT where available if perceived requirement

# MEDEVAC mission orders

## Preparation 2

### Preliminaries

- Task organisation and call-signs
- Ground overview to pickup point (PUP); detail of PUP. Use map/sketch

### Situation

- **Casualties:** number by priority, clinical detail, CBRN involvement?
- **Enemy:** threat *en route* and at PUP
- **Friendly Forces:** MEDEVAC escort/protection

### Mission

- MEDEVAC mission statement (repeat this)

### Execution

- **Concept of Ops**
  - Intent – effect to be achieved (recovery of any casualties)
  - Scheme of manoeuvre – chronological summary of how MEDEVAC will run
  - Main effort – the activity most crucial to the success of the mission
- **Missions**
  - To subordinates to allow own planning
- **Coordinating Instructions**
  - Timings – in detail
  - Location of forming up point (FUP) e.g. departure HLS
  - Route to FUP (if relevant) and transport details
  - Action in FUP/loading plan
  - Action at PUP
  - Action on civilian casualties
  - Action on enemy casualties
  - Action on vehicle/aircraft down
- **Summary**
  - Execution paragraph to be summarised

### Service Support

- Essential information or changes to SOPs: dress, equipment, weapon states, ammo, rations, water, batteries, personal morphine
- Special equipment required

### Command and Signal

- Relevant important locations
- Code words, CEI changes
- Synchronise watches

### Questions

**Use 9-line information to extract detail for MEDEVAC Mission Orders**

# Trauma team activation criteria

## Preparation 3

2–3

Preparation

### Mechanism/History

#### Penetrating trauma

- Gunshot or shrapnel wound
- Blast injury (mine/IED/grenade)
- Stab wound

#### Blunt trauma

- Motor vehicle crash with ejection
- Motorcyclist or pedestrian hit by vehicle >30km/h
- Fall >5 metres
- Fatality in the same vehicle
- Entrapment and/or crush injury
- Inter-hospital trauma transfer meeting activation criteria

You may only receive a triage category and a mechanism of injury.

For T1 casualties activate the Trauma Team

**and**

### Anatomy

- Injury to two or more body regions
- Fracture to two or more long bones
- Spinal cord injury
- Amputation of a limb
- Penetrating injury to head, neck, torso, or proximal limb
- Burns >15% BSA in adults **or** >10% in children **or** airway burns
- Airway obstruction

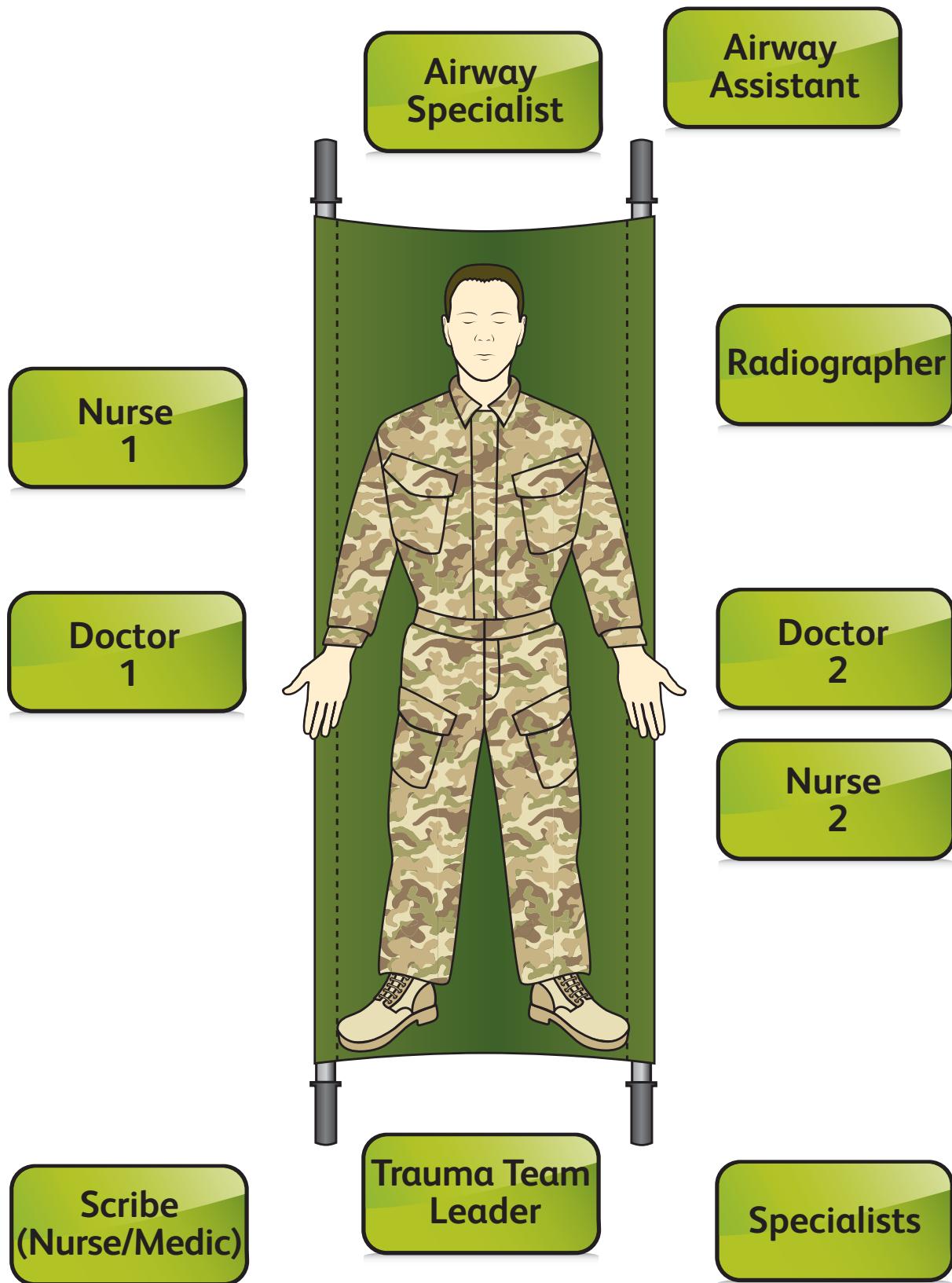
**or**

### Physiology

- Systolic blood pressure <90mmHg or pulse >120bpm (adults)
- Respiratory rate <10 or >30 per minute (adults); SpO<sub>2</sub> <90%
- Depressed level of consciousness or fitting
- Deterioration in the Emergency Department
- Age >70 years
- Pregnancy >24 weeks with torso injury

# Trauma team roles & positions

## Preparation 4



# Trauma team roles & positions

## Preparation 4 (Cont'd)

4

Preparation

### **Team Leader (emergency physician)**

- Controls and manages the resuscitation
- Makes decisions; prioritises investigations and treatment

### **Airway Specialist (anaesthetist)**

- Responsible for assessment and management of the airway & ventilation
- Counts the initial respiratory rate
- Administers oxygen; performs suction; inserts airway adjuncts; endotracheal intubation (RSI)
- Maintains cervical spine immobilisation and controls the log roll
- Takes an initial history (AMPLE)

### **Airway Assistant (ODP or ED nurse)**

- Assists in preparing equipment for advanced airway intervention
- Assists with advanced airway intervention, e.g. applies cricoid pressure
- This role may be undertaken by Nurse 1

### **Doctor 1 (emergency physician or surgeon)**

- Undertakes the primary survey: <C>+B to E
- Clinical findings are clearly spoken to Team Leader and recorded by Scribe
- Performs procedures depending on skill level and training

### **Doctor 2 (GDMO)**

- Performs procedures depending on skill level and training

**All team members are responsible  
for ensuring their findings and  
decisions are correctly recorded**

### **This team represents a best practice model**

Where there are limited resources individuals in the team will assume more than one role and specialist resources (e.g. surgeon) may move serially from one patient to another dependent on the need for specialist assessment and intervention skills

# Trauma team roles & positions

## Preparation 4 (Cont'd)

### Nurse 1 (ED nurse, "Airway")

- Applies monitoring equipment
- Assists advanced airway intervention (unless ODP present)
- Assists with procedures

### Nurse 2 (ED nurse, "Circulation")

- Undresses patient
- Assists with procedures

Nursing roles may be undertaken by appropriately experienced medics.

### Scribe (ED nurse or medic or HCA)

- Collates all information and records decisions on Trauma Chart

### Radiographer

- X-rays as directed by the Team Leader

### Hospital specialists

- Undertake secondary survey and advanced procedures (e.g. **General** Surgeon to undertake secondary survey of the head and torso and **Orthopaedic** Surgeon to undertake secondary survey of the limbs, pelvis and spine)
- **FAST may be undertaken by surgeon, emergency physician or ultrasonographer**

All team members are responsible for ensuring their findings and decisions are correctly recorded

### This team represents a best practice model

Where there are limited resources individuals in the team will assume more than one role and specialist resources (e.g. surgeon) may move serially from one patient to another dependent on the need for specialist assessment and intervention skills

# Right turn Resuscitation

4-5

## Preparation 5

Preparation

### Background

“Right turn” refers simply to the layout of the field hospital in Camp Bastion:

It is a left turn into Resuscitation Bay 1, but a right turn into the operating theatre (directly opposite Resuscitation Bay 1).

The term is applied to a casualty who moves directly into the operating theatre on arrival. It has emerged as an increasingly useful process in the resuscitation of combat casualties who are at the very edge of their physiological envelope.

This protocol does not by-pass Emergency Department care as such, as the ED team moves into the operating theatre for the multi-disciplinary resuscitation.

### Which patients?

#### Surgical time critical

- Traumatic cardiac arrest with CPR in progress
  - Limb trauma }
  - Torso trauma }
- With signs of critical hypovolaemia

### Decision points

A decision to “right turn” can occur at two points:

- Receipt of the advance pre-hospital information (JCHAT)
- Ambulance bay triage

Note: an earlier decision is better as the team can pre-position itself.

### Actions

#### (a) ED Team → OR

- Team Leader
- Nurse Level 1 Blood Warmer Teams

(b) Team leadership starts with the Consultant Emergency Medicine (positioned at the foot end) and is passed on to the Consultant Anaesthetist (at the head end) once rapid infusion lines are secured, fluid resuscitation with blood products has started, the patient is anaesthetised, and the initial imaging is complete (e.g. FAST scan and/or critical plain films).

#### (c) Anaesthetists

- Manage: “A” and central access
- Massive Transfusion Protocol

#### (d) Surgeons

- Surgical intervention will start immediately in cardiac arrest or peri-arrest, if thoracotomy and aortic cross-clamping is indicated.

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# Section 2

# Incident

# management

# Incident management

## Introduction

### **IM – Intro.1**

The principles of incident management follow the generic systematic approach encapsulated within the *Major Incident Medical Management and Support* (MIMMS) framework.

### **IM – Intro.2**

Guidance is given, in the form of action cards, for command of a multiple casualty incident at both the incident site and the hospital.

### **IM – Intro.3**

Safety is considered across the hazard spectrum, taking into account needs that may be predominantly, although not exclusively, single Service (for example rescue from water, actions following a mine strike, and actions following an aircraft crash).

### **IM – Intro.4**

Common message formats are presented to standardize the information passed from the scene of a multiple casualty incident (mnemonic METHANE) and at handover of a patient to the next level of care (mnemonic MIST). An alphanumeric coded message sequence is now used extensively for requesting SH for MEDEVAC (9-Line Message).

### **IM – Intro.5**

Algorithms are given to assist the sorting of both adult and paediatric patients into priorities for treatment (triage) in both a conventional and CBRN environment.

# Incident management

## Generic principles – contents

Contents

Incident  
management



Command

Incident management **1**



Safety

Incident management **2**



Communication

Incident management **3**



Assessment

Incident management **4**



Triage

Incident management **5**



Treatment guidelines

Go to Section 3 →



Transport

Go to Section 4 →



Intentionally blank



# Command

## Incident management **1**

1

Incident  
management

### Major incident – scene

First medical team at scene

Incident management **1a**

Medical Commander

Incident management **1b**

Scene layout

Incident management **1c**

Triage Officer

Incident management **1d**

Ambulance parking

Incident management **1e**

Ambulance loading

Incident management **1f**

Casualty clearing

Incident management **1g**

### Major incident – hospital

Medical Coordinator

Incident management **1h**

Senior Nursing Officer

Incident management **1i**

Command Post

Incident management **1j**

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# First medical team at scene

## Incident management **1a**

**1a**Incident  
management

- Start a log and record time of arrival.
- Wear protective clothing:
  - Helmet
  - High visibility coat or tabard (civil incident)
  - Body armour (hostile military incident): as per SOP.
- Make METHANE assessment, encode as necessary, and send.
- Consider where arriving ambulance vehicles should park.

**Go to****3**Incident  
management

- Consider where casualty clearing station/RAP should be placed (discuss with Tactical Commander):
  - safe distance from incident
  - on vehicle circuit
  - on hard standing where possible
  - using available shelter and hard cover.
- Request/task the Tactical Commander to locate and mark a suitable Emergency Helicopter Landing Site.

**Go to****Section 4****Contents**

Transport

- Continue to assess and communicate with higher formation as details become available.
- Continue duties of Medical Commander until relieved.

**Go to****1b**Incident  
management

# Medical Commander

## Incident management **1b**

### **Command**

- Take **command** of all medical assets; make key appointments.
- Remain near tactical command element where possible – usually at the Incident Control Point. Wear a tabard to identify yourself when one is available and it is tactically appropriate.
- Start a log of your actions, noting the time for each entry: use a nominated scribe when resources allow.

### **Safety**

- Take responsibility for the safety of all medical personnel at scene, or delegate this to a **Safety Officer**. Tactical safety will remain the responsibility of the Tactical Commander.

Go to

2

Incident  
management

### **Communications**

- **Liaise regularly** with Tactical Commander and/or commanders of any civil emergency services present.
- **Brief** all medical personnel on arrival.
- **Update** higher medical formation regularly: pass information to receiving medical units in accordance with SOP and Communication Electronic Instruction (CEI).
- Consider how you will communicate with fixed points at the scene (e.g. CCS, ambulance parking area, ambulance loading) depending on resources (e.g. runner, radio, loud hailer, hand signals, whistle, field telephone or mobile phone).
- Provide media brief when instructed by higher formation and with knowledge/involvement of Tactical Commander.
- Follow METHANE and 9-Line message structures.

Go to

3

Incident  
management

# Medical Commander

## Incident management **1b** (Cont'd)

**1b**

Incident management

### Assessment

- Identify areas for ambulance parking and CCS; establish an ambulance circuit (liaise with Tactical Commander).
- Identify helicopter landing site and ensure is marked.
- Assess developing hazards to military personnel.

Go to

**4**

Incident management

- Assess need for additional medical personnel and equipment resources; liaise with higher formation as necessary.
- Assess need to rest or relieve medical personnel at scene.

### Triage

- Ensure triage is being carried out appropriately; priorities for evacuation may differ from priorities for treatment at the scene.
- Determine the use of the T4 (**Expectant**) category.

Go to

**5**

Incident management

### Treatment

- Establish a casualty clearing station (= casualty collection point/CAP/RAP or equivalent); delegate running of CCS to Medical Officer when available.
- Provide medical personnel to treat patients at point of first contact; bring forward medical personnel from CCS for specific tasks. Otherwise concentrate medical personnel at CCS or deploy as per orders.
- Aim to achieve best practice standards, but accept compromise when resources are overwhelmed.

Go to

**Section 3**

Contents

Treatment guidelines

- Select appropriate transport for individual patients; liaise with loading officer and tactical commander.

Go to

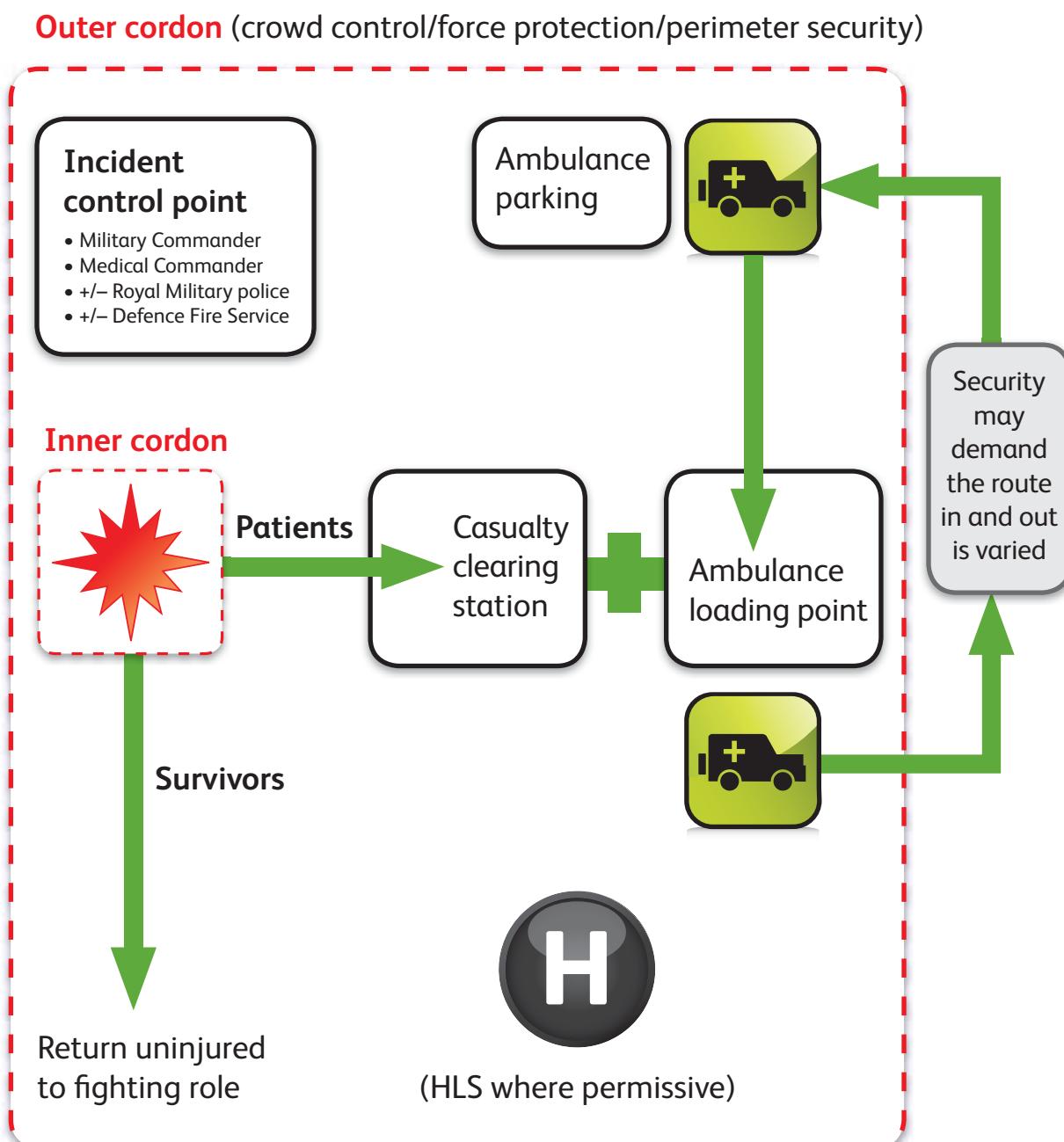
**Section 4**

Contents

Transport

# Scene layout

## Incident management 1c



**Consider principles of defence including:**  
**all round defence, mutual support, defence in depth,**  
**and overlapping arcs of fire.**

# Triage Officer

## Incident management **1d**

**1c-d**

Incident  
management

### Primary triage (point of wounding)

- In a military permissive environment, wear a tabard to identify yourself as the **Triage Officer** if available.
- Assign priorities and label casualties within the sector designated by the Medical Commander
- Use the **Triage Sieve** to initially prioritise adults.

Go to **5a**  
Incident  
management

- Use a **Paediatric Triage Tape** to initially prioritise children.

Go to **5c**  
Incident  
management

- Implement the use of the T4 (**Expectant**) category at the discretion of Medical Commander.
- Keep a tally of the number of casualties of each priority within your assigned sector; report this to the Medical Commander.
- Once primary triage is complete, report to Medical Commander for further tasking.

### Secondary triage (treatment facility)

- Use the **Triage Sort** if you have enough time and personnel, otherwise continue with the **Triage Sieve**.

Go to **5b**  
Incident  
management

### Chemical triage

- Follow the **Chemical Sieve & Sort**.

Go to **5d-e**  
Incident  
management

# Ambulance parking

## Incident management 1e

- In militarily permissive environment wear a tabard to identify yourself as the **Parking Officer**.
- Establish a parking area for ambulances, ideally on hard standing and on/adjacent to vehicle circuit; consider camouflage as tactically required.
- Coordinate ambulance parking.
- Confirm an appropriate Emergency Helicopter Landing Site has been established and marked.

Go to **Section 4**



Contents

Transport

- Receive medical teams as they arrive and direct them to Medical Commander/ Incident Control Point for briefing.
- Assess suitability of protective equipment of arriving personnel and inform Medical Commander when clothing is inadequate.
- Liaise with **Loading Officer** for requirement to send vehicles forward to CCS for patient evacuation.

# Ambulance loading

## Incident management 1f

1e-f

Incident  
management

- In militarily permissive environment wear a tabard to identify yourself as the **Loading Officer**.
- Work within the CCS (or equivalent).
- Establish a holding area for casualties awaiting evacuation. Ensure this area is adequately staffed and equipped (direct your personnel and equipment requirements to CCS commander).
- Supervise the triage of casualties for evacuation.

Go to

5

Incident  
management

- Select appropriate transport and escort for individual casualties, liaising with a CCS doctor or the Medical Commander.
- Liaise with **Parking Officer** and call forward vehicles as required.

Go to

Section 4

→ Contents

Transport

- Evacuate casualties in priority order, allowing lesser priority casualties to be evacuated when packaging of higher priority casualties is incomplete.
- Ensure patient packaging is adequate (secure lines; limb/spinal immobilisation; adequate fluids and analgesia; documentation accompanying casualty).
- Ensure loading of helicopter(s) is supervised by trained staff.

Go to

Section 4

→ Contents

Transport

- Log the destination of casualties.

# Casualty clearing

## Incident management 1g

- In militarily permissive environment wear a tabard to identify yourself as the **Casualty Clearing Station (CCS) Officer**.
- Take command of CCS (or equivalent).
- If not already identified, select location with Medical Commander:
  - Hard standing where possible
  - Close to vehicle circuit
  - Safe distance from scene hazards
  - Using available shelter and hard-cover.
- Clearly mark entrance to CCS and each priority area.
- Assign staff to do triage: use **Triage Sieve** until adequate personnel to assist with **Triage Sort**.



- Place staff in a clinical area appropriate to their training and experience.
- Orientate casualties with head towards the centre of a tent/temporary shelter; do not overcrowd a shelter.
- Set up equipment dump and delegate management of internal resupply.
- Call forward vehicles as required for transport of casualties: liaise with **Parking Officer**.
- When CCS overwhelmed with **T1** / **T2** do not attempt to treat **T3** casualties at scene; transport to next Role with medical assistance as escort where possible. **T3** casualties may still undertake self help and buddy aid using their personal medical equipment (this may extend to army team medic capability.)
- Start to record destination of casualties treated in CCS and hand this responsibility to **Loading Officer**.
- Liaise with Medical Commander for staff and equipment resources.

# Medical Coordinator

## Incident management **1h**

**1g-h**

Incident  
management

- The Medical Coordinator is the doctor who leads the clinical response in the field hospital/PCRF.
- This role is logically undertaken by the General Medicine consultant (no immediate clinical responsibility with multiple trauma casualties): the background is less important than the fact it is predetermined and the individual is trained.
- The Medical Coordinator is initially best situated in the Reception area to ensure preparedness and adequacy of resources: later relocation to the Hospital Squadron office/Hospital Management Cell may be appropriate to coordinate critical transfers and casualty flow within the hospital.
- The responsibilities of the Medical Coordinator are:
  - Start a timed log of information, decisions and actions
  - Liaise with OC Hospital Squadron/Command Post (dependent on the size of the hospital) to obtain up-to-date METHANE reports
  - Liaise with Senior Nursing Officer to determine level of staffing required to meet anticipated needs
  - Allocate medical staff to ED treatment teams and ensure all teams are briefed
  - Ensure minor treatments area is manned and equipped and personnel are positioned at Reception to escort the minor injured
  - Ensure ability to rapidly deploy Immediate Response Team (IRT) or Medical Emergency Response Team (MERT) personnel if requested
  - Monitor clinical needs during response and report equipment/drug/blood requirements through command chain together with requirements for in-theatre transfers and CCAST
  - Provide the focus to obtain specialist reach out advice (PJHQ, Poisons Centre, CDC, clinical experts etc)
  - Coordinate return to normal working practices as soon as possible and authorise major incident stand-down.

**These are generic guidelines:**  
 improvisation may be required dependent  
 on the size and nature of the incident  
 and the available resources

# Senior Nursing Officer

## Incident management 1i

- The Senior Nursing Officer (SNO) for the hospital will coordinate the clinical response jointly with the Medical Coordinator: for land operations the SNO may also be OC Hospital Squadron and the established link between the clinical hospital function and CP.
- The SNO may initially be best situated in the Reception area with the Medical Coordinator to ensure preparedness and adequacy of resources: later relocation to the Hospital Squadron office/Hospital Management Cell will be appropriate to coordinate nursing staff resources and casualty flow within the hospital.
- The responsibilities of the Senior Nursing Officer are:
  - Start a timed log of information, decisions and actions
  - Liaise with Command Post to obtain up-to-date METHANE reports
  - Liaise with Medical Coordinator to determine level of staffing required to meet anticipated needs, including temporary relocation of ITU and ward nursing staff to ED
  - Ensure adequate manning to receive casualties at HLS (delegated to Senior Nurse ED)
  - Ensure Senior Nurse ED allocates nursing staff to treatment teams and briefs all teams
  - Ensure Senior Nurse ED maintains a Casualty State Board to monitor initial flow and disposition of casualties
  - Liaise with QM to ensure arrangements to remove personal equipment and weapons before entering ED
  - Reconfigure wards to generate the bed spaces for the anticipated number of casualties
  - Monitor use of equipment and drugs during response and identify requirements for re-supply
  - Coordinate return to normal nursing shifts as soon as possible.

**These are generic guidelines:**  
improvisation may be required dependent  
on the size and nature of the incident  
and the available resources

# Command Post

## Incident management **1j**

1i-j

Incident  
management

- Maintain a timed log of information, decisions and actions.
- Initiate the clinical response by a predetermined activation system (telephone, tannoy, vehicle siren) to indicate **Major Incident Standby or Major Incident Declared**.
- Obtain METHANE report; pass all clinical information and updates to the Medical Coordinator and/or Senior Nursing Officer.
- Determine any requirement for pre-hospital support (IRT/MERT) and deploy on demand.
- Manage information flow from Hospital Squadron to maintain accurate picture of casualty location, severity and requirements for evacuation.
- Inform chain of command at intervals regarding casualty numbers and severity, including all SIL and VSIL listings.
- Facilitate clinical requests for extraordinary equipment and/or personnel resources to support the response.
- Ensure catering needs of staff are met where routine mealtimes are interrupted.

**These are generic guidelines:**  
improvisation may be required dependent  
on the size and nature of the incident  
and the available resources

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# Safety

## Incident management **2**

2

Incident  
management

Care under fire drill

Incident management **2a**

Improvised explosive device

Incident management **2b**

Mine

Incident management **2c**

Vehicle accident

Incident management **2d**

Water safety

Incident management **2e**

Aircraft accident

Incident management **2f**

CBRN/Hazchem safety

Incident management **2g**

Steep slope rescue

Incident management **2h**

Confined space

Incident management **2i**

Collapsed structure

Incident management **2j**

This section provides practical guidance on dealing with predictable safety hazards

It does not replace local Standing Orders, but provides outline guidance  
in an emergency when no trained assistance is available

**Optimal safety procedures demand prior training**

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# Care under fire drill

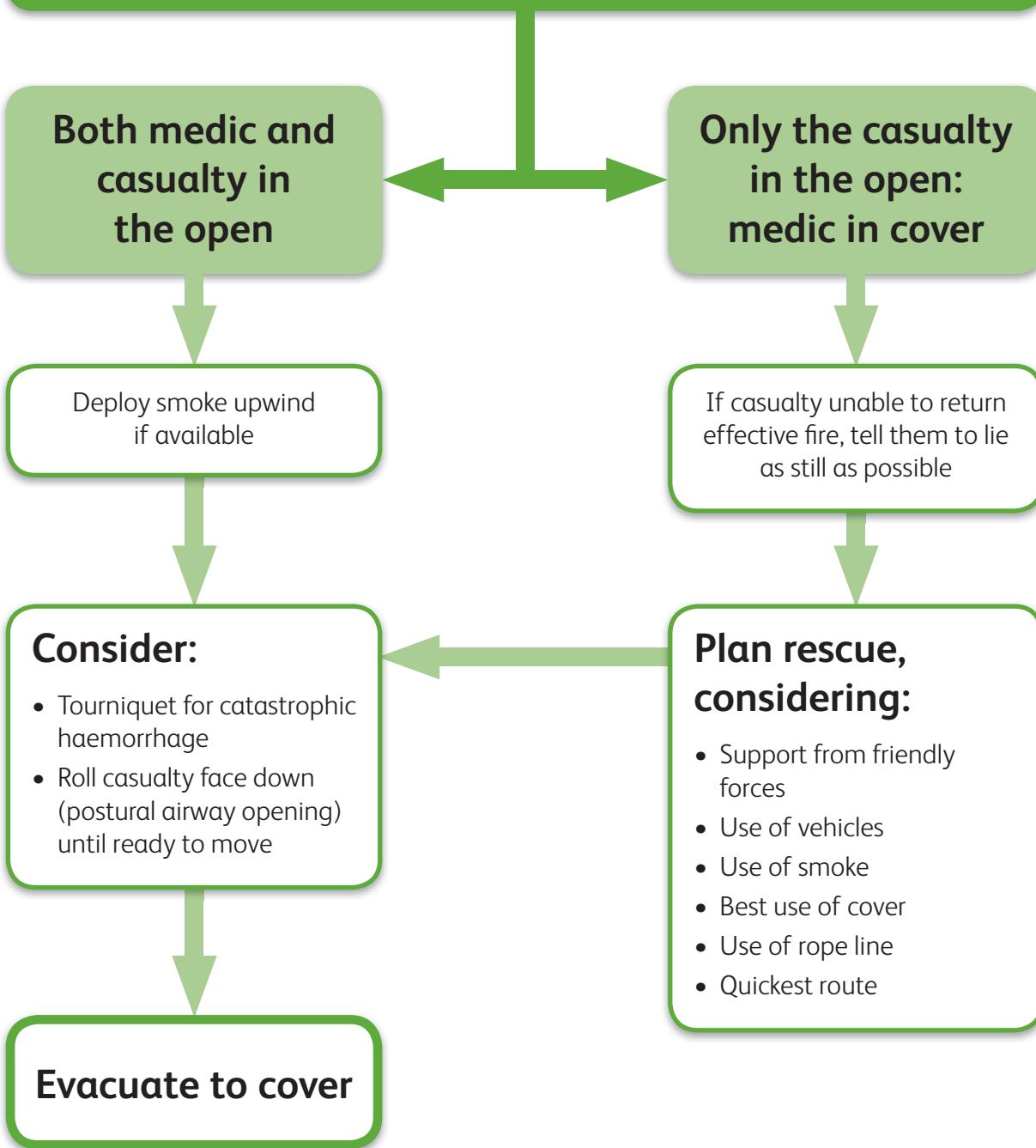
## Incident management 2a

2a

Incident  
management

This drill should be learned and remembered: if you need to read a guideline whilst under fire your training has failed

All personnel (including casualties where able) to return and maintain fire to suppress the enemy



# Improvised explosive device

## Incident management **2b**

### (1) Suspected IED: The Four Cs

- On finding anything that is suspected to be an IED, specialist support should immediately be sought. **No radio/mobile phone transmissions should be made within 15m in order to minimise risk of triggering electro-explosive devices.**
- Incident Commander should take the following actions:
  - **a. Confirm.** This may be as simple as to visually confirm, from a distance, the presence of the item reported. Evaluation of the size of the device (and possible secondary hazards in close proximity) should be made so as to assess the correct cordon distance. Consideration should be given to how an EOD Operator or their remote vehicle will gain access to the item: what obstacles (e.g. stairs) are present? Do not close and lock doors that will impede this access.
  - **b. Clear.** Move away from the item, as quickly as practicable, evacuating personnel out to and beyond the required cordon distance.
  - **c. Cordon.** Create a cordon to keep people at a safe distance. Standard evacuation distances are **a minimum:**
    - **100m** from small, hand delivered items
    - **200m** from suitcase bombs and small vehicles (cars)
    - **400m** from hazardous items including petrol tankers or large vehicles

These are minimum distances: where practical a larger area should be secured. Hazards must be assessed at cordon positions e.g. being out of line of sight is preferable, but adjacent/below glass (e.g. housing/offices/shops) is not. Due to the nature of an explosion glass may be shattered and drawn out of a building into the street by the passage of the shock and pressure waves.
  - **d. Control.** Create an Incident Control Point (ICP) to control the cordon, monitoring arrival and departure of personnel.
  - **e. Check.** Ensure that **Confirm, Clear, Cordon and Control** have been carried out and the locations of the device, the ICP and a safe route has been passed up the command chain.
- Usually the EOD Operator assumes responsibility for the scene until he/she declares the area to be safe from risk of explosion. The area is then handed back to the senior military/civilian commander. It may be necessary to retain the cordon (possibly at a reduced distance) if the “render safe” procedure has damaged any of the surroundings and created a physical hazard. This cordon will also protect the forensic evidence.

# Mine

## Incident management **2c**

**2b–c**

Incident  
management

### (2) Action on mine find/functioning

- Consider (and if possible identify) the kind of mine and fuse involved, to minimise risk of functioning further mines. Mine fields often have mixes to include antitank and antipersonnel mines.
- Mines may be located on the surface or buried/camouflaged. ‘Scatterable’ mines may also be hung overhead (often trail an orientating streamer, which can easily be tangled on a branch), so a thorough visual search must be carried out in all directions.
- A simple procedure may be adopted, as described below, but specialist support should be used wherever possible.

#### Procedure, on foot:

- Stop, stand still and alert others (inform command if appropriate by radio, but only if you are standing more than 15m from mines.)
- Visually check area for trip wires and fuses: a trip wire feeler should be used where possible.
- If specialist support is not available or appropriate, then turn around carefully within your footprint and retrace footprints to a safe area.
- If no footprint is visible then look and feel for trip wires and fuses, then prod (see next page) to clear a path until you reach a clear area.

#### If in a group:

- Mark footprints for others.
- Use ‘On Foot’ procedure.
- Move one at a time.
- Maintain 10 metre spacing.

#### Procedure, in vehicle:

- Stay in vehicle, inform command and request specialist help.
- If you must leave the vehicle, exit via rear or over roof.
- Visually check area for trip wires and fuses.
- Step only into vehicle tracks and follow these to a safe area.

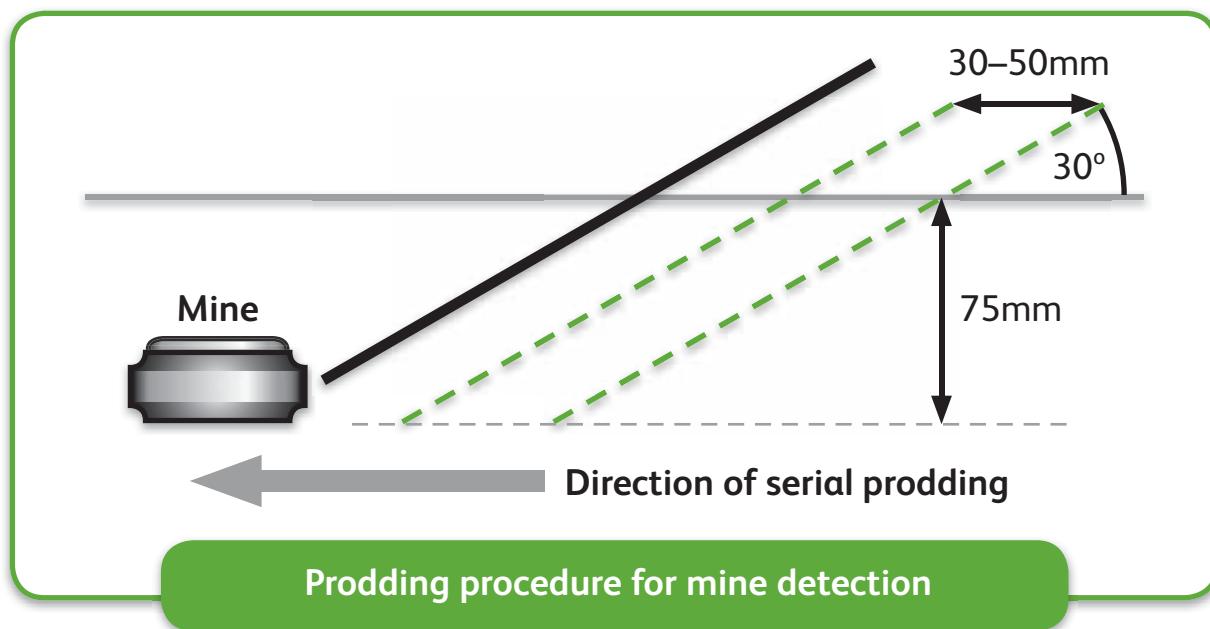
**In all cases, once clear of danger mark the area, record it onto maps and report it to command chain**

# Mine

## Incident management **2c** (Cont'd)

### (2) Action on mine find/functioning (cont'd)

- The area should be first visually searched and then 'felt' to exclude the presence of fuses and trip wires indicating a mine (preferably using a trip-wire feeler). All indications of a mine being present should be clearly marked for other personnel and avoided. Only after the area is cleared visually should the area be cleared by prodding.
- Prodding is a systematic search of a lane/area carried out with a non-magnetic material prodder. A bayonet or similar may be used if no issued mine prodder is available. The ground should be probed to a depth of approximately 75mm at an angle of approximately 30° to the horizontal with a spacing of 30–50mm.
- Once a solid object or inconsistency in the ground is found then the suspect area should be marked clearly and avoided.



### Recovery of a casualty from a mined area

Follow procedures described above and:

- Continuously reassure casualty
- Clear and mark exit route from the mined area
- Re-enter along marked path
- Clear and mark path to casualty
- Clear area around casualty
- Administer first aid
- Recover casualty along marked path, provide additional treatment as necessary on reaching safe ground and evacuate.

# Vehicle accident

## Incident management 2d

2c-d

Incident management

Vehicle accidents include Road Traffic Collisions and off-road incidents  
They may involve soft-skin or armoured vehicles, and occupants or pedestrians

### Safety of self

- Consider tactical threats first. If under fire, follow *Care under fire drill* → **Go to 2a**
- Wear suitable Personal Protective Equipment (PPE) if available. Consider:
  - Specialist PPE: e.g. flame retardant high-visibility coveralls
  - Uniform: sleeves rolled down. High-visibility tabard if available. Boots with some toe protection if available
  - Helmet: ‘hard hat’ or Kevlar helmet as available.
  - Gloves: leather gloves to protect from debris, latex or nitrile gloves to protect from body fluids
  - Eyes: visor on helmet, goggles, safety glasses or combination
  - Ears: ear defenders, especially if transport in helicopters
  - Respiratory: dust mask ‘at hand’ if available (during glass management phase)
  - HAZMAT: See HAZMAT Safety guideline.
- Approach with care, using the opportunity to ‘read the wreckage’ → **Go to 4a**

### Safety of scene

- Consider tactical threats: think about use of armour, hard cover, and dead ground as appropriate cover. Consider ‘snatch rescue’ as part of Care Under Fire.
- Control/stop traffic.
- Consider parking in ‘fend-off’ position if on a road. Place traffic cones if available.
- Place fire extinguisher in readily available position.
- If train is involved, think about warning down the line and notifying train operator; use of short circuit device (Track Operating Clip) to trigger the signal at the rear to red; or rapid extrication as appropriate.
- Isolate vehicle battery (consider using electrics to wind down windows first where appropriate or opening doors in armoured vehicles). As a minimum, turn off ignition.
- Stabilise vehicle by ‘chocking’ and consider whether deflating tyres will benefit stability.

### Safety of casualty

- Gain rapid access to any casualties.
- Triage casualties.
- Plan a controlled release, but also plan for snatch rescue in the event a sudden hazard presents.
- Think about physical protection for the casualty: eye protection, ear protection (for helicopter MEDEVAC or if loud cutting equipment being used), fragment (especially glass) protection with improvised shielding, and protection from heat or cold.

**If you see a hazard that no-one else has – shout!**

# Water safety: Safety at sea

## Incident management **2e(i)**

The fundamentals of safety at sea apply to all HM, RFA or Merchant Ships

### **Securing for sea**

- Be prepared for sudden movements of the ship even in calm seas. Make sure medical equipment is properly secured at all times.
- Stow away any small items that could otherwise roll into spaces (such as drainage inlets) and cause damage.
- Patients who are ‘turned in’ must not be left unattended if they cannot look after themselves, especially in rough weather. If they must be left, make sure they are secure.
- If the ship is on ‘cruising watch,’ inform the Captain before performing surgical procedures, as he may be able to put the ship onto a steadier course.

### **Personal safety**

- ‘Ship Knowledge’ is the key. Be completely familiar with the ship’s emergency procedures and evacuation routes especially from where you live and work. Plan in advance how you would evacuate your patients.
- At your place of work and Action Station, know the locations of Emergency Breathing Apparatus, fire-fighting equipment, first aid kit, and blankets (to prevent smoke ingress).
- Always have an emergency light source to hand.

### **Securing for action**

- Be correctly dressed for the appropriate readiness state.
- Have your Anti-Gas Respirator, life jacket and survival suit close at hand.
- Be familiar with the layout of your Action Station and how to adopt the ‘Brace’ position when ordered to.

### **Priorities**

If the ship is hit, fire fighting and damage control take priority over casualty care, until medical personnel are relieved by the appropriate specialist teams.

# Water safety: Water rescue

## Incident management **2e(ii)**

**2e(i)–(ii)**

Incident  
management

### The Environment

- **Cordon and control:** use a physical cordon of at least 3m from the water, and increase this if on sloping or unstable ground.
- If the water source is tidal ask, “What are the change tide times?”
- **Remember** the physical properties of water. It is:
  - Relentless
  - Powerful – 1m per sec in knee height water will exert a force of 8kg (double the speed again and the force is quadrupled)
  - Predictable – hydrology rarely changes.
- **Water flow:**
  - Spins where there is friction – a river embankment – re-circulating water back into the main flow
  - Speeds up – on the outside of river bends causing undercuts in the embankment
  - Tends to travel in straight lines
  - Strains and siphons – through fences, vehicles, felled tree branches.
- **Dangerous features:**
  - Weirs that have near vertical drops are ‘stoppers’ – they will kill as the water re-circulates pulling the victim back into the white water at the base of the weir
  - Structures that can strain water through, but will entangle and pull down larger objects (i.e. fences, felled trees, branches, vehicles)
  - Structures that can cause foot entrapments – tree roots, rocks, debris
  - Pins – large structures mid-flow in water in which water pressure can pin someone against, eventually submerging them.

# Water safety: Water rescue

## Incident management **2e(ii)** (Cont'd)

### **System of Work**

- All personnel within the risk area to be in appropriate PPE
- Work in pairs, at least
- Have 'throw-lines' available
- Make use of buoyancy aids (including improvised aids)
- Consider the rescue formula:
  - Shout: make verbal contact with the victim, instruct them to what you want them to do
  - Reach: branches, poles, weapons, stretchers
  - Throw: buoyancy aids, throw lines (not all ropes will float), combat jackets tied together etc
  - Row: if you have dinghies and the water has been assessed as being suitable for craft (not too much white water, current is slow moving, etc)
- If you have accidental immersion consider:
  - Cold water reflex and how to minimise
  - Safe defensive swimming technique – lying on back, facing down stream
  - Emergency signal to make others aware:
    - One arm raised
    - Three repeated blasts on a whistle
- Consider pre-plan – do **you** have a rescue strategy?

# Aircraft accident

## Incident management **2f**

**2e(ii)-f**

Incident  
management

### Management of the crash site

- Action following an aircraft crash is to take place in 2 phases. The first involves immediate emergency care and making the site safe to prevent further injury, whereas the second involves investigation of the cause.
- Crash site hazards include: fire, explosive ordinance, aircraft debris (particularly modern construction materials, such as Man-Made Mineral Fibres, MMMF).
- MOs, supported by Command Advisers, must be prepared to give advice on the subject.

### Phase 1 – Immediate response

#### Live Aircrew

- Clinical considerations must always dictate how aircrew are handled.
- Aircrew who have ejected, yet appear uninjured, must still be managed according to predetermined policy (AP 1269A 3-03 Annex I).
- The PAIME (post-accident initial medical examination) is to be undertaken at an appropriate time, after which uninjured aircrew may be cleared to return to flying duties immediately.

#### Fatalities

- Once death has been confirmed, MOs are to resist pressure to move bodies immediately. Bodies provide valuable evidence for the accident investigation and are to be considered under phase 2 of the post-accident response.

#### Notification

- CFMO(RAF) is to be notified immediately. He/she will provide advice and notify other agencies as required.

### Phase 2 – Management of aircrew following ejection/aircraft accidents or incidents

#### General considerations

- The use of an ejection seat exposes the spine to considerable compression and flexion forces. In addition, the cervical spine may be exposed to lateral flexion, rotation and traction. These forces may cause spinal compression fractures, rupture of ligaments, and spinal cord and brain stem lesions. These injuries are often asymptomatic or more severe than mild symptoms may suggest. Instances have occurred, particularly following ejection at high aircraft speeds, of potentially lethal cervical spine injury producing minimal symptoms and being undetected by radiography.

# Aircraft accident

## Incident management **2f** (Cont'd)

### **Management**

#### **It must always be assumed that**

- Personnel who have ejected or who have been exposed to high levels of vertical acceleration have unstable head, neck and spinal injury. They must always be taken to hospital for assessment and spinal immobilisation during movement is essential.
- There has been a period, however brief, of loss of consciousness following ejection. Transient loss of consciousness is extremely common following ejection.

### **Assessment**

#### **Initial**

- Full history and physical examination, including detailed neurological assessment
- AP and lateral X-rays of the cervical spine

#### **Secondary**

- MRI scan

The likelihood of identifying changes in a MRI scan diminishes with time; the MRI scan of the spine should be performed as soon as reasonably practicable following the aircraft accident or ejection. Ideally this should be within 24 hours, but must not be later than 72 hours after the incident.

#### **The following investigations should be undertaken regardless of clinical well-being**

- Detailed neurological assessment by a consultant neurologist or neurosurgeon
- MRI scanning of the whole spine to include the following sequences:
  - Sagittal T1 weighted
  - Sagittal T2 weighted
  - Sagittal STIR

A whole body isotope scan 3 to 14 days after injury is desirable. MRI scanning of the brain should be limited to those who have, or who are suspected of having, suffered a brain injury. The threshold level of suspicion for the presence of brain injury should be low, particularly where there has been a loss of consciousness, even for a very short period.

### **Ophthalmic considerations following aircraft ejection**

Injuries may result from canopy disrupting mechanisms and air blast during ejection. Decision to refer an ejectionee for examination by a consultant ophthalmologist should be determined on clinical grounds. With any evidence that the eyes may have been injured, the individual is to be seen by a consultant ophthalmologist as soon as possible. The individual is not to return to flying until the MO has discussed the case with CFMO(RAF) and, where necessary, the RAF CA in ophthalmology.

# CBRN/Hazchem safety

## Incident management 2g

2f-g

Incident  
management

### Approach from upwind and uphill

#### Safety of self

- Personal Protective Equipment
- Appropriate respirator (note general issue NBC ‘canister’ will not meet requirements for many Toxic Industrial Chemicals)

#### Safety of scene

- Respirable atmosphere?
- Other hazards?
- Military imperative?

#### Safety of casualty

- Personal Protective Equipment
- Contamination?
- Extractable?

#### Hot zone

- Life saving first aid only: extract along principles of *Care under fire drill* → Go to

2a

Incident  
management

#### Warm zone

- Full casualty decontamination in an area upwind of incident
- Full Personal Protective Equipment for medical personnel
- Start therapy
- Dispose of contaminated equipment in gas-proof bags
- Do not allow a build up of disposables
- Cycle staff
- **T1** casualties with RN (i.e. CBRN) contamination only may be evacuated prior to decontamination

#### Cold zone

- Must be a safe area without risk of off-gassing
- Respiratory protection should be unnecessary

#### Notes

Thickened nerve and mustard agents pose a threat to medics due to long off-gassing duration. Cyanides and other highly volatile agents are less likely to pose a threat to medics as the agents will probably have dispersed.

Irradiated casualties do not pose a threat to medics and contaminated (CBRN) casualties do not pose a threat if medics wear appropriate Personal Protective Equipment.

A build up of CBRN contaminant potentially poses a threat.

# Steep slope rescue

## Incident management 2h

### The environment

- Consider setting up a safety cordon depending on how far the drop and how steep the ground.
- Is the rescue taking place near water? Ensure appropriate PPE.

Go to

2e

Incident  
management

- What are the conditions underfoot – wet, slippery, uneven, crumbling?
- Identify an equipment storage area outside the inner cordon.
- Consider weather, wind strength and direction if at height or exposed.

### System of work

- All personnel within the risk area to be in appropriate PPE – helmets, gloves, eye protection if working face is crumbling.
- Consider work restraint system using ropes within the inner cordon, either ‘single line and slack’ for working within the area (but not near the edge) or ‘double line and tensioned’ for work positioning e.g. observing over the edge.
- Rope protectors must be used for all ropes over the edge.
- Single/double line for access (depending on tactical situation), double for rescue (i.e. where taking another person’s load).
- Use multiple anchor points, or single ‘bomb proof’ anchor.
- Consider carefully the method of descent and whether you will need to re-ascend.
- Can you add or remove mechanical advantage?
- Is the rope long enough?
- Consider depth of field perception – concave slopes look shorter!

### Casualty considerations

- Consider method of lowering and/or raising the casualty.
- Consider using a counter weight.
- Consider how much medical intervention should be done on first contact with the casualty, versus recovering them first.
- Consider whether you have enough manpower to move the casualty once rescued.
- Think about setting up an Emergency Helicopter Landing Site while the work progresses.

# Confined space

## Incident management 2i

2h-i

Incident  
management

### Definition of a confined space

“Any place, including any chamber, tank, silo, vat, pit, trench, pipe, sewer, flue, well or similar space, in which, by virtue of its enclosed nature, there arises a reasonably foreseeable specified risk.”

It often includes a space that is only accessible by a ladder.

### The environment

- Personnel entering the inner cordon to be in correct PPE and to be recorded (“tagged”) going in and out.
- What is the size of the space (e.g. a ship’s hold or engine room)?
- Consider detection equipment for toxic gases, oxygen levels, excessive heat.
- Consider the ease of entry and exit.
- What are you going to encounter within the space (e.g. liquid or solid material that can flow-sludge)?
- Are there other hazards (electrical, mechanical, noise, asbestos risk)?

### System of work

- Can you access the space?
- Does your system allow for retrieval?
- Do you need to travel within the space?
- Do you need to disconnect from your retrieval system?
- Do you need a rapid extrication plan?
- Can you or your kit get caught up during entry/exit?
- Have you sufficient mechanical advantage to raise the casualty/rescuers?
- Can this mechanical advantage be increased/decreased?
- Do you have appropriate PPE (e.g. S10 Respirator or Breathing Apparatus – remember that a filtration canister will not correct a hypoxic environment)?
- Lighting – what is available and what does the tactical situation allow?
- Ensure oxygen delivery equipment is close to the working site.
- Isolate electrical equipment where possible.
- Effective command, control and communications **must** be maintained throughout.

# Collapsed structure

## Incident management **2j(i)**

### The environment

- Why has the structure collapsed?
  - Natural: earthquake, tsunami, hurricane?
  - Faulty structure?
  - Deliberate: IED (secondary devices?), bomb, missile, arson etc?
- What is the extent of the collapse?
- Cordon at least 100m around the structure. Control cordon with armed personnel if necessary.
- All personnel moving through the cordon should be recorded, whether going in or out.
- Apply strict hygiene control measures – no eating and drinking in cordon.
- All personnel inside the inner cordon must wear appropriate PPE – helmet, gloves, respiratory protection, and eye protection.
- Appropriate equipment for debris removal and casualty extraction e.g. long spinal board, KED, MIBS stretcher, semi-rigid collar.

### Significant hazards

#### External

- Obstructed access
- Unstable conditions underfoot
- Restricted vision – smoke, dust
- Overhanging hazards
- Falling objects
- Airborne particulates
- Secondary collapse
- Tactical threat/hostile local population

#### Internal

- Oxygen deficient atmosphere
- Explosive/flammable atmosphere
- Biological hazards
- Leaking gas, exposed electrical wiring
- Asbestos
- Sharps – glass, nails etc.

# Collapsed structure

## Incident management **2j(ii)**

**2j(i)-(ii)**

Incident  
management

### Rescue Considerations

**REPEAT**

- R** **Reconnaissance** and survey of the building, putting together a picture of the original use and shape of the building.
- E** **Elimination** of utilities: cutting power, shutting off water mains (drowning a very real problem in recent earthquakes), isolation of gas main.
- P** **Primary** and surface search and rescue: search the rubble pile:
  - **Look:** animals will smell victims better than humans; dogs may be aroused by the smell of open wounds.
  - **Listen:** moans, crying, tapping, scratching, scraping. Ensure all personnel stop what they are doing when this is done. Must be coordinated with no freelancing taking place.
- E** **Exploration** of voids and spaces if the structure has been supported or shored.
- A** **Access** to the structure by deliberate removal of limited debris.
- T** **Termination** of the operation by complete removal of debris to identify any live casualties.

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# Communication

## Incident management **3**

**3**Incident  
management

METHANE

Incident management **3a**

9-LINE message

Incident management **3b**

MIST message

Incident management **3c**

NATO phonetic alphabet

Incident management **3d**

Intentionally blank

# METHANE

## Incident management **3a**

3a

Incident  
management

The METHANE report is designed as an initial report from the scene of a major incident involving multiple casualties.

### METHANE

**M** My call-sign, or name and appointment

- Major incident **standby** or **declared**

**E** Exact location

- Grid reference, or GPS where available

**T** Type of incident

**H** Hazards, present and potential

**A** Access to scene, and egress route

- Helicopter landing site location

**N** Number and severity of casualties

**E** Emergency services, present and required

# 9-LINE message

## Incident management 3b

**9-LINE provides the information needed to request MEDEVAC.**

A MIST message is given at handover between each successive level of care.

Detail		9 Line Message		Add details as required
1	Location (grid of pick up zone)	1		
2	Call sign & frequency	2		
3	Number of patients/precedence	3		
<b>A URGENT P1</b>				IN HOSPITAL (ROLE 2/3) IN 90 MINUTES
<b>B PRIORITY P2</b>				IN HOSPITAL (ROLE 2/3) IN 4 HOURS
<b>C ROUTINE P3</b>				IN HOSPITAL (ROLE 2/3) IN 24 HOURS
4	Special equipment  A None      C Extrication B Hoist      D Ventilator	4	A B C D	
5	Number Litter (stretcher) to be carried Ambulatory (walking) E Escorts (e.g. children)	5	L A E	
6	Security at pick up zone  N No enemy      P Possible enemy E Enemy in area      X Hot pick up zone	6	N P E X	
7	Pick up zone marking methods  A Panels B Pyro C Smoke D None E Other (explain)	7	A B C D	E
8	No. of patients by national status  A Coalition mil B Civilian with coalition forces C Non coalition security forces D Non coalition civilian E Opposing forces / PW / Detainee F Children	8	A B C D E F	
9	Pick up zone Terrain / Obstacles	9		
INCLUDE A "MIST AT" REPORT M – Mechanism I – Injury S – Symptoms T – Treatment A – Adult/Child T – Time				

All then encrypted as tactically dictated

This is a NATO system: priorities at serial 3 do not fit Triage Sieve system.  
In formats where "additional information" is allowed, send MIST message content for individual patients.

# MIST message

## Incident management **3c**

**3b–c**

Incident  
management

**The MIST message is given at handover between each successive level of care.**

### MIST

**M** Mechanism of injury

**I** Injuries or illness found or suspected

**S** Signs

- Respiratory rate
- SpO<sub>2</sub>
- Pulse rate (and rhythm if abnormal)
- Blood pressure
- Glasgow Coma Scale (or AVPU)

**T** Treatment given

**A** Adult/Child

**T** Time

**The MIST handover takes no more than 20–30 seconds**

**All members of the receiving team are to listen**

**If CPR is in progress, there is catastrophic external bleeding or the airway is obstructed allow the clinical care at the next Role to start first**

# NATO phonetic alphabet

## Incident management **3d**

The NATO phonetic alphabet is used when spelling words over the radio

alpha

juliet

sierra

bravo

kilo

tango

charlie

lima

uniform

delta

mike

victor

echo

november

whisky

foxtrot

oscar

x-ray

golf

papa

yankee

hotel

quebec

zulu

india

romeo



# Assessment

## Incident management **4**

**3d–4**

Incident  
management

Vehicle accident

Incident management **4a**

Hazchem recognition

Incident management **4b**

Intentionally blank

# Vehicle accident

## Incident management 4a

4a

Incident management

### Safety

Consider the **safety** of yourself, the scene and the survivors (injured and uninjured).

Go to

2

Incident management

Approach the scene carefully, and avoid a tunnel vision approach to the most obvious problem.

### Read the wreckage

- What happened?

Example: a motorcyclist 20m beyond an accident shows that he/she slowed over that distance – this is much less serious than the rider lying 2m away from the foot of a wall.

- Skid marks on road? How long? What direction?
- Number of vehicles involved?
- Obvious hazards (e.g. fuel spills)?
- Rate of deceleration (much more important than speed of impact)?
- How many casualties?
- Any pedestrian involvement?
- Could anyone be hidden (ditch, hedge, wandered away)?
- Degree of entrapment?
- Has the vehicle rolled (look for damage to the roof)?
- Has the vehicle had more than one impact?
- What were the force vectors (e.g. was the vehicle hit from front or side)?
- Were seat belts worn?
- Have any airbags or safety systems deployed?
- Has the steering wheel been deformed by the driver's chest?
- Does any windscreen have a 'bullseye' impact from an occupant's or pedestrian's head (often small hairs in glass at impact point)?
- Is any hair caught on underside of car – e.g. sump plug, where a pedestrian is involved, may demonstrate person has been driven over?

# Vehicle accident

## Incident management **4a** (Cont'd)

### **Access and triage**

- Gain rapid access to patient(s) to assess degree of injury, entrapment (real or relative), triage for extrication, and immediacy of any clinical problems.

### **Plan**

- Plan which casualty needs to come out first and by what means.
- Have an 'A' plan – urgent but not rushed, for optimal spinal immobilisation.
- Have a 'B' plan – for immediate snatch rescue at any point e.g. patient suddenly develops unmanageable airway, or there is a vehicle fire. Keep 'B' plan in your mind throughout: change it as needed as the structure of the vehicle is altered.
- If the Fire Service is in attendance, discuss the plan: give a **realistic** time target for the patient to be released.

### **General order and principles of extrication plan**

- **Safety** – disconnect battery or at least turn off ignition (consider winding down electric windows first). Deploy fire extinguisher.
- **Vehicle stability** – chock the vehicle (planks, rocks, sandbags, commercial chock) and consider deflating tyres.
- **Glass management** – remove all glass if cutting to occur. With non-bonded windscreens, remove rubber seal, lift out, and place under vehicle. Where glass needs to be broken, do so with control using sharp pointed object while protecting patient(s) with improvised shield.
- **Space making** – depends on cutting equipment (hand hacksaws or reciprocating saw can be used to remove a roof in a few minutes) and requirement. If posts are to be cut, strip out fascia and wires first to make cutting easier and to allow saw blade to take easiest route (avoiding safety systems).
- **Pedals** – may need to be cut or bent out of the way (use length of seat belt as 'rope': attach one end to pedal and one end to door. Open door using mechanical advantage to bend pedal to one side).
- **Release the casualty** – extricate, where possible, on a spinal board with longitudinal movement i.e. along the board.
- **Move the casualty** to predetermined treatment area/kit dump for re-assessment, intervention as required, and packaging for transport.
- **Speak to the patient(s) throughout!**

# Hazchem recognition

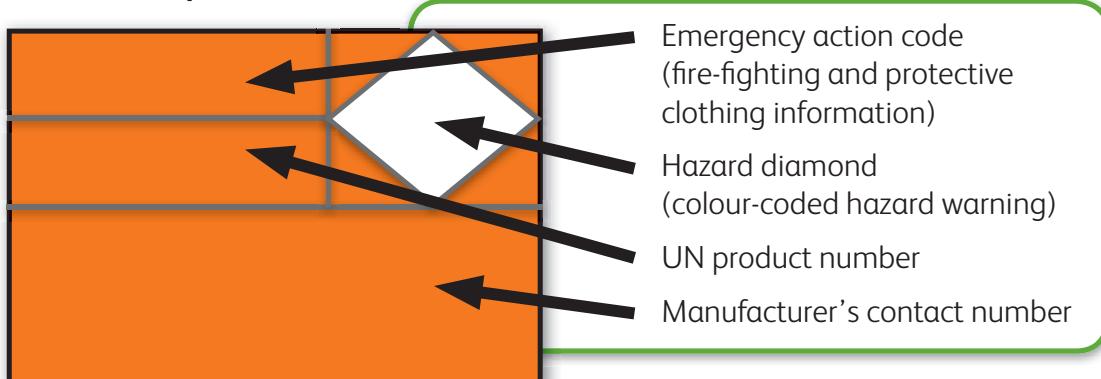
## Incident management 4b

4a-b

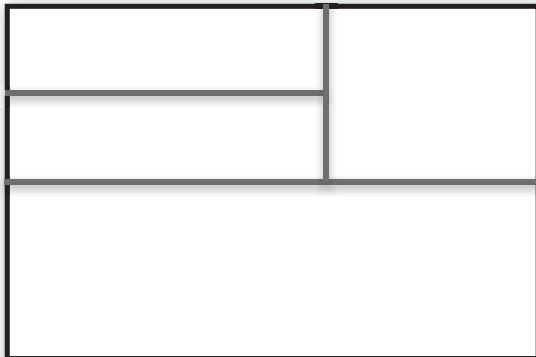
Incident  
management

- The recognition and neutralising of hazardous chemicals is a responsibility of the **Fire Service**.
- A board displaying details of the hazardous chemical is required on all vehicles on which they are transported.

### UK hazard plate



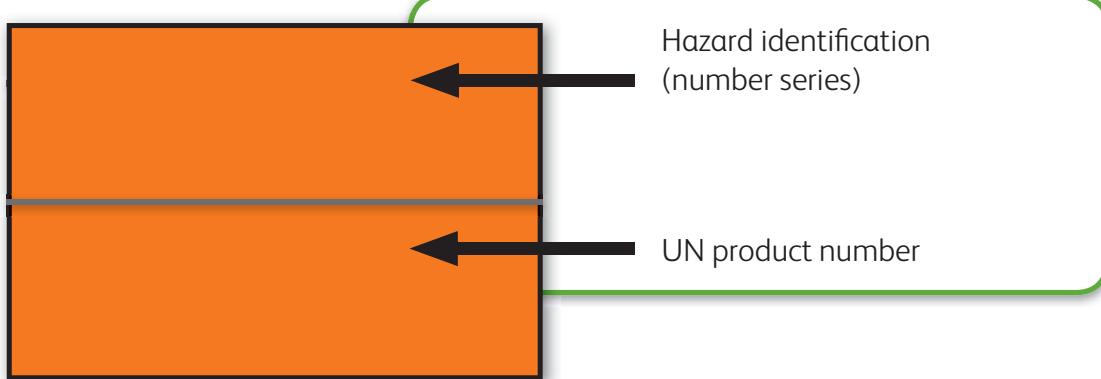
### UK low hazard



### UK mixed load



### European hazard plate



Intentionally blank



# Triage

## Incident management **5**

**5**Incident  
management

### Triage Sieve

Incident management **5a**

### Triage Sort

Incident management **5b**

### Paediatric Sieve

Incident management **5c**

### CBRN (special incident) Triage Sieve

Incident management **5d**

### CBRN Triage Sort

Incident management **5e**

### Chemical primary survey

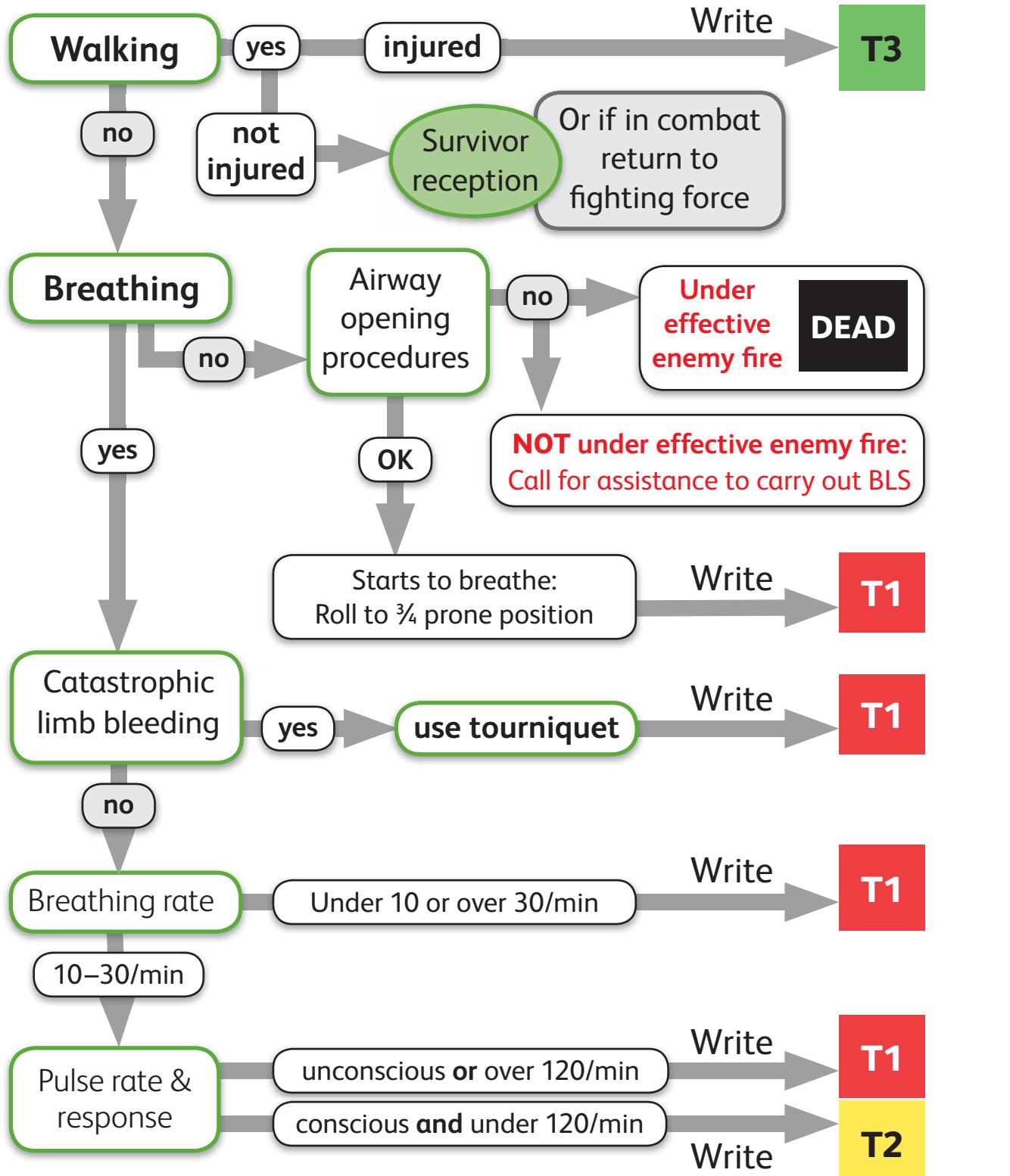
Go to **Section 6****2b**

Toolbox

Intentionally blank

# Triage Sieve

Incident management **5a**



# Triage Sort

## Incident management **5b**

### Step 1: calculate the **Glasgow Coma Score (GCS)**

**E = Eye opening:**

spontaneous	4
to voice	3
to pain	2
none	1

**V = Verbal response:**

orientated	5
confused	4
inappropriate	3
incomprehensible	2
no response	1

**M = Motor response:**

obeys commands	6
localises	5
pain withdraws	4
pain flexes	3
pain extends	2
no response	1

$$\text{GCS} = E + V + M$$

### Step 2: calculate the **Triage Sort score**

**X = GCS**

13–15	4
9–12	3
6–8	2
4–5	1
3	0

**Y = Respiratory rate**

10–29	4
30 or more	3
6–9	2
1–5	1
0	0

**Z = Systolic BP**

90 or more	4
76–89	3
50–75	2
1–49	1
0	0

$$\text{Triage Sort score} = X + Y + Z$$

### Step 3: assign a triage priority



### Step 4: upgrade priority at discretion of senior clinician, dependent on the anatomical injury/working diagnosis

Source: Hodgetts T & Porter C: *Major Incident Management System*. BMJ Publishing (2002)

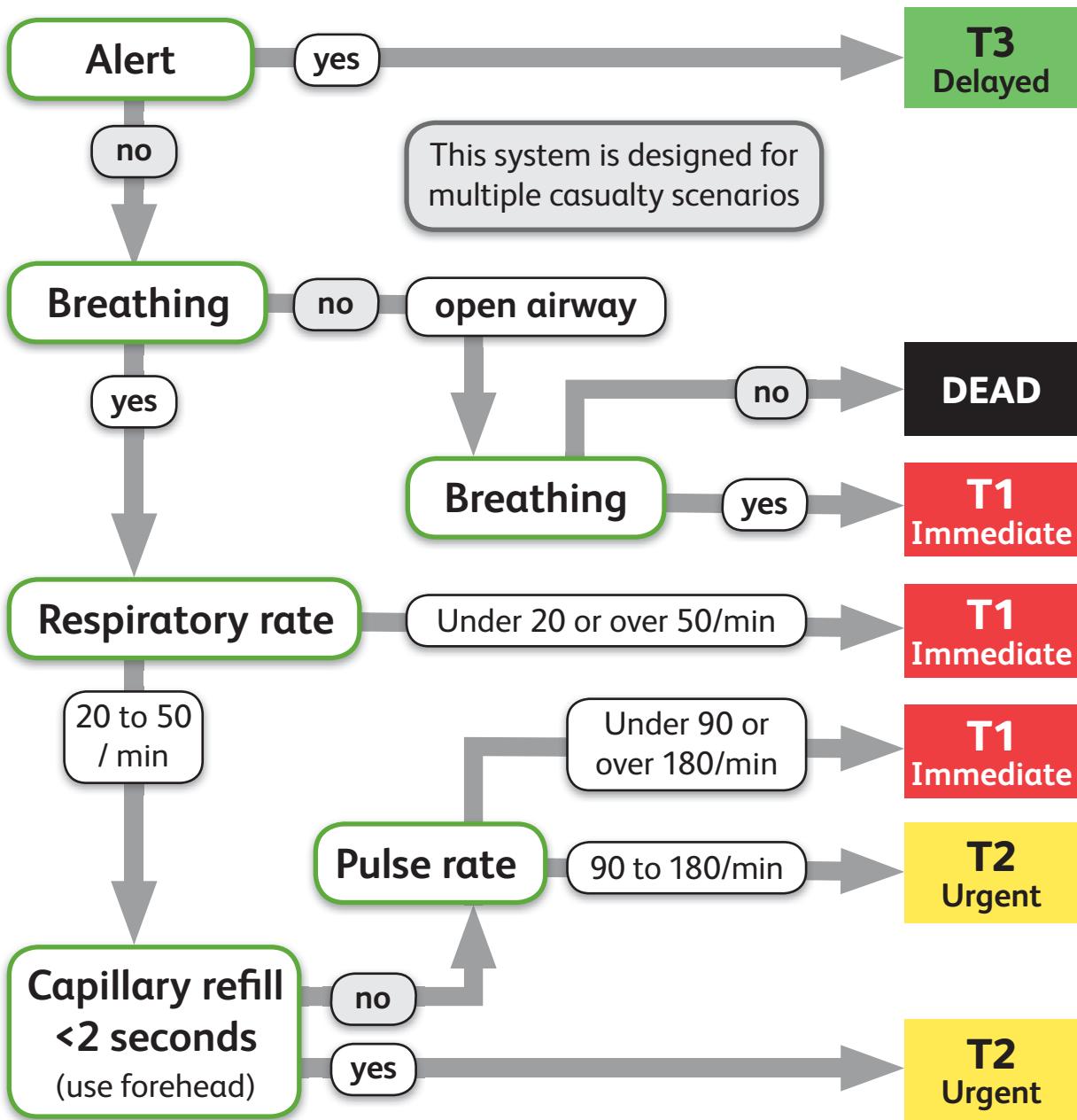
# Paediatric Sieve

## Incident management 5c

5b-c

Incident  
management

50–80cm (or 3–10kg)

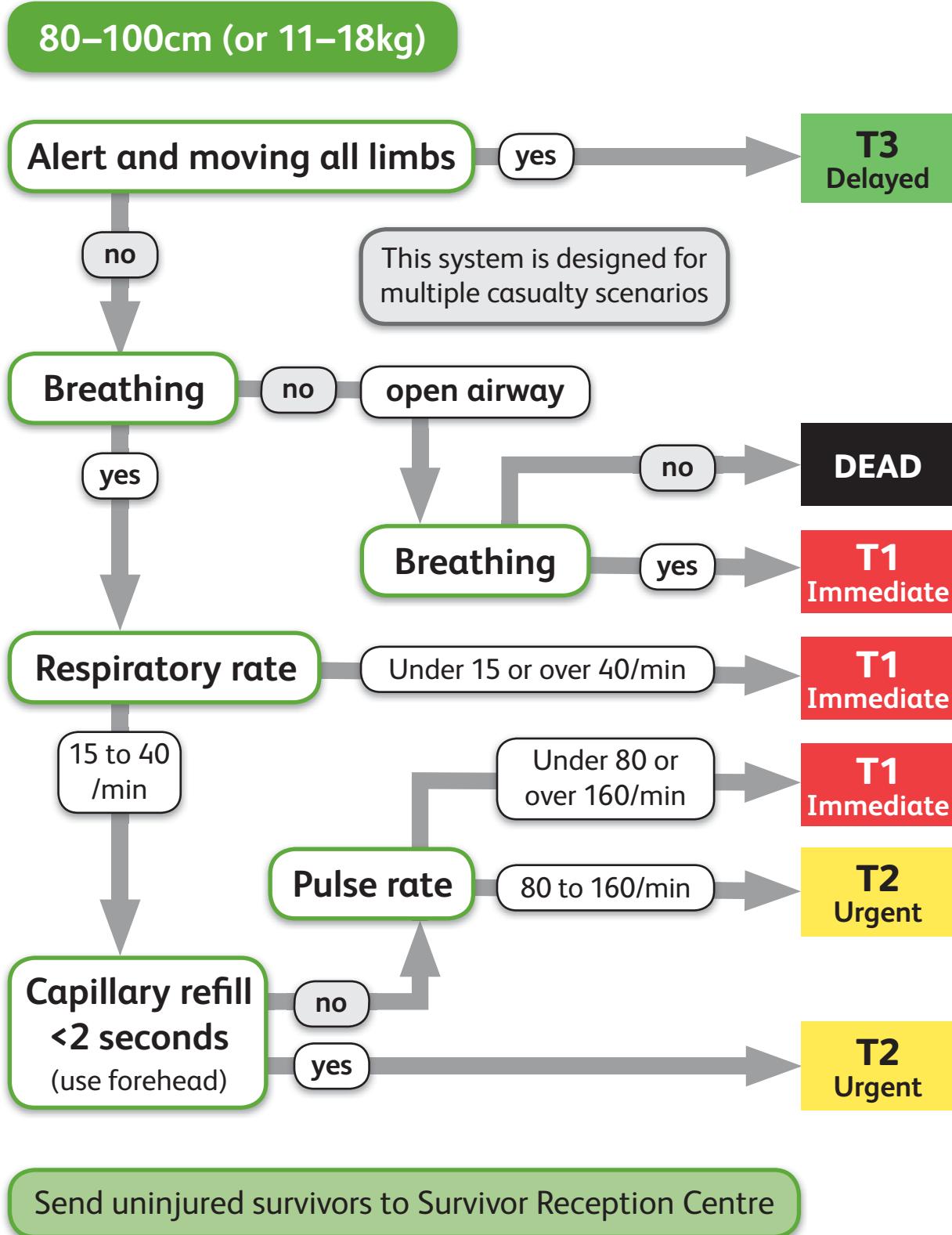


Send uninjured survivors to Survivor Reception Centre

Source: Hodgetts T & Porter C: *Major Incident Management System*. BMJ Publishing (2002)

# Paediatric Sieve

## Incident management **5c** (Cont'd)



Source: Hodgetts T & Porter C: *Major Incident Management System*. BMJ Publishing (2002)

# Paediatric Sieve

## Incident management **5c** (Cont'd)

5c

Incident management

100–140cm (or 19–32kg)

Use adult triage systems if child is longer than 140cm or heavier than 32kg

**Alert and moving all limbs**

yes

**T3**  
Delayed

no

This system is designed for multiple casualty scenarios

**Breathing**

no

**open airway**

no

**DEAD**

**Respiratory rate**

Under 10 or over 30/min

**T1**  
Immediate

10 to 30 /min

Under 70 or over 140/min

**T1**  
Immediate

**Pulse rate**

70 to 140/min

**T2**  
Urgent

**Capillary refill <2 seconds**  
(use forehead)

no

yes

**T2**  
Urgent

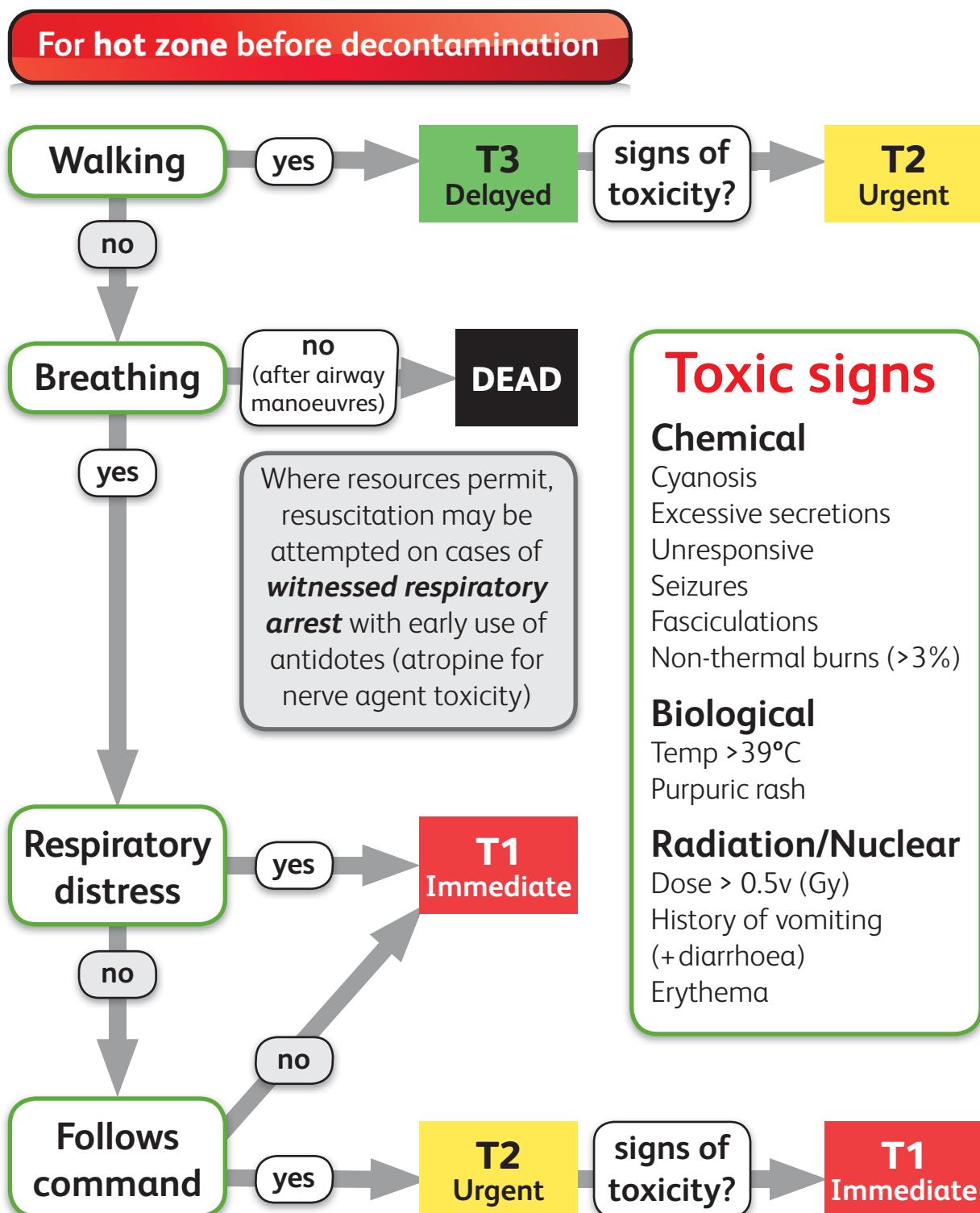
**Send uninjured survivors to Survivor Reception Centre**

Source: Hodgetts T & Porter C: *Major Incident Management System*. BMJ Publishing (2002)

# CBRN (special incident)

## Triage Sieve: Hot zone

### Incident management **5d(i)**



# CBRN (special incident)

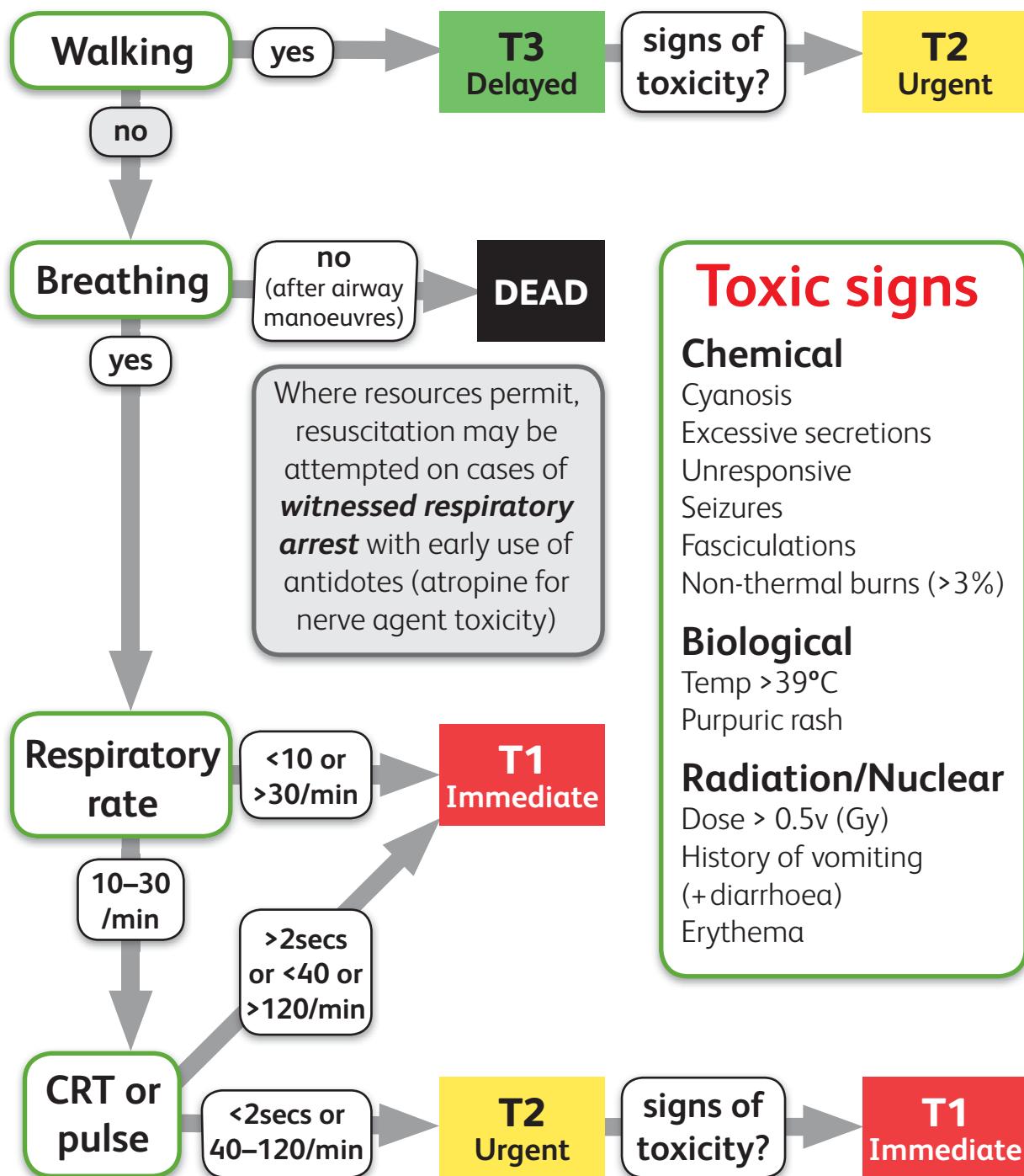
## Triage Sieve: Cold zone

### Incident management **5d(ii)**

**5d(i)–(ii)**

Incident  
management

For use after decontamination



# CBRN (special incident) Triage Sort

## Incident management 5e

For use after decontamination

<b>Respiration</b>	10–29/min 30 or more/min 30 or more/min + cyanosis 9 or less/min <b>Respiratory arrest</b>	4 2 0 0	<input type="text"/>
<b>Heart rate</b>	600–100/min 40–59/min or 101–120/min 40/min or less More than 120/min <b>Cardiac arrest</b>	4 2 0 0	<input type="text"/> <b>DEAD</b>
<b>Systolic blood pressure</b>	90 or more 70–89 60–69 1–49 <b>Cardiac arrest</b>	4 3 2 1	<input type="text"/> <b>DEAD</b>
<b>Glasgow Coma Score/ AVPU</b>	Alert 13–15 Verbal 9–12 6–8 Pain 4–5 <b>Unresponsive</b> 3 or convulsions	4 3 2 1 0	<input type="text"/>
<b>Fasciculations</b>	None Local/intermittent General/continuous Flaccidity	4 2 0 0	<input type="text"/>
<b>Biological</b>	Any of the following: Temp >39°C Purpuric rash Ascending paralysis Visual disturbance (bulbar syndrome)	-2	<input type="text"/>
<b>Radiological</b>	Any of the following: Vomiting, diarrhoea, erythema Dose >2Sv	-2	<input type="text"/>
<b>Score</b>	<b>Category</b>	<b>Total</b>	
20	Delayed T3		
18–19	Urgent T2		
0–17	Immediate T1		Out of 20

# Section 3

# Treatment

# guidelines

# Treatment guidelines

## Introduction

### **TG – Intro.1**

The treatment of an individual casualty has been designed with a common gateway for all emergencies, whether the emergency is traumatic, medical, toxicological or environmental in nature.

### **TG – Intro.2**

The priorities for treatment are <C>ABCDE. This is an evolution from previous doctrine and recognises the requirement to treat catastrophic external haemorrhage as the first priority. This is the commonest cause of avoidable battlefield death.

### **TG – Intro.3**

Evidence-based guidelines are presented that are tempered with operational experience and that have been matched to the availability of equipment and drugs within the deployed medical modules.

### **TG – Intro.4**

**This is not a textbook of all possible emergencies.** Rather, conditions have been selected that are likely to be encountered within the military population in the operational setting, or if rare are still important clinically and will predictably require guidance.

# Treatment guidelines

## Contents

Contents

Treatment  
guidelines



**Cardiac arrest** – Trauma and medical  
Treatment guidelines **1**



**Catastrophic haemorrhage** – Trauma and medical  
Treatment guidelines **2**



**Airway compromise**  
Treatment guidelines **3**

**Cervical spine trauma**  
Treatment guidelines **4**



**Difficult or abnormal breathing**  
Treatment guidelines **5**



**Shock**  
Treatment guidelines **6**

**Chest pain**  
Treatment guidelines **7**

**Peri-arrest rhythms**  
Treatment guidelines **8**



**Reduced response**  
Treatment guidelines **9**



**Electrolytes** – includes poisoning and CW  
Treatment guidelines **10**

**Environment**  
Treatment guidelines **11**

Intentionally blank



# Cardiac arrest

## Treatment guidelines **1**

1

Treatment  
guidelines

### Adult BLS

Treatment guidelines **1a**

### Adult ALS

Treatment guidelines **1b**

### Adult choking

Treatment guidelines **1c**

### Paediatric BLS

Treatment guidelines **1d**

### Paediatric ALS

Treatment guidelines **1e**

### Child choking

Treatment guidelines **1f**

### Infant choking (<1 year old)

Treatment guidelines **1g**

### Newborn life support

Treatment guidelines **1h**

### Emergency thoracotomy

Treatment guidelines **1i**

### Cardiac Arrest or Cardiovascular Collapse caused by Local Anaesthetic

Treatment guidelines **1j**

Intentionally blank

# Adult BLS

## Treatment guidelines **1a**

1a

Treatment guidelines

### Check responsiveness

Shake and shout

If unresponsive get help now

### Open airway

Head tilt /chin lift

### Check breathing – Abnormal or absent

If unresponsive and breathing place in recovery position

Look, listen and feel. No longer than 10 seconds

### 30 chest compressions

Rate 100/minute

### 2 rescue breaths: 30 compressions

Change rescuer every 2 minutes to prevent fatigue

#### Signs of life

Recovery position

Check patient only if they begin  
to breathe normally

#### No signs of life

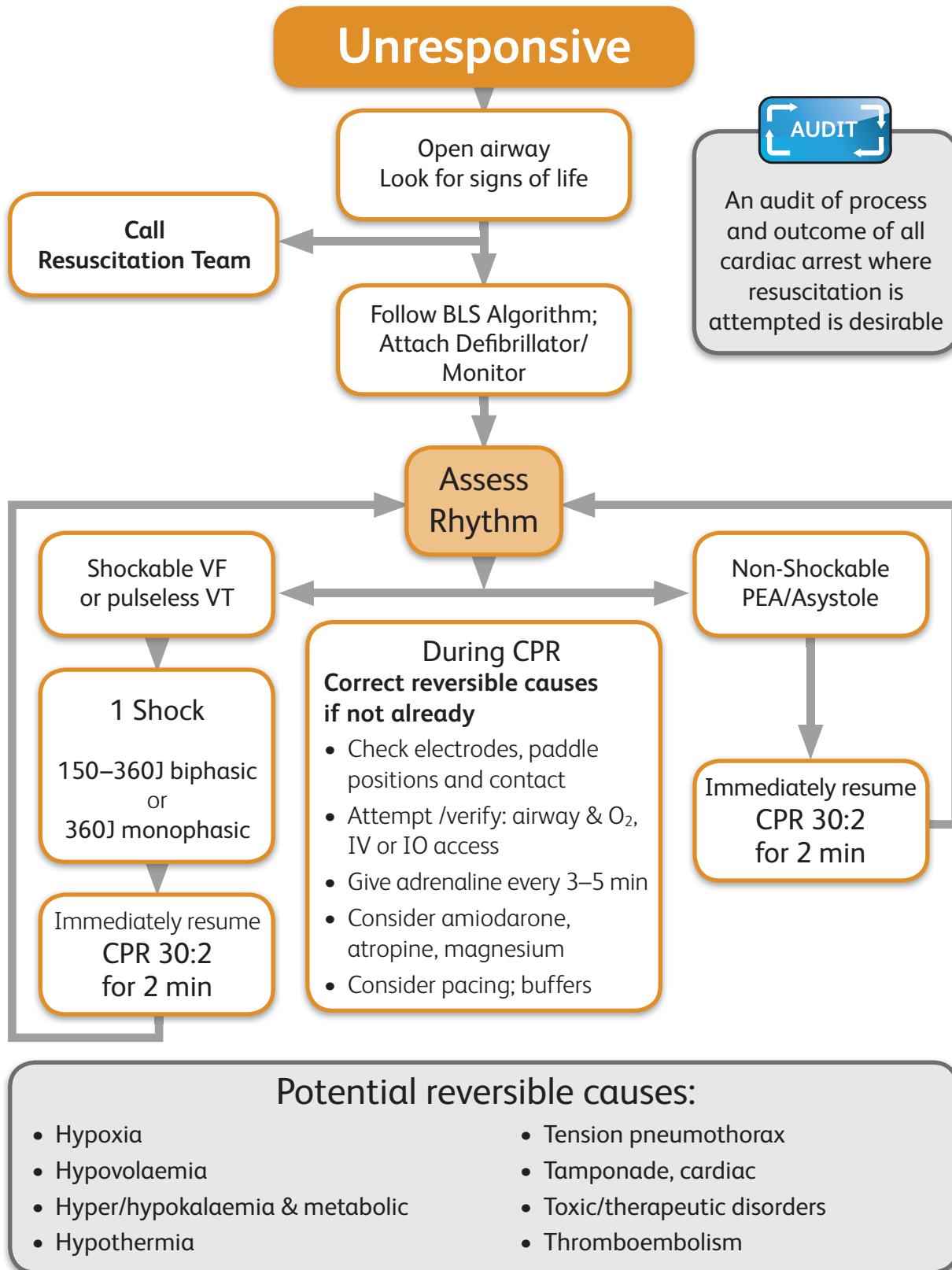
Continue resuscitation

100/minute compressions  
30:2 ratio

**Send or go for help as soon as possible**

# Adult ALS

## Treatment guidelines 1b



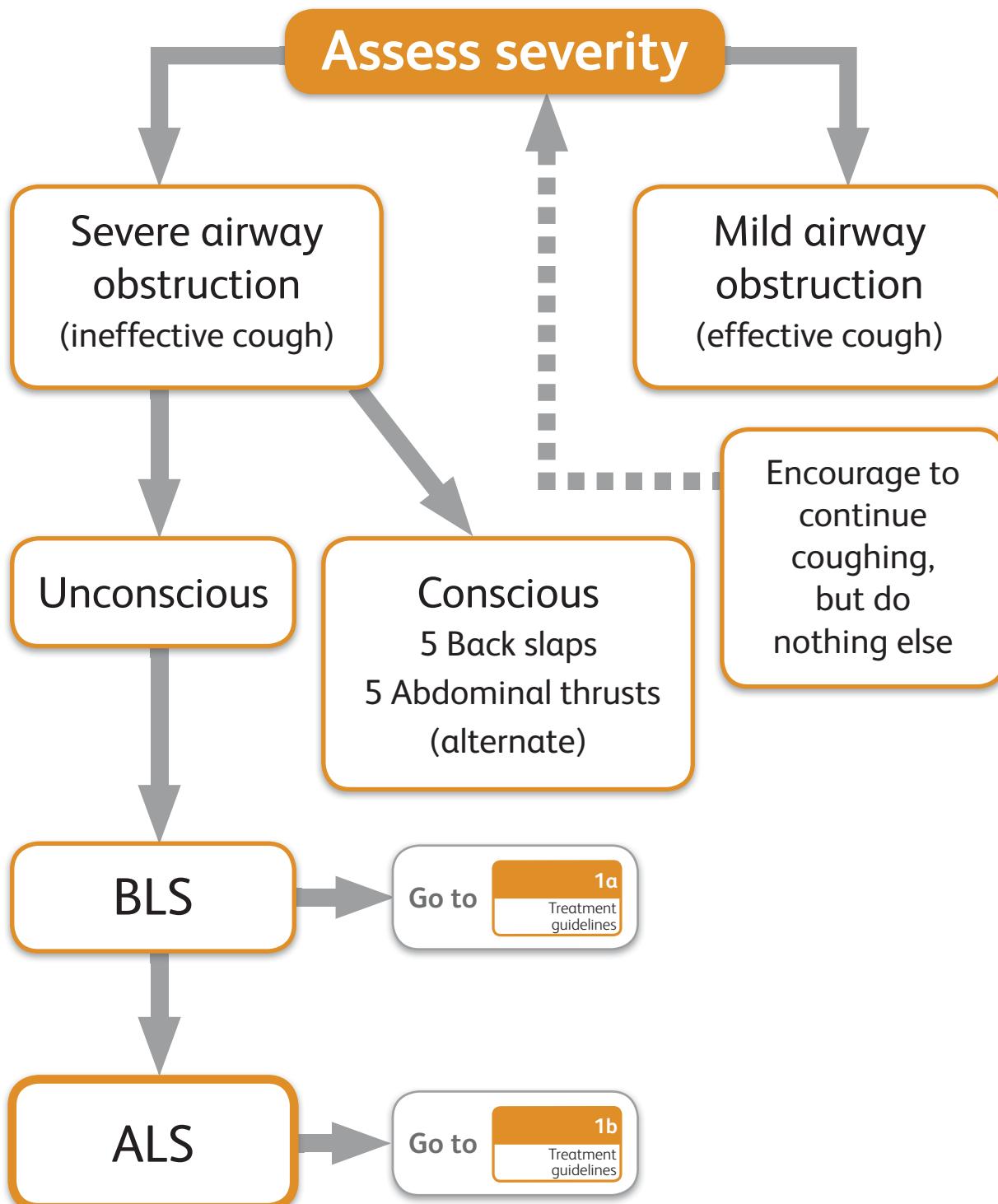
Adapted from: *Advanced Life Support Guidelines*. UK Resuscitation Council (2005)

# Adult choking

Treatment guidelines **1c**

**1b–1c**

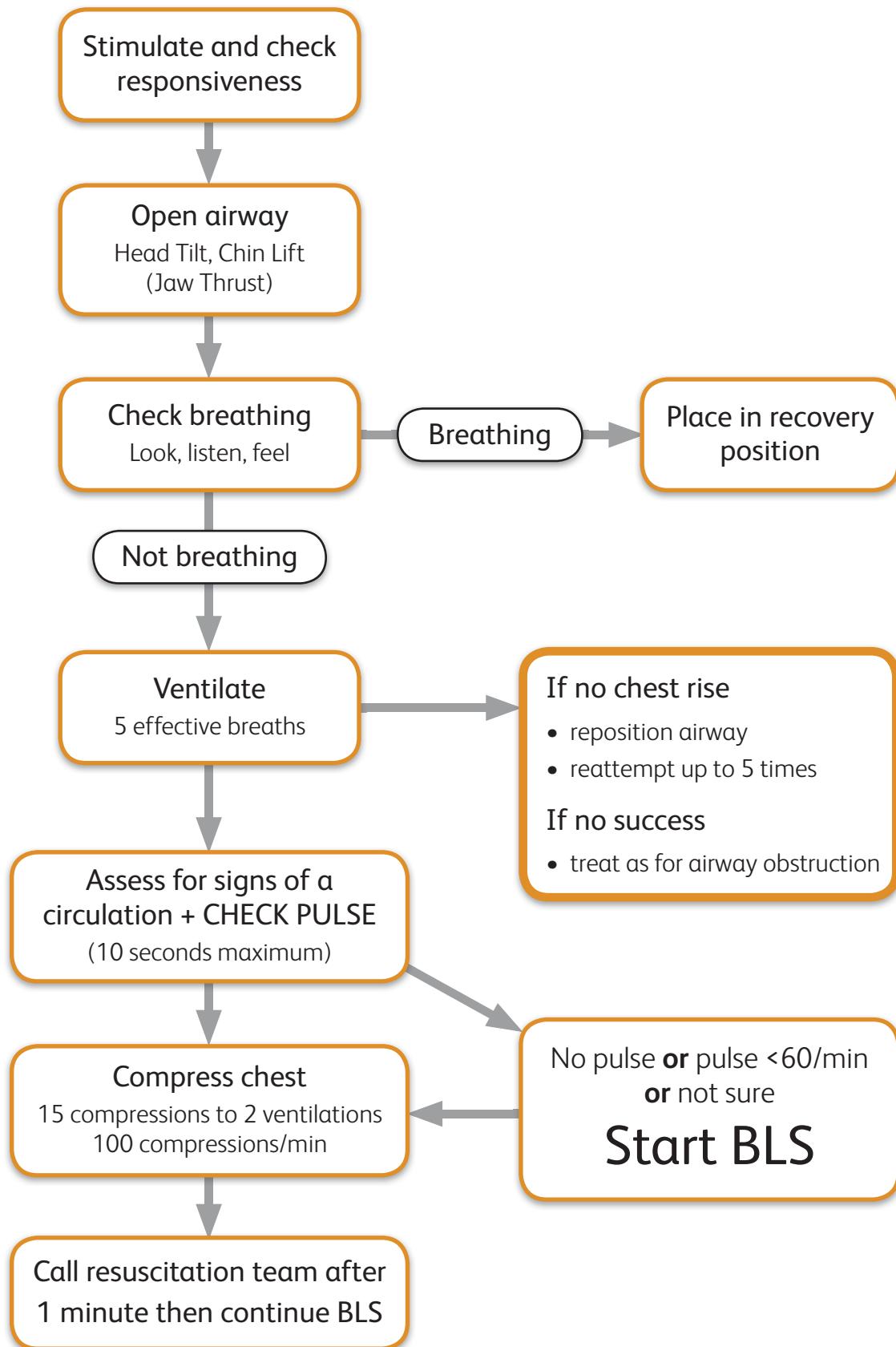
Treatment guidelines



Adapted from: *Advanced Life Support Guidelines*. UK Resuscitation Council (2005)

# Paediatric BLS

## Treatment guidelines 1d

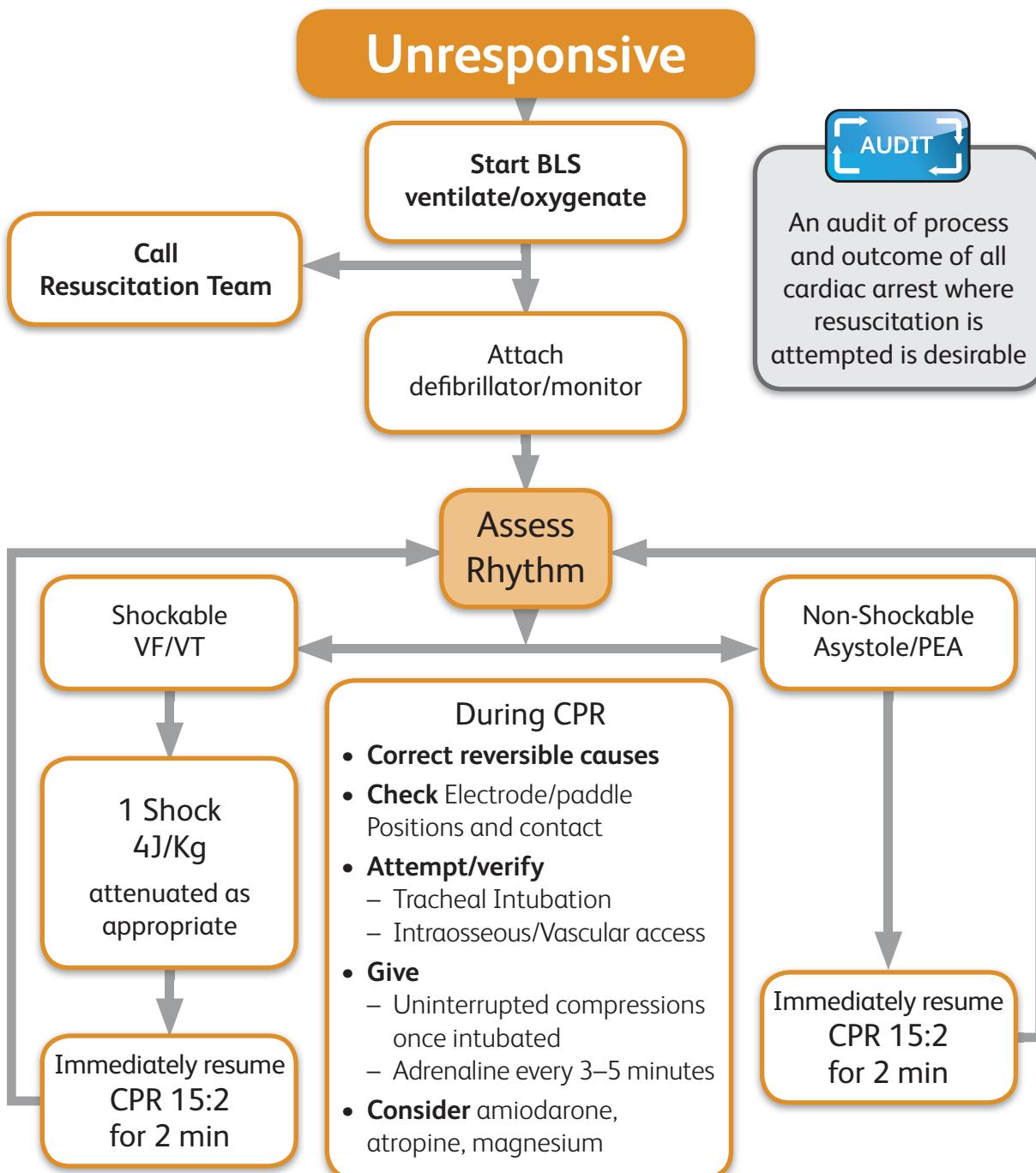


# Paediatric ALS

## Treatment guidelines **1e**

1d-1e

Treatment guidelines

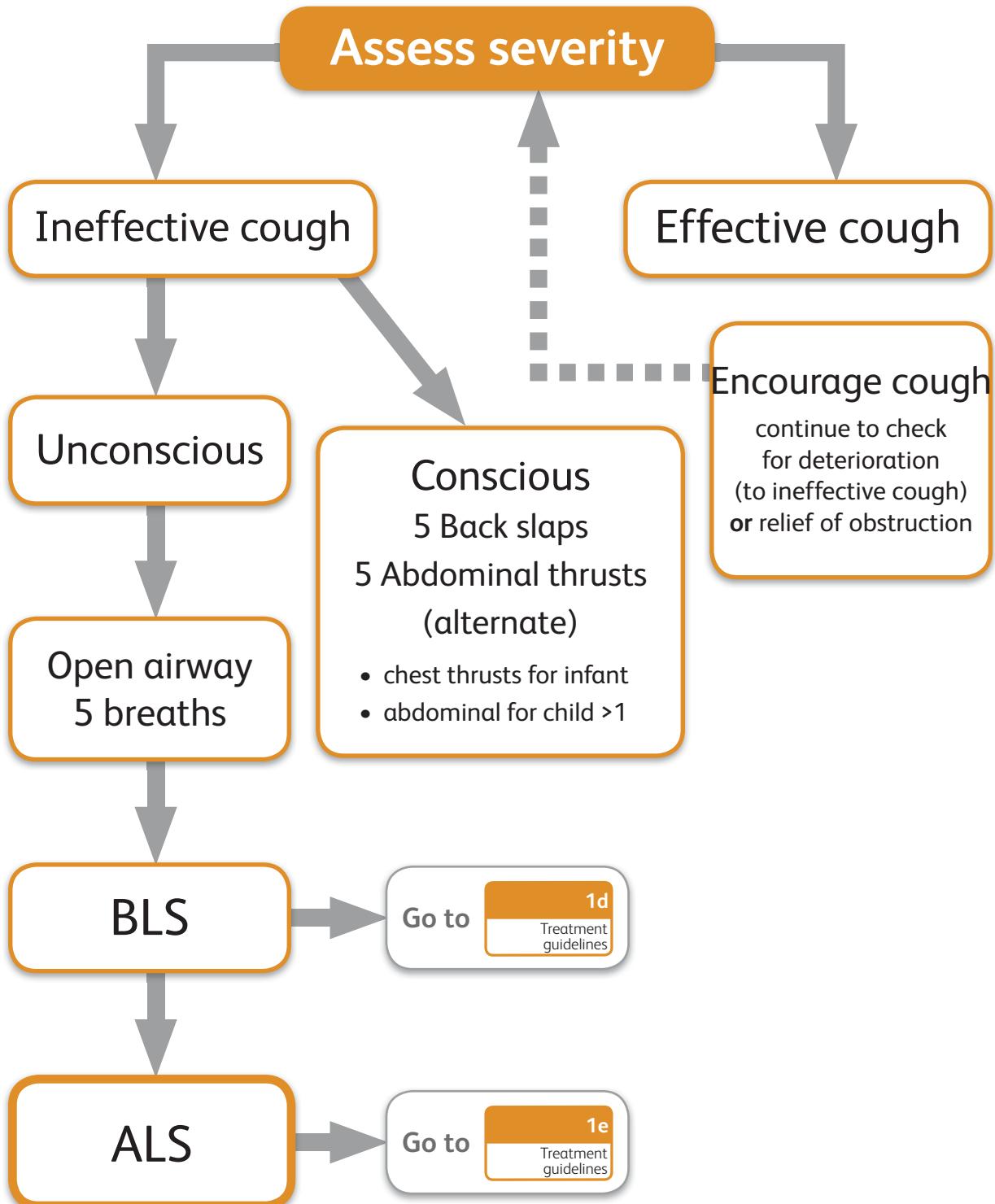


### Potential reversible causes:

- Hypoxia
- Hypovolaemia
- Hyper/hypokalaemia & metabolic
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxic/therapeutic disorders
- Thromboembolism

# Child choking

## Treatment guidelines **1f**



Adapted from: Advanced Life Support Guidelines. UK Resuscitation Council (2005)

# Infant choking (<1 year old)

## Treatment guidelines **1g**

**1f-1g**

Treatment  
guidelines

**NEVER do a blind finger sweep to try and remove an obstruction**

Lay the baby along your arm, head down.  
Use the heel of your hand to give up to 5 smart blows between the shoulder blades

If this fails

Turn the baby over and give up to 5 chest thrusts

Chest thrusts performed in the same way as chest compressions with 2 fingers placed 1 finger-breadth below the inter-nipple line, but sharper and at a slower rate

If there is still no breathing

Attempt up to 5 rescue breaths

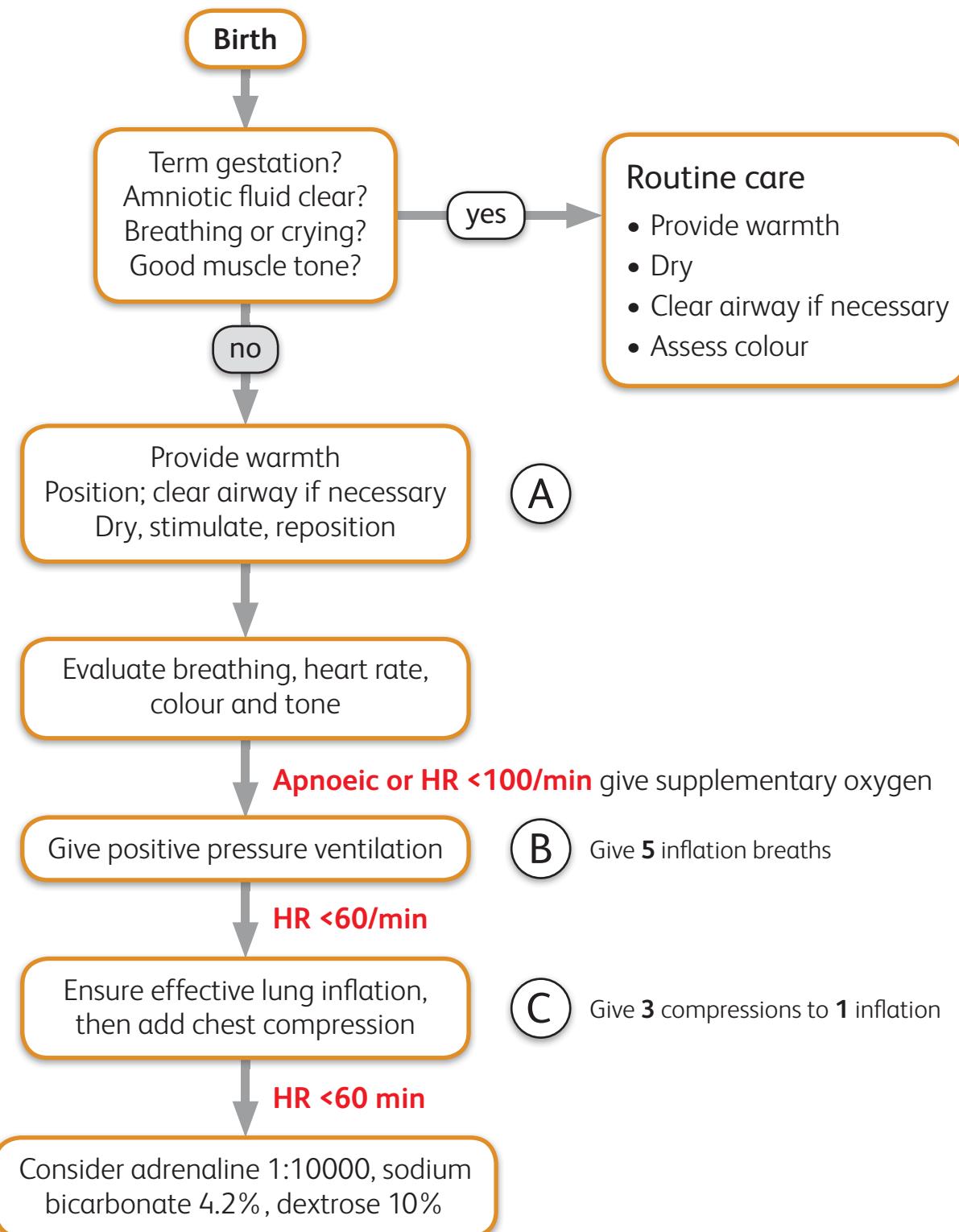
If unsuccessful repeat sequence of 5 back blows and 5 chest thrusts

**Do not perform abdominal thrusts on a baby as these may damage internal organs**

Adapted from: Advanced Life Support Guidelines. UK Resuscitation Council (2005)

# Newborn life support

## Treatment guidelines **1h**



Adapted from: *Newborn Life Support Guidelines*. Resuscitation Council (2005)

# Newborn life support

## Treatment guidelines **1h** (Cont'd)

1h

Treatment  
guidelines

A healthy baby will be born blue, will have good tone, will cry within a few seconds of delivery, will have a good heart rate (about **120–150** beats/min) and will rapidly become pink during the first **90** seconds.

A less healthy baby will be blue at birth, will have less good tone, may have a slow heart rate (less than **100** beats/min) and may not establish adequate breathing by **90–120** seconds.

An ill baby will be born pale and floppy, not breathing and with a slow or very slow heart rate.

### Airway

Place the baby on his back with the head in the neutral position, place support under shoulders but be careful not to overextend the neck.

### Breathing

If not breathing adequately by approx **90** seconds give **5** inflation breaths. Aeration of the lungs is likely to require sustained application of pressures of about 30cm of water for **2–3** seconds. Continue to provide regular breaths at a rate of **30–40** minutes until the baby starts to breathe on his own.

### Chest compressions

Two thumbs are placed side by side over the sternum between the nipples and the hands encircle the torso. The depth of compression is one third of the anteroposterior diameter of the chest. At a rate of **3:1** this results in 90 compressions to 30 breaths/min. Pulse rate is assessed every **30** seconds.

### Drugs

Should be delivered via an umbilical venous catheter or intraosseous.

**Adrenaline** is 10mcg/kg (0.1ml/kg of 1:10000) If not effective a dose of up to 30mcg/kg (0.3ml/kg of 1:10000) may be tried.

**Sodium bicarbonate** 2 to 4ml/kg of 4.2% bicarbonate solution.

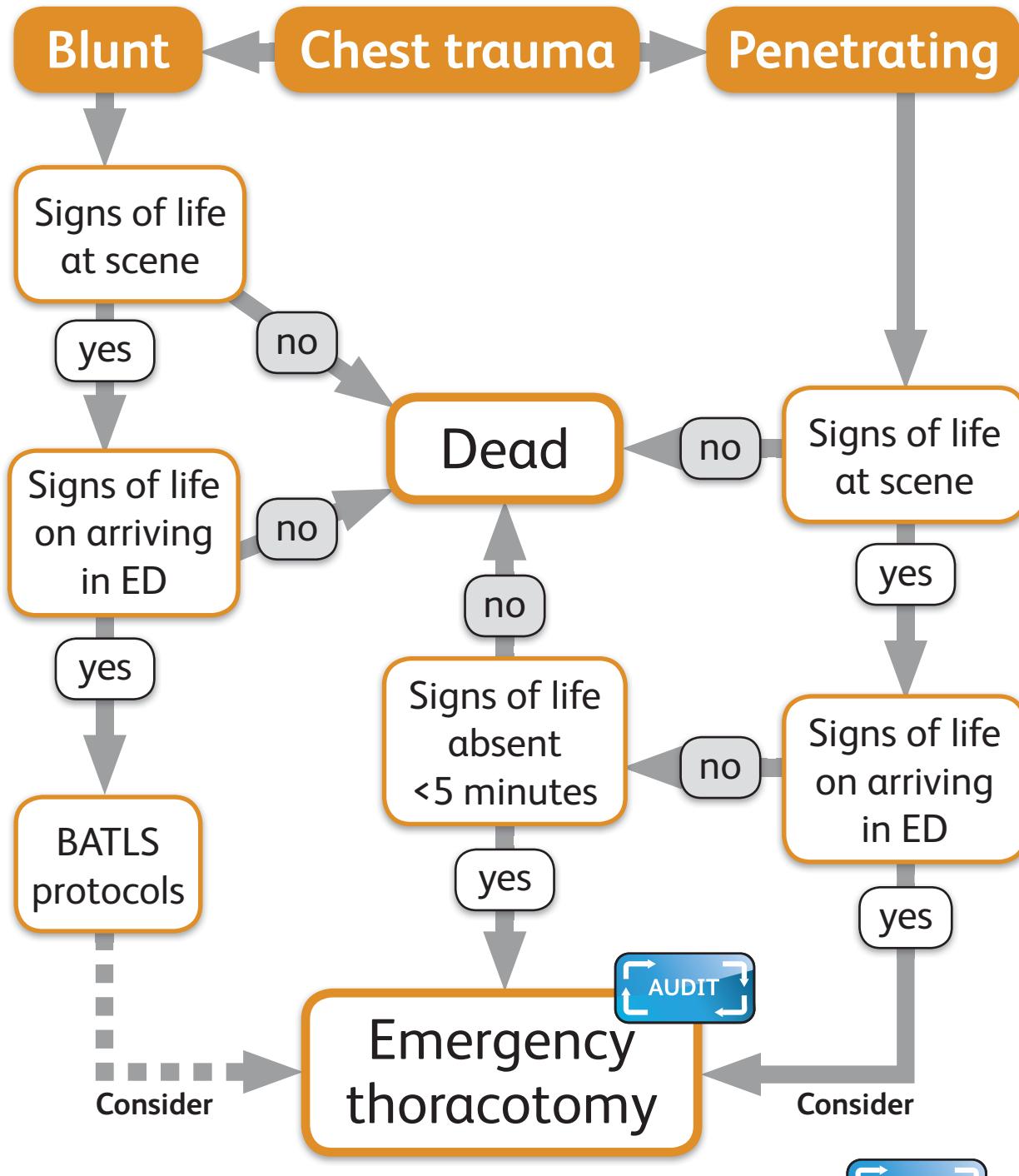
**Dextrose** recommended is 250mg/kg (2.5ml/kg) of 10% dextrose.

If there are no signs of life after 10 minutes of continuous and adequate resuscitation then discontinuation may be justified.

Adapted from: *Newborn Life Support Guidelines*. Resuscitation Council (2005)

# Emergency thoracotomy

## Treatment guidelines 1i



In rare circumstances, the equipment and expertise may be available to perform emergency thoracotomy outside a clinical facility: this is only appropriate in penetrating trauma and only if the procedure is performed within 5 minutes of losing vital signs

# Cardiac Arrest or Cardiovascular Collapse caused by Local Anaesthetic

## Treatment guidelines 1j

1i-1j

Treatment guidelines

It has been recommended that 20% lipid emulsion should be available wherever patients receive large doses of local anaesthetic (e.g. operating rooms, emergency department, radiology suite)

### Start CPR using standard guideline

### Consider treatment with lipid emulsion

Approximate doses are given in red for a 70kg person

- Give an intravenous bolus injection of Intralipid 20% 1.5ml/kg<sup>-1</sup>/min
  - Give a bolus of 100ml
- Continue CPR
- Start an intravenous infusion of Intralipid 20% at 0.25ml/kg
  - Give at a rate of 400ml over 20min
- Repeat the bolus injection twice at 5 min intervals if an adequate circulation has not been restored
  - Give two further boluses of 100ml at 5 min intervals
- After another 5 min, increase the rate to 0.5ml/kg/min if an adequate circulation has not been restored
  - Give at a rate 400ml over 10 min

#### Note

- Maximum permissible cumulative dose is 12ml / kg
- Continued CPR throughout treatment with lipid emulsion
- Infusion of intralipid should be terminated after 25 mins even if CPR is ongoing
- Recovery from LA-induced cardiac arrest may take > 1 h
- Propofol is not a suitable substitute for Intralipid

Resuscitation Council July 2008, The Association of Anaesthetists (AAGBI) 2007



# Catastrophic haemorrhage

## Treatment guidelines **2**

**2**

Treatment  
guidelines

First aid (all users)

Treatment guidelines **2a**

Use of Celox

Treatment guidelines **2b**

Universal donor blood

Treatment guidelines **2c**

Recombinant factor VIIa

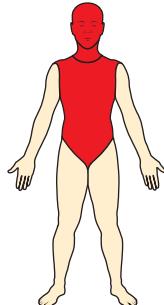
Treatment guidelines **2d**

# First aid (all users)

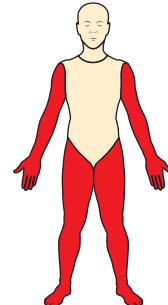
## Treatment guidelines **2a**

**2a**

Treatment guidelines



### Catastrophic haemorrhage



Head, neck, torso

Field dressing &amp; pressure

Dressing soaked

Celox gauze

Bleeding not controlled

Field dressing(s) &amp; direct pressure

Limb(s)

C.A.T.

Fails

Inappropriate

Celox gauze

Bleeding not controlled

Field dressing(s) &amp; direct pressure

Bleeding stops

Secure dressing over wound

Continue first aid drills &amp; evacuate

**T1**

Intentionally blank

# Use of Celox

Treatment guidelines **2b**

**2b**

Treatment  
guidelines

This is ideally a two-person technique

Operator 1

Operator 2

Apply pressure  
into the wound through field  
dressing

Open a fresh field dressing.  
Open Celox gauze

**Now work closely together**

Remove field  
dressing.

1

Unravel and insert  
Celox gauze packing wound  
tightly

2

Apply pressure through a  
fresh field dressing for 3  
minutes

3

Celox gauze may be used internally by trained surgeons  
as a temporary haemostatic measure

# Universal donor blood

## Treatment guidelines **2c**

### **Indication**

- Rh D Negative red cells are used as the universal donor group for patients in need of urgent blood transfusion when there is no time to cross-match.

### **Constraint**

- As only 8% of the population are O RhD Negative, blood of this type is a scarce and valuable commodity.

### **Guideline for use of O RhD negative blood**

- In an emergency setting O RhD Negative cells may be used in all blood types where a delay in access to blood would threaten life. Once the patient's blood group has been established, a switch to group specific blood is to be made but in all circumstances type specific blood should be used after a maximum of 4 units universal donor blood.

### **Guideline for use of O RhD positive blood**

To conserve limited stocks of O RhD Negative cells, O RhD Positive blood may be substituted as the universal donor type in an emergency setting. The **exceptions** are:

- Females with child-bearing potential (age <60 years if in doubt) in whom the blood group is unknown **unless** there is no alternative to save life (presumes O RhD Negative stocks are exhausted)
- Males with known anti-D antibodies documented on a NATO Medical Warning Tag (there is no opportunity to test for these antibodies in the field)
- If the phenotype of female <60 years is known to be O RhD Negative

### **Alternative red cells for minority ABO types**

- In the event of shortage of minority blood groups, alternative red cell groups should be issued according to the following table, unless advised otherwise by the National Blood Service (NBS):

Patient group	Preferred alternative group
AB RhD pos	A RhD pos
AB RhD neg	AB or A RhD pos to male/elderly female A RhD neg to young female
A RhD neg	A RhD pos to male/elderly female O RhD neg to young female
B RhD neg	B RhD pos to male/elderly female O RhD neg to young female

# Universal donor blood

## Treatment guidelines **2c** (Cont'd)

2c

Treatment  
guidelines

### Emergency donor panel

- In exceptional circumstances, and only with clearance from the theatre Commander Medical in consultation with Permanent Joint Headquarters (PJHQ), emergency donor panels may be used to provide transfusion support. It is imperative that the use of such emergency donor panel blood is clearly documented and that the donors are retrospectively tested by the NBS for the mandatory microbiological markers. An individual who has been part of an emergency donor panel is not to be selected to donate again for at least 12 weeks.

### Follow up action

- All individuals who are O RhD Negative and have received O RhD Positive blood in an emergency are to have their serum tested for anti-D antibody and other clinically significant blood group antibodies between 3–6 months post transfusion. If detected, this information is to be carried by the patient on a NATO Medical Warning Tag.

### Policy

- This guidance is compiled from SGPL 11/04 and National Blood Service (NBS) advice.

# Recombinant factor VIIa

## Treatment guidelines **2d**

### **Indications**

- Life-threatening haemorrhage where conventional resuscitation and/or surgical techniques have failed. Life-threatening haemorrhage is defined as:
  - Loss of entire blood volume within 24 hours
  - Loss of 50% of blood volume within 3 hours
  - Blood loss at a rate of 150ml/min
  - Blood loss at a rate of 1.5m/kg/min for 20 minutes or more.
- In practical terms, rFVIIa should be considered if there is evidence of continued bleeding after 6–8 units of packed red blood cells and correction of coagulopathy with fresh frozen plasma.
- **The prescription of this drug is restricted to consultants only.**

### **Contraindications**

- Do not use if the patient is expected to be unsalvageable despite rFVIIa.
- Known or suspected ischemic heart disease.
- A history of thromboembolic event in the preceding 6 months.

### **Dose**

- 100mcg/kg IV bolus (a dose of 80mcg/kg has been used by Israelis for intraalveolar haemorrhage in blast lung, **but evidence is only anecdotal.**)
- A second bolus of 100mcg/kg IV may be given after ~20 minutes.
- Further doses are unlikely to be beneficial.

### **Adverse effects**

- Thromboembolic events are a theoretical risk, but there has been no increased incidence within the available published literature when used in the trauma population.
- Disseminated intravascular coagulopathy.
- For a full description of potential adverse effects see product data sheet.

### **Follow up action**

- All uses of rFVIIa will be tracked on the Joint Theatre Trauma Registry at ADMEM, Royal Centre for Defence Medicine. Ensure all documentation for the Trauma Nurse Coordinator is completed.

### **Policy**

- This guideline is in accordance with DMSD/05/01/02 dated 14 June 2007 and DGAMS Policy Letter 12/05.



# Airway compromise

## Treatment guidelines 3

2d–3

Treatment  
guidelines

### Universal airway algorithm

Treatment guidelines **3a**

### Endotracheal intubation

Treatment guidelines **3b**

### Rapid sequence induction

Treatment guidelines **3c**

### RSI supporting drugs

Treatment guidelines **3d**

### Surgical airway

Treatment guidelines **3e**

### Basic airway

Treatment guidelines **3f**

### Oxygen therapy

Treatment guidelines **3g**

Intentionally blank

# Universal airway algorithm

## Treatment guidelines 3a

3a

Treatment guidelines

### Aim

Clear the airway and get oxygen to the cells of the vital organs; provide adequate ventilation

### Methods

Depend on individual skills and available equipment

#### Symptoms/signs of airway obstruction

- Noise (stridor, snoring)
- Secretions
- Abnormal breathing pattern
- Patient pale or blue
- Looks distressed
- Cannot speak or difficulty in speaking

#### Clear and support the airway

- Use simple actions first: suction, jaw thrust, chin lift
- Progress to simple adjuncts: NPA, OPA, LMA (as tolerated)
- Consider using a laryngoscope to improve view for suction (if available)
- Consider Magill forceps to remove solid debris (if available)

**With suspected C-spine injury jaw thrust is preferred to chin lift**

#### Support ventilation

- Give high concentration oxygen (by mask, or delivered by BVM)
- Aim for consistent ventilation between 10–20/min if RR >30 or <8/min

#### Airway satisfactory

- **Consider** lateral,  $\frac{3}{4}$  prone or head down positions (depending on other injuries)
- If spinal immobilisation applied, suction should be available and head down or immediate lateral tilt adopted in case of vomiting
- **Consider** the expected clinical course: can the casualty reasonably be expected to survive the delay to their next point of care without further airway intervention (cricothyroidotomy or endotracheal intubation)?

#### Airway NOT CLEAR

- **Consider** rapid sequence induction and intubation

Go to

3c

Treatment guidelines

or surgical airway

(facial injury; airway burns; foreign body stuck in airway; lack of appropriate training, equipment or drugs for RSI)

# Endotracheal intubation

## Treatment guidelines 3b

- These guidelines are not a substitute for training. Trained anaesthetists and emergency physicians will follow the protocols they are most familiar with.
- ‘Medical’ casualties who are deeply unconscious or unresponsive (cardiac arrest, drowning, overdose) can often be intubated without anaesthetic drugs.
- ‘Trauma’ casualties who are deeply unconscious or unresponsive and can be intubated without drugs have a very poor outcome.

**Anaesthetic and muscle relaxant drugs have effects  
on heart rate, blood pressure and respiration**

**They must be used only by trained and experienced individuals**

- Do simple airway manoeuvres first (suction, jaw thrust, chin lift, NPA, OPA).
- Give oxygen and support ventilation.
- GET HELP. Check and **prepare equipment** for endotracheal intubation:

**Suction**

Airway adjuncts (or escape ventilation)

Ventilator or BVM

Emergency cricothyroidotomy kit

Tube, tape or tie

Heat and Moisture Exchanger (HME)

Endotracheal tube

**Drugs**

Angle piece catheter mount

Monitoring, including ETCO<sub>2</sub>

Stethoscope

Elastic bougie

Laryngoscope

Syringe 10mls

- If C-spine immobilisation is *in situ* this may impede the view with the laryngoscope. Apply manual in-line immobilisation, remove the head blocks and tape, and open the cervical collar.
- Give RSI drugs in doses appropriate to the patient’s condition → Go to **(anaesthetic doses are greatly reduced in shock)**. Wait for the drugs to work.
- After placing the ETT check the position with a stethoscope and ETCO<sub>2</sub> (if available).
- **If unable to place ETT re-oxygenate the patient with BVM before further attempt. Consider use of a different laryngoscope blade (and use a bougie or introducer if not already tried). If this fails consider LMA or surgical airway.**

3d

Treatment  
guidelines

# Rapid sequence induction

Treatment guidelines **3c**

**3b-c**

Treatment  
guidelines

## “The six Ps”

### Preparation

t-minus 10 min

(unless Crash Induction)

Yankauer suction.  
Reservoir-Bag-Valve-Mask.  
Ventral/intraosseous access.  
Allocate team tasks.  
Position patient & apply monitoring.  
Pharmacy – draw up and label all drugs.  
Check and test endotracheal tubes.  
Check and test laryngoscope blades.  
Evaluate for difficult airway.

### Pre-oxygenation

t-minus 5 min

100% O<sub>2</sub> with non-rebreather mask.  
If SpO<sub>2</sub> <90% provide PPV via Reservoir-Bag-Valve-Mask with PEEP valve attached.

**In this case apply cricoid pressure.**

### Pre-medication

t-minus 2 min

Suspected raised intracranial pressure, intraocular hypertension, myocardial ischaemia or hypertensive emergency: give fentanyl.

Go to

**3d**

Treatment  
guidelines

### Paralysis

t = zero

Induction.  
Cricoid pressure.  
Neuromuscular blockade.

### Passage of the endotracheal tube

t-plus 30–45 sec

#### Intubate

Observe passage of ETT between cords.  
Consider BURP manoeuvre for poor visualisation of cords.  
If SpO<sub>2</sub> <90% STOP! Provide PPV and O<sub>2</sub> until SpO<sub>2</sub> >90%.

### Post intubation care

t-plus 45 sec

Confirm placement + inflate cuff.  
Detect ETCO<sub>2</sub>.  
Cease cricoid pressure + secure tube.  
ABG and CXR.  
Reassess oxygen requirements.  
Continue sedation +/- paralysing.  
Oro/nasogastric tube and urinary catheter.

# RSI supporting drugs

## Treatment guidelines **3d**

### Pre-induction agents

- **Fentanyl** – rapid acting/short lasting opioid. Blunts hypertensive response to laryngoscopy and intubation.
  - Indications: haemodynamically stable patients with raised intracranial pressure, hypertensive emergencies, raised intraocular pressure, myocardial ischaemia.
  - Dose: 1–2 micrograms/kg IV over 60 to 120 seconds.

### Induction agents

- **Etomidate** – favourable haemodynamic profile. Relatively good in hypovolaemic shock.
  - Dose: STABLE, 0.3mg/kg IV push (UNSTABLE, 0.15mg/kg IV).
- **Ketamine** – dissociative anaesthetic with excellent analgesic and amnesic properties. Potent bronchodilator. Favourable haemodynamic profile with some preservation of laryngeal and respiratory reflexes.
  - Indications: acute severe asthma or COPD with bronchospasm requiring intubation and ventilation. Haemodynamically unstable patient.
  - Dose: 0.5–2mg/kg IV push.

### Neuromuscular blocking agents

- **Suxamethonium**
  - Dose: 1.5mg/kg IV push.
  - Contraindications: history of malignant hyperthermia (personal or family); uncontrolled hyperkalaemia; spinal injury >3 days old or denervation illness; crush injury >3 days old or rhabdomyolysis; sepsis >7 days duration; severe burns >24 hours old.
- **Rocuronium** – non-depolarising neuromuscular blocking agent. Use in all cases when suxamethonium is contraindicated. Produces adequate paralysis in 45–60 seconds. May be reversed.
  - Dose: 1mg/kg IV push.

# Surgical airway

## Treatment guidelines 3e

3d-e

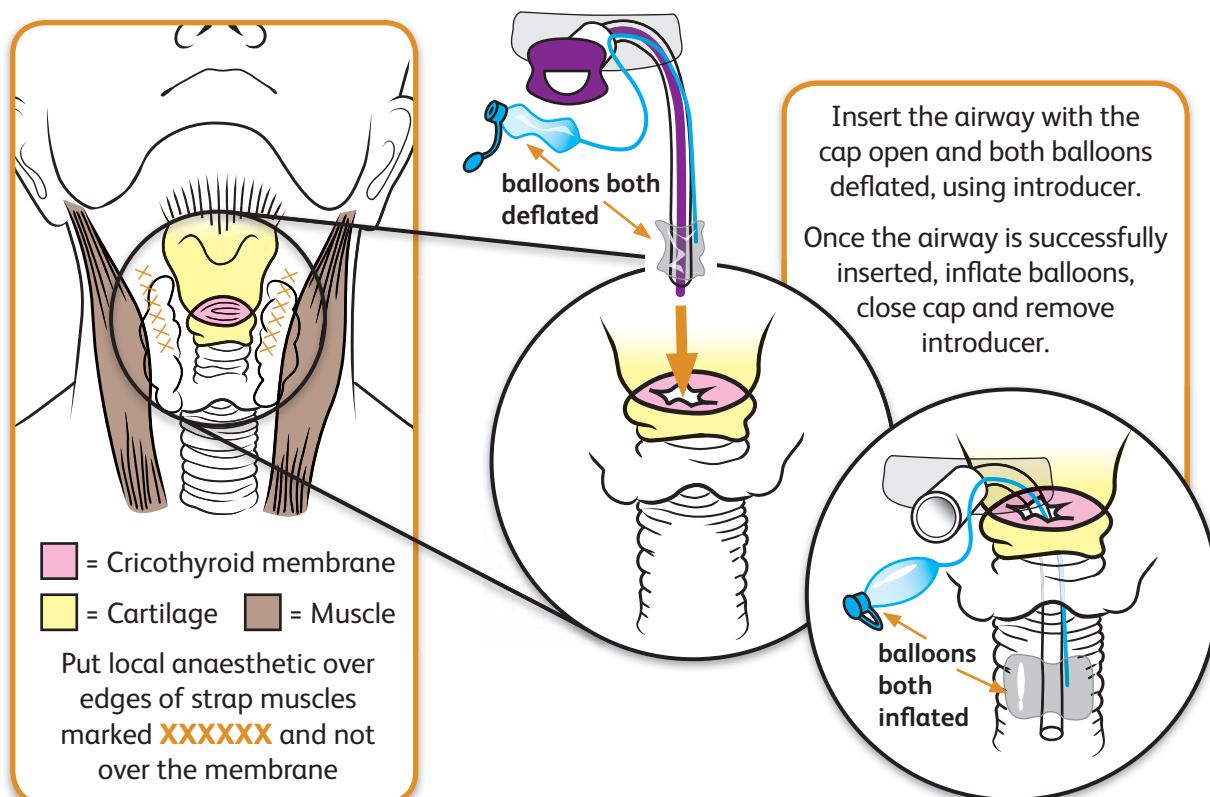
Treatment guidelines

### A surgical airway is indicated when:

- A casualty needing a definitive airway for resuscitation or evacuation is too awake to tolerate endotracheal intubation without an anaesthetic and specialist anaesthetic support is unavailable.
- A casualty with face and neck burns requires airway protection to pre-empt delayed obstruction, but expert anaesthetic help to facilitate intubation is unavailable.
- Trauma to the face and neck make endotracheal intubation impossible.

### Surgical cricothyroidotomy: procedure

- Place the casualty supine with the neck in the neutral position.
- If not contraindicated, extend the neck and place a pillow/rolled blanket (or suitable alternative) under the shoulders: this will bring the landmarks into more prominence.
- Palpate the thyroid notch and cartilage, cricothyroid membrane and cricoid cartilage.
- Clean the skin and infiltrate with local anaesthetic (unless the casualty is deeply unconscious).
- Stabilise the thyroid cartilage with the left hand.
- Make a horizontal skin incision over the cricothyroid membrane.
- Carefully incise through the membrane horizontally; open the incision using artery forceps.
- Insert a 6mm cuffed tracheostomy tube through the cricothyroid membrane incision, directing the tube distally into the trachea.
- Inflate the cuff. Secure the tube by stitch or tape, or both.



# Basic airway

## Treatment guidelines 3f

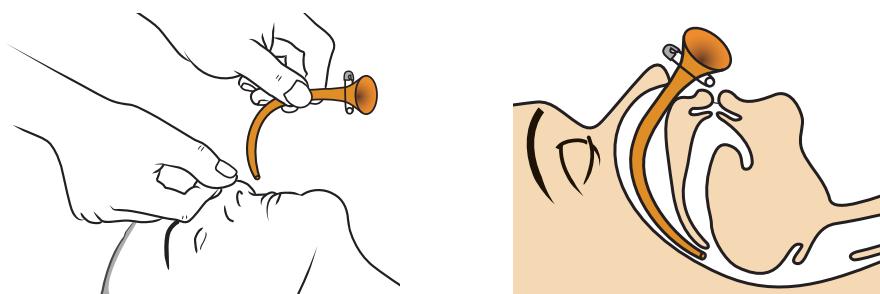
### Oropharyngeal airway (OPA)

- The correct sized airway will extend from the centre of the casualty's mouth to the angle of the jaw. **OPA Technique:** Open the casualty's mouth: insert the tip of the airway along the roof of the mouth to the soft palate. Rotate the airway 180°, directing the concavity of the airway towards the feet and slip the airway over the tongue.



### Nasopharyngeal airway (NPA)

- The correct size airway should reach from the patients nostril to the earlobe or the angle of the jaw. Usually equates to size **6** for female and size **7** for male.
- Use when there is oral injury, a fractured mandible or masseter spasm.
- It is better tolerated than the OPA by the more responsive casualty and is less likely to be dislodged during evacuation. NPA can be used in both sides simultaneously.
- A suspected fractured base of skull is not an absolute contraindication for use of this airway if an oropharyngeal airway cannot be inserted or the airway maintained by other means.



### NPA Technique

Assess the nasal passages for any apparent obstruction (fractures, haemorrhage, polyps).

- Choose a nostril that is patent.
- Select size 6 for an adult female and size 7 for an adult male.
- Insert the safety pin across the nostril end of the airway (new devices have an extended flange) it should be placed laterally to allow a soft suction catheter to pass.
- Lubricate the NPA with a water-soluble lubricant or water.
- Insert the tip of the airway into the nostril and direct it posteriorly and towards the ear lobe.
- Gently slide the nasopharyngeal airway through the nostril into the hypopharynx with a slight rotating motion until the flange rests against the nostril.
- If an obstruction is encountered try the other nostril or try a smaller nasopharyngeal airway.

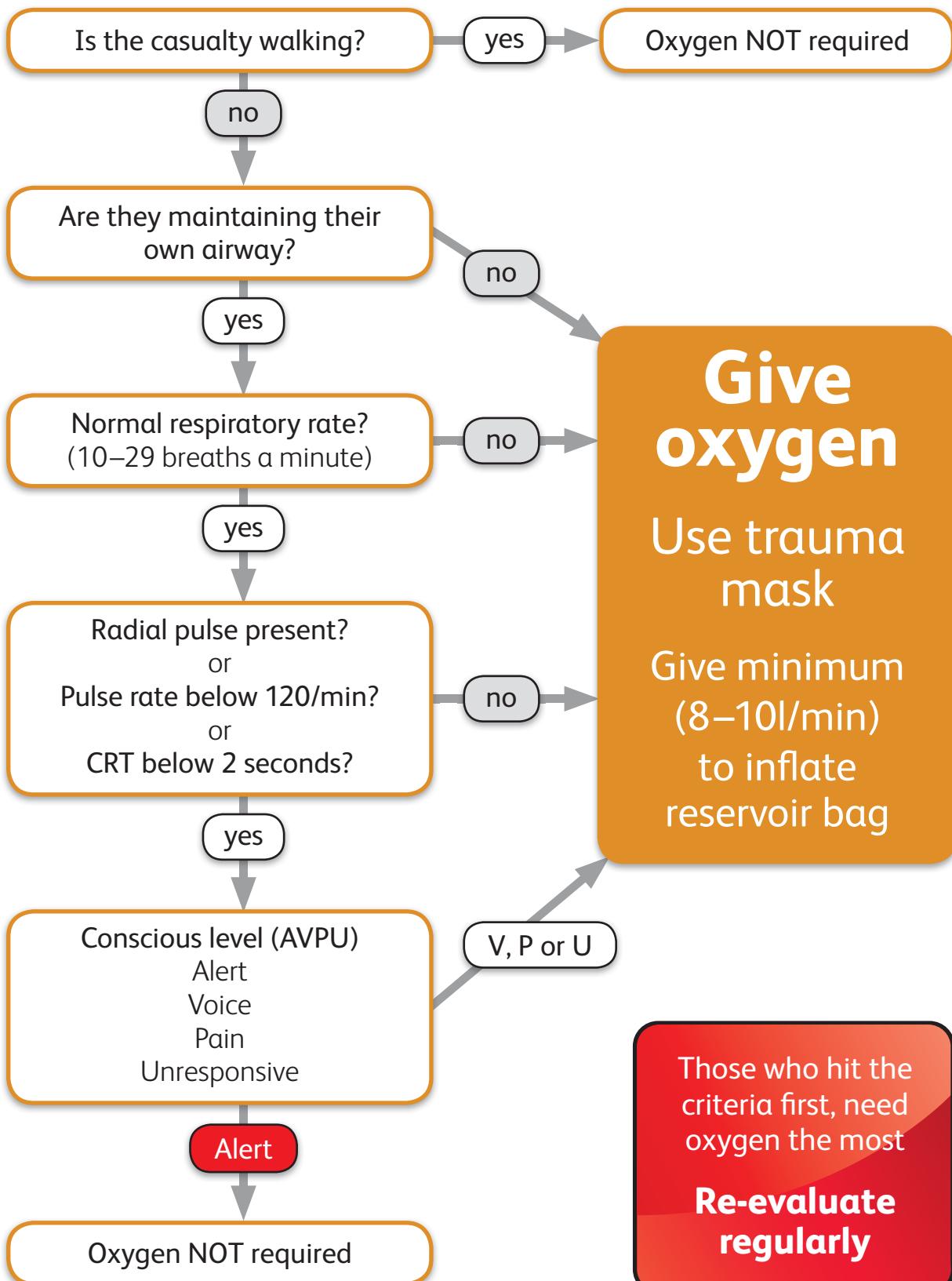
**Trying to force the nasopharyngeal airway past an obstruction may cause severe bleeding.**

# Oxygen therapy

## Treatment guidelines **3g**

3f–g

Treatment guidelines



Intentionally blank



# Cervical spine trauma

## Treatment guidelines **4**

4

Treatment guidelines

### Immobilisation

Treatment guidelines **4a**

### Log roll

Treatment guidelines **4b**

### Spinal clearance

Treatment guidelines **4c**

### Airway issues in C-spine injury

Treatment guidelines **4d**

# Immobilisation

## Treatment guidelines **4a**

### Rules of spinal immobilisation

- **NEXUS Guidelines:** identify those patients who do not require C-spine immobilisation following blunt trauma.

Go to

**4c**

Treatment  
guidelines

- **Care Under Fire/Tactical Field Care:** Evacuation to a more secure area takes precedence over spinal immobilisation.
- **Role 1:** Maintain in-line immobilisation and use semi-rigid collar and head blocks to immobilise the neck.
- **Role 2 Light Manoeuvre:** Continue in-line immobilisation and spinal precautions.
- **Role 2 Enhanced/Role 3:** Continue in-line immobilisation and spinal precautions until radiological and clinical clearance.

### Exceptions

- There is no role for cervical collar immobilisation following penetrating injury. Data does not support the use of collar immobilisation in penetrating trauma and at worst a collar may mask wounds and haematomata.
- The combative patient may not tolerate immobilization in head blocks. To enforce this may mean the head is pinned down while the rest of the body moves: this is not desirable with a potential C-spine injury. Immobilise with semi-rigid collar and repeated reassurance.
- Where there is concern for raised intracranial pressure (ICP) after a closed head injury, head blocks alone will suffice to immobilise the unresponsive patient. ICP may be further raised by pressure on the neck veins from semi-rigid collar. Ideally these patients are also managed 30 degrees head up, which also assists ICP (this may not be possible until in a hospital environment). Consider the orientation of head injured casualties when transporting in a helicopter, which will fly in a nose-down attitude: if the patient's head is towards the aircraft nose this may aggravate a raised ICP.

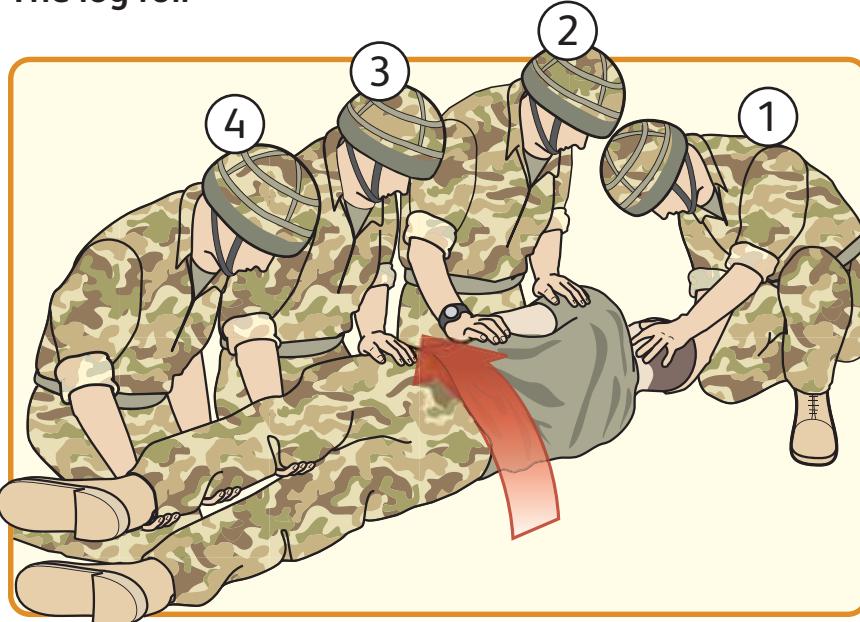
# Log roll

## Treatment guidelines 4b

4a–b

Treatment guidelines

### The log roll



**“Three over, three under” hand position for the log roll:**

- **Position (1)** leads the team and controls the head and C-spine
- **Position (2)** controls the shoulder, arm and chest
- **Position (3)** controls the pelvis and thigh
- **Position (4)** controls the distal lower limb

- The log roll is ideally a 4-person technique.
- Head blocks and cervical collar are removed before the roll when the spine is to be examined (e.g. by a surgeon).
- Position (1) takes control of the head and neck and gives the orders. In-line immobilisation is maintained.
- Choose to roll away from the affected side where appropriate. Ensure there is adequate slack in all lines (IV lines; ventilator tubing; monitoring leads).
- If the spinal board is to be removed, ensure all straps are taken off the board prior to roll (otherwise they would be dragged under the patient).
- Position (1) uses the command “Ready – Brace – Roll” to ensure synchronous movement when rolling onto the side.
- A 5th person must remove/place the spine board and perform a spinal examination (including rectal examination at the hospital). Clothing is also removed.
- Position (1) uses the command “Ready – Brace – Roll” to roll the patient onto their back. Where the spine has not been radiologically and clinically cleared, the cervical spine immobilisation is re-applied.

# Spinal clearance

## Treatment guidelines **4c**

### Clearance of the C-spine

- *NEXUS Guidelines* from US (National Emergency X-Radiograph Utilization Study, with guidelines validated on >30000 patients) are an established framework for clinical clearance of the cervical spine following blunt trauma (99% sensitivity for detecting a fracture). The C-spine can be cleared if:
  - The patient is GCS 15 (normal level of alertness) and
  - There is no posterior mid-line tenderness and
  - There is no distracting injury (other painful injury) and
  - There is no focal neurological deficit and
  - There is no intoxication (alcohol or drugs, including iatrogenic).
- Cervical spine X-rays should be performed on all other patients. Three-view plain X-ray imaging (lateral, AP, peg) is recommended for conscious patients (sensitivity of ~94% for showing fracture in symptomatic patients). A Swimmer's view is performed if C7–T1 junction is not seen on the lateral view. If these images are normal then the casualty can be clinically examined and cervical spine precautions removed if she/he is non-tender and demonstrates a full range of active neck movements. If there is mid-line tenderness then flexion and extension films are used to assess for ligamentous injury.
- Where CT is available it is appropriate to image the lower cervical spine if not seen on plain X-ray. Where CT of the brain is undertaken following blunt trauma it is recommended to extend the imaging to include C1–3.
- CT with reconstructed images of the cervical spine is increasingly used in trauma centres as a primary imaging tool for the head injured patient sent to CT for brain imaging (i.e. US practice is to defer plain C-spine radiographs in favour of CT imaging for head injured patients).

### SCIWORA

- Spinal Cord Injury Without Radiological Abnormality (SCIWORA) is a rare phenomenon (0.08% cervical spine injuries) that occurs in both adults and children. The most common injuries (MRI confirmation) are central disc herniation, spinal stenosis, and cord oedema or contusion.

### Clearance of the thoracolumbar spine

- The thoracolumbar spine is cleared clinically during the log roll and radiologically where symptoms and signs demand imaging.

Go to

**4b**

Treatment  
guidelines

Principal source: Hoffman JR et Al: *Ann Emergency Med.* 32: 461-9 (1998)

# Airway issues in C-spine injury

## Treatment guidelines **4d**

**4c-d**

Treatment  
guidelines

### Indications for ventilation

- Casualties with cervical cord injury above the level of C4 have diaphragmatic and intercostal muscle paralysis and rely on accessory muscles for ventilation. They will require early intubation to maintain adequate ventilation. Casualties with cord injury between C4 and C8 retain the diaphragm function; however, loss of the intercostal muscle function reduces the FVC and tidal volume by up to 60% and ventilatory support may be required if the casualty tires.
- Role 2 Light Manoeuvre:** If skills are available endotracheal intubation with in-line neck stabilisation should be performed. If advanced airway skills are not available and the casualty requires an urgent airway a surgical airway (cricothyroidotomy) should be performed.

Go to

**3e**

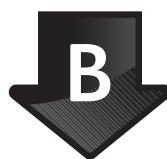
Treatment  
guidelines

- Role 2 Enhanced/Role 3:** Airway management by endotracheal intubation.

### Procedure for intubation with concomitant neck injury

- In the presence of a cervical collar, laryngoscopy becomes more difficult. It is essential to maximise the opportunity to secure the airway on the first attempt at intubation.**
- An assistant provides manual in line immobilisation of the cervical spine.
- The equipment stabilizing the C-spine is removed (in the case of a collar this may mean unfastened and opened rather than completely removed.)
- The patient is pre-oxygenated.
- A separate assistant applies cricoid pressure.
- The patient receives anaesthetic drugs and rapid acting neuromuscular blocking drugs.
- The patient's trachea is intubated, the endotracheal tube position is checked and the tube secured.
- The stabilizing devices are reapplied.
- This procedure must include pre-assembling all necessary equipment and a rehearsed plan for dealing with a grade 2–3 laryngoscopy and failed intubation. A gum elastic bougie and a smaller diameter than estimated (uncut) endotracheal tube should be available.**

Intentionally blank



# Difficult or abnormal breathing

5

Treatment guidelines

## Treatment guidelines 5

### Trauma

Tension pneumothorax – awake

Treatment guidelines **5a(i)**

Tension pneumothorax – ventilated

Treatment guidelines **5a(ii)**

Open pneumothorax

Treatment guidelines **5b**

Massive haemothorax

Treatment guidelines **5c**

Flail chest

Treatment guidelines **5d**

### Medical

Anaphylaxis

Treatment guidelines **5e**

Asthma

Treatment guidelines **5f**

Pulmonary oedema

Treatment guidelines **5g**

Pulmonary embolus & DVT

Treatment guidelines **5h**

Chemicals & poisons [Go to](#)

10e

Treatment guidelines

### Trauma or medical

Spontaneous pneumothorax

Treatment guidelines **5i**

Intentionally blank

# Tension pneumothorax – awake

## Treatment guidelines **5a(i)**

**5a(i)**

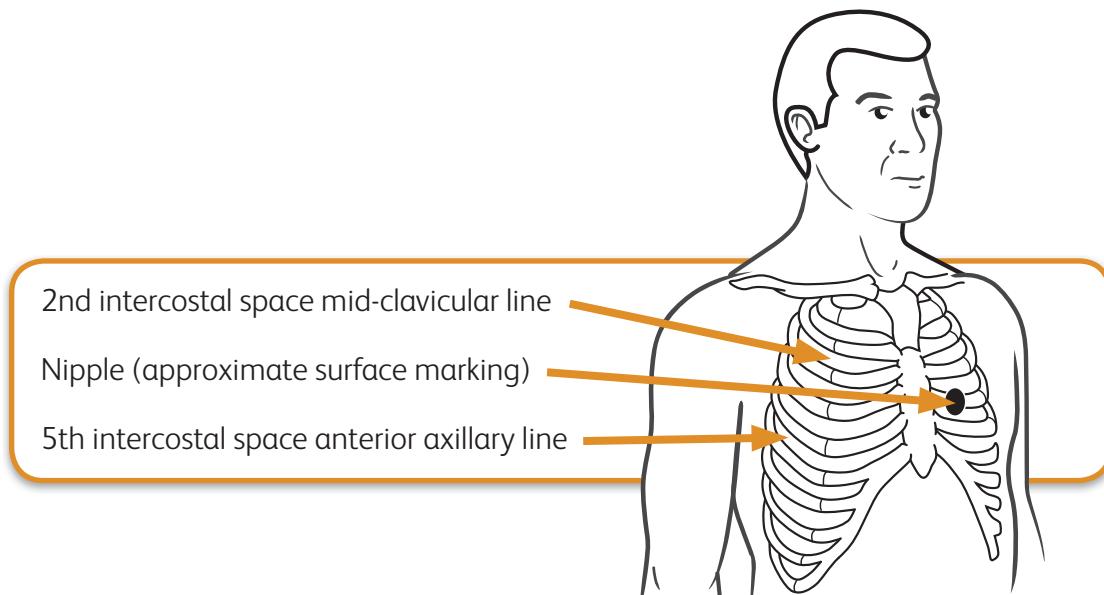
Treatment  
guidelines

### Features (may be delayed)

- Chest pain       Hyperinflated hemithorax       Splayed ribs
- Extreme respiratory distress (consistent; refractory to reassurance)
- Low SpO<sub>2</sub>       Reduced/absent breath sounds       Hyperresonance
- Reduced/absent movement on affected side
- Late signs: hypotension; trachea deviated away from affected side; distended neck/ chest/upper arm veins (inconsistent sign if hypovolaemia)

### Needle decompression (affected side)

Locate second intercostal space mid-clavicular line on affected side (2nd rib joins the sternum at the sternal angle; 2nd intercostal space is **below** this rib).



- Insert a large bore cannula perpendicularly into the chest, just above the 3rd rib
- Remove the metal needle and leave the cannula uncapped: air should be heard escaping
- Document the procedure (this is important if the cannula is removed/falls out before the casualty reaches hospital)

If the technique fails and the diagnosis is certain, the cannula may be too short. Think laterally and go laterally. Place the cannula in the 5th intercostal space, anterior axillary line or proceed immediately to a chest drain.

### Definitive care

- A chest drain is required

# Tension pneumothorax – ventilated

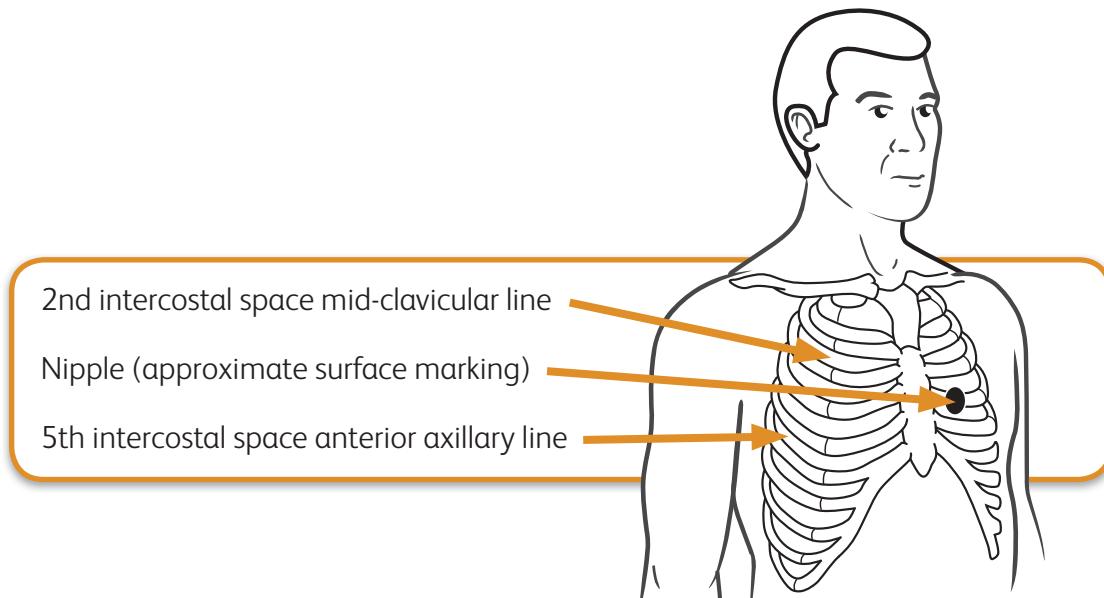
## Treatment guidelines **5a(ii)**

### Features (immediate)

- Low SpO<sub>2</sub>
- Hypotension
- Surgical emphysema
- High inflation pressures
- Affected side showing over-expansion (ribs splayed), reduced mobility, reduced/absent breath sounds, increased resonance
- Late signs: trachea deviated away from affected side
- Distended neck/chest/upper arm veins (inconsistent sign if hypovolaemia)
- Potential for bilateral tension pneumothorax

### Needle decompression (affected side)

Locate second intercostal space mid-clavicular line on affected side (2nd rib joins the sternum at the sternal angle; 2nd intercostal space is **below** this rib).



- Insert a large bore cannula perpendicularly into the chest, just above the 3rd rib.
- Remove the metal needle and leave the cannula uncapped: air should be heard escaping.
- Document the procedure (this is important if the cannula is removed/falls out before the casualty reaches hospital.)

If the technique fails and the diagnosis is certain, the cannula may be too short. Think laterally and go laterally. Place the cannula in the 5th intercostal space, anterior axillary line or proceed immediately to a chest drain

### Definitive care

- A chest drain is required.
- Thoracostomy (a surgical hole without placement of a drain) is a temporary option **for the ventilated casualty**.

# Open pneumothorax

## Treatment guidelines **5b**

**5a(ii)–b**

Treatment  
guidelines

### Features

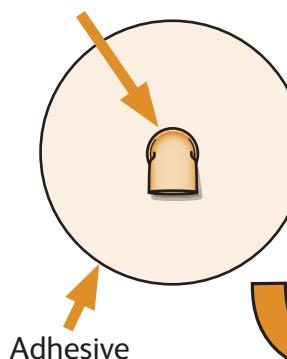
- Low SpO<sub>2</sub>
- Shock
- Respiratory distress
- Affected side showing reduced movement, absent breath sounds, reduced mobility (under-expansion), increased resonance
- “Sucking” and bubbling from the wound

### First aid

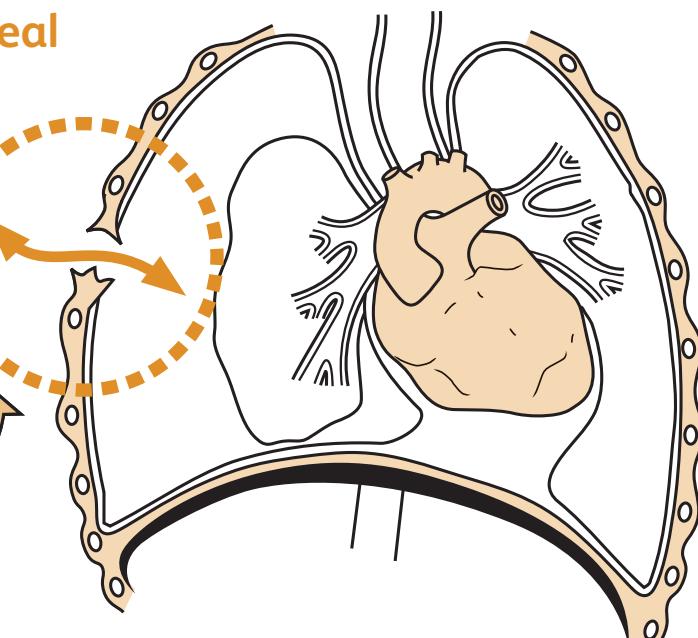
- Apply Asherman Chest Seal (“ACS then reassess”).
- Evacuate as **T1**

### Asherman Chest Seal

Flutter valve



Adhesive patch



### BATLS resuscitation

- Insert a chest drain.
- Evacuate to definitive care as **T1**
- Give analgesia and antibiotic therapy according to Gunshot Wound (GSW) pathway

Go to

Section 5



1

Pathways

- Ventilate if respiratory compromise despite chest drain → Go to **1**  
(Rapid Sequence Induction of anaesthesia by trained staff only.)
- For haemorrhagic shock → Go to **6a**

**3c-d**

Treatment  
guidelines

### Surgical care

- This typically involves extending the defect to form a small thoracotomy, excision of the wound edges and partial closure.

# Massive haemothorax

## Treatment guidelines **5c**

### Features

- Shock (tachycardia and hypotension)
- Affected side showing: reduced breath sounds, dullness to percussion, under-expansion and reduced mobility
- Respiratory distress (mild – severe)

The stethoscope is a blunt tool, but should yield useful information in massive haemothorax. CXR will reliably detect massive haemothorax: however, it takes ~500ml fluid to produce detectable changes on erect CXR and when supine up to 1000ml may be present in a hemithorax without marked radiological signs. CT is the most sensitive diagnostic tool where available at Role 2 Enhanced/Role 3.

### First aid

- No specific treatment
- Evacuate as **T1**

### BATLS resuscitation

- Consider inserting a chest drain. Balance the benefit of improving ventilation with precipitating further blood loss that cannot be replaced when forward of a Role 2/3 with surgical capability. A chest drain at Role 1 may convert such a patient from being “critically stable” to being precipitously unstable.
- Consider a thoracostomy instead of a chest drain when the patient is ventilated and rapid packaging for transport is essential (e.g. primary retrieval from point of wounding): remember that blood drained from an open thoracostomy cannot be measured.
- Research (animal studies of haemothorax) has shown **no benefit** from clamping a chest drain.
- Evacuate to definitive care as **T1**
- Give analgesia and antibiotic therapy according to Gunshot Wound (GSW) pathway. Antibiotics do not appear to reduce the risk of secondary empyema.



- Ventilate if respiratory compromise despite chest drain (Rapid Sequence Induction of anaesthesia by trained staff only). → **Go to**



- For haemorrhagic shock → **Go to**



### Complications

- Empyema (risk after chest drain for all indications is 1–25%)
- Fibrothorax (rare)

# Flail chest

## Treatment guidelines 5d

5c-d

Treatment guidelines

### Features

- Severe chest pain
- Extreme respiratory distress
- External signs of blunt chest injury (bruising/swelling/seatbelt marks)
- Crepitus: fractured ribs/surgical emphysema
- Paradoxical movement of the flail segment (see diagram, may be subtle), or hypomobility
- Low SpO<sub>2</sub>
- Signs from associated haemothorax may be present

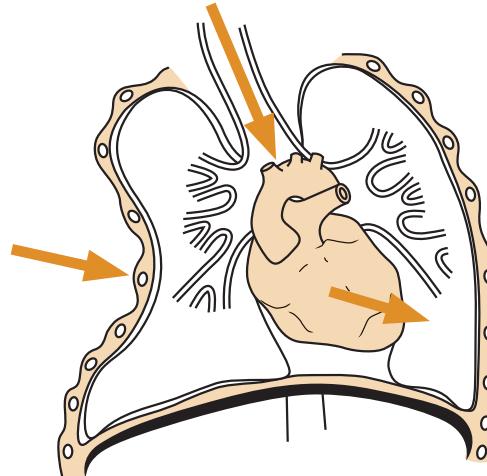
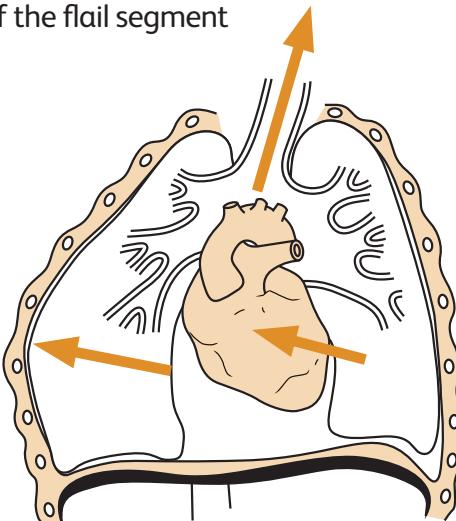
### First aid

- Evacuate **T1** with affected side down (will offer some splinting of segment).

### BATLS resuscitation

- **Critical decision:** exclude or treat associated tension (key indicator is over-inflation of hemithorax). Remember that needle decompression in absence of tension might make the patient's condition worse.
- A chest drain (technically may be difficult) will be needed for failed decompression, large simple pneumothorax or prolonged transport to R2E. There is a low threshold for post-ventilation chest drain because of the risk of tension pneumothorax.
- Continuing treatment is principally directed towards the underlying contusion. Where there is respiratory compromise (hypoxia and/or hypercapnia) on blood gases proceed to ventilation (Rapid Sequence Induction of anaesthesia by trained staff only). → **Go to 3c-d**

Paradoxical movement of the flail segment



- Ventilation may be avoided by effective analgesia (including intercostal nerve blocks or thoracic epidural): realistically, this is a technique that will be undertaken at a Role 2 Enhanced or a Role 3 facility, unless the Medical Officer is extremely isolated.

### Definitive care

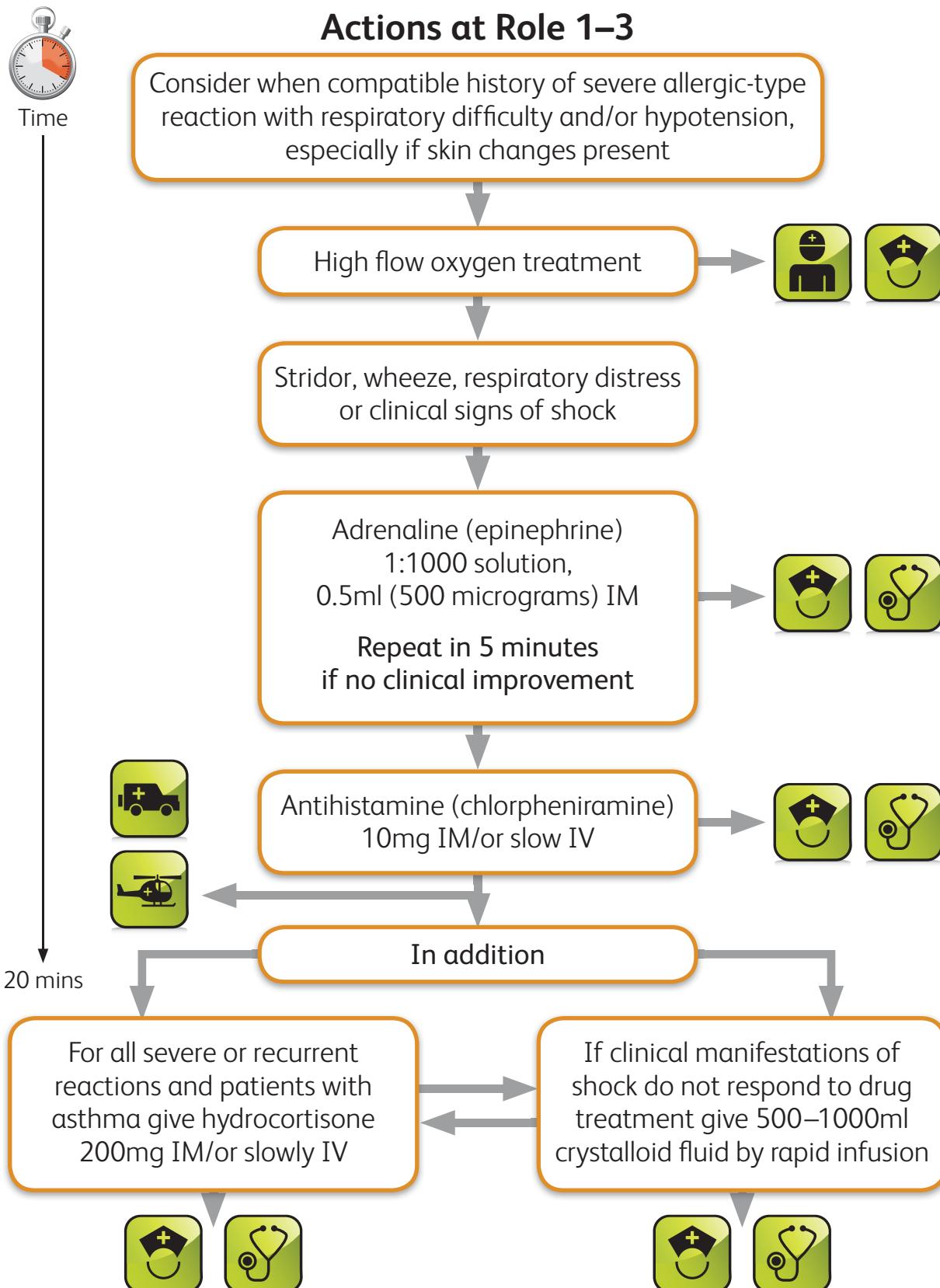
- Evacuation will be required to Role 4. Dependent on the degree of underlying contusion and respiratory failure this may require ventilation and a critical care transfer. CPAP is a widely used option.

3c-d

Treatment guidelines

# Anaphylaxis (adult)

## Treatment guidelines 5e



Adapted from: Advanced Life Support Algorithm (January 2008)

# Anaphylaxis (child)

## Treatment guidelines **5e** (Cont'd)

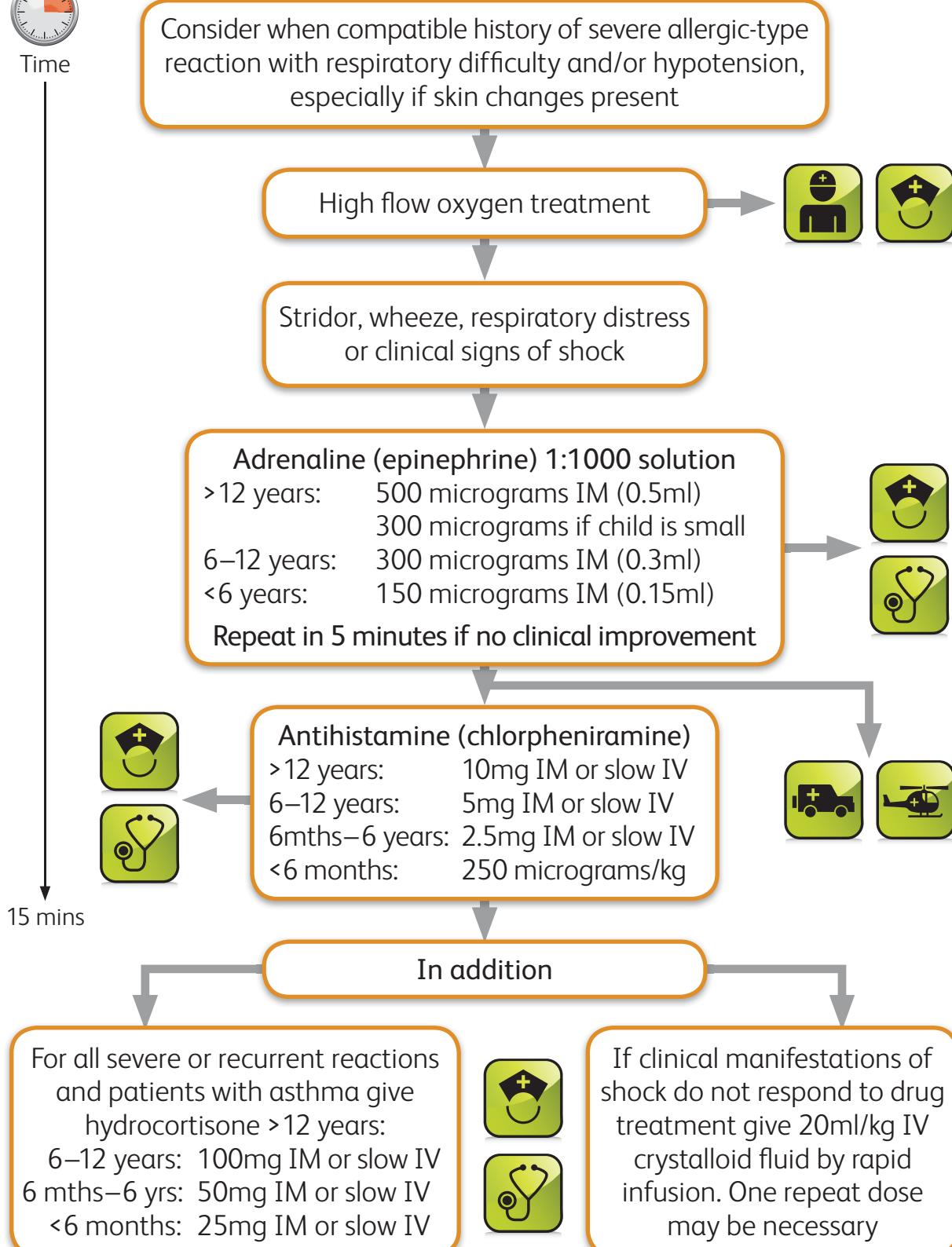
5e

Treatment guidelines



Time

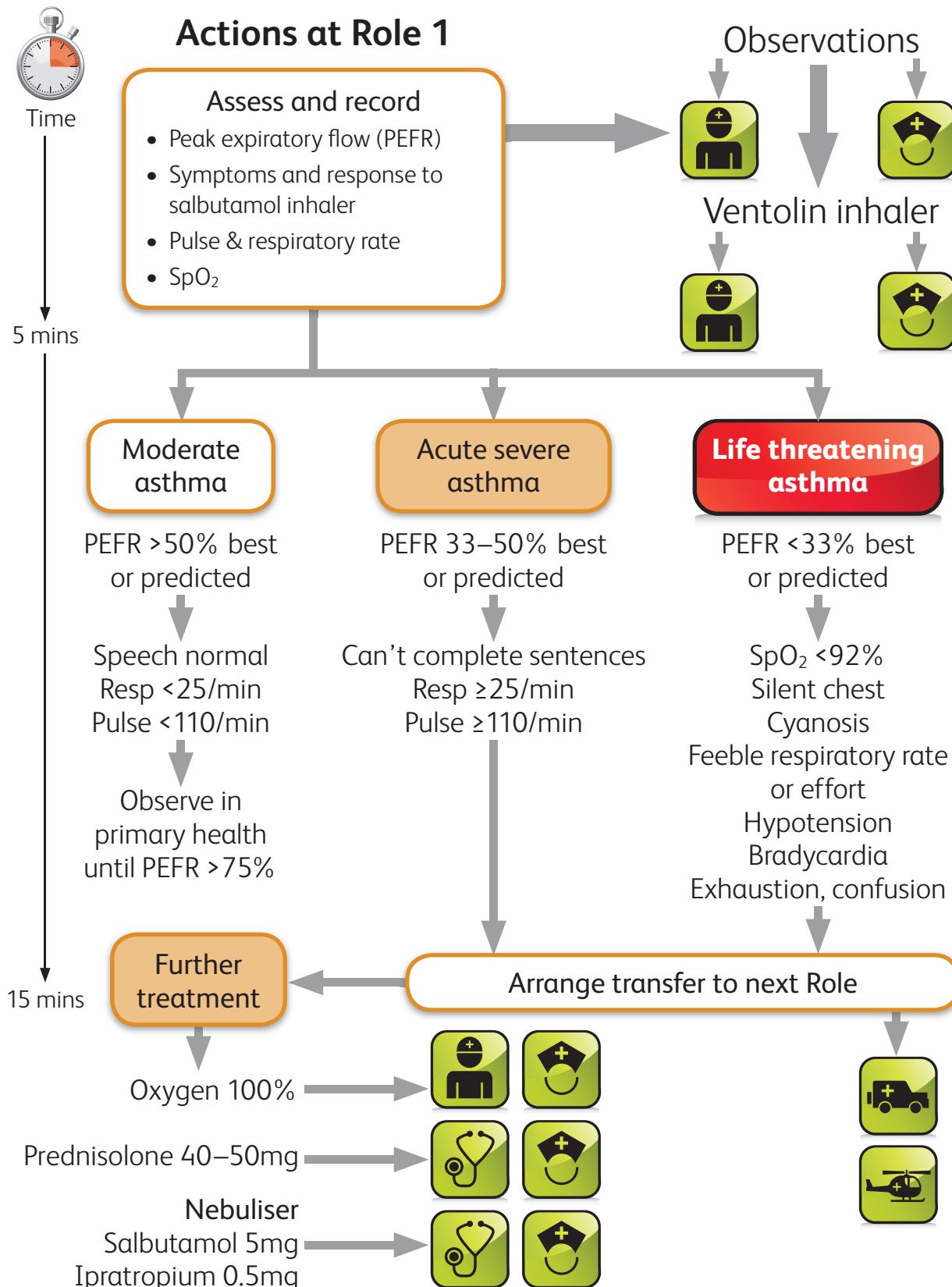
### Actions at Role 1-3



Adapted from: Advanced Life Support Algorithm (January 2008)

# Asthma (adult)

## Treatment guidelines 5f



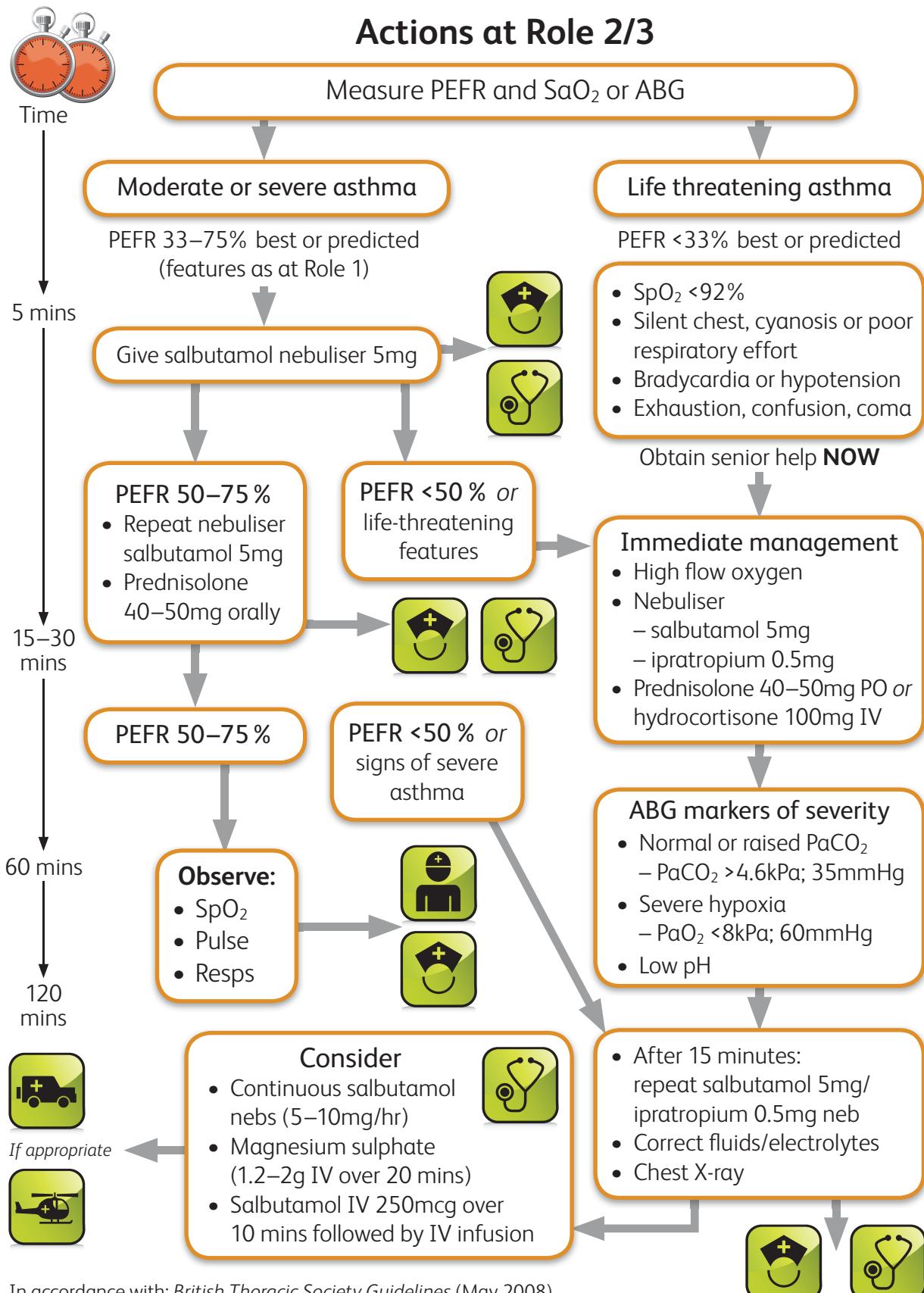
In accordance with: *British Thoracic Society Guidelines* (May 2008)

# Asthma (adult)

## Treatment guidelines 5f (Cont'd)

5f

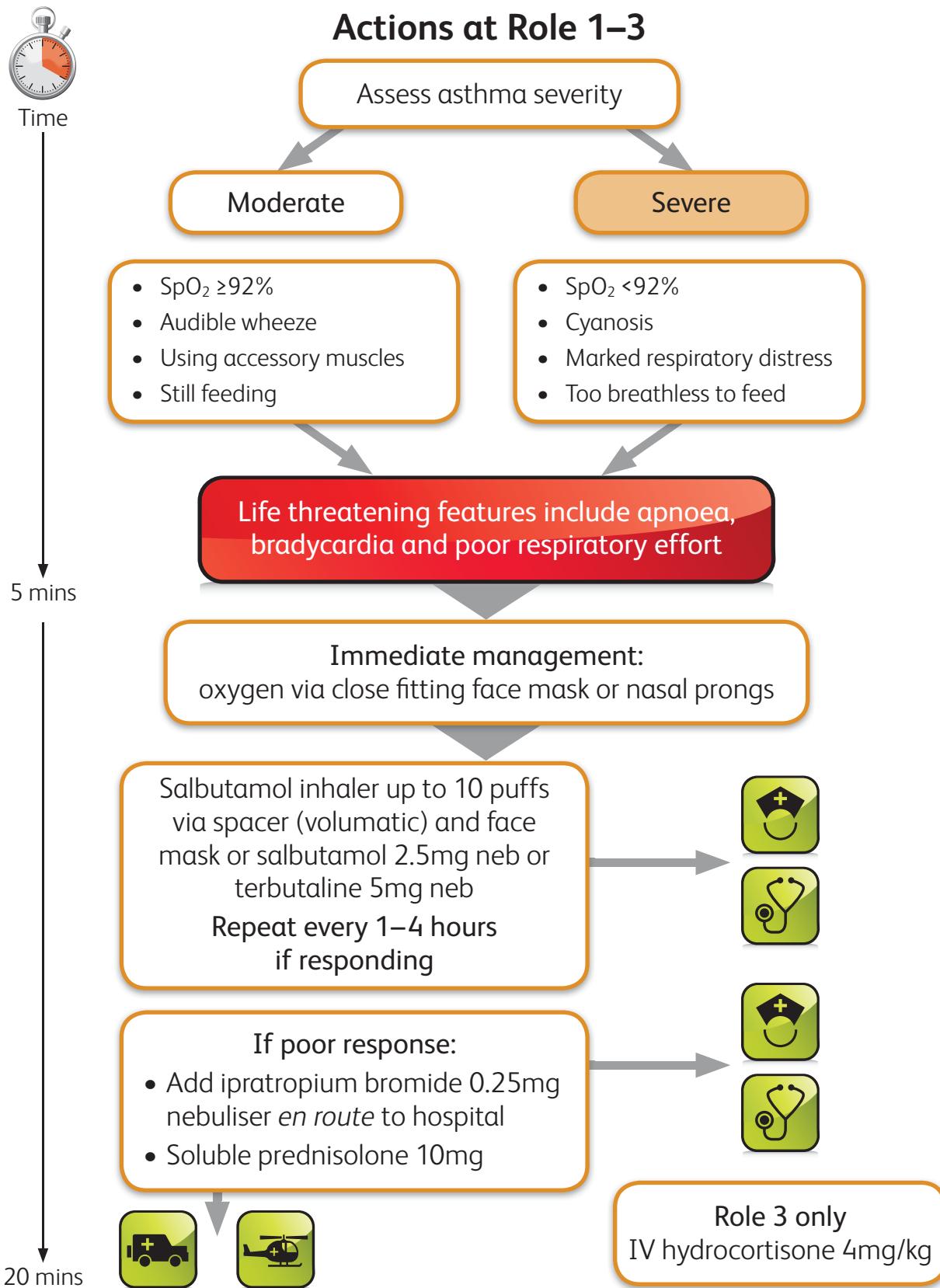
Treatment guidelines



In accordance with: British Thoracic Society Guidelines (May 2008)

# Asthma (child under 2 years)

## Treatment guidelines 5f (Cont'd)



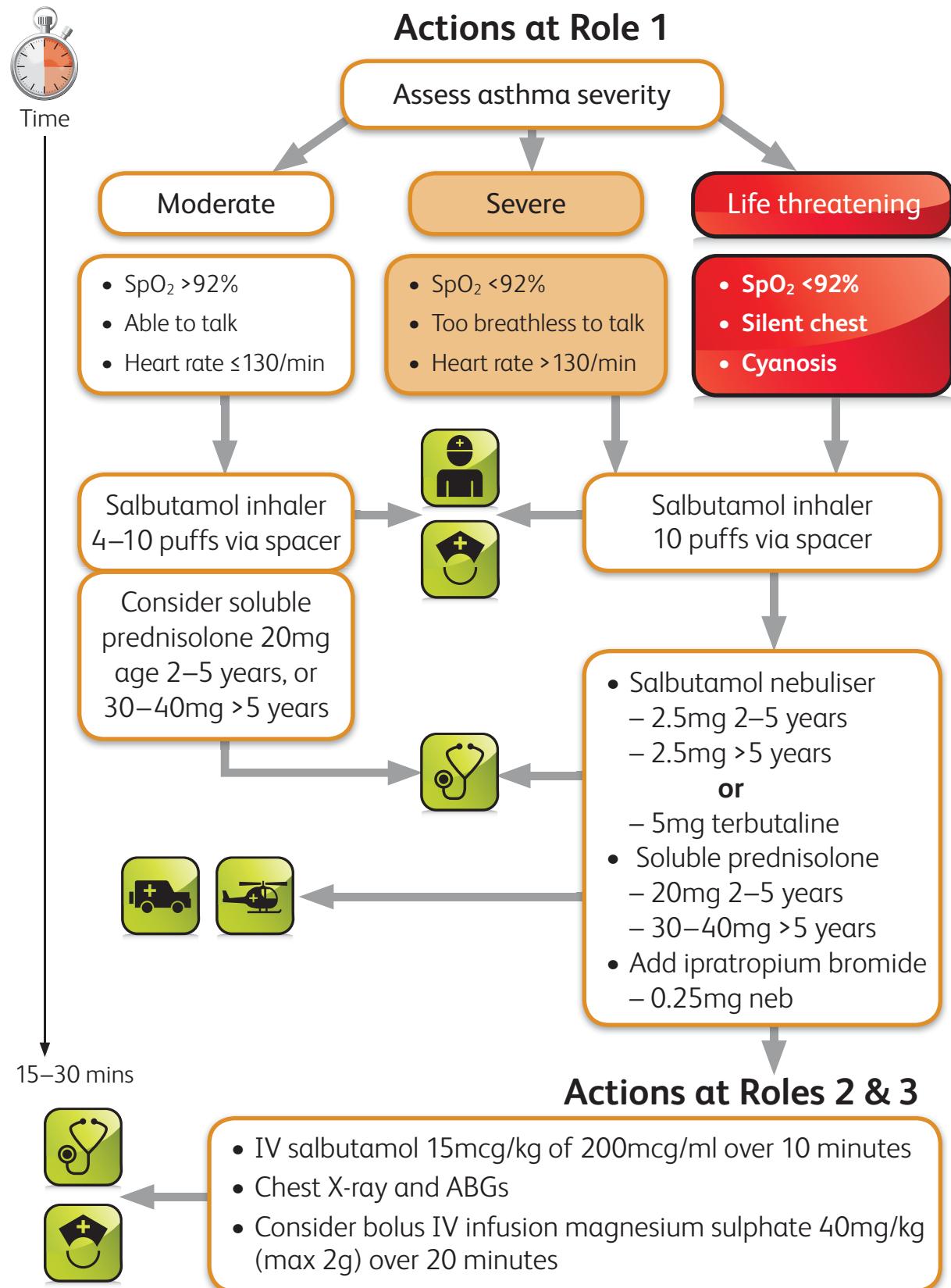
In accordance with: *British Thoracic Society Guidelines* (May 2008)

# Asthma (child over 2 years)

Treatment guidelines **5f** (Cont'd)

**5f**

Treatment guidelines



In accordance with: *British Thoracic Society Guidelines* (May 2008)

# Pulmonary oedema

## Treatment guidelines **5g**

### Role 1

- Signs of shock (clammy, anxious)
- Dyspnoea/difficulty talking
- Tachycardic/tachypnoeic
- Pink frothy sputum
- Crackles or wheeze
- Signs of exhaustion/reduced level of consciousness



#### Immediate treatment

- If conscious sit up
- 100% oxygen
- If wheezing give salbutamol nebuliser 2.5–5mg
- Monitor resp, pulse, BP



**PLUS**  
Furosemide  
50mg IV



### Role 2 & 3

#### Investigations

- FBC, U&Es, glucose
- ABG
- Chest X-ray
- 12-lead ECG

#### Treatment

- Nitrates (buccal suscard 2–5mg or nitrate infusion if systolic BP >90mmHg)
- Morphine 2.5–5mg IV
- Furosemide 50mg IV
- Metoclopramide 10mg IV or cyclizine 50mg IV
- Systolic BP <100mmHg = treat for shock

# Pulmonary embolus & DVT

## Treatment guidelines **5h**

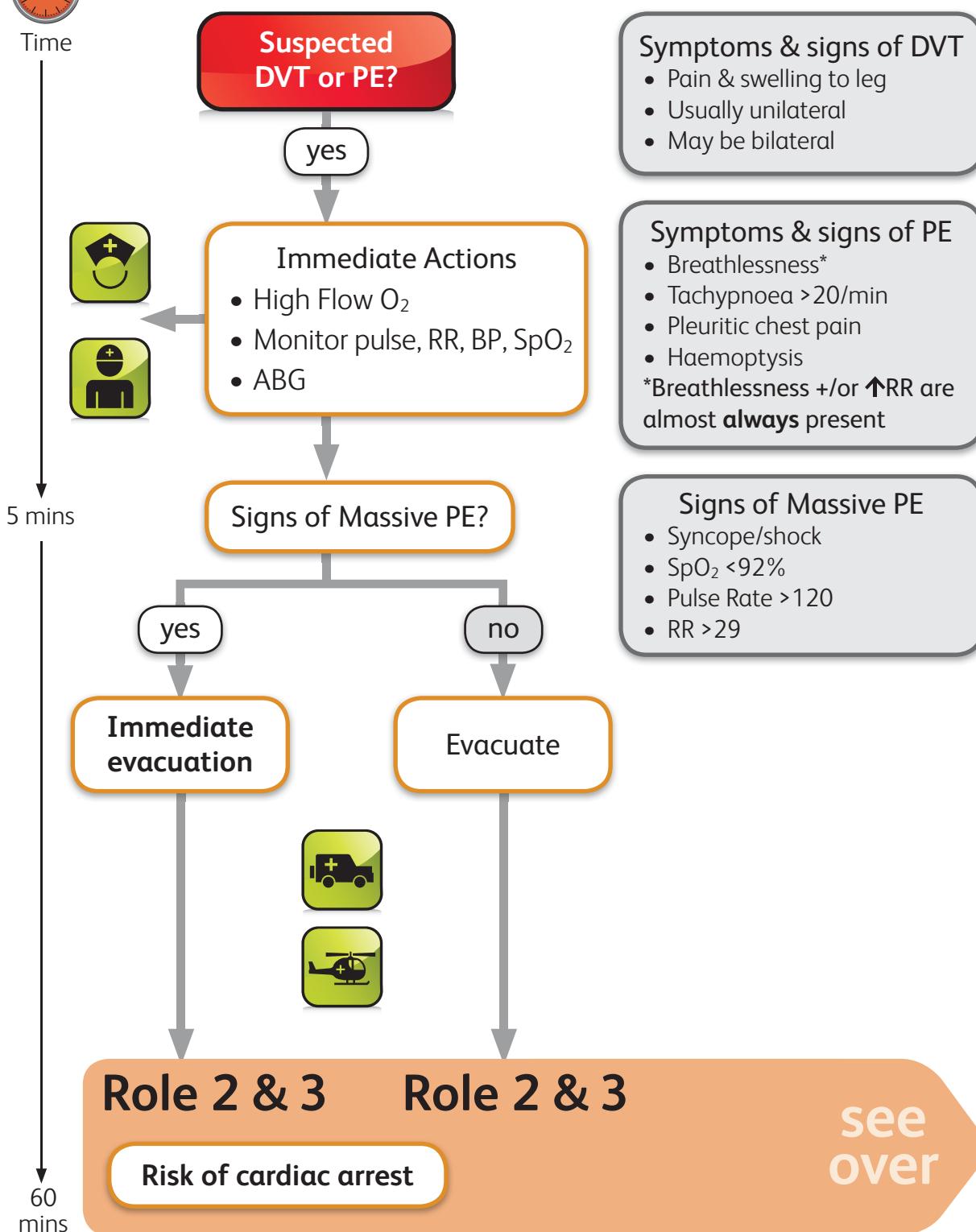
5g-h

Treatment guidelines



Time

### Role 1



Adapted from: British Thoracic Society Guidelines on the Management of Pulmonary Embolism (2003)  
& Auckland City Hospital VTE Investigation Algorithm (2005)

# Pulmonary embolus & DVT

## Treatment guidelines **5h** (Cont'd)

### Well's score for risk stratification

#### Well's score for DVT

- A Score of 2 or more = probability of DVT 28% (likely)
- A Score <2 = probability of DVT 5% (unlikely)

#### Clinical Characteristic

	Score
• Active cancer (receiving treatment within 6 month or palliation)	1
• Paralysis, paresis or recent POP lower extremities	1
• Bedridden for 3 or more days, major surgery within 12 weeks	1
• Localised tenderness line of the deep veins	1
• Entire leg swollen	1
• Calf swelling at least 3cm more than the other side (measured 10cm below tibial tuberosity)	1
• Pitting oedema confined to the symptomatic leg	1
• Collateral superficial veins (non-varicose)	1
• Previous documented DVT	1
• Alternative diagnosis at least as likely as DVT	-2

Reference: *N Engl J Med* 349 (13) Sept 25, 2003. 1227–1235

#### Well's score for PE

- A Score of >4 = > probability of PE 41% (likely)
- A Score < or =4 = > probability of PE 8% (unlikely)

#### Clinical Characteristic

	Score
• Clinical signs and symptoms of DVT (Minimum of leg swelling and pain on palpation of deep veins)	3
• Alternative diagnosis less likely than PE	3
• Heart Rate >100	1.5
• Immobilisation or surgery in the previous 4 weeks	1.5
• Previous documented DVT/PE	1.5
• Haemoptysis	1
• Malignancy (Treated within 6 months or palliative)	1

Reference: *Thromb Haemost* 2000; 83: 416–20

Vidas D-Dimer has a low specificity in older patients, in trauma, post operative states, inflammation, infection and malignancy.

It should **not** be used as a 'routine screen' for venous thromboembolism in patients who are likely to have a positive test for another reason.

Adapted from: *British Thoracic Society Guidelines on the Management of Pulmonary Embolism* (2003)  
& *Auckland City Hospital VTE Investigation Algorithm* (2005)

# Pulmonary embolus & DVT

## Treatment guidelines **5h** (Cont'd)

5h

Treatment guidelines

### Thromboprophylaxis: general

- Venous thromboembolic (VTE) disease (deep vein thrombosis, DVT, +/- pulmonary embolic disease, PED), is a major contributor to morbidity and mortality in hospital admissions across all specialities. Studies have shown that 0.9% of all hospital admissions will die of PED, 10% of all hospital deaths are due to PED and the risk of VTE rises tenfold in patients hospitalised after trauma, surgery or immobilising medical illness.<sup>1,2</sup>
- VTE thromboprophylaxis is to be given unless there is a clear indication to the contrary. The decision NOT to give prophylaxis should be made by a senior clinician and reasons for this decision recorded in the clinical notes.

#### Trauma

Multiple trauma, major lower limb fractures, head or spinal cord trauma without significant risk of bleeding

As above but with bleeding risk from head trauma or blast lung

#### Surgical patients

Major surgery (>1 hour and/or patient >40 yrs)

As above but with significant bleeding risk

#### Medical patients

Patients who are likely to be immobile in bed for >72 hours (e.g. MI, pneumonia)

#### Prophylaxis

Full length GECS + LMWH (enoxaparin 40mg SC once daily)

Full length GECS alone until haemodynamically stable: then add enoxaparin 40mg SC once daily

Full length GECS + LMWH (enoxaparin 40mg SC once daily)

Full length GECS alone until haemodynamically stable: then add enoxaparin 40mg SC once daily

Full length GECS + LMWH (enoxaparin 40mg SC once daily)

**GECS** = Graduated Elasticated Compression Stockings

**LMWH** = Low Molecular Weight Heparin

#### Notes

- Below-knee GECS are NOT to be used
- LMWH does not require coagulation monitoring
- Aspirin not suitable for prophylaxis as of unproven efficacy<sup>2</sup>
- Duration of therapy is until fully mobile or discharge from hospital



<sup>1</sup> Scottish Intercollegiate Guidelines Network: *Prophylaxis of Venous Thromboembolism, National Clinical Guideline*. SIGN. Edinburgh (2002)

<sup>2</sup> British Committee for Standards in Haematology: *Guidelines on the Use and Monitoring of Heparin*. BCSH (2005)

# Spontaneous pneumothorax

## Treatment guidelines **5i**

### Features

- Pneumothorax may occur spontaneously in the absence of trauma.
- Pneumothorax may also be secondary to asthma, pneumonia or TB.
- Sudden onset unilateral pleuritic chest pain
- Dyspnoea +/– cough.
- Depending on size of pneumothorax there may be tachypnoea and tachycardia and percussion may be normal or hyperresonant.

### Investigations

- CXR is essential to diagnose small pneumothoraces: the stethoscope is only a crude diagnostic aid.
- Monitor SpO<sub>2</sub>.
- Measure ABG when there is dyspnoea and/or reduced SpO<sub>2</sub>.
- ECG when the prominent symptom is chest pain.

### Treatment

- Aspiration is recommended for spontaneous pneumothorax:
  - infiltrate with local anaesthetic, insert a 16G IV cannula in the 2nd intercostal space in the mid clavicular line
  - attach three way tap and aspirate with a 50ml syringe
  - continue aspiration until patient coughs excessively or until 2.5 litres of air is removed.
- If aspiration unsuccessful insert a chest drain.

Where no chest X-ray capability is available, the patient is symptomatic and clinically there is a pneumothorax, **insert a chest drain**

### Note

Ultrasound can be used successfully to detect a pneumothorax.



# Shock

Treatment guidelines **6**

**5i–6**

Treatment  
guidelines

Hypovolaemic shock

Treatment guidelines **6a**

Septic shock

Treatment guidelines **6b**

Cardiogenic shock

Treatment guidelines **6c**

Neurogenic shock

Treatment guidelines **6d**

EZ-IO

Treatment guidelines **6e**

Intentionally blank

# Hypovolaemic shock

## Treatment guidelines **6a**

**6a**

Treatment guidelines

### Step 1

- Stop external bleeding → Go to

**2a–b**

Treatment guidelines

### Step 2

- Assess the cause of the hypovolaemic shock:
  - haemorrhage (trauma and non-trauma)
  - plasma (burns)
  - electrolyte solution (diarrhoea and/or vomiting).

### Step 3

- Estimate the degree of hypovolaemic shock from the table:

<b>Class of Shock</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>
<b>Blood loss</b>	<b>Up to 750ml &lt;15% lost</b>	<b>750–1500ml 15–30% lost</b>	<b>1500–2000ml 30–40% lost</b>	<b>&gt;2000ml &gt;40% lost</b>
Heart rate	<100/min	>100/min	120–140/min	>140/min
Systolic BP	Normal	Normal	Decreased	Decreased/ unrecordable
Pulse pressure	Normal	Narrowed	Narrowed	Very narrow/ absent
Capillary Refill	Normal	Prolonged	Prolonged	Prolonged/ Absent
Respiratory Rate	14–20/min	20–30/min	>30/min	>35/min
Urine output	>30ml/hr	20–30ml/hr	5–20ml/hr	Negligible
Cerebral function	Normal/ slightly anxious	Anxious/ Frightened/ Hostile	Anxious/ Confused	Confused/ unresponsive

### Step 4

- Replace fluid intravenously for Class II, III and IV shock (see over).

### Step 5

- Splint unstable pelvic fractures.
- Apply a traction splint for fractured femur.

# Hypovolaemic shock

## Treatment guidelines **6a** (Cont'd)

### Fluid replacement

#### Haemorrhage

- The endpoint for resuscitation for non-compressible haemorrhage (chest or abdomen) is a systolic BP of 90mmHg. Where SBP cannot be measured, use the presence of a radial pulse to indicate adequate volume replacement (but this can over-estimate SBP).
- Give 0.9% NaCl (normal saline) or Hartmann's solution in 250ml aliquots.
- If there is continuing evidence of shock after 2L crystalloid then blood is needed.
- For patients with Class III shock ask for group compatible blood to be available within 15 minutes (a full cross match cannot give you blood in the Resuscitation Room in under 45 minutes).
- For patients with Class IV shock use universal donor blood. → Go to



- Use fresh frozen plasma in parallel to packed red cells to restore clotting factors
- When more than 6–8 units of packed cells are needed consider recombinant Factor VIIa . → Go to



- Monitor the effect of volume resuscitation using the pulse rate, pulse pressure, blood pressure, respiratory rate and hourly urine output (urometer).

#### Burns

- Estimate the **size** of the burn using the *Rule of Nines* or the *Lund and Browder Chart*.

Go to **Section 6** →



Toolbox

- Estimate the **weight** of the patient to the nearest 10kg.
- Estimate the **time** since the injury to the nearest hour.
- Now use the **Burns calculator** to determine the fluid requirement. Fluid is replaced as Hartmann's solution only.

Go to **Section 6** →



Toolbox

#### Diarrhoea and/or vomiting

- Start fluid resuscitation with 0.9% NaCl (normal saline) or Hartmann's solution. Refer to Compendium for specific treatment of infectious causes of D&V.
- Consider **Septic shock** → Go to



**6b**  
Treatment  
guidelines

#### Related guidelines

**Heat illness** → Go to



**11c**  
Treatment  
guidelines

# Septic shock

## Treatment guidelines 6b

6a-b

Treatment guidelines



Time

### Actions at Role 1

Hypotension usually accompanied by: fever/other features of sepsis/warm peripheries

See also “Neurology + Fever” guideline

Go to

9d

Treatment guidelines

#### Consider:

- Meningitis if meningism + photophobia ± purpuric rash
- Meningococcal septicaemia if purpuric rash only
- Endocarditis
- Severe pneumonia including atypical organisms
- Biliary or renal tract infection
- Wound infection or bowel perforation if penetrating injuries
- Necrotising fasciitis if soft tissue affected → surgical review
- Malaria if exposure within 2 years → do antigen card test
- Typhoid/typhus/leptospirosis if deployed overseas

Cefotaxime IV or IM 2g (50mg/kg in children)

**or** if severe penicillin allergy give chloramphenicol IV 25mg/kg

**with**

100% oxygen + IV fluid resuscitation



- If risk or features of malaria → quinine IV 20mg/kg up to 1400mg
- If risk or features of typhus → doxycycline PO 200mg (not in children)
- If risk or features of listeriosis → amoxicillin IV 2g (100mg/kg in children)



15 mins

**Beware of hypoglycaemia with quinine**

# Septic shock

## Treatment guidelines 6b (Cont'd)



Time

### Actions at Role 2 & 3

GCS <15 or other acute neurological features  
+ fever or other features of sepsis

See also "Neurology + Fever" guideline

Go to

9d

Treatment guidelines

#### Consider

- Meningitis if meningism + photophobia ± purpuric rash
- Encephalitis or septicaemia if no meningism or photophobia
- Cerebral malaria if exposure within 2 years → do antigen card test

- If features of meningitis then consider lumbar puncture (LP) unless signs of ↑ ICP or laboratory investigations unavailable
- **Do not delay antibiotics for >30 minutes in order to do LP**

- Cefotaxime 2g IV or IM (50mg/kg in children) or if severe penicillin allergy give chloramphenicol IV 25mg/kg with 100% oxygen + IV fluid resuscitation + review by intensive care unit team

- Cefotaxime 2g IV or IM (50mg/kg in children) **or**  
if severe penicillin allergy give chloramphenicol IV 25mg/kg with 100% oxygen + IV fluid resuscitation + review by intensive care unit team

1 hour

- If risk or features of septicaemia → gentamicin IV 5–7mg/kg
- If risk or features of malaria → quinine IV 10mg/kg up to 1400mg
- If risk or features of typhus → doxycycline PO 200mg (not children)
- If risk or features of listeriosis → amoxicillin IV 2g (100mg/kg in children)

#### Notes

- Beware of hypoglycaemia with malaria + quinine
- F Med 85 notification to communicable disease control team
- See also Meningitis Research Foundation Guidelines → Go to

9d

Treatment guidelines

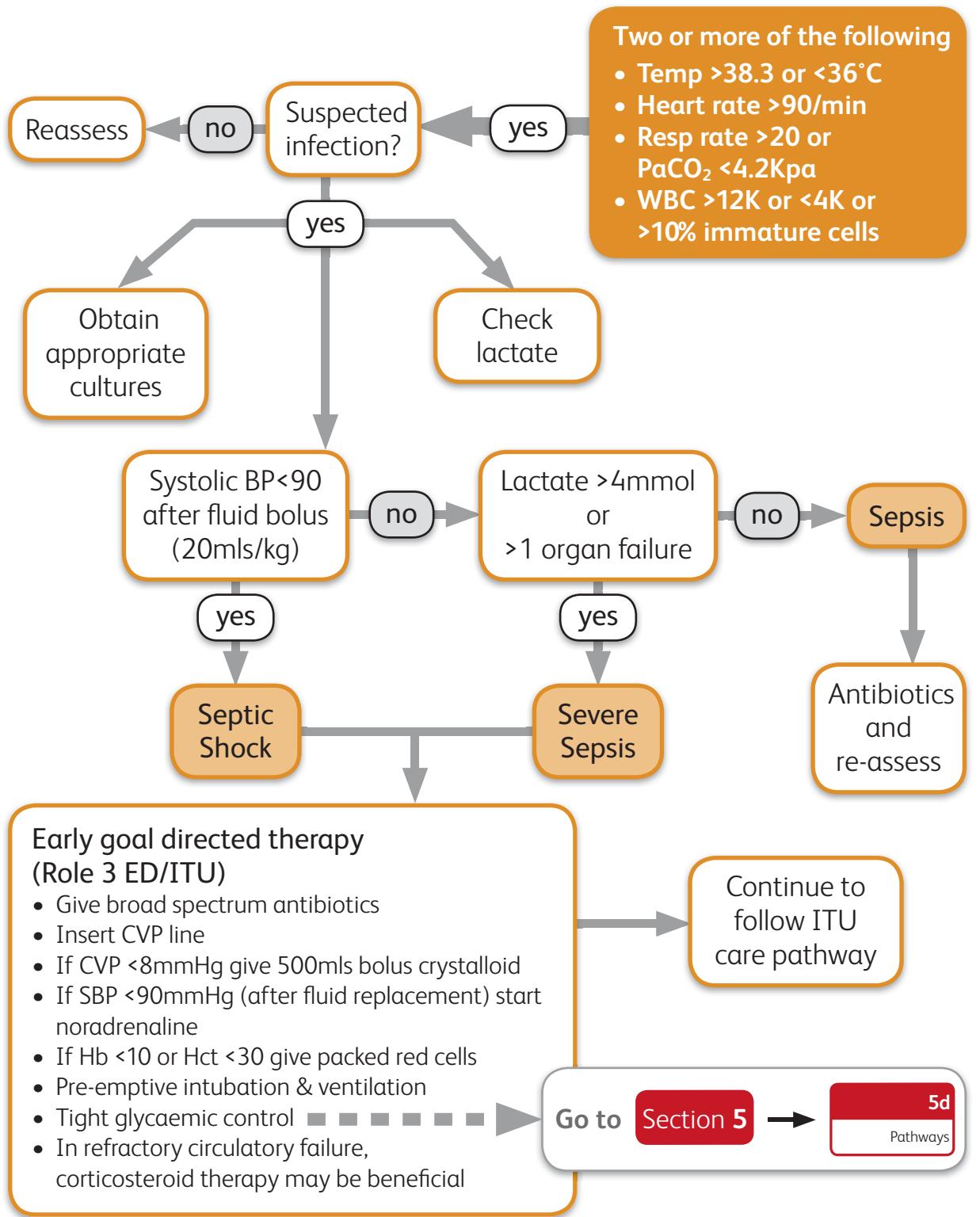
# Septic shock

Treatment guidelines **6b** (Cont'd)

**6b**

Treatment  
guidelines

## Intensive care (care may start in the ED)



Adapted from: The Surviving Sepsis Campaign (2005), UHCW (2005) & the Meningitis Research Foundation (2004)

# Cardiogenic shock

## Treatment guidelines **6c**

### Definition

- Cardiogenic shock is defined clinically as a poor cardiac output plus evidence of tissue hypoxia that is not improved by correcting reduced intravascular volume. When a pulmonary artery catheter is used, cardiogenic shock may be defined as a cardiac index below 2.2L/minute/m<sup>2</sup> despite an elevated pulmonary capillary wedge pressure (>15mmHg).

### Aetiology

- Acute myocardial infarction is the most likely cause. Cardiogenic shock occurs in about 7% of patients admitted with AMI and typically may be present acutely or develop within 24–48 hours. Major risk factors for developing cardiogenic shock with AMI are tachycardia or bradycardia, hypotension, diabetes and previous MI.

### Treatment

- Thrombolysis is unlikely to be beneficial in these cases and RCT has found no significant difference in mortality at 21 days.
- Medical supportive treatment can be provided with vasopressors, inotropes and vasoconstrictors.
- A large RCT has identified that early invasive cardiac revascularisation will reduce mortality compared to medical treatment alone. This will require judgement regarding the availability of local resources (Host Nation and/or Neighbouring Nation) or the suitability for CCAST evacuation to Role 4.

# Neurogenic shock

## Treatment guidelines **6d**

**6c-d**

Treatment  
guidelines

### Definition

- Neurogenic shock is a form of “distributive shock” where loss of vascular tone leads to a mal-distribution of blood flow.

### Aetiology and pathophysiology

- Injury to the spinal cord may interrupt the sympathetic chain resulting in vasodilation with **hypotension** and **warm peripheries**. Symptoms are more severe with high cervical cord lesions whereas lesions below T6 would rarely produce shock.
- Loss of sympathetic innervation to the heart results in unopposed parasympathetic activity with resultant **bradycardia**.
- Patients who have lost sympathetic tone also **lose some ability to thermoregulate**: they do not sweat in the heat and they cannot vasoconstrict in the cold.

### Treatment

- Beware attributing hypotension to spinal cord injury in the initial phases of resuscitation: a patient with spinal cord injury may have warm extremities, a bradycardia and a soft abdomen despite having a significant haemoperitoneum. **Presume hypotension is due to blood loss and search for a source of bleeding** (CXR, Pelvis XR, FAST scan of abdomen, clinical examination of long bones, catheter to exclude haematuria from retroperitoneal bleed).
- Monitor the patient’s temperature: if the Resus Room is hot (desert environment) be prepared to spray with water and fan to cool; if the room is cold cover with blankets and use the hot air warming blanket.
- Use atropine for bradycardia.

Go to

**6b**

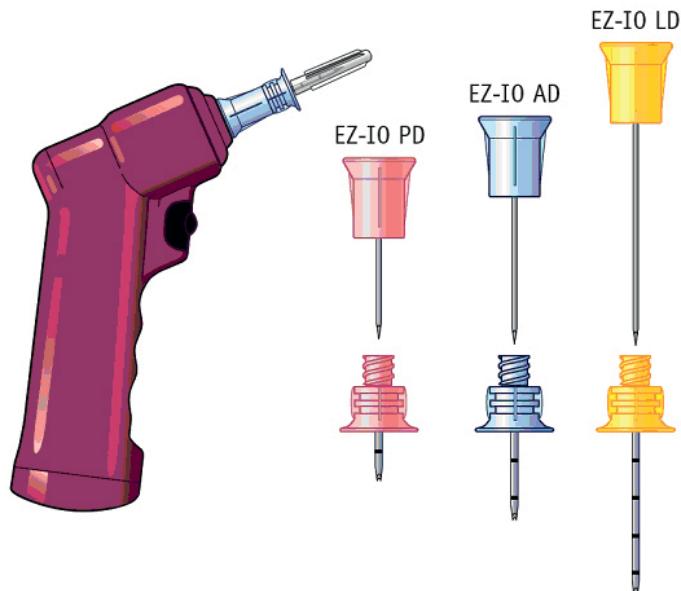
Treatment  
guidelines

This may be ineffective as the underlying pathophysiology is absence of sympathetic tone rather than excessive parasympathetic tone. If atropine fails use vasopressors (e.g. norepinephrine) under the direction of an intensivist and progress to cardiac pacing (external pacing available through the defibrillator). Bradycardia typically resolves at 3–5 weeks.

# EZ-IO

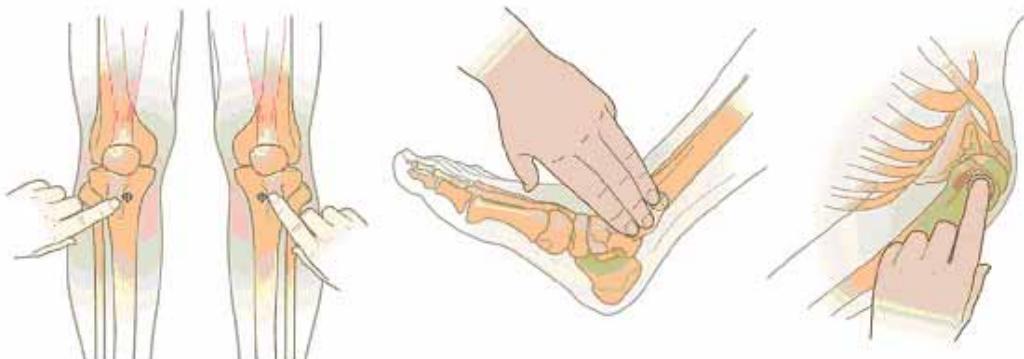
## Treatment guidelines **6e**

The EZ-IO is indicated for immediate vascular access in emergencies.



**Figure 1** EZ-10 Power Driver and Needle sets

- Check skin, adipose and muscle thickness before insertion (see Figure 2).
- Use aseptic technique.



**Figure 2**

- Open the pouch and prepare equipment (including a 50ml syringe).
- Prepare IV fluids. Prime 3 way tap and EZ connector with fluid.
- Check the patency of the chosen limb.
- Clean insertion site with alcohol swab (see Figure 3).
- Choose appropriate size needle and attach to driver. Ensure the driver and needle are securely seated.

# EZ-IO

## Treatment guidelines **6e** (Cont'd)

**6e**Treatment  
guidelines

Figure 3 Tibial site demonstrated



Figure 4



Figure 5

- Insert EZ-IO needle set.

**IMPORTANT:** Do not touch the needle set with your hands or fingers.

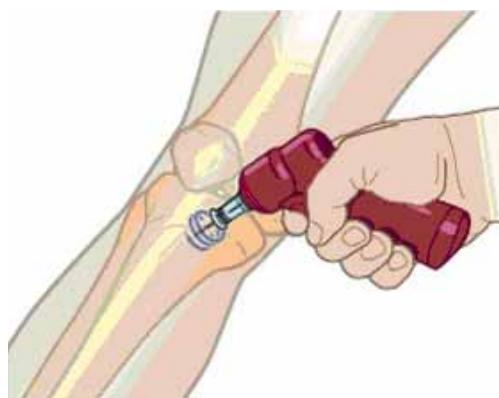


Figure 6

- Position Driver at insertion site with needle set at a 90-degree angle to the bone.
- **Gently** power or press needle set until needle set touches bone.

**IMPORTANT:** Control the patient's movement prior to and during needle set insertion.

# EZ-IO

## Treatment guidelines **6e** (Cont'd)

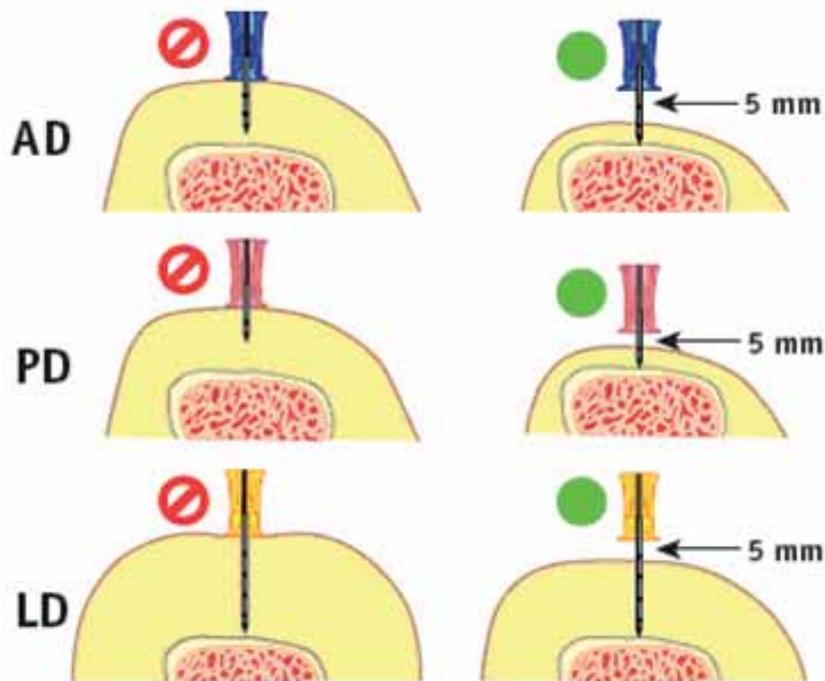


Figure 7 Ensure at least 5mm of the catheter is visible

- Penetrate bone cortex by squeezing the driver's trigger and applying **gentle, steady downward pressure**.
- Release Driver's trigger and stop insertion process when:
  1. A sudden "give" or "pop" is felt upon entry into the medullary space.
  2. The desired depth is obtained.

**IMPORTANT:** use gentle-steady pressure. DO NOT USE EXCESSIVE FORCE. Allow the needle set rotation and downward pressure to provide the penetrating action.

Note: If the Driver stalls and will not penetrate the bone you may be applying too much pressure.

**IMPORTANT:** use gentle-steady pressure. DO NOT USE EXCESSIVE FORCE. Allow the needle set rotation and downward pressure to provide the penetrating action.

Note: If the Driver stalls and will not penetrate the bone you may be applying too much pressure.

# EZ-IO

6e

Treatment guidelines

## Treatment guidelines 6e (Cont'd)

- Remove Power Driver and Stylet (Figure 8).
- Confirm metal catheter stability.
- Attach primed extension set to catheter hub's Luer lock. (Figure 9)

**Do not attach a syringe directly to the EZ-IO catheter hub**

- Aspirate a small amount of marrow to confirm placement.
- Flush the EZ-IO catheter with 10 ml of Normal Saline.

**Note:** frequently monitor the insertion site for extravasation.

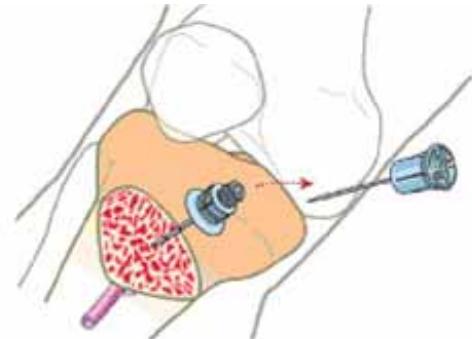


Figure 8

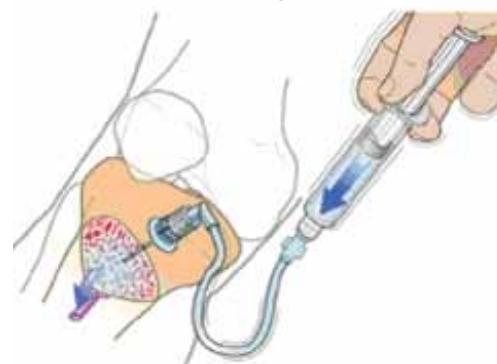


Figure 9

- **To remove catheter from patient** attach Luer lock syringe, continuously rotate clockwise while slowly and gently applying traction to catheter.

**Do not rock or bend the catheter during removal (figure 10).**

- Dress site as appropriate.

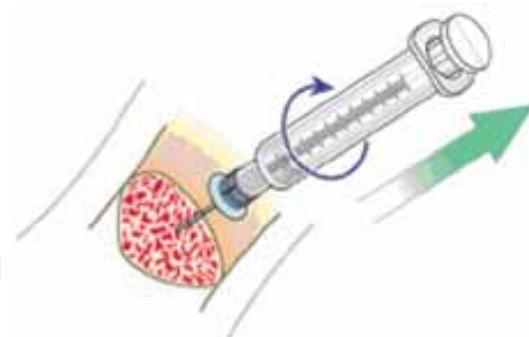
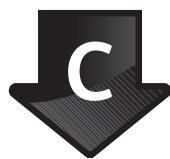


Figure 10

**CAUTION: Do not leave the catheter >24 hours**

Adapted from manufacturer's directions for use 2008 With permission of Vidacare

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# Chest pain

Treatment guidelines **7**

**7**Treatment  
guidelines

## Myocardial infarction & Acute Coronary Syndromes

Treatment guidelines **7a**

## Thrombolysis

Treatment guidelines **7b**

Intentionally blank

# Myocardial infarction & ACS

## Treatment guidelines 7a

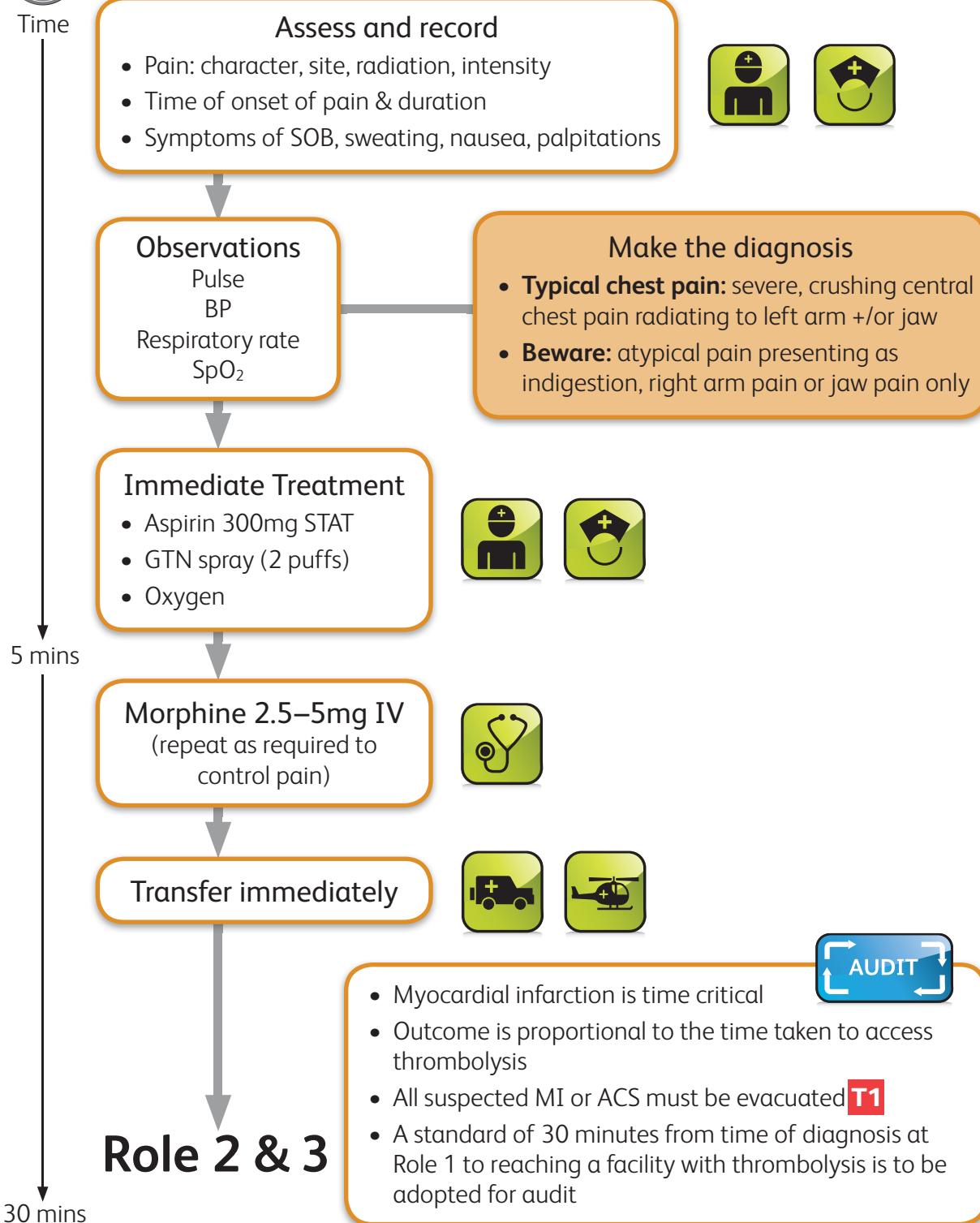
7a

Treatment guidelines



Time

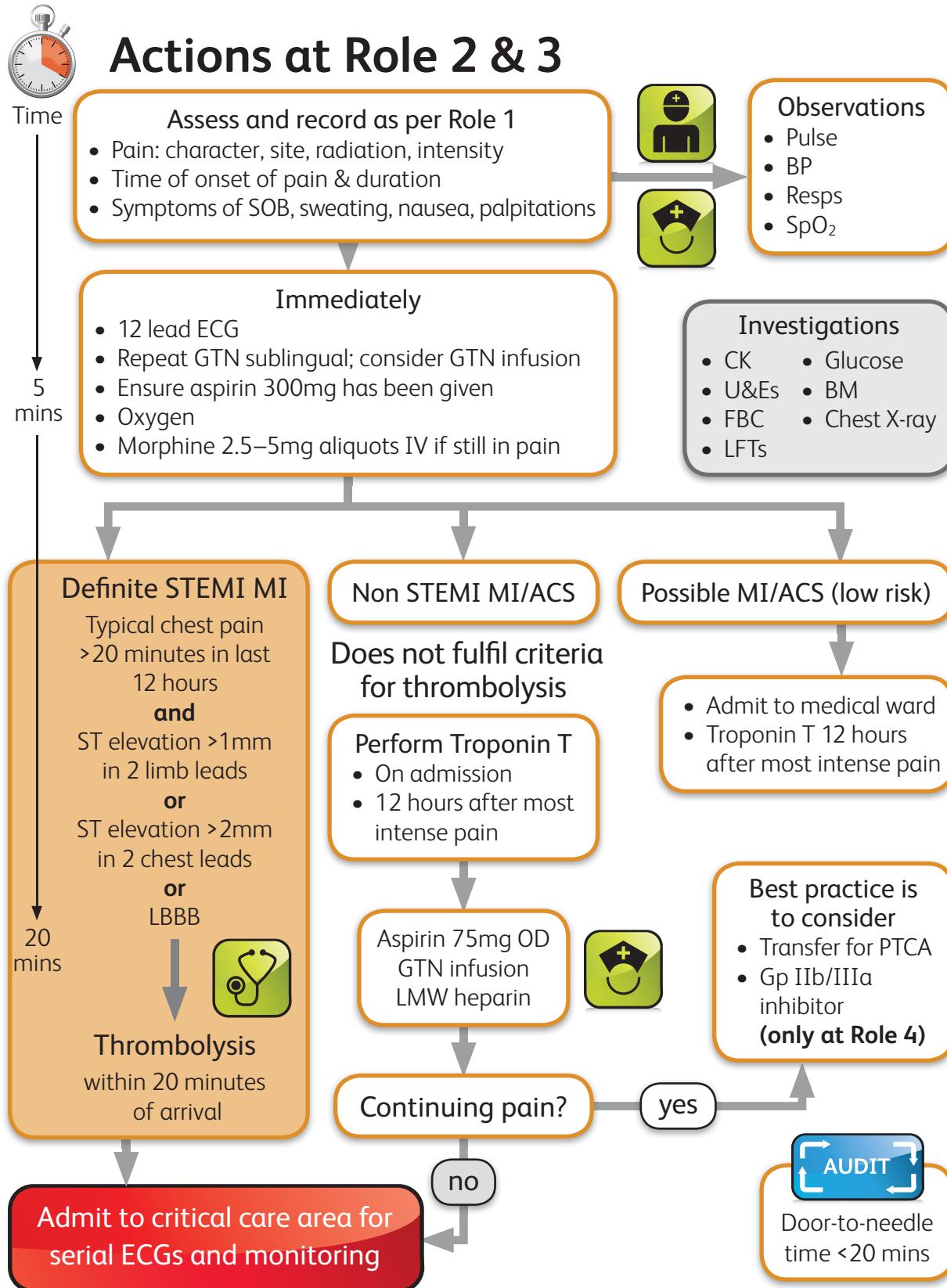
### Actions at Role 1



Adapted from: *The National Service Framework for Coronary Heart Disease* (2000, updated 2005)

# Myocardial infarction & ACS

## Treatment guidelines 7a (Cont'd)



Adapted from: *The National Service Framework for Coronary Heart Disease* (2000, updated 2005)

# Thrombolysis

## Treatment guidelines 7b

7a-b

Treatment guidelines

### **Tenecteplase is the first choice of thrombolytic agent if the patient:**

- Is <75 years old with anterior infarction, and presents within six hours of the onset of pain
- Has had previous streptokinase or is allergic to streptokinase
- Is profoundly hypotensive (BP <90mmHg)

Otherwise use streptokinase

### **Administration of tenecteplase (Metalyse®):**

- 30–50mg according to body-weight (500–600 micrograms/kg) IV over 10 seconds; max. 50mg
- Should be given within 6 hours of a myocardial infarction
- **Heparin** infusion is used as adjunctive therapy to prevent re-thrombosis and should be continued for at least 24 hours

Go to Section 7 →

1

Operational formulary

### **Administration of streptokinase:**

- 1500000 units over 60 minutes
- Should be given within 12 hours of onset of pain
- Reduce dosage if patient weighs <70kg

### **Absolute contradictions to thrombolysis:**

- Active peptic ulcer
- Major surgery within past ten days
- Bleeding diathesis
- CVA within previous six months

### **Relative contraindications to thrombolysis:**

- Prior arterial puncture
- Anticoagulant therapy
- Traumatic CPR
- Head injury/serious trauma (within last 12 months)
- Pregnancy
- Uncontrolled hypertension

### **Patient monitoring:**

- Record BP every 15 minutes
- If side effects occur, STOP infusion and inform doctor
- Restart after 15 minutes if condition stabilises

### **Adjunctive therapy:**

- GTN infusion if SBP >90mmHg
- Start β-blocker within 36 hours of MI (as soon as possible in ACS)
- Start ACE Inhibitor on day 3–10 (if no contraindications)
- Lipid testing and statins are not available in the field

Adapted from: *The National Service Framework for Coronary Heart Disease* (2000, updated 2005)

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# Peri-arrest rhythms

## Treatment guidelines **8**

8

Treatment guidelines

Broad complex tachycardia

Treatment guidelines **8a**

Narrow complex tachycardia – presumed  
supraventricular tachycardia)

Treatment guidelines **8b**

Bradycardia

Treatment guidelines **8c**

Complete heart block

Treatment guidelines **8d**

ECG diagnosis

Go to **Section 6**



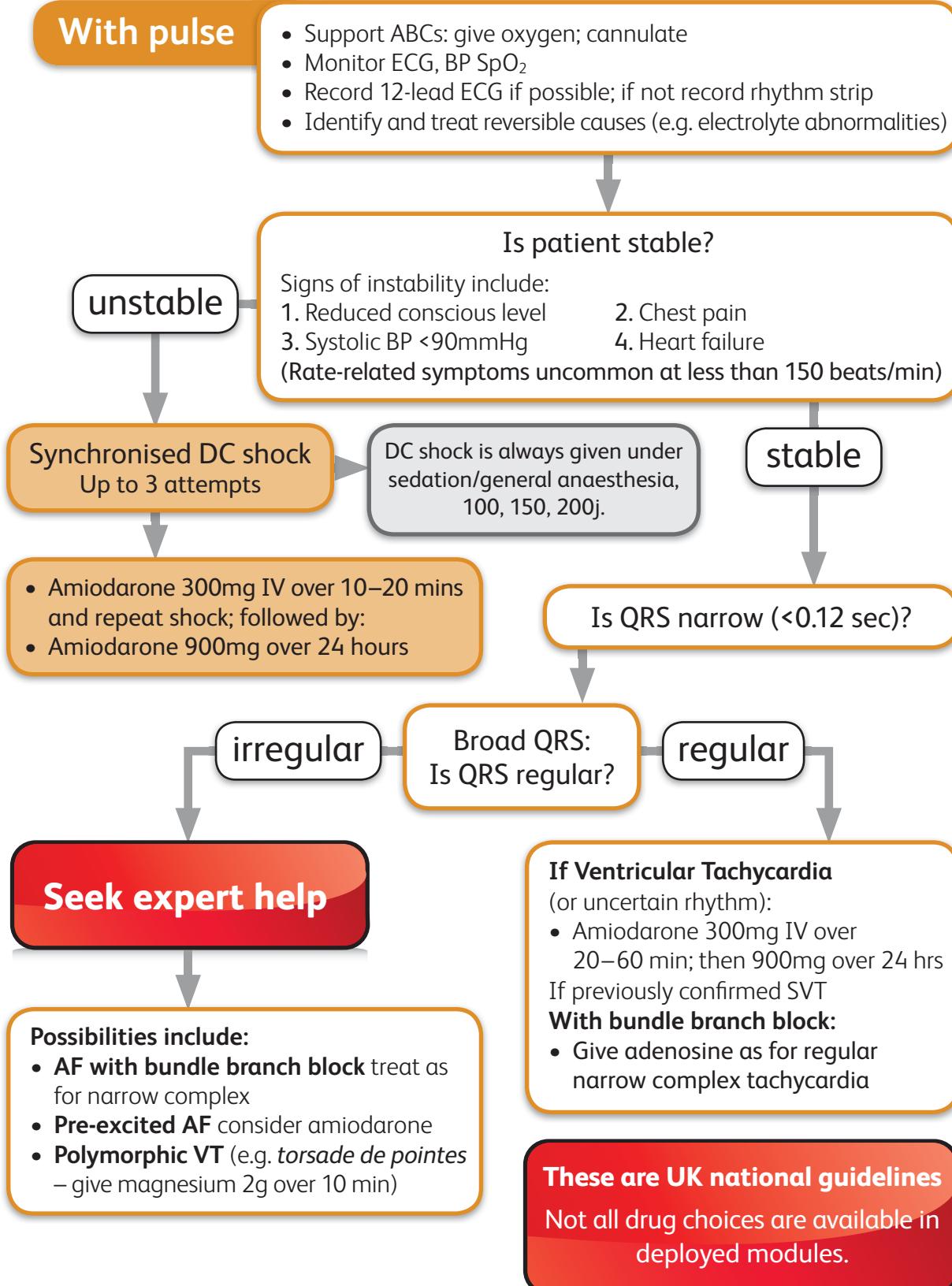
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# Broad complex tachycardia

## Treatment guidelines 8a

8a

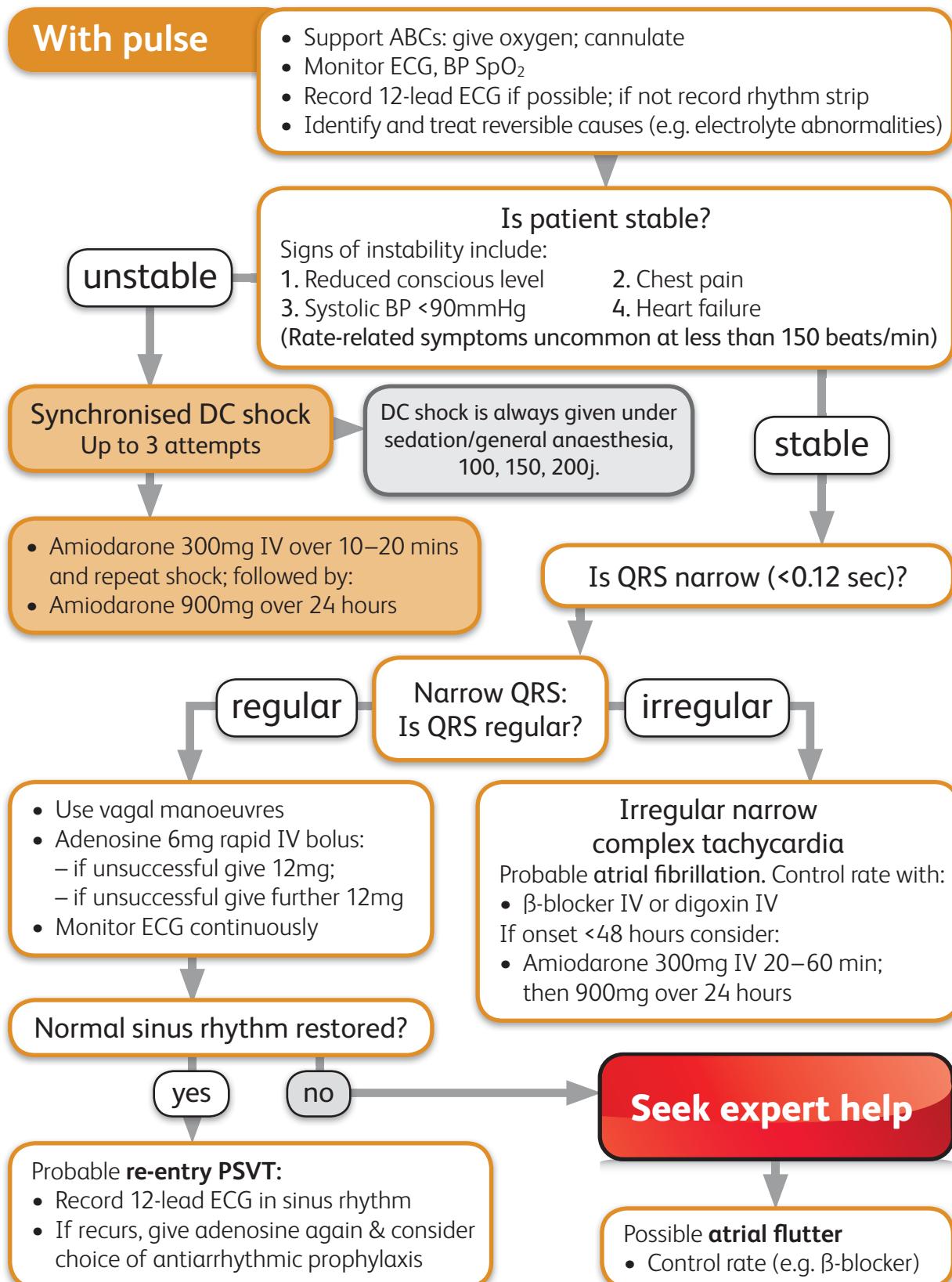
Treatment guidelines



Adapted from: Advanced Life Support Guidelines. UK Resuscitation Council (2005)

# Narrow complex tachycardia

## Treatment guidelines 8b



Adapted from: Advanced Life Support Guidelines. UK Resuscitation Council (2005)

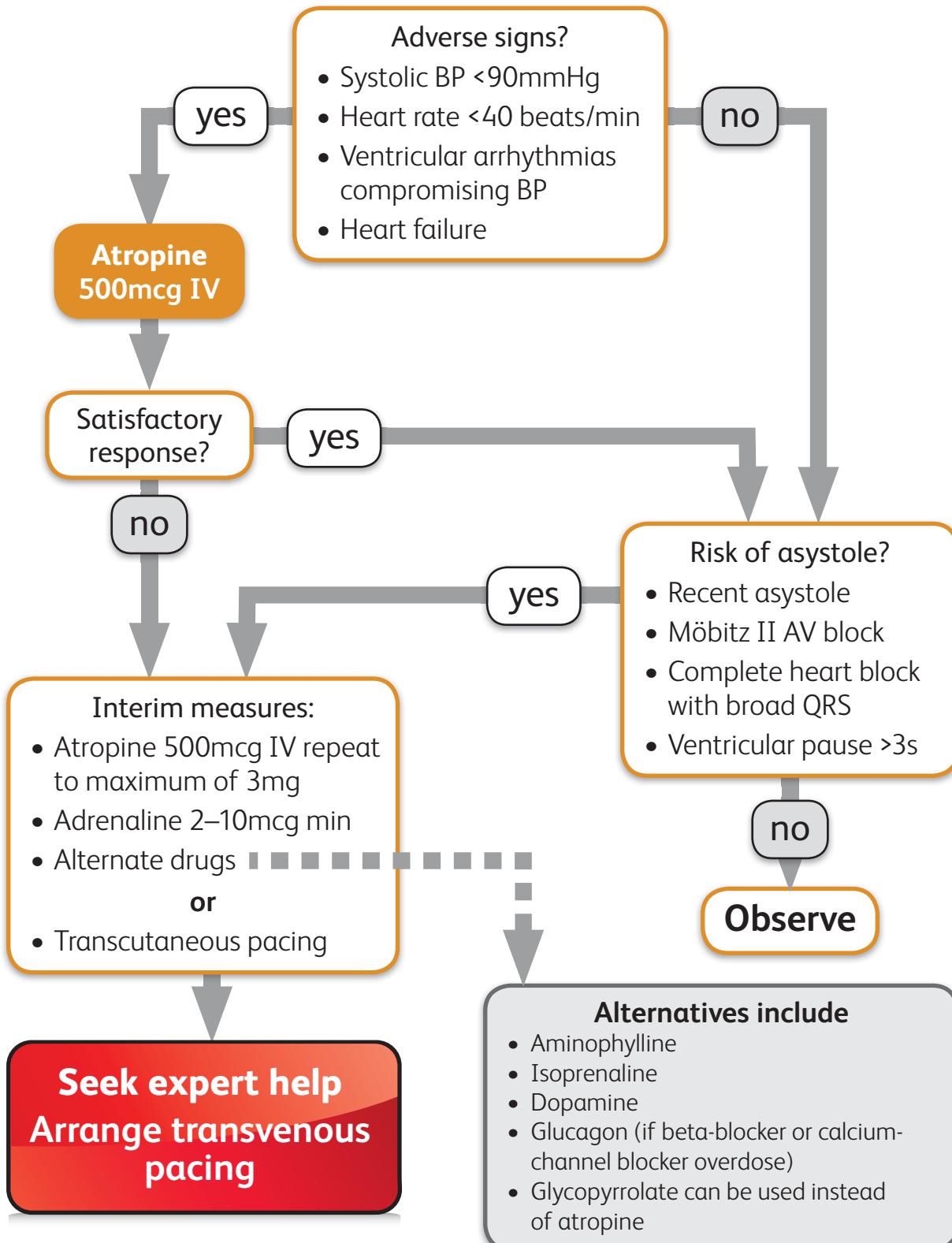
# Bradycardia

## Treatment guidelines 8c

8b-c

Treatment guidelines

If appropriate give oxygen, establish venous access and record a 12-lead ECG



Adapted from: Advanced Life Support Guidelines. UK Resuscitation Council (2005)

# Complete heart block

## Treatment guidelines **8d**

### Features

- Complete heart block (CHB) occurs when there is total failure of conduction of electrical activity from atria to ventricles.
- CHB can be due to disease at AV node or bundle of His level.
- If nodal level block the escape rhythm will be narrow complex, stable, and usually fast enough to support an adequate circulation.
- If block is at the bundle of His the escape rhythm will be slow, unreliable and broad complex with an increased risk of major symptoms.
- The unreliable escape rhythm may fail either briefly, leading to Stokes-Adams syncope, or completely causing ventricular standstill and cardiac arrest.

### Treatment

- Broad complex complete heart block will require cardiac pacing.

### Non-invasive pacing techniques

- Percussion pacing comprises of the delivery of a series of gentle blows over the precordium lateral to the lower left sternal edge. The hand should fall a few inches only and the blows should be gentle enough to be easily tolerated by a conscious patient. If percussion pacing does not produce a pulsatile rhythm rapidly then orthodox CPR should be used without further delay.
- Transcutaneous pacing can be established very quickly. The electrodes of a multifunction pacing-defibrillator can be placed in the anterior-posterior position, but during cardiac arrest it is more convenient to use an anterior-lateral configuration so chest compressions are not interrupted:
  - Select the demand mode and adjust the ECG gain to ensure sensing of any intrinsic QRS complexes.
  - Select an appropriate pacing rate (60–90 for adults).
  - Select the lowest pacing current setting and gradually increase while observing the patient and the ECG.
  - Increase the current until electrical capture occurs (in the range of 50–100mA).
- A palpable pulse confirms the presence of mechanical capture with contraction of the myocardium. Failure to achieve mechanical capture in the presence of good electrical capture indicates a non-viable myocardium.



# Reduced response

## Treatment guidelines **9**

**8d–9**

Treatment guidelines

### Trauma

#### Head injury

Treatment guidelines **9a**

#### ECG diagnosis

Go to **Section 8**

1

Policies

### Medical

#### Fitting (convulsions)

Treatment guidelines **9b**

#### Glycaemic emergencies

Treatment guidelines **9c**

### Infection

#### Neurology + fever

Treatment guidelines **9d**

#### Meningococcal disease

Treatment guidelines **9e**

#### Encephalitis

Treatment guidelines **9f**

### Malaria

Treatment guidelines **9g**

### Vascular

#### Subarachnoid haemorrhage

Treatment guidelines **9h**

#### Cerebrovascular accident

Treatment guidelines **9i**

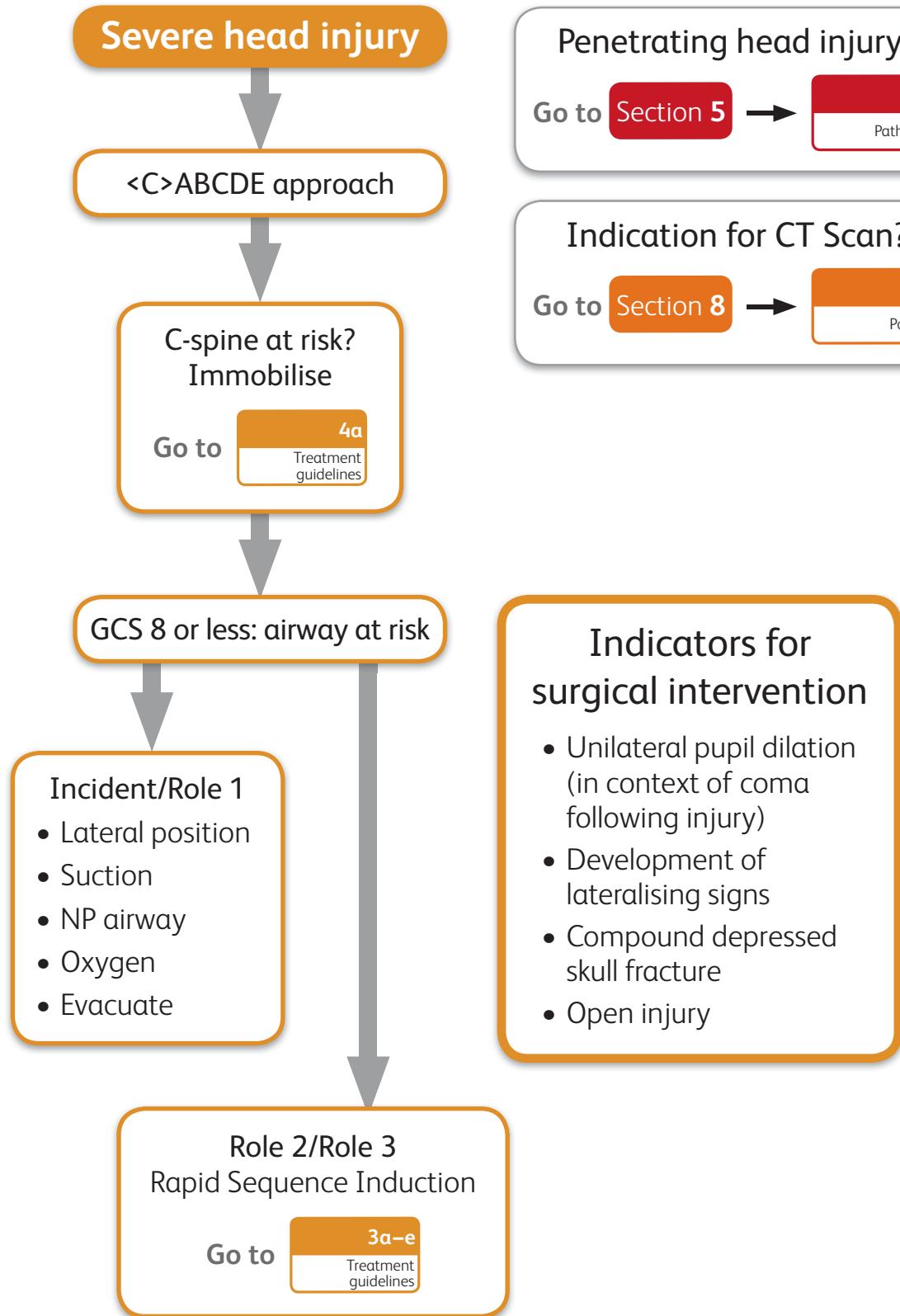
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# Head injury

## Treatment guidelines 9a

9a

Treatment guidelines



# Head injury

## Treatment guidelines **9a** (Cont'd)

### **Head injuries – indications for neurosurgical referral**

Criteria for urgent neurosurgical consultation are the presence of one or more of the following:

- Fractured skull in combination with:

**Either**

- Confusion or other depression of the level of consciousness

**Or**

- Focal neurological signs

**Or**

- Fits

- Confusion or other neurological disturbance persisting for more than 4 hours even if there is no skull fracture
- Coma continuing after resuscitation
- Suspected open injury of the vault or the base of the skull
- Depressed fracture of the skull
- Neurological deterioration

### **Head injuries – indications for CT**

As for consultation with a neurosurgeon above.

**In addition:**

- Skull fracture or fit following head trauma
- Unstable haemodynamic status precluding transfer to a Neurosurgical unit, where CT is available in the field hospital
- Diagnostic uncertainty
- Uncertain level of consciousness in intubated and ventilated patients

**Detailed guidance on indications for CT scanning is given in Section 8 Policies**

Go to **Section 8**



In accordance with National Institute for Health and Clinical Excellence Head Injury Guidelines (September 2007)

# Fitting (convulsions)

## Treatment guidelines **9b**

9a-b

Treatment guidelines

### Role 1

#### ADULT

##### Time critical features

- Any major <C>ABCD problems
- Serious head injury
- Underlying infection (meningitis)

##### Other important causes

- Hypoxia
- Hypotension
- Hypoglycaemia
- Electrolyte imbalance
- Alcohol withdrawal

**Do not** attempt an oropharyngeal airway  
Nasopharyngeal airway may be useful

Go to

3f

Treatment guidelines

- 100% oxygen
- Diazepam 10mg rectal
- Obtain IV access if possible
- Check BM to exclude hypoglycaemia



### Role 2 & 3



- Gain IV access
- If fitting repeatedly or one fit lasting 5 mins give diazemuls 10mg IV; may be repeated
- Phenytoin infusion (**loading dose:** 15mg/kg at a rate not exceeding 50mg/min)
- **Do not** use if bradycardia or heart block
- Anaesthetise (thiopentone) and ventilate
- Establish and treat the cause

Lorazepam (0.05mg/kg, maximum 4mg) is a first line alternative to diazemuls

# Glycaemic emergencies

## Treatment guidelines 9c



Time

5 mins

15 mins

45 mins

### Hypoglycaemia

Consider hypoglycaemia in any patient with acute agitation, abnormal behaviour or impaired consciousness

#### Symptoms & signs

- Skin cold/ clammy
- Tachycardia
- Restlessness
- Irrational or violent
- Confusion
- Trembling
- Coma

#### Observations

- Respiratory Rate
- Pulse
- BP
- BM



Hypoglycaemic if BM <3.0mmol/l

#### Conscious & cooperative

- Give 5–15g of fast acting oral carbohydrate:
  - 3–4 dextrose tablets
  - 4 tsp sugar in 150ml warm water
  - Cola 90mls



Repeat as necessary  
after 10–15 minutes

#### Unconscious/semi conscious

- Glucagon 1mg IM or SC if IV access difficult
- Give 500ml Glucose 10% IV  
(add 50ml 50% glucose to 500ml 0.9% NaCl)
- **Then** give oral carbohydrate when awake



Maintain <C>ABC  
Monitor  
Repeat BM

### Role 2 & 3

- Obtain a laboratory glucose within 1 hour of presentation
- 90% of patients recover fully within 20 minutes

Adapted from: West Mercia Clinical Guidelines (2004), Oxford Handbook of Accident and Emergency Medicine (2005) and the British National Formulary (2004)

# Glycaemic emergencies

Treatment guidelines **9c** (Cont'd)

**9c**

Treatment guidelines

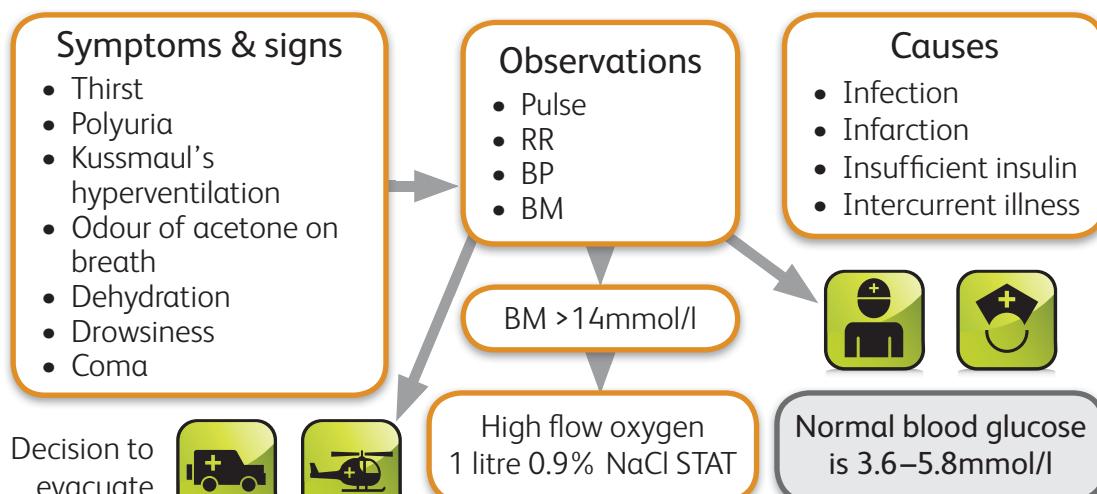


Time

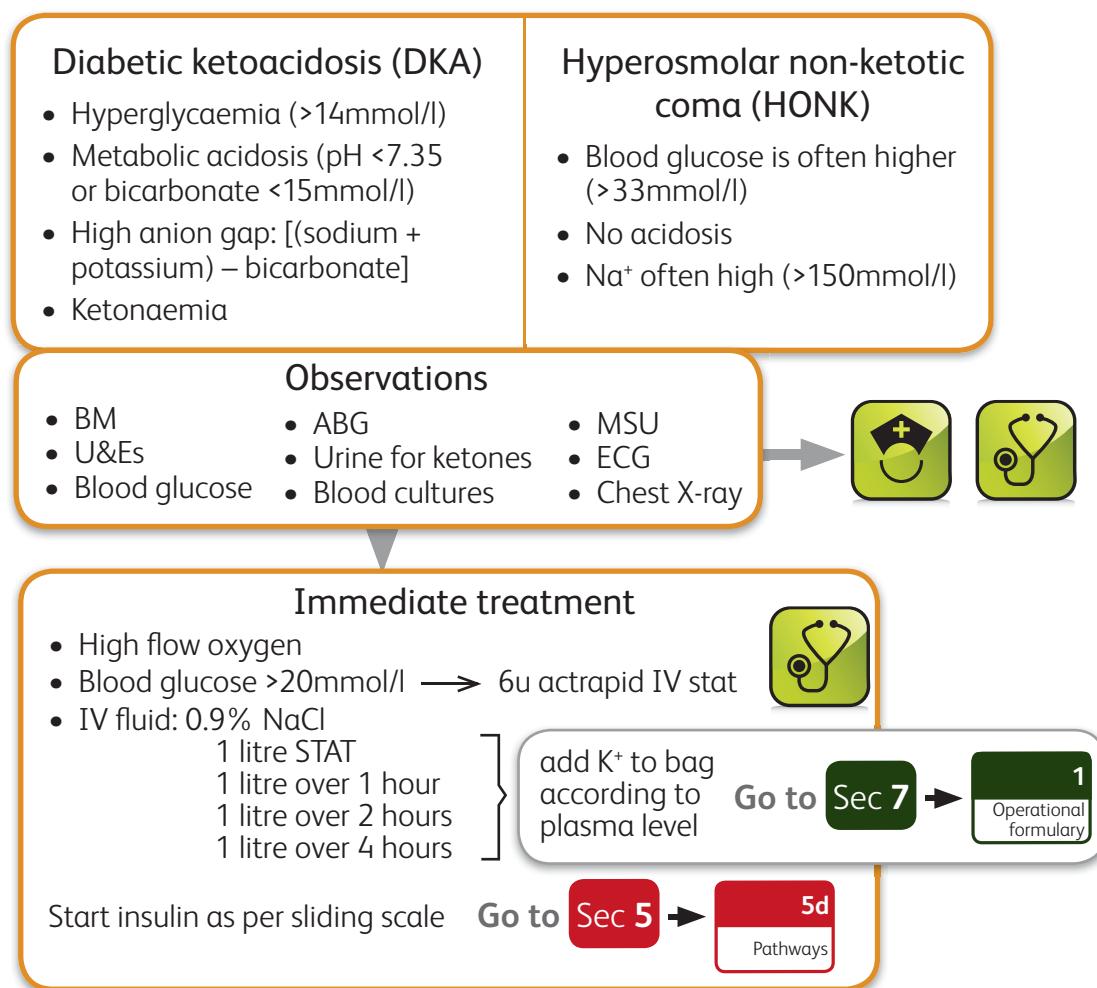
10 mins

30 mins

## Diabetic ketoacidosis & HONK



### Role 2 & 3



Adapted from: West Mercia Clinical Guidelines (2004) and Oxford Handbook of Accident and Emergency Medicine (2005)

# Neurology + fever

## Treatment guidelines **9d**



Time

### Actions at Role 1

GCS <15 or other acute neurological features  
+  
fever or other features of sepsis

See also  
“meningococcal disease”

Go to

**9e**  
Treatment guidelines

#### Consider:

Meningitis if meningism + photophobia ± purpuric rash  
Encephalitis or septicaemia if no meningism or photophobia  
Cerebral malaria if exposure within 2 years → do antigen card test

Benzylpenicillin IV or IM 1200mg (600mg in children)  
*or if severe penicillin allergy use chloramphenicol IV 25mg/kg with 100% oxygen + IV fluid resuscitation*



If risk or features of malaria → quinine IV 10mg/kg up to 1400mg  
If risk or features of typhus → doxycycline PO 200mg (not in children)  
If risk or features of listeriosis → amoxicillin IV 2g (100mg/kg in children)

15 mins



#### Notes

- Beware of rabies as a cause of encephalitis
- Beware of hypoglycaemia with malaria + quinine

Sources: *Meningitis Research Foundation Guidelines*, 2nd Ed (2005) – [www.meningitis.org](http://www.meningitis.org)  
*British National Formulary, Journal of Infection* (2005;50:373–4) and *J Neurol Neurosurg Psychiatry* (2004;75:2–9)

# Neurology + fever

Treatment guidelines **9d** (Cont'd)

**9d**

Treatment guidelines



## Actions at Role 2 & 3

GCS <15 or other acute neurological features  
+  
fever or other features of sepsis

See also  
“meningococcal disease”

Go to

**9e**  
Treatment guidelines

### Consider:

- Meningitis if meningism + photophobia ± purpuric rash
- Encephalitis or septicaemia if no meningism or photophobia
- Cerebral malaria if exposure within 2 years → do antigen card test

- If features of meningitis consider CT head scan and lumbar puncture (LP) unless signs of ↑ ICP or laboratory investigations unavailable
- Do not delay antibiotics for >30 minutes in order to do LP

- Cefotaxime 2g IV or IM (50mg/kg in children)  
*or if severe penicillin allergy use chloramphenicol IV 25mg/kg*
- 100% oxygen + IV fluid resuscitation + review by intensive care unit team

- If risk or features of meningitis → dexamethasone IV 0.15mg/kg
- If risk or features of encephalitis → acyclovir IV 10mg/kg
- If risk or features of septicaemia → gentamicin IV 5–7mg/kg
- If risk or features of malaria → quinine IV 10mg/kg up to 1400mg
- If risk or features of typhus → doxycycline PO 200mg (not in children)
- If risk or features of listeriosis → amoxicillin IV 2g (100mg/kg in children)

1 hour

### Notes

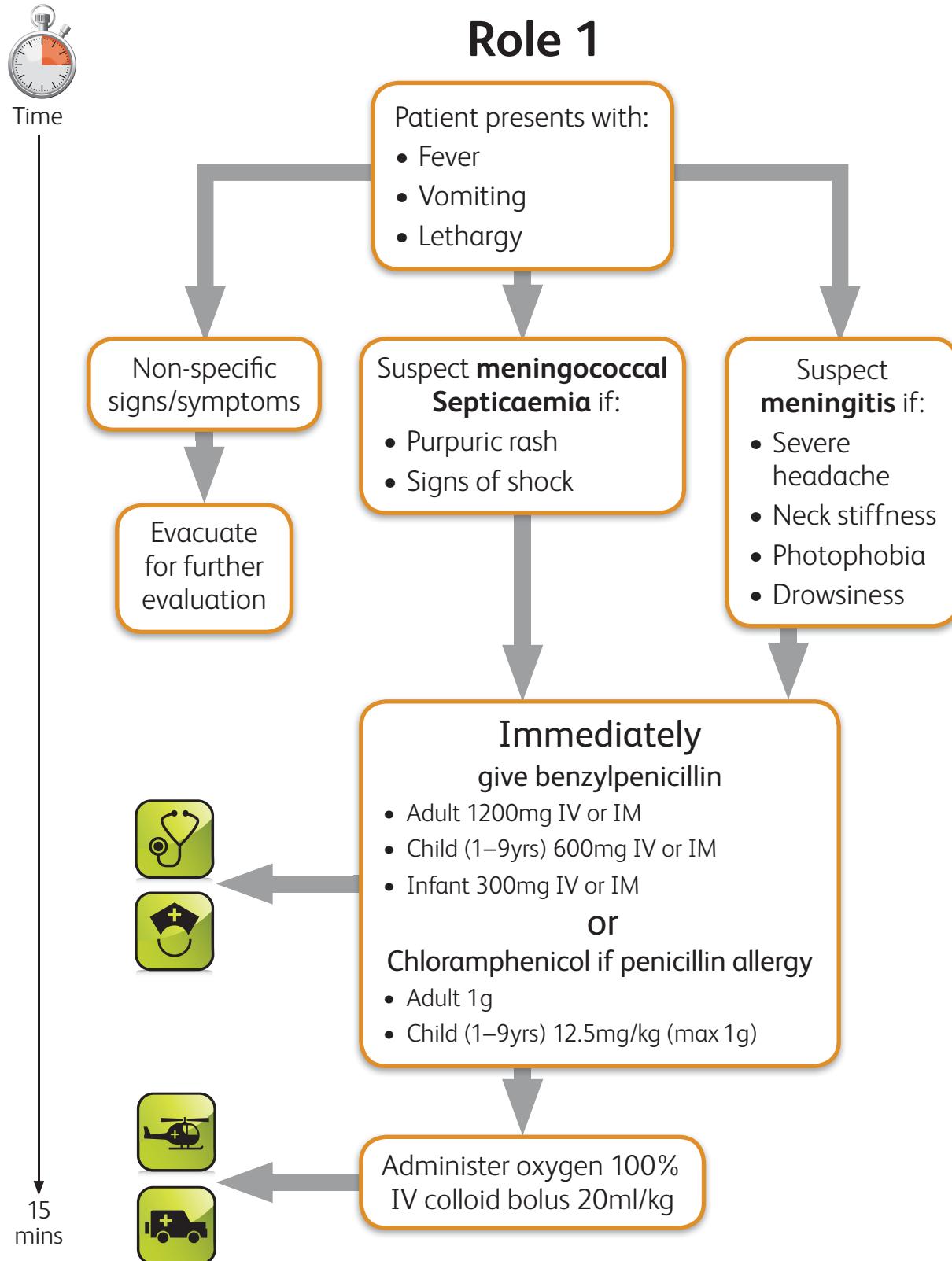
- Beware of rabies as a cause of encephalitis
- Beware of hypoglycaemia with malaria + quinine
- F Med 85 notification to communicable disease control team
- see also Meningitis Research Foundation guidelines (following pages)

Sources: *Meningitis Research Foundation Guidelines*, 2nd Ed (2005) – [www.meningitis.org](http://www.meningitis.org)

*British National Formulary, Journal of Infection* (2005;50:373–4) and *J Neurol Neurosurg Psychiatry* (2004;75:2–9)

# Meningococcal disease

## Treatment guidelines **9e**



Adapted from: The Meningitis Research Foundation – [www.meningitis.org](http://www.meningitis.org)

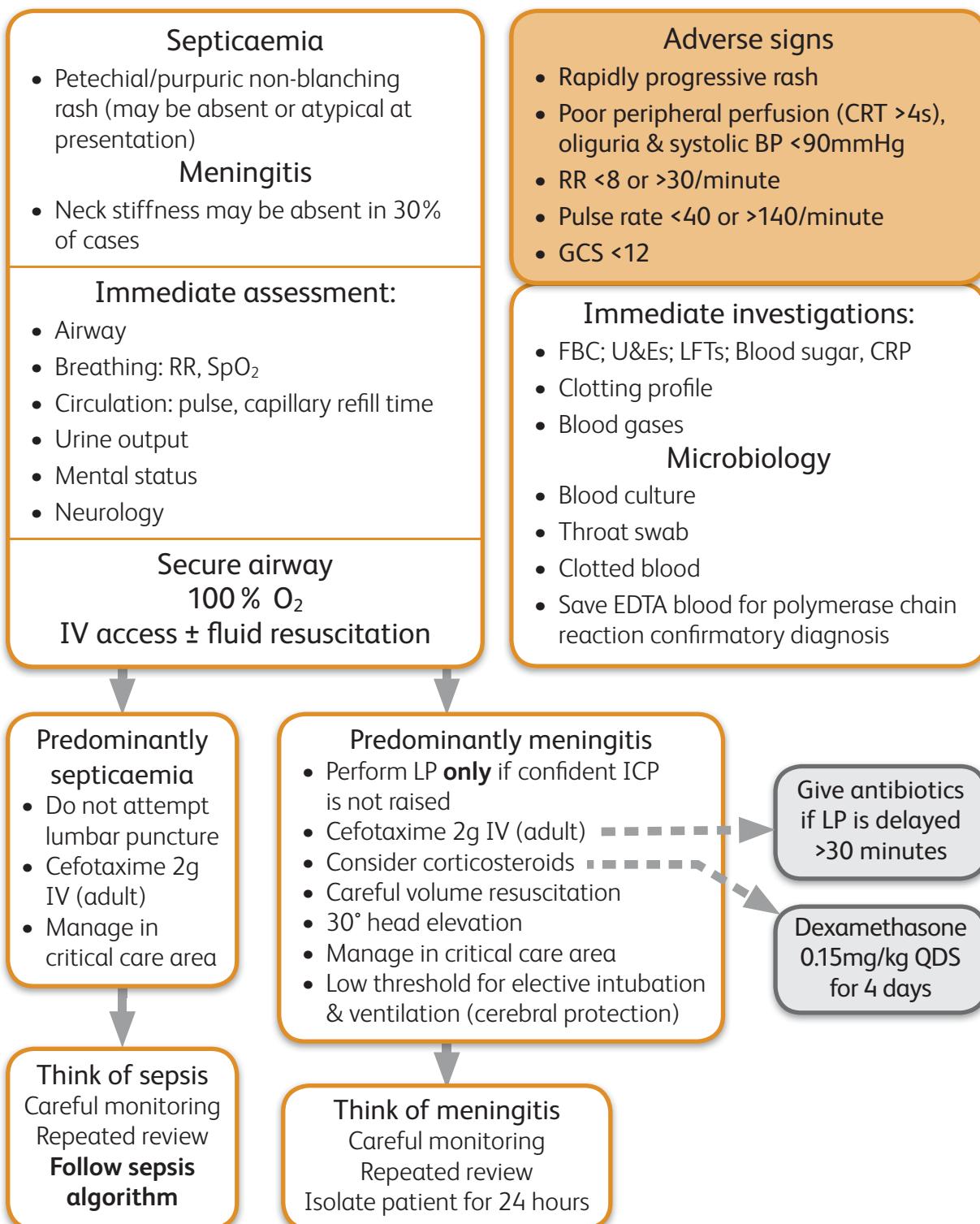
# Meningococcal disease

## Treatment guidelines **9e** (Cont'd)

**9e**

Treatment guidelines

### Roles 2 & 3



Meningitis Research Foundation Guidelines, 2nd Ed (2005) – [www.meningitis.org](http://www.meningitis.org), Journal of Infection (2005;50:373–4)

# Meningococcal disease

## Treatment guidelines **9e** (Cont'd)

### Children

#### **Estimate of child's weight (1–10 years)**

- Weight (kg) = 2 x (age in years + 4)

#### **Systolic blood pressure = 80+ (age in years x 2)**

- N.B. low BP is a pre-terminal sign in children

#### **Observe HR, RR, BP, perfusion, conscious level**

- Cardiac monitor and pulse oximetry
- Take blood for glucose FBC, Clotting, U&E, Ca<sup>2+</sup>, Mg<sup>2+</sup>, PO<sub>4</sub>, blood cultures, blood gas, cross-match

#### **Colloid bolus (20ml/kg)**

- 4.5% Human Albumin Solution (or Fresh Frozen Plasma or Hemaccel/Gelofusine)  
IV or IO (intraosseous)

#### **Inotropes**

- Dopamine or Dobutamine at 10–20mcg/kg/min:  
make up 3x weight (kg) mg in 50ml 5% dextrose and run at 10ml/hr = 10mcg/kg/min  
(these dilute solutions can be used via a peripheral vein)
- Start adrenaline via a central line only at 0.1mcg/kg/min:  
make up 300mcg/kg in 50ml of saline at 1ml/hour = 0.1mcg/kg/min

#### **Intubate**

- Atropine 20mcg/kg (max 600mcg) **and** thiopentone 3–5mg/kg  
**and** suxamethonium 2mg/kg (caution when high potassium).  
ETT size = [age/4 +4]; ETT length (oral) = [age/2 +12].
- Then: morphine (100mcg/kg) + midazolam (100mcg/kg) every 30 minutes

#### **Hypoglycaemia (glucose <3mmol/l)**

- 5ml/kg 10% dextrose bolus IV, then dextrose infusion at 80% of maintenance requirements over 24 hours

#### **If K<sup>+</sup> <3.5mmol/l**

- Give 0.25mmol/kg over 30 mins IV with ECG monitoring – **caution if anuric**

Adapted from: The Meningitis Research Foundation (2004) – [www.meningitis.org](http://www.meningitis.org)

# Encephalitis

## Treatment guidelines **9f**

9e-f

Treatment guidelines

### Viral encephalitis

- Encephalitis means ‘inflammation of the brain’ and is usually the result of a viral illness. There are 2 main types (i) acute viral encephalitis, and (ii) post-infectious encephalitis (an autoimmune condition).

### Symptoms

- Encephalitis may begin with a flu-like illness or headache, progressing to confusion, drowsiness, altered level of response, fits and coma.
- Photophobia and neck stiffness may occur, as in meningitis, but symptoms that help discriminate encephalitis include dysphasia, sensory changes, loss of motor control and uncharacteristic behaviour.
- Some symptoms are attributable to a rise in intracranial pressure (severe headache, dizziness, confusion and fits).

### Diagnosis

- There is no useful field diagnostic test for viral encephalitis: diagnosis will be on the clinical presentation. Polymerase chain reaction is sensitive for diagnosing HSV-1 should blood samples be returned to UK.

### Treatment

- In most cases treatment is symptomatic and is not amenable to antiviral therapy. Herpes simplex encephalitis (HSE) and varicella zoster encephalitis may respond to acyclovir 10mg/kg IV every 8 hours. If given in the first few days of illness the mortality can be reduced from ~80% to ~25%. Treatment may often have to be continued beyond the standard 10 day regimen (potentially for up to 21 days).

### Tick-borne encephalitis (TBE)

- This is caused by TBE virus (of the family *Flaviviridae*) and is spread by the ixodid tick, endemic in Europe, former Soviet Union and Asia. The incubation period is 7–14 days after which there is a 2–4 day viraemic phase followed by a remission (of ~8 days) then a second febrile illness in 20–30% characterised by symptoms encephalitis, meningitis or both. Treatment is symptomatic and the disease is rarely fatal (1–2%) although sequelae are common.

# Malaria

## Treatment guidelines **9g**



### **Presentation**

#### **Specific**

- Fever (characteristically cyclical)

#### **Additional features**

- History of poor compliance with malaria prophylaxis
- Rigors, headache, vomiting, diarrhoea, sweating +++, prostration
- Abdominal pain, jaundice, hepatosplenomegaly
- Increasing haemolytic anaemia
- *P.falciparum* severe signs: cerebral malaria, shock, DIC, renal impairment, haemoglobinuria, pulmonary oedema, hyperpyrexia

### **Differential diagnosis**

- Consider malaria in all patients with febrile illness, including heat illness, and any patient with symptoms of septicaemia.



### **Investigations**

- Microscopy of thick and thin films
- Plasmodium and falciparum antigen tests (available in field laboratory)
- FBC (look for anaemia, and decreased platelets)
- U&E ( $\downarrow$ Na and  $\uparrow$ urea) and urinalysis; glucose ( $\downarrow$ ); LFTs ( $\uparrow$ AST/ALT)



### **Treatment**

- Supportive: rehydration, antipyretics, analgesia

#### **Uncomplicated cases**

- *P.falciparum*: Malarone 4 tablets OD for 3 days
- *P.vivax/P.ovale/P.malariae*: chloroquine (base) 600mg PO **then** 300mg after 6 hours **then** 300mg OD for 2 days
- Primaquine required for *P.vivax*/*P.ovale* after chloroquine

#### **Complicated cases**

- Quinine 20mg/kg IV (max 1.4g) infused over 4 hours then after 8–12 hours give 10mg/kg (max 700mg) infused over 4 hours then repeat every 8–12 hours
- If quinine resistance known or suspected follow with Fansidar (3 tablets) stat or doxycycline 7/7 course

Alternative therapeutic regimens may be acceptable or desirable, but are not supported within the current module scaling



### **Communication**

- Inform Chain of Command

# Subarachnoid haemorrhage

## Treatment guidelines **9h**

**9g-h**

Treatment  
guidelines

**Consider subarachnoid haemorrhage in any ‘worst ever’ or sudden onset headache: “Sudden agonizing headache” is subarachnoid haemorrhage until proven otherwise**

### History

- Most bleeds follow rupture of saccular ('berry') aneurysms in the Circle of Willis.
- Patients report sudden onset and 'worst ever' headache.
- Often described as 'like a blow to the back of the head'.
- Accompanied by neck pain, photophobia and vomiting.
- May present after collapse or fits.
- Drowsiness and confusion may occur.

### Investigation

- This may need to proceed alongside resuscitation.
- Venous access and check glucose, FBC, clotting screen, U&E.
- CXR may show changes of neurogenic pulmonary oedema.
- ECG may demonstrate ischaemic changes.
- Urgent CT head scan to detect intracranial blood (if operationally possible; maximally sensitive within 12 hours). If CT negative do LP to detect xanthochromia.

### Treatment

- Provide adequate analgesia and antiemetic:
  - Codeine 30–60mg PO
  - Paracetamol 1g PO/IV and/or NSAID
  - Morphine titrated.
- If severely agitated or combative intubate and ventilate.
- Maintain MAP c.90mmHg.
- Maintain normal PaO<sub>2</sub> with supplemental oxygen.
- Give at least 3L maintenance fluids/24hrs IV (more if vomiting).
- Aim to evacuate to neurosurgical unit within 24 hours of haemorrhage.

### Further treatment options

- Nimodipine 60mg PO every 4 hours or 1mg/hr IV (**not on deployed module scale**).

# Cerebrovascular accident

## Treatment guidelines **9i**

In cases of suspected ischaemic stroke, the patient's survival and functional recovery **may** depend on prompt recognition and treatment.

### Immediate general assessment

#### First 10 minutes after arrival to the hospital

- Assess the airway, breathing, circulation, and vital signs.
- Provide oxygen by mask, obtain venous access.
- Take blood samples (FBC, U&Es, coagulation studies).
- Check blood glucose (BM Stix): provide treatment if indicated.
- Obtain a 12-lead ECG: check for arrhythmias.
- Perform a mini-neurological assessment including Glasgow Coma Scale.

### Immediate neurological assessment

#### First 25 minutes after arrival to the hospital

- Review the patient's history.
- Establish onset (<3 hours required for thrombolytics).
- Perform a full physical examination.
- Perform a full neurological examination. Determine stroke severity.
- Obtain urgent non-contrast CT scan (door-to-CT scan civilian performance indicator is <25 minutes from arrival) where available (door-to-CT scan read civilian performance indicator is <45 minutes after arrival).

### Management

- CT scan is undertaken to rule out non-ischaemic causes of stroke (e.g. SAH, tumour, traumatic haemorrhage).
- If CT negative, review thrombolytic exclusions and review risk and benefits of thrombolytic therapy for patient.
- If elect for thrombolytic therapy door-to-treatment goal is <60 minutes.

#### Note:

The use of thrombolytic therapy for acute ischaemic stroke is not yet routine in UK civilian practice and the decision to use this therapy must rest with the deployed consultant physician.



# Electrolytes

Treatment guidelines **10**

**9i–10**

Treatment  
guidelines

Hyperkalaemia

Treatment guidelines **10a**

Hypokalaemia

Treatment guidelines **10b**

Hypocalcaemia during massive transfusion

Treatment guidelines **10c**

Hyponatraemia

Treatment guidelines **10d**

Acute renal failure

Treatment guidelines **10e**

**Chemicals & poisoning** – includes CW agents

Treatment guidelines **10f**

**Biological agents & toxins** – includes BW agents

Treatment guidelines **10g**

**Radiation casualties**

Treatment guidelines **10h**

Management of irradiated casualties

Go to **Section 8** → **9**  
Policies

CBRN triage

Go to **Section 2** → **5d–e**  
Incident management

Intentionally blank

# Hyperkalaemia

## Treatment guidelines **10a**

10a

Treatment guidelines

$K^+ \geq 7.0\text{mmol/L}$	<b>Immediate treatment</b>
$K^+ 6.0\text{--}6.9\text{mmol/L} + \text{ECG changes}$	<b>Immediate treatment</b>
$K^+ 5.3\text{--}5.9\text{mmol/L}$	<b>Recheck +/- enteral</b>

### ECG changes

- Tented T-wave
- Broad QRS
- Flattened/absent P-wave

#### Immediate treatment

- **Stop** any potassium supplements (IV/PO)
- **Give** 10ml 10% calcium gluconate IV
- **Start** salbutamol nebuliser 5mg (2.5mg if ischaemic heart disease)
- **Give** 25ml 50% dextrose + 10iu Actrapid insulin IV over 15 minutes
- **Give** 50–100mmol sodium bicarbonate IV
  - 50–100mls 8.4% over 30 minutes via central line or
  - 200–400ml 2.1% over 30 minutes via peripheral line

#### Continuing treatment

- **Do** blood gasses
- **Consider** repeat doses of calcium gluconate every 10–20 minutes until ECG normal or to maximum of 50ml
- **Consider** 1 litre 20% glucose + 100iu Actrapid at 2ml/kg/hour

#### Enteral treatment

- **Consider** calcium resonium 30g enema, followed by 15g PO TDS in water with oral lactulose 10–20ml (up to QDS)

#### Dialysis requirements

- Persistent  $K^+ > 7.0\text{mmol/L}$
- Fluid overload (pulmonary oedema)
- Symptomatic uraemia (urea likely  $> 45\text{mmol/L}$ )
- Acidosis, pH  $< 7.1$
- Pericarditis

**Recheck potassium hourly  
until  $< 6.0\text{mmol/L}$  (unless chronic)**

# Hypokalaemia

## Treatment guidelines **10b**

### **Severe <2.5mmol/L**

- Replace intravenously, 40mmol/hour maximum, ideally via central line. Use ECG monitoring.
- Continuing therapy will be determined by response.

### **Moderate 2.5–3.0mmol/L**

- **If receiving digoxin or ECG changes ('u' waves)** replace intravenously, 40mmol/hour maximum (40mmols in 100mls sodium chloride/dextrose over 1hour, ideally via central line) .
- Use ECG monitoring.
- If not receiving digoxin **give** Sando-K, 4 tablets stat.
- Continuing therapy will be determined by response and estimation of ongoing losses.

### **Mild >3.0mmol/L requiring replacement**

- **Give** Sando-K, 2 tablets stat.
- Continuing therapy will be determined by response and estimation of ongoing losses.

# Hypocalcaemia during massive transfusion

**10b–10c**

Treatment guidelines

## Treatment guidelines **10c**

### **Definition**

Hypocalcaemia is a corrected serum calcium less than 2.20mmol/L, or an ionized calcium <1.0mmol/L.

The normal range for total serum calcium is 2.20-2.65mmol/L and the measured value requires to be corrected for the albumin concentration:

- Correction factor (serum calcium concentration [mmol/L]):  
 – +0.02 for every 1.0g/L albumin below 40g/L  
 – -0.02 for every 1.0g/L albumin above 40g/L

The normal range for serum ionized (free) calcium is 1.0-1.3mmol/L.

### **Symptomatic or severe hypocalcaemia**

Symptoms usually occur with total serum calcium levels of less than 1.8mmol/L (ionized calcium less than 0.7mmol/L).

Acute hypocalcaemia causes neurological excitability with:

- Peri-oral or peripheral paraesthesia
- Hyperreflexia
- Tetany, muscle cramps, seizures
- Chvostek's sign: tap over the facial nerve in the parotid gland, approximately 2cm anterior to the tragus of the ear  
 – Twitching at the angle of the mouth
- Trousseau's sign: inflate blood pressure cuff to above the systolic pressure for about 2 minutes (obstructs the brachial artery and causes ulnar and median nerve ischaemia and results in carpal spasm)

Complications include:

- Hypotension, bradycardia, cardiac failure
- Prolonged Q-T interval, arrhythmias
- Intellectual deterioration
- Laryngospasm
- Bronchospasm

### **Intravenous calcium supplementation**

- 10% calcium gluconate solution is the first choice.
- 10% calcium chloride may be used, but can cause tissue necrosis if extravasated.
- Give 10mls calcium gluconate slowly over 10-20 minutes, with continuous ECG monitoring.
- Ionized calcium should be monitored and this is available on ISTAT EG7 cartridge from an

# Hypocalcaemia during massive transfusion

## Treatment guidelines **10c** (Cont'd)

arterial blood sample.

- Consider the need for further calcium after each 4 units of stored red cells transfused: determine the requirement by regular monitoring of ionized calcium levels and clinical symptoms/signs.

### Cautions

- Undiluted calcium should not be used as it causes thrombophlebitis.
- Calcium must not be given through the same line as NaHCO<sub>3</sub> (sodium bicarbonate) as this will result in precipitation of calcium carbonate.

### Monitor

- ECG
- Improvement in clinical signs and symptoms
- Serial blood levels (ionized calcium).

### Source

Guideline adapted from National Library for Health, Map of Medicine, dated 29 Jan 2009.

**Also see Cardiac Arrest or Cardiovascular Collapse caused by local Anaesthetic (Treatment Guidelines 1c) and Management of Massive Haemorrhage on Operations Policies 10**

# Hyponatraemia

## Treatment guidelines **10d**

**10c–d**

Treatment  
guidelines

### Diagnostic features

- Mild hyponatraemia is commonly seen in soldiers excessively drinking water.
- Confusion and irritability occur with serum levels ~120mmol/L.
- Coma, fits and death occur with serum levels ~110mmol/L.
- Assessment of volume status helps diagnosis and management.

### Management

- Exclude pseudohyponatraemia.** Lipaemic serum, hyperglycaemia, and mannitol (*et al*) give a falsely low reading. Calculate the osmolarity  $[2 \times (\text{Na}^+ + \text{K}^+) + \text{urea} + \text{glucose}]$  and compare with the measured osmolarity. Is there an ↑osmolar gap?
- If coma or fits.** Start infusion of 0.9% sodium chloride ~500ml/hour until hypertonic saline available. Give 1.8% sodium chloride at 70mmol Na<sup>+</sup>/hour until serum sodium >120mmol/L.
- If volume depleted (dehydrated).** Start 0.9% sodium chloride infusion. Add colloid if hypotensive. Monitor urine output and CVP. Beware of cardiac failure.
- If not dehydrated.** For patients with SIADH restrict input to 800–1000ml/24hour. If Na<sup>+</sup> <125mmol/L and unresponsive to fluid restriction consider demeclocycline 300mg tds PO. Seek expert help early.

The diagnosis of the cause of hyponatraemia and its management is a complex issue, requiring the early involvement of the appropriate consultants

Osmotic demyelination, caused by too rapid an elevation of serum sodium in established hyponatraemia is often irreversible

# Acute renal failure

## Treatment guidelines **10e**

### **Assess renal reserve**

Estimated glomerular filtration rate (eGFR) can be derived from serum creatinine (preferred to urea as it is independent of dietary protein intake) by the Cockcroft-Gault equation:

- eGFR in males =  $[140 - \text{Age(yrs)}] \times \text{Wt(kg)} / [\text{serum creatinine } (\mu\text{mol/l}) \times 0.814]$
- eGFR in females: multiply the result of the above equation by 0.85.

Normal eGFR is ~120mls/min. Critical minimum=20ml/min. A rising creatinine and falling eGFR indicates a potential need for renal replacement treatment. Seek advice from a nephrologist if management is uncertain.

### **Causes of impaired renal function**

These are classified into three groups:

- **Pre-renal** = poor renal perfusion (best sign: hypotension especially if this is postural)
- **Renal** = nephritis (best sign: urinary dipsticks show blood, protein or both)
- **Post-renal** = obstruction (best sign: obstruction on ultrasound).

### **Indications for renal replacement treatment (haemofiltration, dialysis etc)**

There are four indications for renal replacement. The presence of any one that fails to respond to conservative measures qualifies:

- Fluid overload (pulmonary oedema)
- Hyperkalaemia ( $[K^+] > 6.5 \text{ mmol/l}$ )
- Urea  $> 40 \text{ mmol/l}$
- Metabolic acidosis ( $[HCO_3^-] < 12 \text{ mmol/l}$ ).

### **Diagnosis and treatment of oliguric acute renal failure**

- Most causes are medical, usually due to reduced renal perfusion following hypotension (secondary to absolute or relative hypovolaemia), but nephritis is a possibility.
- **Normal urine output is about 1500mls/24hrs = 60ml/hr**

**Acute renal failure = 400ml/24hrs = 18.5ml/hr**

Hourly urine output and renal function tests (especially serum creatinine) should be monitored regularly in seriously ill patients as soon as medical assessment commences, especially in patients who have suffered trauma, burns or infection who are at particular risk. In these patients, attention should be paid to restoration of peripheral oxygen delivery (increasing pulmonary arterial oxygenation and peripheral blood flow).

# Chemicals & poisons

Treatment guidelines **10f**

**10e-f**

Treatment  
guidelines

## Drugs in overdose

Poisoning: general

Treatment guidelines **10f(i)**

## Chemical weapons

Cyanide

Treatment guidelines **10f(ii)**

Incapacitating agents

Treatment guidelines **10f(iii)**

Inhalational

Treatment guidelines **10f(iv)**

Methaemoglobinæmia

Treatment guidelines **10f(v)**

Organophosphates

Treatment guidelines **10f(vi)**

Vesicants

Treatment guidelines **10f(vii)**

Phosgene

Treatment guidelines **10f(viii)**

Intentionally blank

# Poisoning: general

## Treatment guidelines **10f(i)**

**10f(i)**

Treatment  
guidelines

### General care

- All patients who show features of poisoning should generally be admitted.
- If possible, identify the type and quantity of poison and the time at which taken.
- Most poisoning cases are treated by managing symptoms as they arise.

### Respiration

- Respiration is often impaired in unconscious patients; most poisons that impair consciousness also depress respiration. Respiratory stimulants do not help and should be avoided.
- Give high concentration oxygen, especially with carbon monoxide poisoning or inhalation of irritant gases. Avoid oxygen in paraquat poisoning.
- Support airway and breathing as required.

Go to

and

3  
Treatment  
guidelines

5  
Treatment  
guidelines

### Blood pressure

- Hypotension is common in severe poisoning with central nervous system depressants. Support blood pressure with a combination of head-down positioning and the use of intravenous crystalloids (e.g. 0.9% NaCl).
- Hypertension is less common and is usually transient: it may be associated with illicit sympathomimetic drugs (e.g. amphetamines and cocaine).

### Heart

- Conduction defects and arrhythmias can occur, notably with tricyclic antidepressants, some antihistamines, and coproxamol. Treatment is targeted at correcting hypoxia and acidosis or other biochemical abnormality rather than antiarrhythmic drugs.

### Body temperature

- Hypothermia is common in unconscious patients. Core temperature should be monitored and managed.
- Hyperthermia can occur after ingestion of some CNS stimulants. Cool with tepid sponging and a fan to aid evaporation: **do not use iced water**.

### Convulsions

- Short lived convulsions do not require treatment.
- For protracted convulsions:

Go to

9b  
Treatment  
guidelines

# Poisoning: general

## Treatment guidelines **10f(i)** (Cont'd)

### **Removal from gastrointestinal tract**

- **Induction of vomiting is not indicated.**
- Gastric lavage is only indicated where the following are true:
  - Life threatening amount of drug has been ingested in the last hour
  - Airway can be adequately protected
  - Poison cannot be adsorbed by charcoal (e.g. iron or lithium).

### **Prevention of absorption using activated charcoal**

- Activated charcoal can bind to poisons and reduce absorption.
- The sooner it is given, the more effective it is (but may still be effective up to an hour or more after ingestion of the poison).
- It is particularly useful where small amounts of drug are toxic, e.g. antidepressants:
  - Adult: 50g initially, repeated if necessary
  - Child under 12yrs: 25g (50g in severe poisoning).
- Charcoal should **not** be used when poisoned with:
  - Petroleum distillates
  - Corrosive substances
  - Alcohol
  - Iron
  - Lithium.

### **Resources for further information**

- [www.spib.axl.co.uk](http://www.spib.axl.co.uk) (TOXBASE) is available to registered users.
- National Poisons Information Service: phone numbers are listed inside the cover of the *British National Formulary* (0870 600 6266 via Whitehall Operator).

# Cyanide

## Treatment guidelines 10f(ii)

10f(i)–(ii)

Treatment guidelines

### Specific agents

- Hydrogen Cyanide (AC)
- Cyanogen Chloride (CK)
- Nitrile compounds
- Hydrogen Sulphide (HS)

### Contamination

#### Personal protective equipment decontamination

- Limited requirement due to vapour
- Dilution of any liquid contamination

### PPE

#### Decontamination (warm) team

- IPE (4R)

#### Medical (warm) team

- IPE (4R) and surgical gloves (change every 10–15 minutes)

### Signs and symptoms (onset seconds to minutes)

#### Airway

- Odour – bad eggs (HS)

#### Breathing

- Pink skin (early)
- Cyanosis (late)
- Respiratory distress
- Apnoea

#### Circulation

- Arterialised venous blood

#### Disability

- Loss of consciousness
- Seizures

#### Exposure/skin

#### Other

- Metabolic acidosis
- Lactate
- Bicarbonate

Significant poisoning after 15 minutes is unlikely, unless continuing or further exposure.

## Treatment Role 1 and beyond

### Severity

- Mild  
Dizziness, anxiety, tachycardia, nausea, drowsiness.
- Moderate  
loss of consciousness, convulsions, vomiting, cyanosis.
- Severe  
Deep coma, fixed unreactive pupils, cardiorespiratory failure, cardiac arrhythmias and pulmonary oedema.

### 100% Oxygen and IV/IO access

Serum lactate & bicarbonate (where available at Role 3)

mild → Severity? → moderate/severe

### Supportive management and monitoring

yes → Haemodynamically unstable or significant blood loss?

possible → Symptoms due to cyanide poisoning?

no → Possible CO poisoning?

definite → Dicobalt edetate

### Sodium thiosulphate only (see note)

25mls of 50% solution (12.5mg) IV over 10 minutes

### Sodium nitrite

10mls of 3% solution (300mg) IV over 5–20 minutes, followed by Sodium Thiosulphate 25mls of 50% solution (12.5mg) IV over 10 minutes (see note)

### Dicobalt edetate

300mg IV over one minute followed by a further 300mg if response does not occur after one minute, followed by dextrose (50mls of 50% dextrose solution)

**Note:** only sodium nitrite is required for HS poisoning

# Incapacitating agents

## Treatment guidelines 10f(iii)

- Specific agents**
- Atropine
  - BZ (Agent 15)
  - Nerve agents
  - Other incapacitating agents
  - Biological agent (encephalic syndrome)
  - Illicit drug use

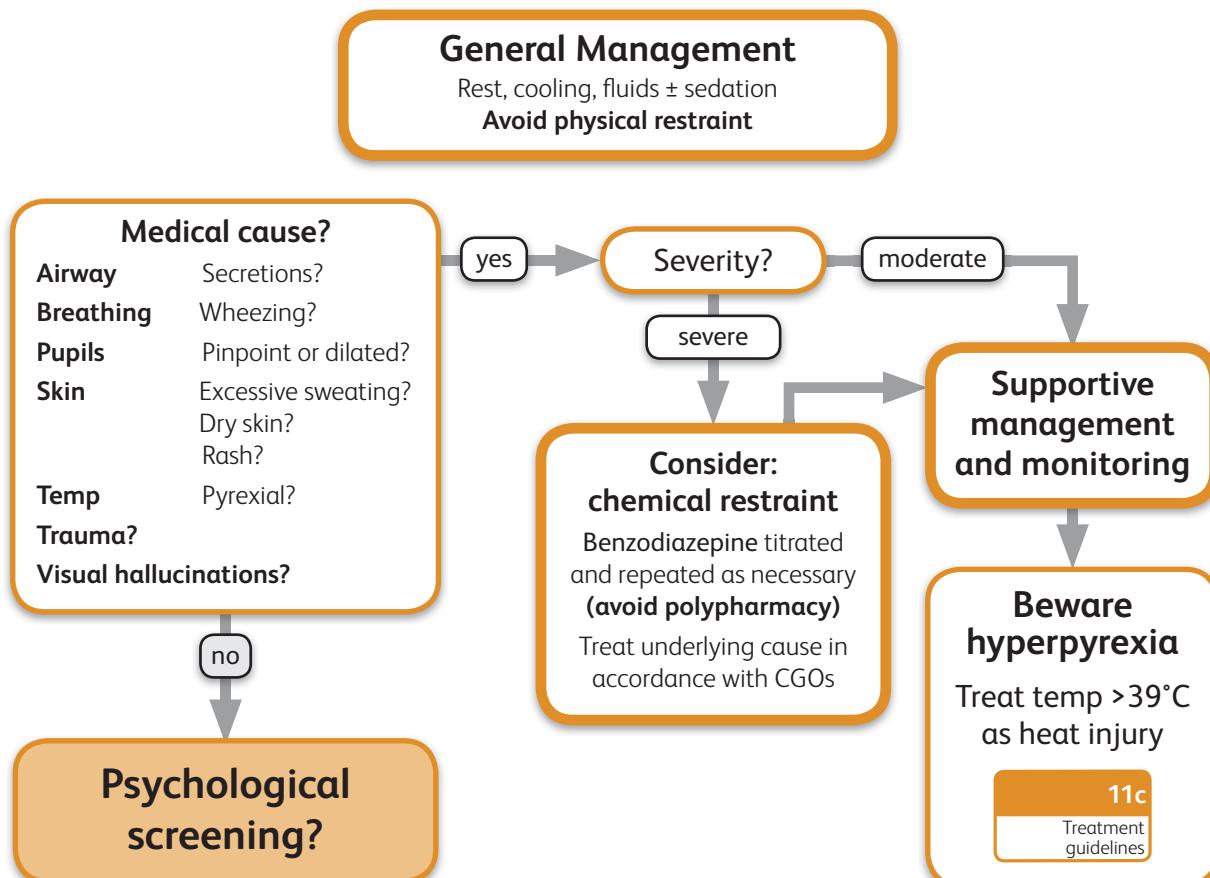
- Contamination**
- Personal protective equipment decontamination**
- Detergent solution
  - Hypochlorite (0.5%) solution
  - Copious water

- PPE**
- Decontamination team**
- IPE (4R)
- Medical team**
- IPE (4R) and surgical gloves (change every 10–15 minutes and caution with Lewisite)

### Signs and symptoms (dependent on causation)

Nuclear/Radiological	Significant irradiation dose >0.5Gy, nausea and vomiting, diarrhoea
Chemical (nerve agent)	Pinpoint pupils, dimness of vision, increased secretions, wheezing, excessive sweating
Chemical (atropine/BZ)	Dry mouth, dilated pupils, dry skin – “Mad as a hatter, blind as a bat, dry as a bone, red as a beet, hot as hell”
Chemical (opiate)	Pinpoint pupils, respiratory depression
Biological/Medical	Delirium, pyrexia, encephalitic syndrome
Conventional injury	Head injury, barotrauma, deafness, shock, hypoxia

### Differentiation and treatment of psychiatric symptoms



# Inhalational

## Treatment guidelines 10f(iv)

10f(iii)–(iv)

Treatment guidelines

### Specific agents

- Chlorine
- Phosgene
- Smoke inhalation (Cyanide /carbon monoxide/nitrous fumes)

### Contamination

#### Personal protective equipment decontamination

- Ensure no liquid hazard (unlikely unless in very cold climate)

### PPE

#### Decontamination team

- IPE (4R)

#### Medical team

- IPE (4R) and surgical gloves (change every 10–15 minutes)

### Signs and symptoms (dependent on causation)

#### Airway

- Rhinorrhea
- Mucosal irritation
- Laryngeal oedema

#### Breathing

- Dyspnoea/ coughing
- Pulmonary oedema
- Cyanosis
- Chest pain

#### Circulation

- Possible hypovolemia

#### Disability

#### Exposure/skin

- Chemical burns
- Frost bite, if exposed to pressurised liquid

#### Other

- Respiratory alkalosis
- Metabolic acidosis (2° to hypoxia or hyperchloraemia)

Initial symptoms may be experienced in chlorine exposure (stinging eyes, lacrimation and blepharospasm). Phosgene symptoms may be delayed and in the absence of initial signs of exposure.

#### Differential diagnosis

Cardiogenic pulmonary oedema, pneumonia, secondary drowning.

## Treatment Role 1

### Symptomatic treatment

- Dyspnoea
- Tachypnoeic
- Frothy sputum or cough
- Desaturating (<93%) (where measurable)

### Oxygen therapy

#### Supportive management:

- Bronchodilators (salbutamol)
- **Avoid exertion**

## Role 2 and beyond

### Severity?

mild/  
moderate

### Reassess

Chlorine: for at least 24 hours  
Phosgene: for at least 72 hours

### Respiratory support

- CPAP (if available)  
**or**  
Intubation and mechanical ventilation (with PEEP)
- For phosgene exposure:  
consider N-acetylcysteine nebulisers (Sciuto *et al*, 1995)
- For cases of possible cyanide:  
consider sodium thiosulphate alone iaw Cyanide Guideline or Hydroxycobalamin (Vitamin B12)

### Oxygen therapy (humidified)

#### Supportive management:

- Bronchodilators (salbutamol)
  - Avoid exertion
- Monitoring:
- ABGs
  - CXR

# Methaemoglobinæmia

## Treatment guidelines **10f(v)**

- Specific agents**
- Amyl/sodium nitrite
  - (cyanide antidote kit)
  - Toxic Industrial Chemicals
  - Local anaesthetics (G6PD deficiency)

- Contamination**  
Personal protective equipment decontamination
- Dependent on causation

- PPE**  
Decontamination team
- Dependent on agent
- Medical team**
- Dependent on team

### Signs and symptoms (dependent on causation)

Airway	Breathing	Circulation	Disability	Exposure/skin	Other
	<ul style="list-style-type: none"> <li>• Cyanosis (unresponsive to oxygen)</li> <li>• Dyspnoea</li> <li>• Abnormal pulse oximetry</li> </ul>	<ul style="list-style-type: none"> <li>• Chocolate coloured venous blood</li> <li>• Dysrhythmias</li> <li>• Cardiac ischemia</li> </ul>	<ul style="list-style-type: none"> <li>• Confusion</li> <li>• Seizures</li> </ul>	<ul style="list-style-type: none"> <li>• Cyanosis</li> </ul>	

15–20% may be asymptomatic, with possible cyanosis

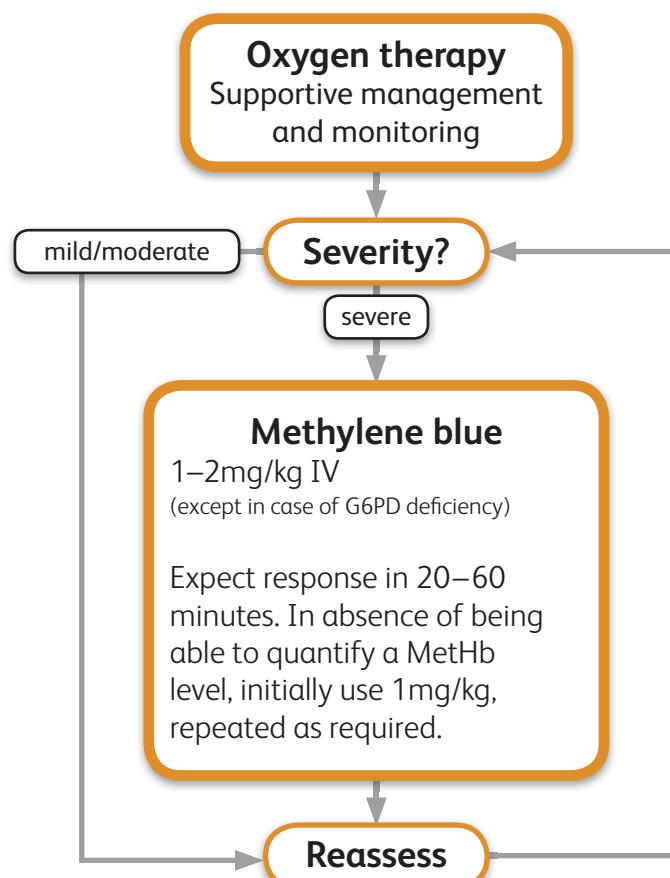
Death at ~70% MetHb

#### Differential diagnosis

Carbon monoxide poisoning (concurrent)

Cyanide poisoning (arterialised venous blood)

## Treatment



# Organophosphates

## Treatment guidelines 10f(vi)

10f(v)–(vi)

Treatment guidelines

- Specific agents**
- Tabun (GA)
  - Sarin (GB)
  - Soman (GD)
  - GF
  - Vx
  - Organophosphates

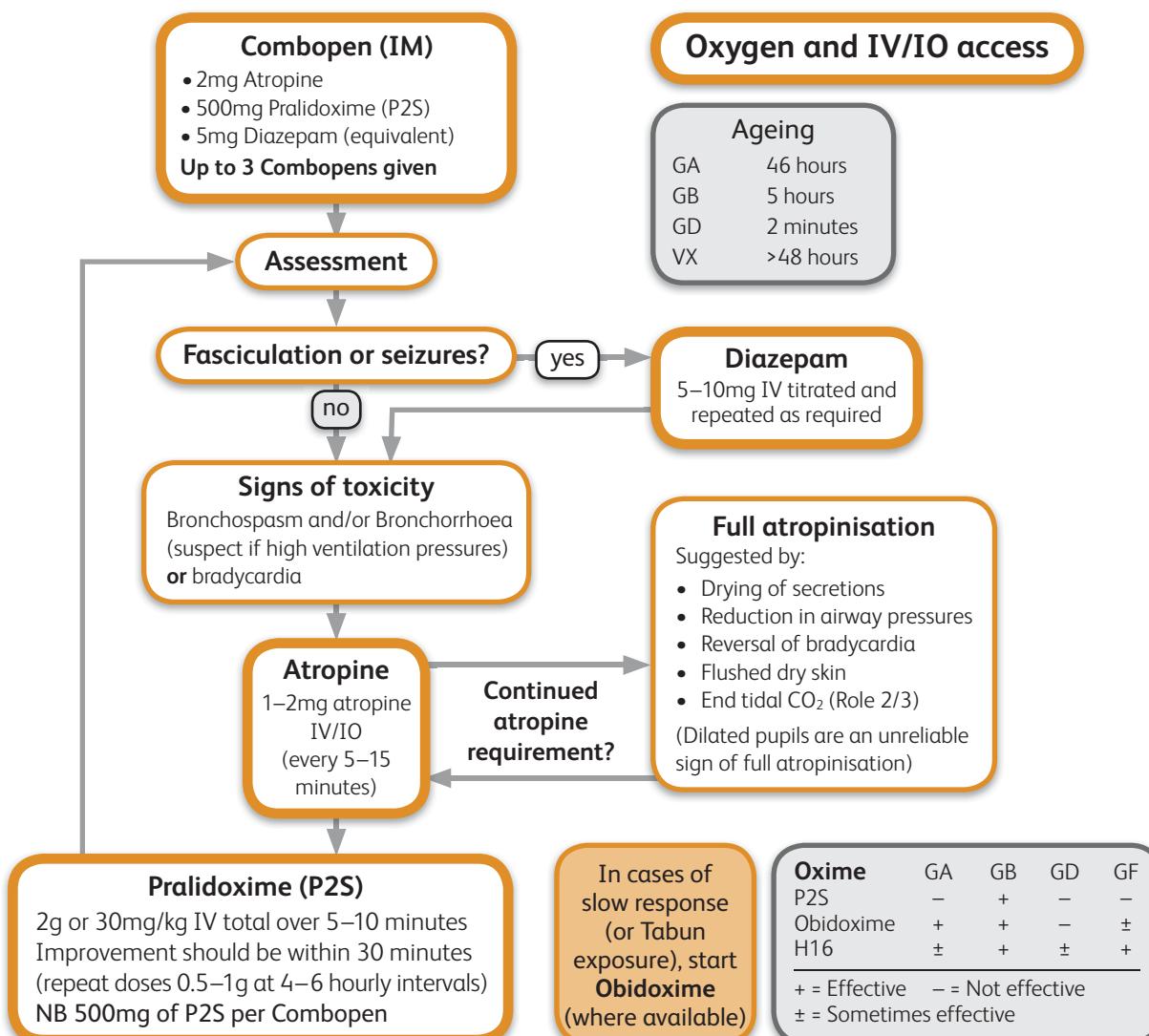
- Contamination**  
**Personal protective equipment decontamination**
- Dilution and open-air circulation
  - Detergent solution
  - Hypochlorite (0.5%) solution

- PPE**  
**Decontamination team**
- IPE
- Medical team**
- IPE (4R) and surgical gloves (change every 10–15 minutes)

### Signs and symptoms (dependent on causation)

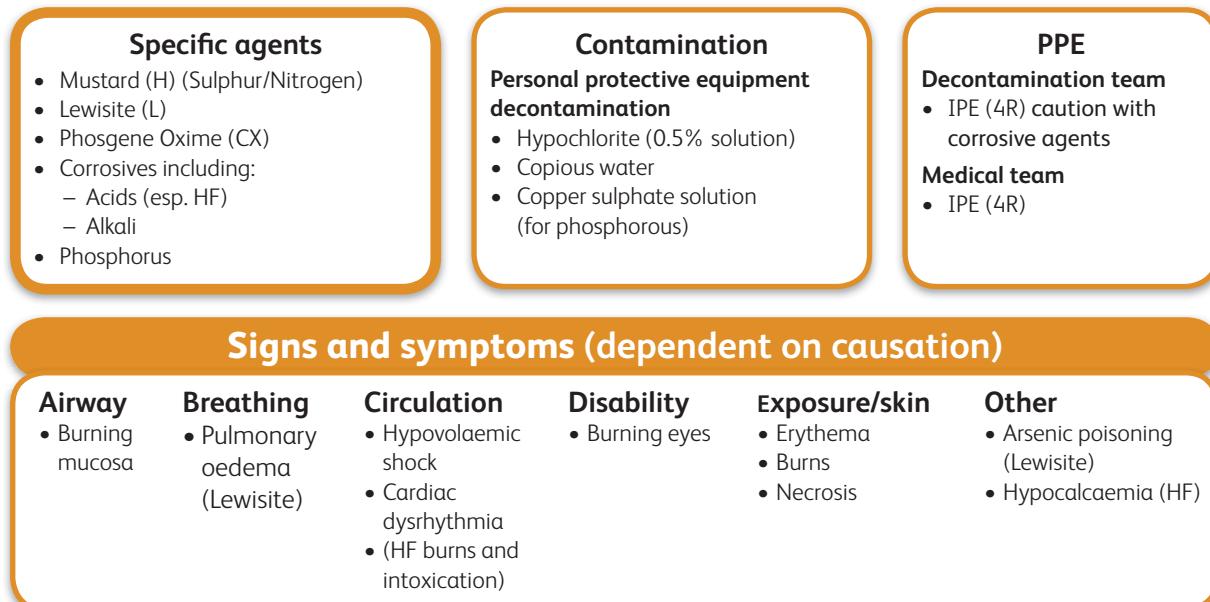
Airway	Breathing	Circulation	Disability	Exposure/ skin	Other
<ul style="list-style-type: none"> <li>• Increased secretions</li> <li>• Rhinorrhoea</li> <li>• Bronchorrhoea</li> </ul>	<ul style="list-style-type: none"> <li>• Bronchoconstriction</li> <li>• Respiratory distress and failure</li> <li>• Apnoea</li> </ul>	<ul style="list-style-type: none"> <li>• Bradycardia</li> </ul>	<ul style="list-style-type: none"> <li>• Pinpoint pupils (miosis)</li> <li>• Dimmed vision</li> <li>• Loss of consciousness</li> <li>• Seizures</li> </ul>	<ul style="list-style-type: none"> <li>• Sweating</li> <li>• Fasciculation</li> <li>• Paralysis</li> </ul>	<ul style="list-style-type: none"> <li>• Decreased urinary output</li> <li>• Gastric stasis</li> </ul>

## Treatment

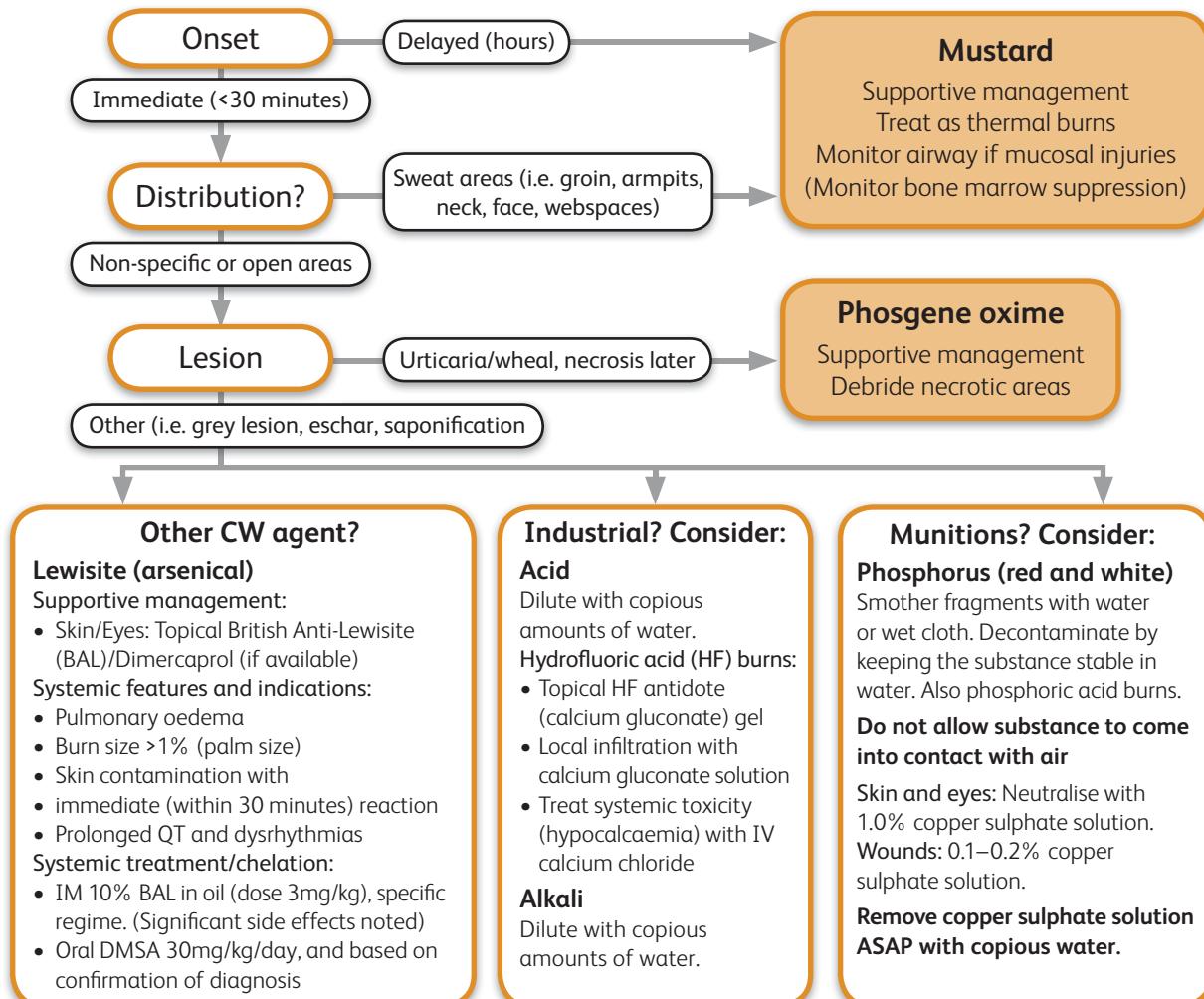


# Vesicants

## Treatment guidelines 10f(vii)



## Differentiation and treatment of skin symptoms



# Phosgene

## Treatment guidelines **10f(viii)**

**10f(vii)–(viii)**

Treatment  
guidelines

Inhalation of phosgene results in a fulminating pulmonary oedema that is incapacitating and may be fatal.

### Signs and symptoms (dependent on causation and exposure)

Airway	Breathing	Circulation	Disability	Exposure/skin	Other
<ul style="list-style-type: none"> <li>• Rhinorrhoea</li> <li>• Mucosal irritation</li> <li>• Laryngeal oedema</li> </ul>	<ul style="list-style-type: none"> <li>• Dyspnoea</li> <li>• Coughing</li> <li>• Pulmonary oedema</li> <li>• Cyanosis</li> <li>• Chest pain</li> <li>• Expiratory wheeze</li> </ul>	<ul style="list-style-type: none"> <li>• Possible hypovolaemia</li> </ul>		<ul style="list-style-type: none"> <li>• Chemical burns</li> <li>• Frost bite, if exposed to pressurised liquid</li> </ul>	<ul style="list-style-type: none"> <li>• Respiratory alkalosis</li> <li>• Metabolic acidosis</li> </ul>

- After a latency period of 6 to 12 hours, acute pulmonary oedema becomes clinically apparent resulting in severe respiratory distress.
- Death may occur from anoxia 6 to 24 hours after exposure.

### Diagnosis

There are few signs or symptoms for up to six hours post exposure. A high index of suspicion is required.

### Symptoms

Initially a dry cough, then chest tightness and/or dyspnoea.

### Signs

Expiratory wheeze or tachypnoea (little else in early stages).

Intentionally blank

# Biological agents & toxins

Treatment guidelines **10g**

**10g**

Treatment  
guidelines

Anthrax

Treatment guidelines **10g(i)**

Botulinum toxin

Treatment guidelines **10g(ii)**

Marine envenomation

Treatment guidelines **10g(iii)**

Plague

Treatment guidelines **10g(iv)**

Plants & mushroom

Treatment guidelines **10g(v)**

Q-Fever

Treatment guidelines **10g(vi)**

Ricin

Treatment guidelines **10g(vii)**

Smallpox

Treatment guidelines **10g(viii)**

Staphylococcal toxin

Treatment guidelines **10g(ix)**

Tularaemia

Treatment guidelines **10g(x)**

Viral haemorrhagic fever

Treatment guidelines **10g(xi)**

Vomiting & diarrhoea

Treatment guidelines **10g(xii)**

Intentionally blank

# Anthrax

## Treatment guidelines **10g(i)**

10g(i)

Treatment guidelines

### Personal protection



### standard precautions



Secretions and lesions are infectious



Corpses are highly infectious (release of spores): use a non-porous body bag

### for body handling



or high particulate filter mask



### Presentation

#### Cutaneous anthrax:

- Rapidly growing painless papule (ulcerates, becoming a dry black scab with surrounding purple vesicles-eschar)
- Local oedema + regional lymphadenopathy
- Pus indicates secondary infection
- Associated rigors, headache, vomiting
- Low mortality

#### Pulmonary anthrax:

- Abrupt onset; may be brief initial improvement before sudden worsening
- Rigors, dyspnoea, cyanosis
  - High mortality, even with ICU support

#### Gastrointestinal anthrax:

- Fever, toxæmia, nausea, vomiting, anorexia, haemolytic colitis
  - High mortality secondary to ingested spore



### Investigations

- Microscopy of vesicle fluid from under eschar/lymph node exudates
- Culture blood, CSF, lymph node exudates
- Chest X-ray in pulmonary anthrax shows mediastinal widening (not always)
- Sputum is often negative for bacilli



### Treatment

- Ciprofloxacin 400mg IV BD **or** 500mg PO BD  
**or**
- Doxycycline 200mg IV/PO stat then 100mg IV/PO BD

**The route of administration is determined by the severity of infection**



### Communication

- Inform Chain of Command

# Botulinum toxin

## Treatment guidelines 10g(ii)

### Specific agents

Botulinum toxin (of biological origin, from *Clostridium botulinum*)

### Contamination

Universal precautions  
Decontamination:  

- Soap and water
- Caution with body fluids

Not contagious

### PPE

Decontamination Team & Medical Team to wear surgical mask, gloves and apron

### Signs and symptoms (onset hours to days) Anticholinergic symptoms without CNS features

#### Airway

- Dry mouth
- Dysphagia
- Dysphasia

#### Breathing

- Dyspnoea
- Respiratory paralysis

#### Circulation

#### Disability

- ALERT  
Cranial nerve palsies  
Blurred vision  
Dilated pupils  
Diplopia  
Descending flaccid paralysis

#### Exposure/skin

Dry skin

- Nausea & vomiting  
Urinary retention  
Constipation

#### Differential diagnosis:

- Guillain-Barré (Miller-Fisher) syndrome: characterised by ascending paralysis
- Tetanus – look for involuntary muscle spasms
- Nerve agent – produces cholinergic toxidrome (increased secretions + CNS involvement)
- Atropine poisoning: produces anticholinergic toxidrome + CNS involvement

## Treatment

### Role 1

### Role 2 and beyond

### Supportive management

mild/moderate

Severity?

severe

### Aggressive respiratory support

Continuing deterioration?

no

### Antitoxin

- Give 1 vial of polyvalent botulinum antitoxin
- Check preparation for specific precautions
- Only effective if circulating toxin present

# Marine envenomation

## Treatment guidelines **10g(iii)**

**10g(ii)–(iii)**

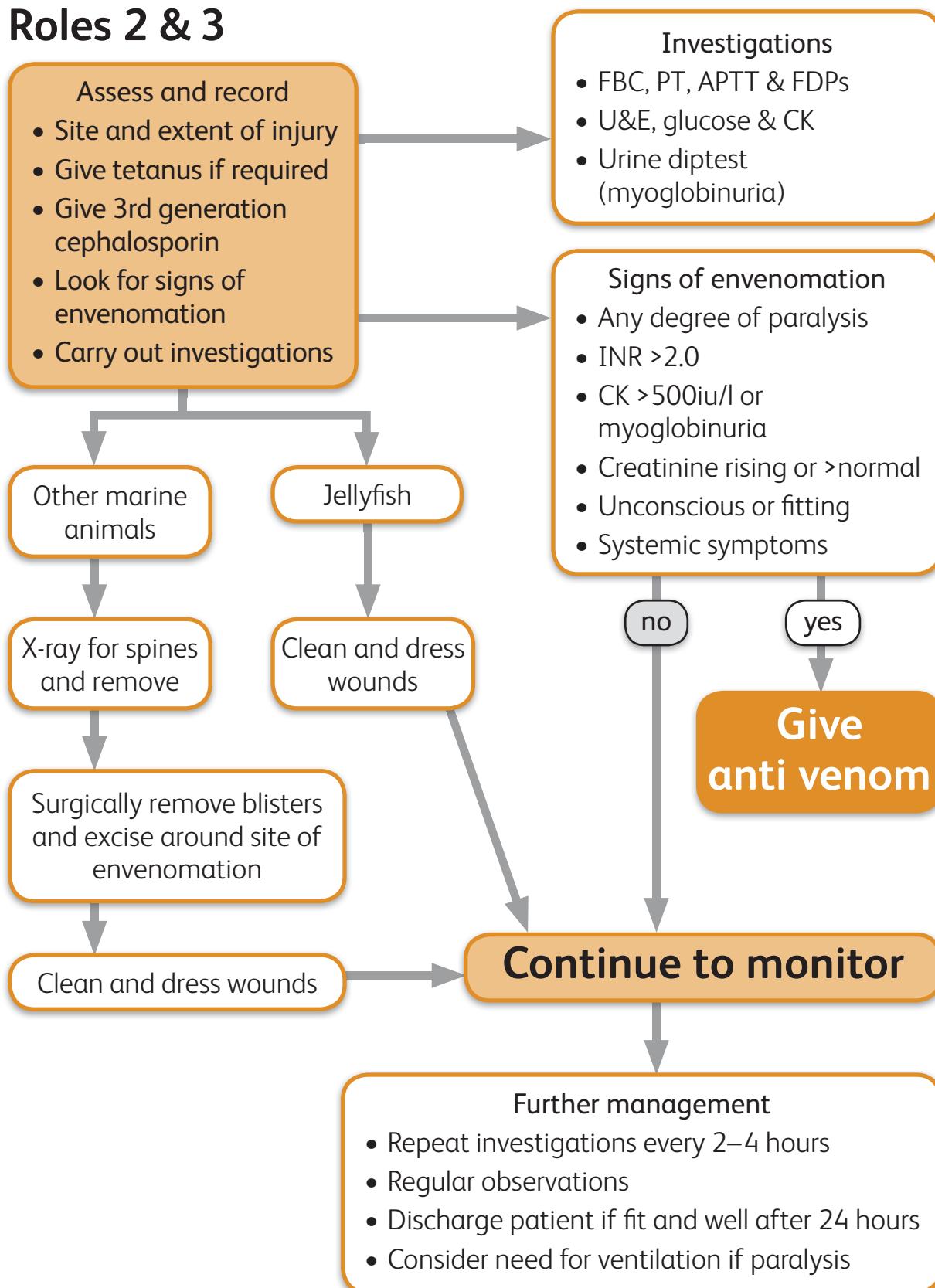
Treatment guidelines



# Marine envenomation

## Treatment guidelines **10g(iii)** (Cont'd)

### Roles 2 & 3



# Plague

## Treatment guidelines **10g(iv)**

**10g(iii)–(iv)**

Treatment  
guidelines

### Personal protection



or  
high particulate  
filter mask + visor

if  
respiratory symptoms  
(pneumonic plague)



+ **isolate pneumonic plague cases**



Person-to-person spread via respiratory droplets or contact with pus from buboes



- Sporadic cases endemic in some geographical areas; spread by fleas from rodent vector
- BW cases will be pneumonic, rapidly progressive, and highly infectious



### Presentation

**Initially non-specific symptoms:** high fever, chills, myalgia, headache.

- **Pneumonic plague:** cluster of pneumonia cases (aerosolised deliberate attack) with bloody sputum, mediastinitis + pleural effusion. Short incubation period (~2 days)
- **Sporadic plague:** affects lymph nodes (e.g. inguinal nodes) which become tender & swollen, and may suppurate (buboes). Secondary symptoms are cough and haemoptysis

### Differential diagnosis

- Acute respiratory infections, including anthrax



### Investigations

- Microscopy and culture of sputum or bubo aspirate
- Acute and convalescent sera (send to UK)
- Chest X-ray: pneumonia with mediastinal lymphadenopathy +/- pleural effusion



### Management

- Ciprofloxacin 400mg IV BD **or** 500mg PO BD  
**or**
- Doxycycline 200mg IV stat then 100mg IV BD or 100mg PO BD
- Source isolation in the hospital environment



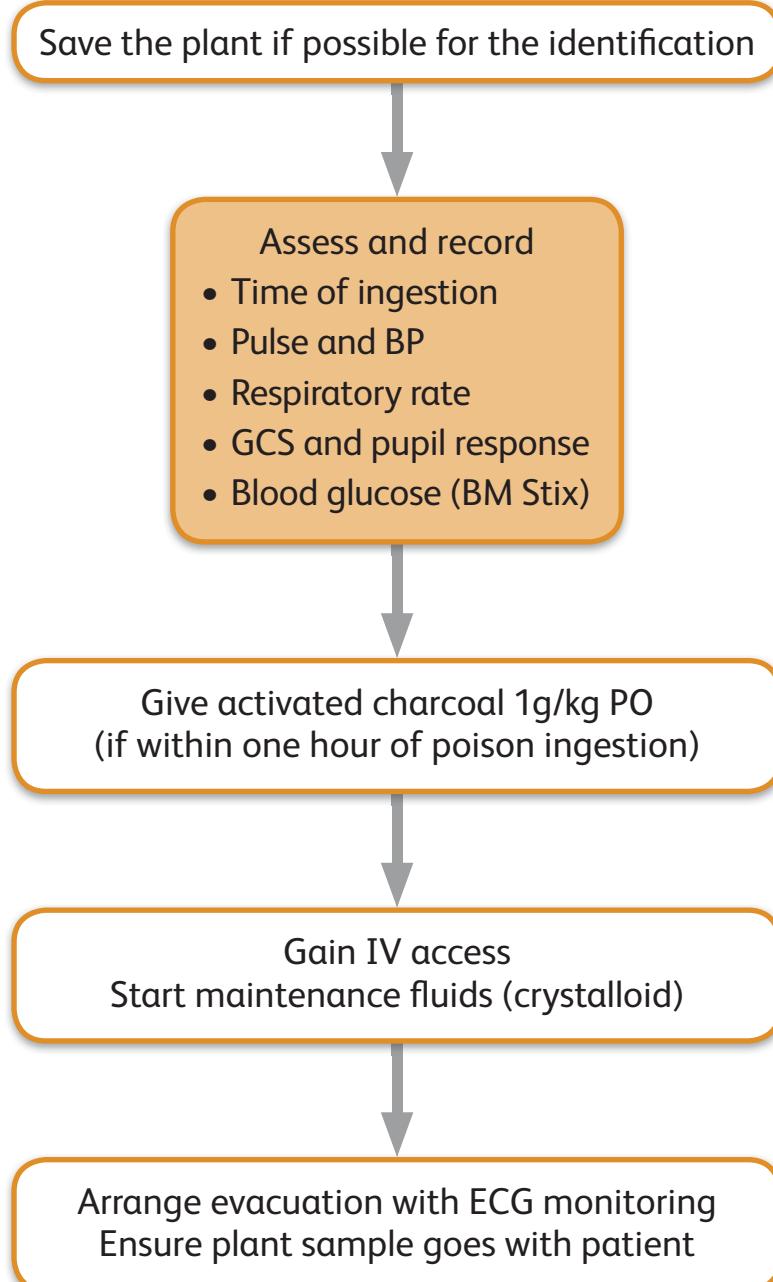
### Communication

- Inform Chain of Command

# Plants & mushroom

## Treatment guidelines **10g(v)**

### Role 1



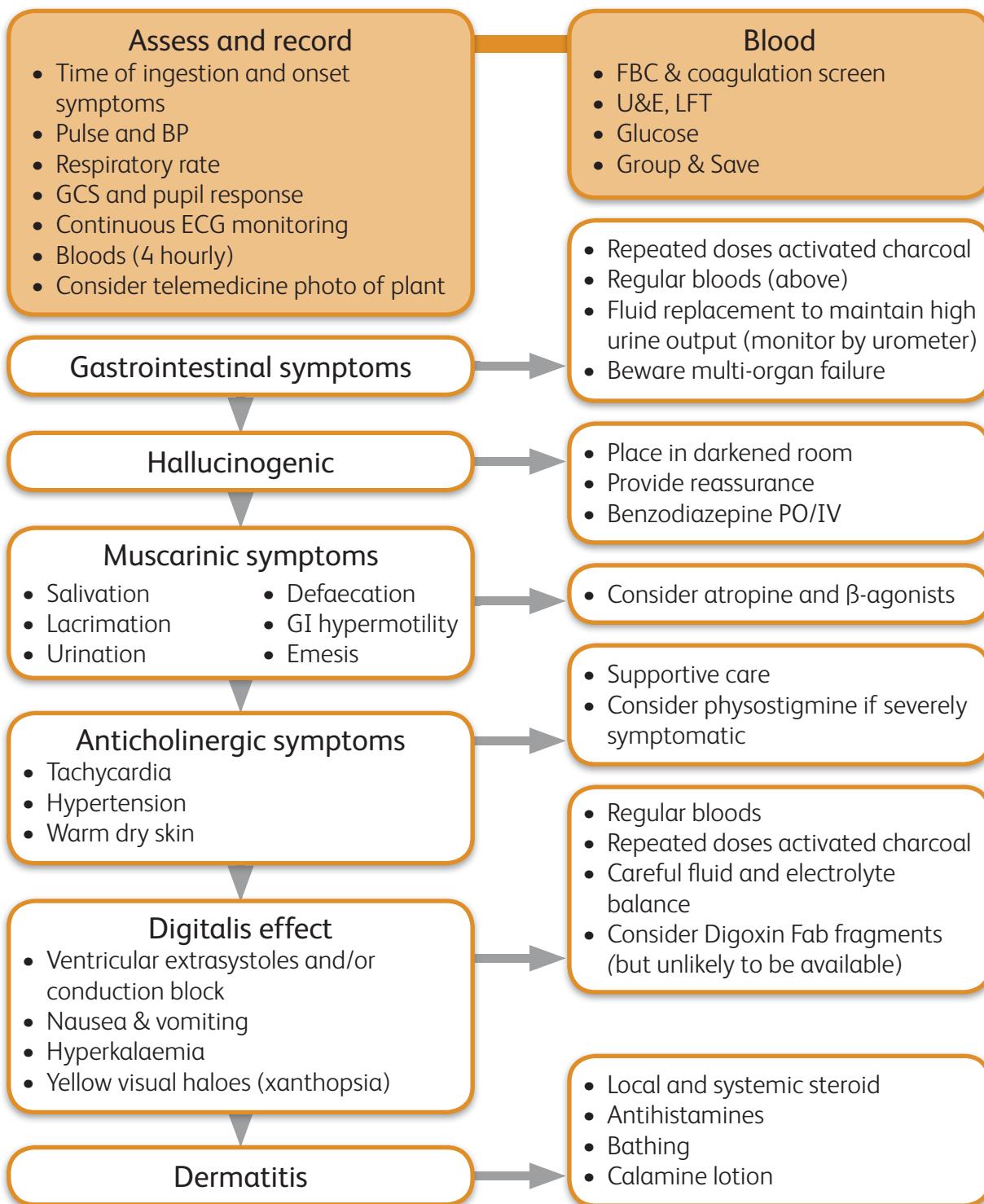
# Plants & mushroom

## Treatment guidelines **10g(v)** (Cont'd)

**10g(v)**

Treatment  
guidelines

### Roles 2 & 3

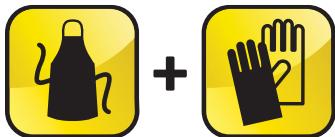


**Beware of liver and renal failure  
(especially when symptoms start 6 or more hours after ingestion)**

# Q-Fever

## Treatment guidelines **10g(vi)**

### Personal protection



**standard precautions**



No isolation required



- Rickettsial disease (*Coxiella burnetti*) caused by inhalation of infected particles, not a tick bite
- Acute & chronic forms: endocarditis + hepatitis more common in chronic form
- Mortality is generally low (<1%)



### Presentation

- Initial flu-like symptoms, with dry cough + pleuritic chest pain at 4–5 days
- Fever, severe retrobulbar headache, myalgia, anorexia, weakness, profuse sweats, nausea, vomiting and diarrhoea
- Aseptic meningitis occurs in 1%



### Investigations

- No acute field test is available to assist diagnosis
- FBC is normal in 70% acute cases ( $\uparrow$ wbc in 30%)
- LFTs show  $\uparrow$ transaminases x2–3, but normal bilirubin
- CXR may range from normal to widespread pneumonitis
- Liver ultrasound – granulomatous hepatitis; ECHO – valve vegetations
- Blood for acute and convalescent sera should be sent to UK



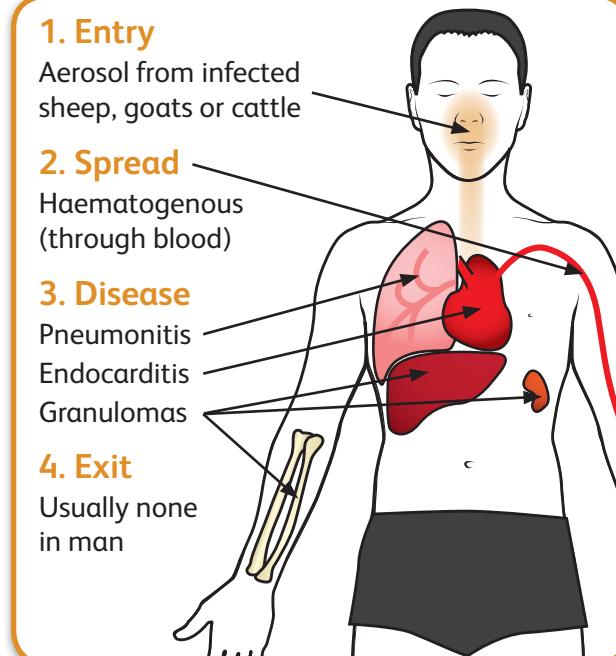
### Treatment

- Doxycycline 200mg IV/PO stat then 100mg IV/PO BD (can be doubled in severe infection) for 10–14 days; reinstitute if a relapse occurs



### Communication

- Inform Chain of Command



# Ricin

## Treatment guidelines **10g(vii)**

**10g(vi)–(vii)**

Treatment  
guidelines

### Personal protection



+



standard precautions

Consider  
external  
DECON if  
contaminated  
by aerosol



- Toxin from castor oil plant, and forms 5–10% of waste in engine oil production
- Effective as aerosol, or injected, or most likely as food/water contaminant



### Presentation

#### Inhalation

- Weakness, fever, cough and pulmonary oedema occur 18–24 hours after inhalation; severe respiratory distress and death from hypoxia follow in 36–72 hours

#### Ingestion

- Severe gastrointestinal symptoms including GI haemorrhage (+ liver, spleen, kidney necrosis) followed by vascular collapse and death

#### Parenteral (injected)

- Local muscle + lymph node necrosis, progressing to organ involvement and death

### Differential diagnosis

- Respiratory: pulmonary anthrax (mediastinitis on CXR); pneumonic plague; phosgene (ARDS mediated by exertion)
- Gastrointestinal: salmonellosis; shigellosis; cholera; staphylococcal enterotoxin B (would not expect life-threatening clinical presentation)
- Dermal injection: necrotising fasciitis



### Investigations

- No acute field test is available to assist diagnosis
- Monitor FBC ( $\uparrow$ wbc), U&E, glucose, clotting, arterial blood gases (hypoxia)
- CXR may show infiltrates or ARDS, but no mediastinitis
- Blood for acute and convalescent sera should be sent to UK



### Treatment

- There is no specific treatment or antidote
- Consider skin (hypochlorite solution) or gut (charcoal) decontamination
- Volume replacement +/- vasoconstrictors (noradrenaline) will be required
- Treat symptomatically, including any pulmonary oedema



### Communication

- Inform Chain of Command

# Smallpox

## Treatment guidelines **10g(viii)**

### Personal protection



or

high particulate filter mask  
+ visor

if

any symptoms of smallpox infection



**+ isolate patient**



Smallpox is highly infectious

Spread is via aerosol, droplets and  
direct contact with vesicle fluid

- Patients are infectious until all scabs have separated
- Strict quarantine must be applied to all contacts for a minimum of 16 days following exposure



### Presentation

#### Prodromal phase

- Malaise, fever, rigors, headache, vomiting & backache (15% may have delirium)
- An erythematous rash will be seen early on Caucasian skin

#### Rash

- Starts at 2–3 days from onset of prodrome and spreads centrally
- Lesions change from macules to papules to pustules
- **Lesions are more abundant on the extremities**
- **Lesions remain synchronous in their stage of development**
- Scabs form 8–14 days after onset of rash

**Outcome:** significant mortality

#### Differential diagnosis

- Any other infections that cause vesicular rashes, e.g. chickenpox
- Important diagnostic features that suggest smallpox are the distribution (spreading from periphery towards centre), the synchronicity of lesions, and lesions that are located more deeply in the dermis than chickenpox

# Smallpox

## Treatment guidelines **10g(viii)** (Cont'd)

**10g(viii)**Treatment  
guidelines

### Investigations

- There is no useful field diagnostic test
- Diagnosis can be confirmed by electron microscopy and PCR (UK reference laboratory investigation of index case)



### Management

- Supportive care
- Source isolation in the hospital environment
- Immediate ring vaccination for all exposed personnel, if not already immunised
- Exercise care when disposing of bedding and/or clothing



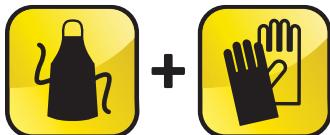
### Communication

- Inform Chain of Command

# Staphylococcal toxin

## Treatment guidelines **10g(ix)**

### Personal protection



**standard precautions**



- The toxin that most commonly causes sporadic endemic food poisoning
- In BW context it is an incapacitating agent, although rarely at high doses it could cause multi-organ failure and death (can be easily aerosolised and is highly stable)



### Presentation

#### Inhalation

- Symptoms within 1–6 hours: fever, shortness of breath and severe retrosternal chest pain. In high dose can cause ARDS

#### Ingestion

- Symptoms within 1–8 hours, rarely up to 18 hours post-exposure: nausea, vomiting, cramping abdominal pain, then urgency and profuse non-bloody diarrhoea. Normally resolves in 12–24 hours. Debilitation can last as long as 2 weeks

### Differential diagnosis

- Small round structured virus (Norwalk-like virus: “winter vomiting disease”)



### Investigations

- Diagnosis is largely clinical
- Diarrhoea is negative for blood on dipstick
- FBC shows neutrophil leucocytosis
- Theoretically, toxin can be detected on nasal swab within 12–24 hours of exposure to aerosol (but field technology cannot support this)



### Treatment

- There is no specific treatment
- Treat vomiting and dehydration symptomatically



### Communication

- Inform Chain of Command

# Tularaemia

## Treatment guidelines **10g(x)**

**10g(ix)–(x)**

Treatment  
guidelines

### Personal protection



### universal precautions



Body fluids are infectious



Hand to eye inoculation may occur  
causing oculoglandular tularaemia



- *Francisella tularensis* is a naturally occurring disease of wild mammals (e.g. rabbits) and birds (animal infection spread by ticks/lice/fleas/flies)
- Human infection may be acquired from bites of infected animals or insects **or** by ingestion or inhalation



### Presentation

#### General

- Fever, chills, headache, exhaustion, and pain in the extremities

#### Respiratory

- Retrosternal discomfort and non-productive cough; atypical pneumonia: cluster of cases will raise suspicion of BW (onset within 3–5 days)

#### Ulceroglandular

- Local ulcer and regional lymphadenopathy

#### Other

- Untreated mortality ~40%; generally low mortality in treated cases

### Differential diagnosis

- Malaria; infectious mononucleosis; Q-Fever; brucellosis; actinomycosis



### Investigations

- Microscopy: can be directly identified from secretions or tissue if fluorescent marked antibodies or immunohistochemical colours available
- Secretion/tissue culture is difficult
- Serology (ELISA) and PCR are ultimately diagnostic: send blood to UK
- CXR for atypical pneumonia



### Treatment

- Gentamicin 5mg/kg IV per day for at least 10 days



### Communication

- Inform Chain of Command

# Viral haemorrhagic fever

## Treatment guidelines **10g(xi)**

### Personal protection



or

high particulate filter mask  
+ visor

if

haemorrhage; diarrhoea or vomiting;  
cough; taking or handling blood samples



+

**+ isolate**

**Decontaminate  
samples**



Scrupulous clinical waste



Corpses are highly infectious



- Wide group of unrelated viral infections
- Includes Ebola, Lassa Fever, Congo-Crimean Haemorrhagic Fever, Hanta virus
- Most infections arise from blood/body fluid contact (e.g. vomit or urine)
- Pre-terminal stages are haemorrhage and multi-organ failure



### Presentation

Fever, malaise, pharyngitis, abdominal pain, nausea and vomiting, constipation or diarrhoea, haemorrhage, haemodynamic collapse

### Differential diagnosis

- Malaria
- Can mimic acute surgical abdomen (appendicitis)
- Other conditions that present with fever, septicaemia and shock (e.g. meningococcal septicaemia)



### Investigations

- Discuss with laboratory prior to sampling any body fluids
- Exclude malaria in malaria endemic areas



### Treatment

- Largely supportive: give fluid replacement **by mouth** where possible (organisms can be aerosolised around an IV entry site when the line is agitated)
- Specific treatment with ribavirin where available **[30mg/kg IV stat, then 15mg/kg IV QDS 4/7, then 2.5mg/kg IV tds 6/7]** may have some effect in Lassa Fever and CCHF if administered early
- Use FFP to correct deranged clotting when there is haemorrhage



### Communication

- Inform Chain of Command

# Vomiting & diarrhoea

Treatment guidelines **10g(xii)**

**10g(xi)–(xii)**

Treatment  
guidelines

## Personal protection



### universal precautions



- Hand washing before and after seeing the patient
- Use alcohol hand rub as additional infection control measure
- Ensure appropriate disposal of clinical waste



- Outbreaks of diarrhoea and vomiting are common in military populations
- Small round structured virus (Norwalk-like virus) should be considered in outbreaks: secretions (especially vomitus) are highly infectious



## Presentation

- Acute onset vomiting, diarrhoea, stomach cramps
- Blood in stools of salmonella, shingella and campylobacter cases

## Differential diagnosis

- May be prodrome for many other diseases
- Consider malaria if fever



## Investigations

- Microscopy:** stool (and diptest for blood)
- Culture:** stool, and blood if systemic symptoms
- Serology
- Virology:** if clusters consider sending sample to UK (will allow diagnosis by PCR and ELISA: electron microscopy requires fresh stool sample and can only be done if patient is in UK)



## Treatment

- Rehydration according to need (oral where possible)
- No routine antibiotics
- Campylobacter enteritis: ciprofloxacin or erythromycin
- Salmonellosis or shigellosis: ciprofloxacin or trimethoprim

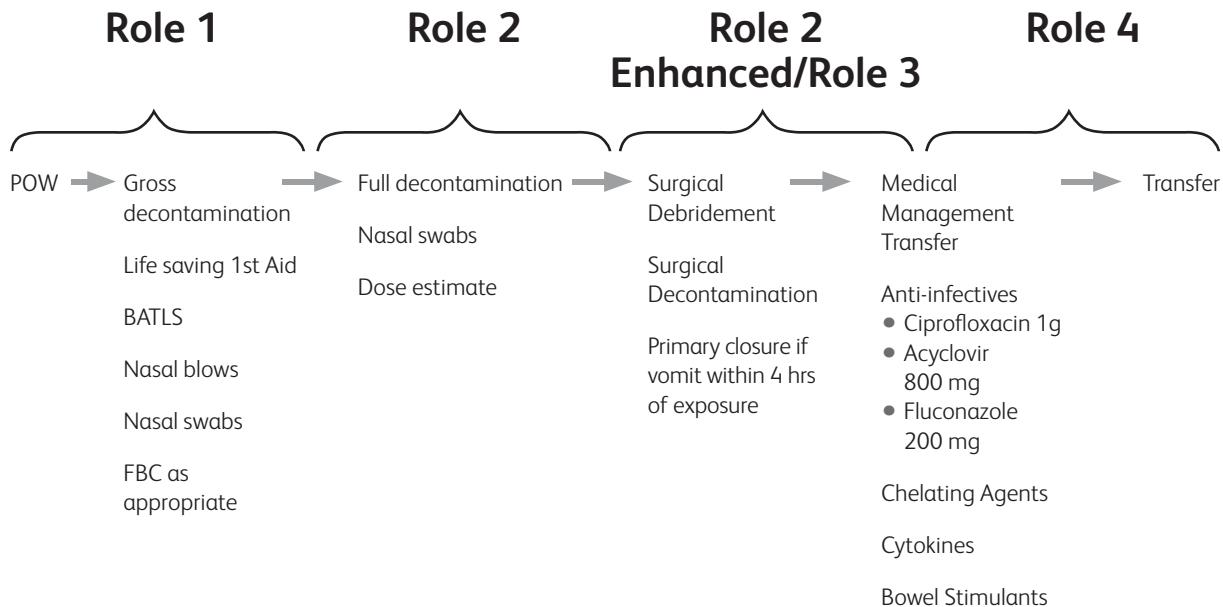


## Communication

- For routine cases complete F Med 85 only
- For outbreaks Inform Chain of Command

# Radiation casualties

## Treatment guidelines **10h**



### Irradiated only

- Ondansetron → Sample Collection:  
**or** Granisetron
- Decontamination
- FBC/Leucocytes 6 hourly/HLA tissue typing/Dicentrics at 24 hrs (blood for chromosomal studies)
  - 24 hour Urine/Faeces/Vomit
  - Dressings and discarded clothes

**Note the requirement for transfer to Role 4 for continuing tests and treatment**

**See Policies for further direction**

Go to **Section 8**

9  
Policies



# Environment

## Treatment guidelines **11**

**10h-11**

Treatment  
guidelines

### Hypothermia

Treatment guidelines **11a**

### Frost bite

Treatment guidelines **11b**

### Heat illness

Treatment guidelines **11c**

### Bites & stings

Treatment guidelines **11d**

### Altitude emergencies

Treatment guidelines **11e**

### Diving emergencies

Treatment guidelines **11f**

### Near drowning

Treatment guidelines **11g**

### Electrical & lightning

Treatment guidelines **11h**

### Acute pain

Treatment guidelines **11i**

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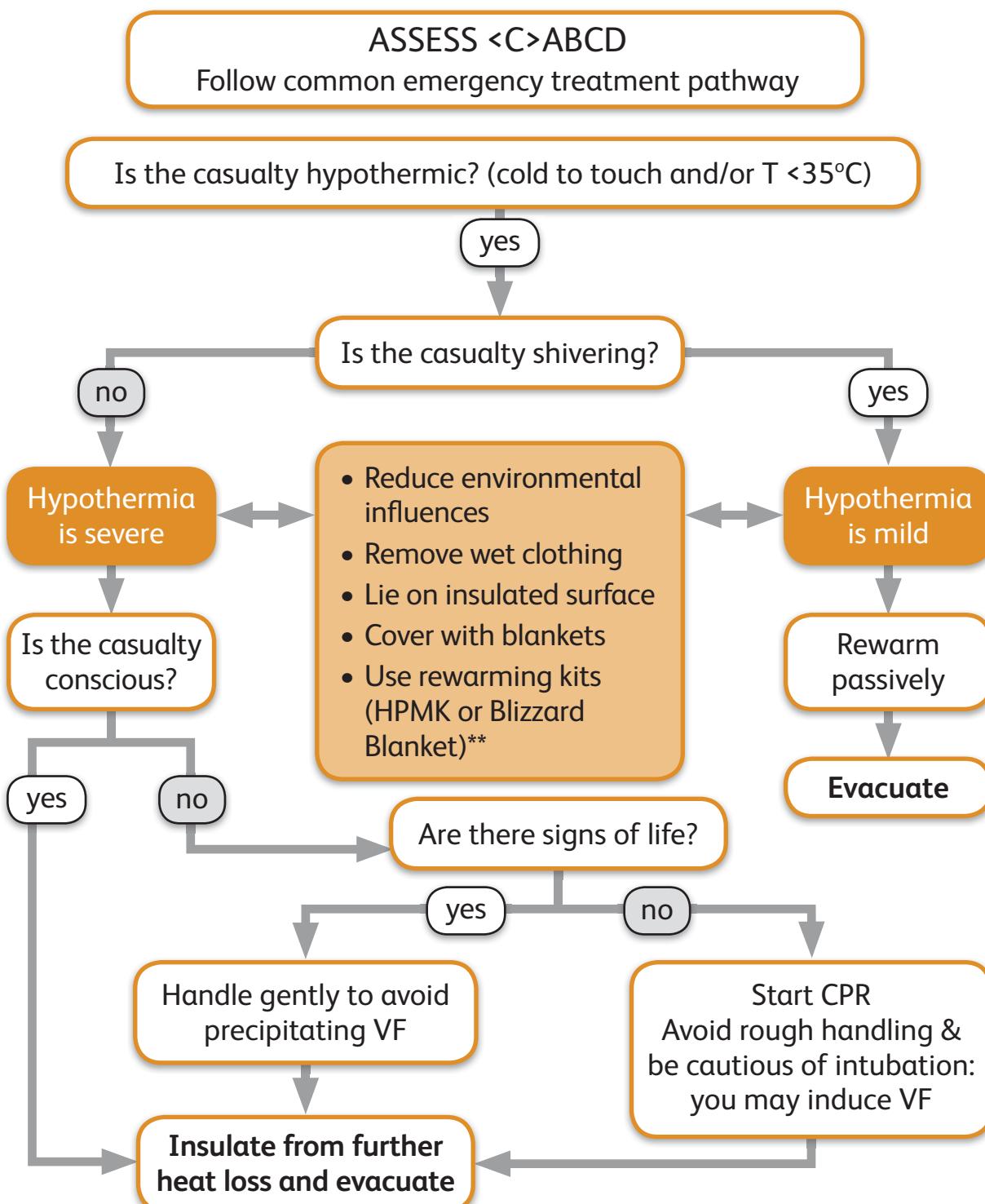
# Hypothermia

## Treatment guidelines **11a**

11a

Treatment guidelines

### Actions at Role 1



\*\* Rewarming blankets take >10mins to reach maximum temperature: active when en route to patient if possible

Adapted from: JSP 539

# Hypothermia

Treatment guidelines **11a** (Cont'd)

## Actions at Role2 & 3

### ASSESS <C>ABCD

Follow common emergency treatment pathway

#### Investigations

- Rectal temp with a low reading thermometer
- BP, pulse, resp, BM
- U&Es, FBC, clotting, amylase, blood cultures
- ABG
- ECG



#### Management

- Humidified oxygen warmed to 42–46°C (active internal rewarming)
- Warm air duvet (bear hugger) (active external rewarming)
- Monitor ECG
- Monitor temp every 30 mins until >36°C
- If hypoglycaemia present correct with IV 50% glucose



#### Investigations

- Drug metabolism is ↓ and unpredictable
- Avoid drugs until core temp >30°C
- Then give drugs with ↑ dosage intervals
- Consider CVP line and urinary catheter in unstable patients

**Consider active internal rewarming for profound hypothermia:**

**Warmed fluid lavage;  
intravesical; nasogastric;  
extrapleural;  
intraperitoneal.**



# Frost bite

## Treatment guidelines **11b**

**11a–b**

Treatment  
guidelines

### Emergency treatment

#### In the open

- Move out of the wind/drink warm fluids
- Remove boots – oedema may hinder replacement
- Remove wet clothes: change for dry
- Warm foot in buddy's armpit/groin for 10 minutes
- Give aspirin (600mg) or ibuprofen (600–800mg)
- If sensation returns – can continue to walk
- At high altitude give oxygen

#### At established camp

- Remove boots and change wet clothing for dry
- Warm fluids to drink
- Give aspirin (500–1000mg)
- Rapid rewarming:
  - Immerse part in warm water at 37°C
  - Rewarm for one hour
  - Dry, apply loose bandaging and elevate
- Evacuation is mandatory

#### Do not

- Rub
- Rewarm one part if the casualty is hypothermic
- Rewarm if there is a possibility of refreezing

# Heat illness

## Treatment guidelines **11c**

### First aid

**Symptoms:** agitation, nausea or vomiting, staggering or loss of coordination, cramps, disturbed vision, confusion, dizziness, collapse or loss of consciousness

#### Stop activity

- Lie the casualty down in the shade
- Elevate feet if conscious
- Strip to underwear
- Sponge or spray casualty with cool water and fan the skin

Give water to drink if the casualty is conscious

Place the unconscious casualty in the recovery position

Evacuate to medical care as quickly as possible

# Heat illness

## Treatment guidelines **11c** (Cont'd)

**11c**

Treatment guidelines

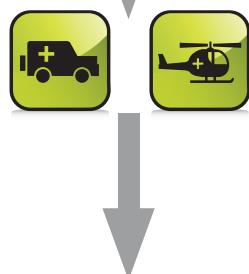
### Role 1

- Airway/Breathing/Circulation
- Axilla or ideally core temperature must be recorded
- Pulse/Resps/BP/GCS
- 100% oxygen
- IV access 1 litre normal saline
- Maintain cooling procedure



#### Symptoms

- Agitation
- Nausea or vomiting
- Cramps
- Staggering or loss of coordination
- Disturbed vision/headache
- Dizziness
- Confusion
- Collapse or loss of consciousness



### Role 2 & 3

- Re-assess ABC
- Pulse/Resps/BP/BM/ECG
- Rectal temperature
- Consider intubation and ventilation
- ABGs
- Urinary catheter/NG tube/ CVP line/Arterial line
- FBC, U&Es, LFTs, CK, clotting screen, myoglobin clearance and lactate

#### Complications

- Cardiac arrest

Go to

**1**

Treatment guidelines

- Fitting

Go to

**9b**

Treatment guidelines

- Hypoglycaemia

Go to

**9c**

Treatment guidelines

- Hyperkalaemia

Go to

**10a**

Treatment guidelines

- Acute renal failure

Go to

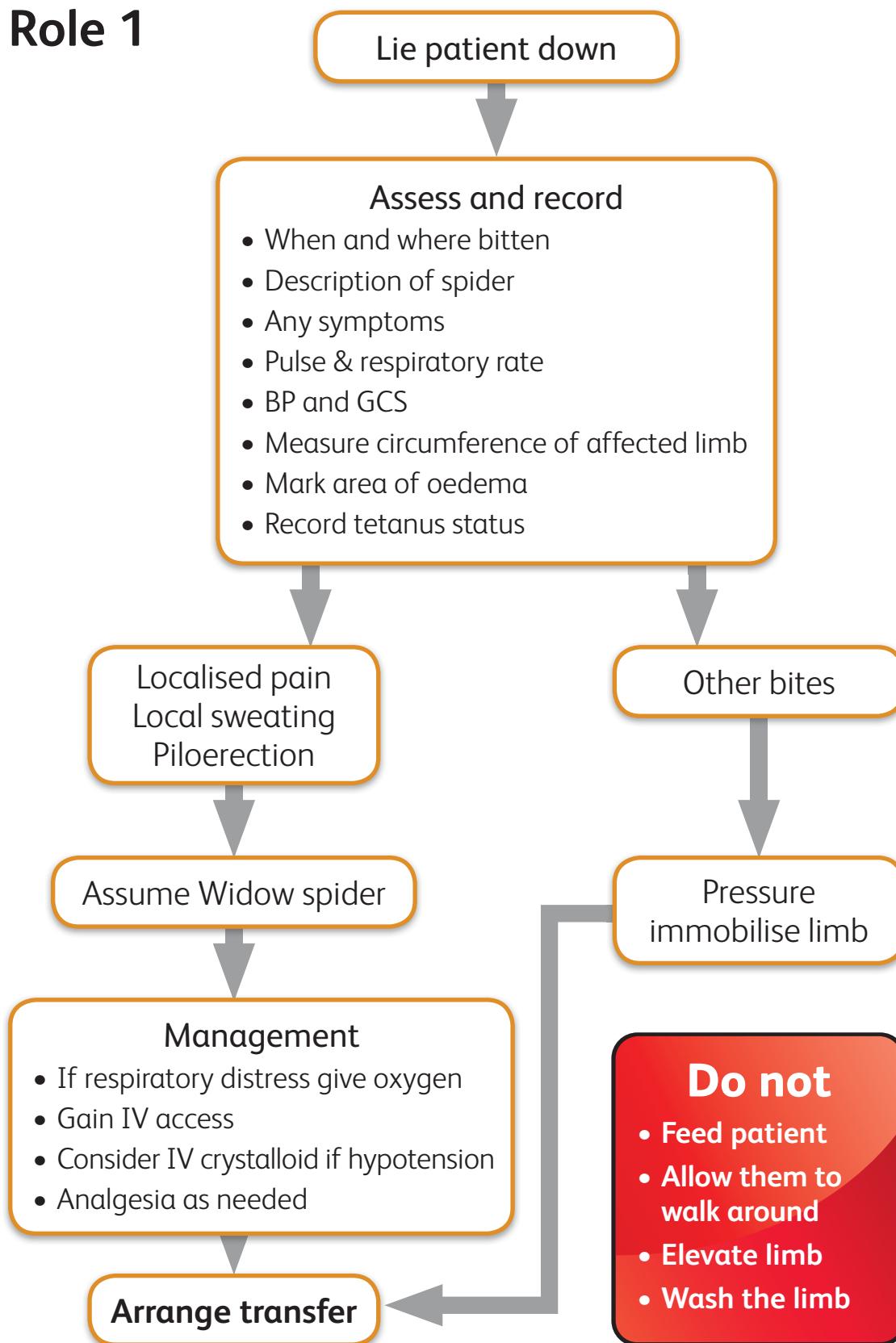
**10d**

Treatment guidelines

# Bites & stings: spider

## Treatment guidelines **11d**

### **Role 1**



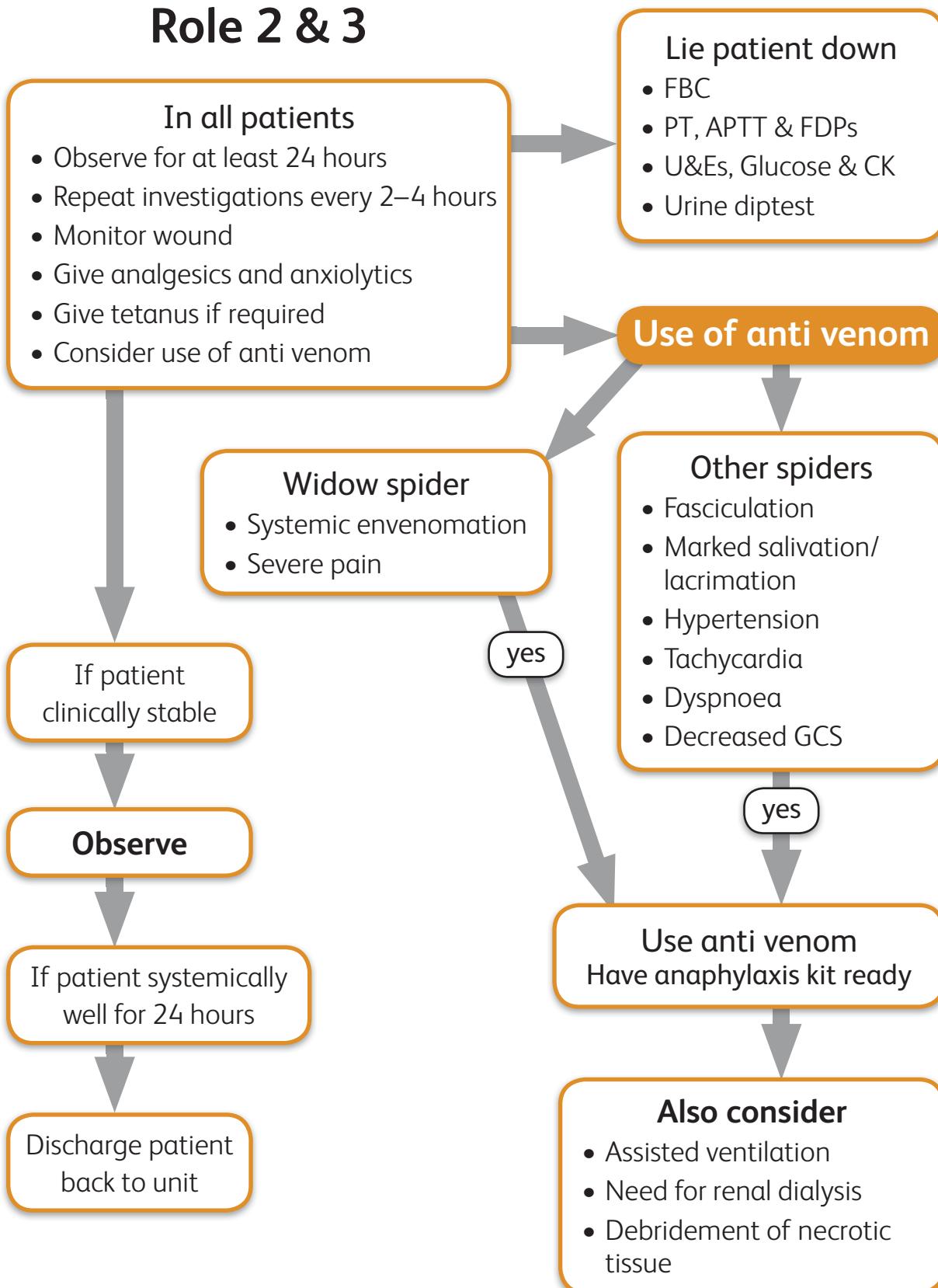
# Bites & stings: spider

Treatment guidelines **11d** (Cont'd)

**11d**

Treatment  
guidelines

## Role 2 & 3



# Bites & stings: snake/scorpion

## Treatment guidelines **11d** (Cont'd)

### Role 1

Lie patient down



#### Assess and record

- When and where bitten
- Description of snake
- Any symptoms
- Heart & respiratory rate
- BP and GCS
- Measure circumference of affected limb
- Mark area of oedema/discolouration
- Look for and document spontaneous bleeding
- Look for and document paralysis (ptosis is early sign)
- Check tetanus status



#### Management

- Pressure immobilisation (elapid snakes only: see following guidance)
- Splint limb
- Gain IV access
- Arrange transfer
- Consider IV crystalloid if hypotension
- If respiratory distress give oxygen

Appropriate use of pressure immobilisation as a first aid technique implies an understanding of the effects of snake venom and the ability to reliably identify snake species.

#### Do not

- Feed patient
- Allow them to walk around
- Elevate limb
- Wash the limb

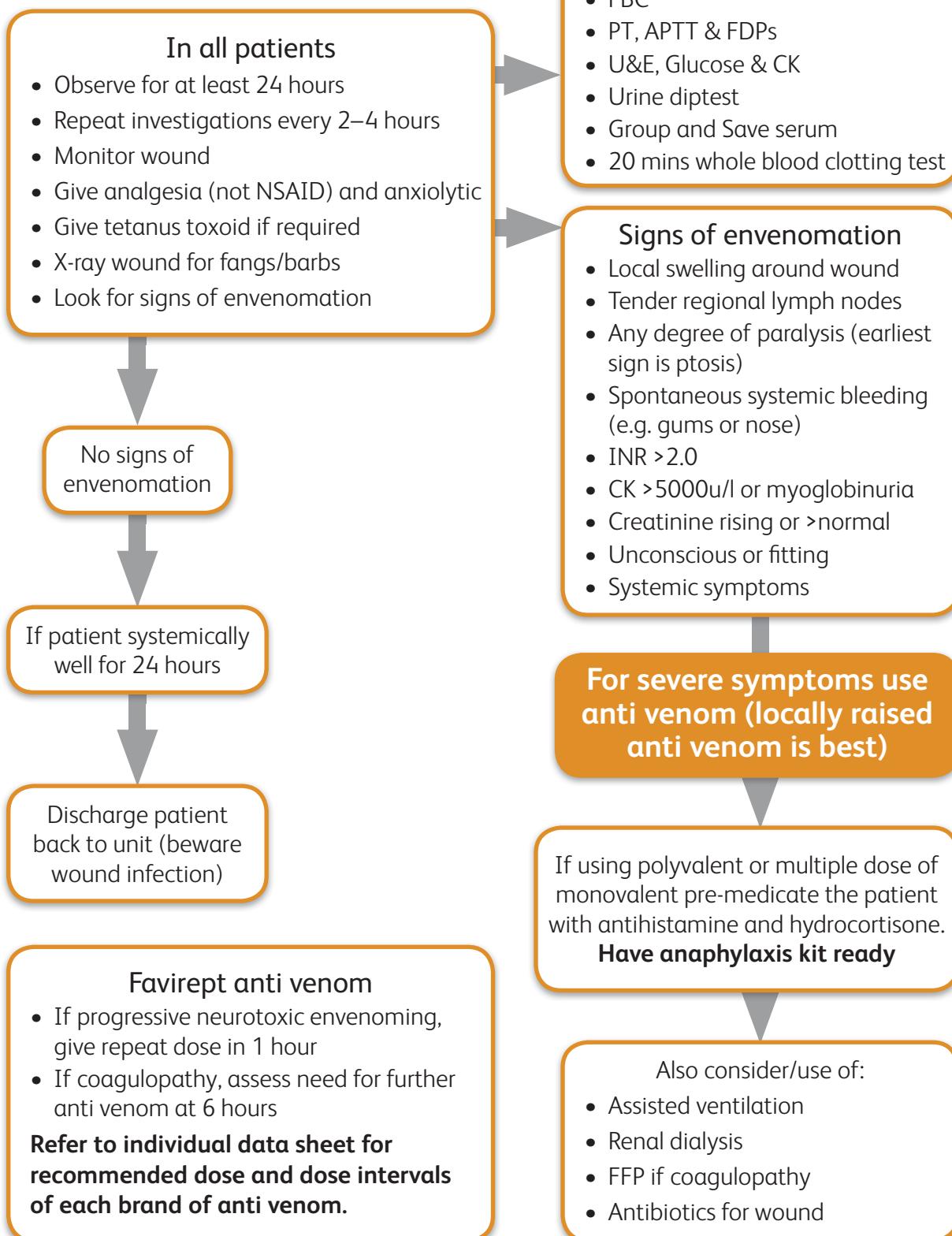
# Bites & stings: snake/scorpion

## Treatment guidelines **11d** (Cont'd)

**11d**

Treatment guidelines

### Role 2 & 3



# Bites & stings: snake/scorpion

## Treatment guidelines **11d** (Cont'd)

### Pressure Immobilisation

(Elapid envenomation only – e.g. cobras)

- This technique slows systemic absorption of snake venom
- Apply a firm bandage to whole length of affected limb
- Capillary refill and arterial pulses must be maintained in the extremity.  
The bandage must not be too tight – you should be able to slip a finger behind the bandage
- The limb can be further immobilised in a full length cast
- The patient **must rest** – only minimal active movement
- **Do not remove** the pressure immobilisation until in the resuscitation facility, after IV access has been obtained in another limb and anti venom is available



1. Locate area of bite or sting and prepare bandage.



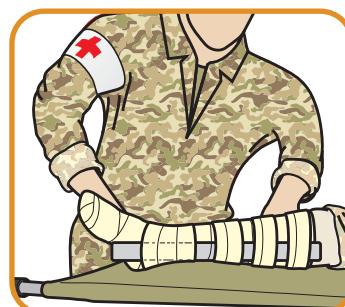
2. Apply a firm bandage, not too tight – you should be able to slip a finger behind the bandage.



3. Apply bandage to whole length of affected limb.



4. The limb can be immobilised using a splint.



5. The limb can be further immobilised in a full length cast.



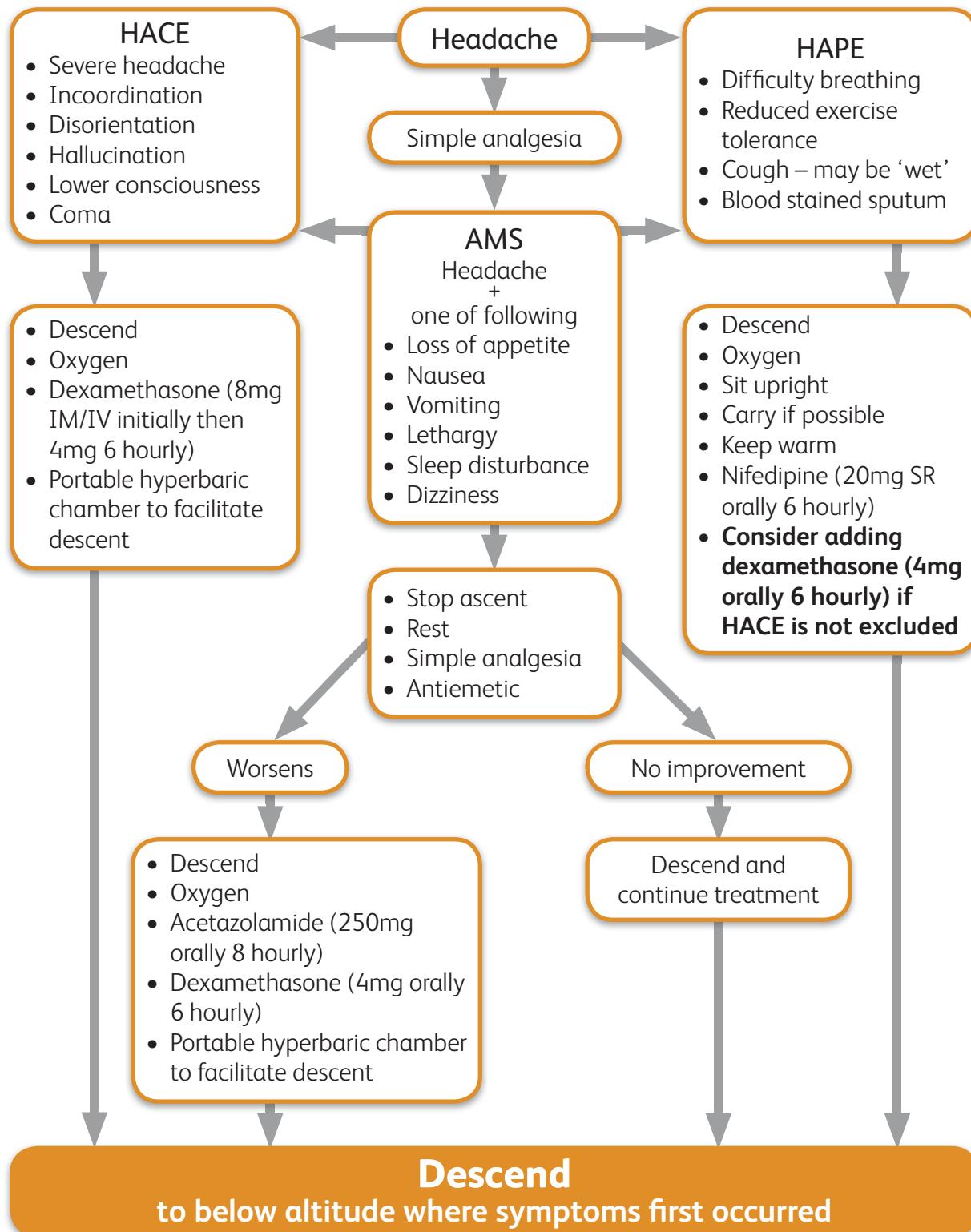
6. **The patient must rest.** Only minimal active movement should be allowed.

# Altitude emergencies

## Treatment guidelines 11e

11d-e

Treatment guidelines



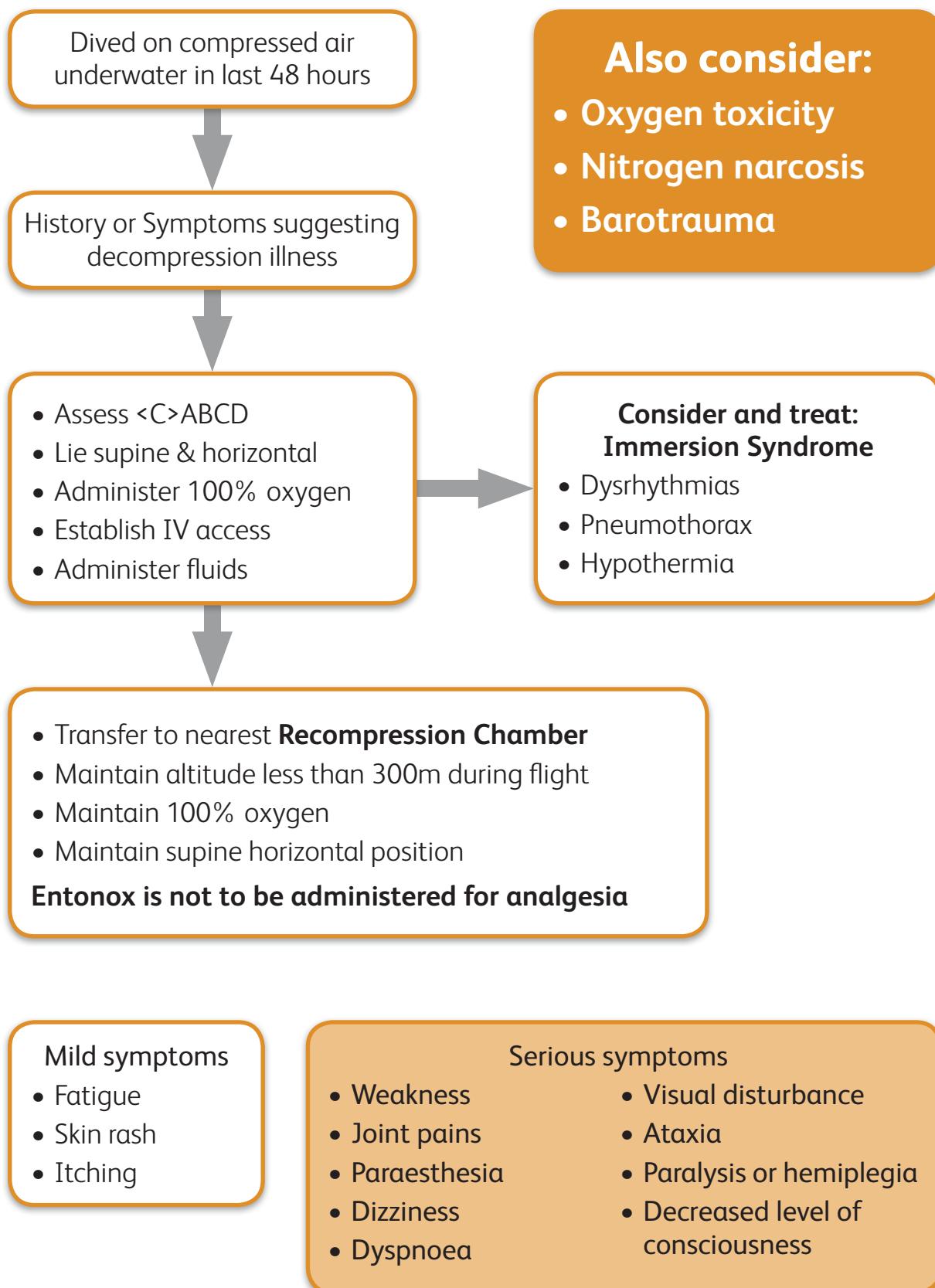
Key	HACE
	High Altitude Cerebral oEdema

HAPE
AMS

High Altitude Pulmonary oEdema
Acute Mountain Sickness

# Diving emergencies

## Treatment guidelines **11f**



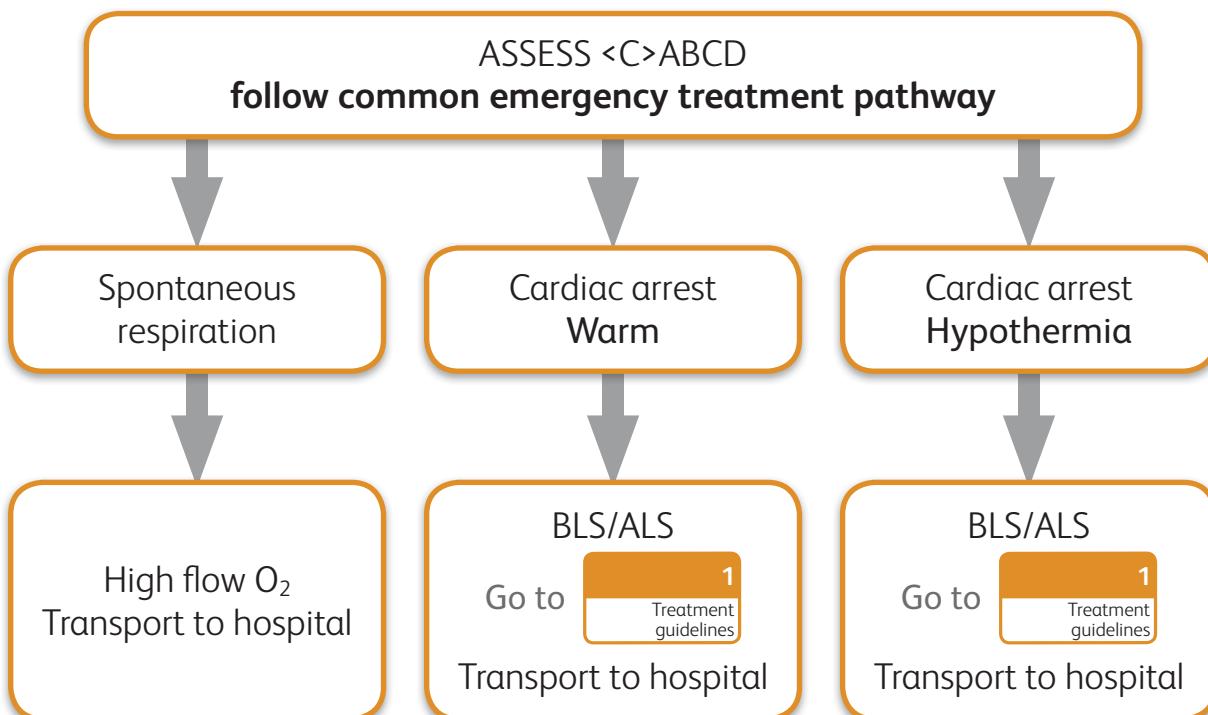
# Near drowning

Treatment guidelines **11g**

**11f-g**

Treatment guidelines

## Actions at Role 1



## Cardiac Arrest

Go to 1 Treatment guidelines

- Beware concomitant injuries, especially spinal injuries. These may occur for instance after aircraft crashes or parachuting incidents into water
- Maintain horizontal posture to avoid post-immersion cardiovascular collapse, especially during rescue
- Sudden or frequent changes in posture may precipitate VF in the cold, bradycardic patient
- Employ warming measures early. In practice it is very difficult to rewarm pre-hospital, but it is vital to prevent further heat loss
- Postural drainage of aspirated fluid does **not** improve oxygenation and may further compromise the airway or the cervical spine
- Convey all patients to hospital unless submerged >3 hours
- Hospital admission for 24 hours is **mandatory** in near drowning
- Anecdotal reports of 'secondary drowning' reflect late manifestations of pulmonary insufficiency

# Near drowning

Treatment guidelines **11g** (Cont'd)

## Actions at Role 2 & 3

- Suspect cervical spine injury
- Primary and secondary survey
- Treat associated injuries
- Treat specific complications

### Investigations

- FBC, electrolytes, serum glucose
- ABG
- Coagulopathy screen
- Urinalysis
- CXR
- ECG
- Blood cultures if febrile

### Pulmonary support

- Supplemental oxygen on all patients
- Maintain  $\text{PO}_2 > 60\text{mmHg}$  in adults
- Maintain  $\text{PO}_2 > 80\text{mmHg}$  in children
- If  $\text{PO}_2$  not maintained then initiate anaesthesia/intubation/ventilation +PEEP
- Trial of CPAP is permissible in alert, non-vomiting patients

### Supportive care

- Nasogastric tube
- Urinary catheter

### Therapeutics

- Treat hypovolaemia with crystalloid
- Metabolic acidosis will improve in line with oxygenation and perfusion
- Electrolyte disturbances are rarely significant and do not require therapeutic correction
- Systemic steroids have no effect on outcome
- Lung infection is common secondary to aspiration
- Brain abscess and systemic aspergillosis have been reported
- Beware leptospirosis from contaminated or stagnant water

### Rewarming

- Rewarm patients with  $T < 35^\circ\text{C}$
- Hypothermic patients in cardiorespiratory arrest must be rewarmed to  $32^\circ\text{C}$  before resuscitation is abandoned
- Consider therapeutic hypothermia ( $32\text{--}34^\circ\text{C}$ ) for 12 hours following VF arrest

### Poor prognostic signs

- CPR  $> 25/\text{min}$  without ROSC
- Other features such as unreactive pupils are **unreliable** prognostic indicators

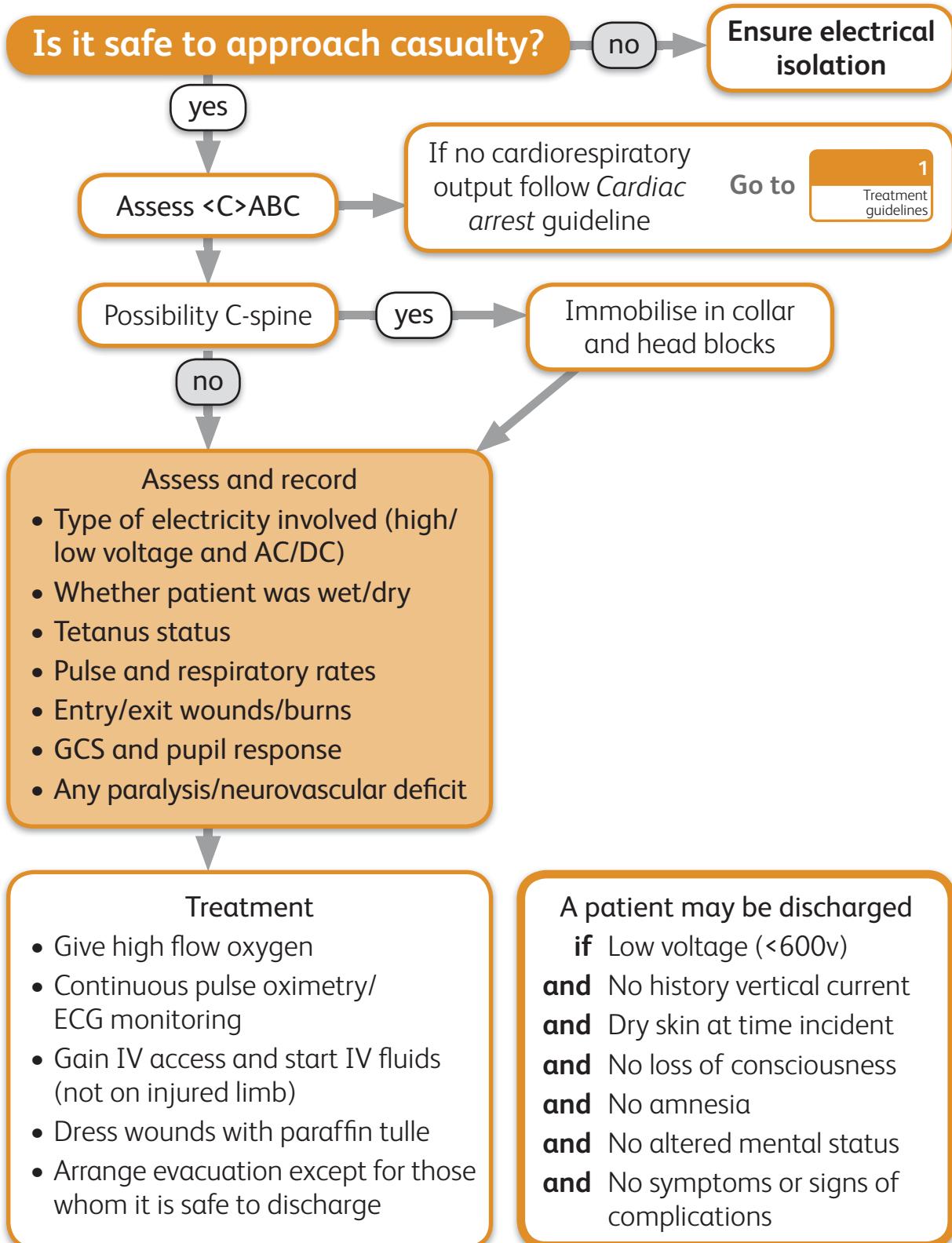
# Electrical & lightning

## Treatment guidelines **11h**

**11g-h**

Treatment  
guidelines

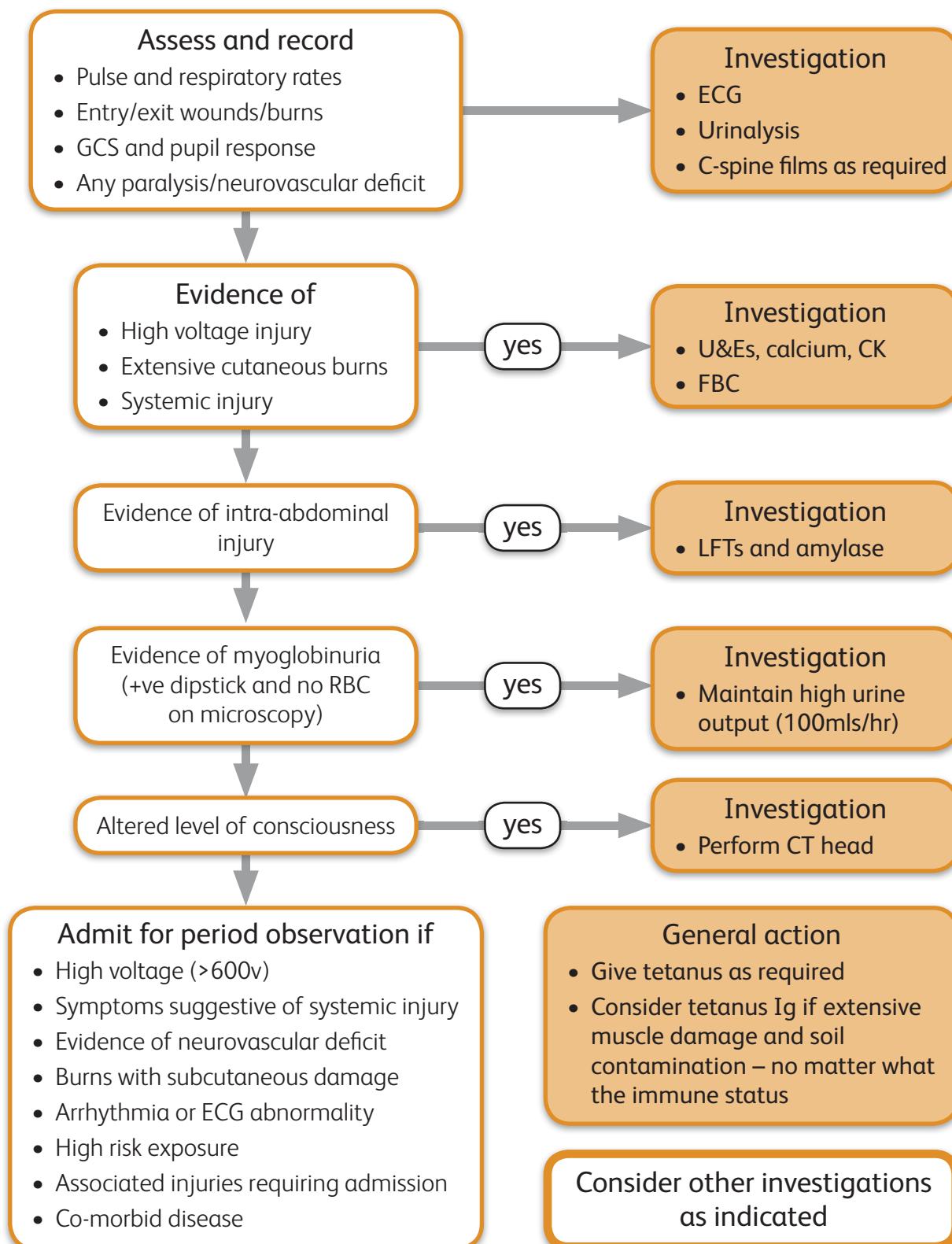
### Role 1



# Electrical & lightning

## Treatment guidelines **11h** (Cont'd)

### Roles 2 & 3



# Acute pain

## Treatment guidelines 11i

11h-i

Treatment guidelines

### Oral analgesia

- Oral analgesia will be adequate for mild or moderate pain (see later in this guideline).



### Splintage

- Splintage will reduce the pain from a fractured limb or digit. Splints can be improvised from clothing. A broad arm sling is effective for most upper limb injuries and when folded into a broad band can be used to splint the lower limbs and the pelvis.
- A traction splint is advised for a suspected fracture of the femoral shaft. The Sager splint can immobilize and provide traction to both legs if required. Apply 7kg (~14lbs) of traction, but do not use the Sager splint if there is a suspected unstable fracture/open book fracture of the pelvis (the counter-traction point is the symphysis pubis).
- A SAM splint is useful for immobilising upper limbs in the position in which they are found (for example, a deformed forearm fracture) if the capability does not exist to perform analgesia-controlled realignment in the “pre-hospital” setting. A **box splint** or **neoprene splint** is an alternative to SAM to immobilise a limb and offers additional padding plus integral Velcro strap securing mechanism.



### Entonox

- Entonox is a mixture of 50% oxygen and 50% nitrous oxide. It is a rapid onset analgesic that may be used by a cooperative patient: offset is also rapid once the mask or mouthpiece is removed by the patient. **Contraindications** are suspected pneumothorax (a tension pneumothorax may be produced), suspected open head injury (a pneumocephalus may be produced) or suspected decompression sickness. In the cold, the gases will separate and the cylinder must be repeatedly inverted before use.



### Opiates

- Intramuscular morphine is available for first aid use, but it is relatively slow in onset and has unpredictable absorption in the shocked patient.
- Intravenous morphine is the benchmark analgesic for use in the operational setting. Titrate against the pain in 2.5–5mg aliquots (0.1mg/kg in children). The peak effect may not be seen for 10–20 minutes so if immediate analgesia is essential (for example to reduce a dislocated ankle to restore a distal pulse) use fentanyl or ketamine as an alternative where available (Medical Officers only).



### For Paediatric Pain Assessment

Go to Section 6



5b

Toolbox

# Acute pain

## Treatment guidelines 11i (Cont'd)



### Ketamine

- Ketamine is a powerful, rapid onset (some effect after about 15 seconds when given IV, but worth waiting 1–2 minutes for peak effect), short acting analgesic that has particular application to assist painful procedures (including facilitating rapid extrication from entrapment and realigning fractured/dislocated limbs). It is a dissociative analgesic, so patients will appear “detached” and unresponsive but will moan or cry out when the procedure is performed.
- Caution must be exercised when used by non-anaesthetists, but it is a generally safe drug if simple rules are followed:
  - Use a dose of 0.25–0.5mg/kg IV for analgesia (2–4mg/kg IM is an alternative). If the patient is shocked, start with the lower dose
  - Have suction available in the event the patient salivates excessively (unlikely at the low analgesic doses).
- Emergence delirium is also uncommon at low doses and additional benzodiazepine IV is not required when used for analgesia.



### Local anaesthesia

- Local anaesthetic nerve blocks provide a means for complete pain relief (when fully effective) that may facilitate extrication from entrapment (e.g. fingers caught in machinery), assist in manipulation of a limb (e.g. realignment of a fractured femur) and optimise ventilation (e.g. for conscious patients with multiple rib fractures, thereby potentially avoiding elective ventilation). The most common use in the operational setting is to support the pain-free suturing of wounds



#### Wound suture:



- **Lignocaine** has historically been the standard agent as 1% or 2% solution: clinical effect is immediate, but the duration is limited to less than 1 hour. The combination of **adrenaline with lignocaine** is useful as an adjunct to haemostasis while suturing (and/or to increase the safe total dose administered), but **this combination must not be used** to anaesthetise fingers or toes. Levo-bupivacaine represents current best clinical practice: it has a perceived improved safety profile over bupivacaine and an extended duration of action over lignocaine, although the onset of peak action is often >5 minutes.
- Topical local anaesthetic (**lignocaine gel**) is used prior to male urinary catheterization, or to anaesthetise the cornea (amethocaine drops) prior to examination and/or removal of a foreign body.



**For side effects and total safe drug doses refer to *British National Formulary (BNF)***

# Acute pain

## Treatment guidelines **11i** (Cont'd)

**11i**

Treatment guidelines

### Pain: continuing requirements

#### Pain Score

- 0 = No pain on rest or movement
- 1 = No pain on rest, mild on movement
- 2 = Mild pain on rest, moderate on movement
- 3 = Continuous pain on rest, severe on movement

#### Mild Pain – Pain Assessment Score 1

Regular paracetamol 1g QDS (maximum 4g/day)  
+ (if not contraindicated) add regular ibuprofen 400mg  
TDS or diclofenac 50mg TDS (maximum 150mg/day)

#### Moderate Pain – Pain Assessment Score 2

Paracetamol 1g QDS + codeine 30–60mgs QDS  
+ (if not contraindicated) regular ibuprofen 400mg  
TDS or diclofenac 50mg TDS

#### Severe Pain – Pain Assessment Score 3

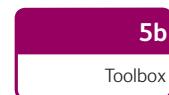
Morphine hourly IM/IV/oral regime  
**or** Patient Controlled Analgesia of morphine  
**or** continuous infusion of morphine

These can be given with regular paracetamol 1g QDS +/- regular ibuprofen 400mg TDS or diclofenac 50mg TDS (if not contraindicated).

Ensure appropriate antiemetic (and laxative where appropriate with repeat doses of opiate) are prescribed.

### For Paediatric Pain Assessment

Go to **Section 6**



# Local Anaesthetic Toxicity

## Treatment guidelines **11j**

In general the Central Nervous System (CNS) is more sensitive to local anaesthetics than the Cardiovascular System (CVS).

### **CNS signs and symptoms**

Early or mild toxicity: light – headedness, dizziness, tinnitus, circumoral numbness, abnormal taste, confusion and drowsiness.

Severe toxicity: tonic – clonic convulsion leading to progressive loss of consciousness, coma, respiratory depression and respiratory arrest.

**Note:** depending on the drug and the speed of the rise in blood level the patient may go from awake to convulsing within a very short time.

Drugs to stop fitting such as Diazepam 0.2 – 0.4mg/kg intravenously slowly over 5 minutes repeated after 10 minutes if required, or 2.5mg – 10mg rectally.

### **CVS signs and symptoms**

Early or mild toxicity: tachycardia and rise in blood pressure. This will usually only occur if there is adrenaline in the local anaesthetic. If no adrenaline is added then bradycardia with hypotension will occur.

Severe toxicity: usually about 4 – 7 times the convulsant dose needs to be injected before cardiovascular collapse occurs. Collapse is due to the depressant effect of the local anaesthetic acting directly on the myocardium. Bupivacaine is considered to be more cardiotoxic than lignocaine.

Also see Treatment Guideline 1b and 10d

# Section 4

# Transport

# Transport

## Introduction

### **TRA – Intro.1**

This section grades the dependency of patients for their needs during inter-unit transport, and identifies the minimal level of professional competence to support these needs.

### **TRA – Intro.2**

Support Helicopters (SH) are a fundamental component of patient transportation either as a vehicle for primary retrieval of the undifferentiated casualty from point of wounding/illness, or for the secondary transport of casualties to a facility for further investigation and/or treatment. These functions require a different skill set for the clinical staff involved. Primary retrieval requires clinicians with resuscitation skills focused on the <C>ABCDE paradigm together with skills in incident scene management and patient extrication. Secondary retrieval demands “intensive care” skills to manage the post-operative and/or anaesthetised patient with a higher level of invasive monitoring and often multiple infusions of fluids and/or drugs.

### **TRA – Intro.3**

This section details the criteria for an improvised helicopter landing site for situations where personnel specifically trained in this procedure are unavailable.

### **TRA – Intro.4**

Safety when approaching SH to load or unload a casualty is paramount. This section describes the configuration and approach procedures of SH regularly encountered by UK DMS personnel on operations.

# Transport

## Contents

Contents

Transport

Inter-unit transfer

Transport **1**

Helicopter landing site

Transport **2**

Aircraft drills: CH47

Transport **3**

Aircraft drills: Puma

Transport **4**

Aircraft notes (alphabetical)

Transport **5**

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# Inter-unit transfer

## Transport 1

1

Transport

### Levels of dependency

There are four levels of dependency for transport:

- 1. Critical Care – High Dependency**
- 2. Critical Care – Medium Dependency**
- 3. Non-Critical Care – Low Dependency**
- 4. Non-Critical Care – Minimal Dependency**

#### Level 1: High dependency

These are patients who require intensive support during transit including any combination of ventilation (with SpO<sub>2</sub> and End Tidal CO<sub>2</sub> monitoring), arterial monitoring for Mean Arterial Pressure, ECG monitoring of cardiac dysrhythmia, and monitoring of core temperature. These patients may be unconscious or sedated/anaesthetised.

An intensivist is required to provide this level of care, supported by a nurse trained in both critical care and in-transit care.

#### Level 2: Medium dependency

These are patients who do not require intensive support, but do still demand regular monitoring and whose condition may deteriorate during transport. Patients include those requiring a combination of oxygen administration, one or more intravenous infusions (including syringe driven drug and fluid administration), and multiple drains or catheters.

An intensivist is required to provide this level of care, supported by a nurse trained in both critical care and in-transit care.

#### Level 3: Low dependency

These are patients whose condition is not expected to deteriorate during transit, but who require nursing care or management of simple oxygen therapy, continuation of an intravenous infusion, and/or a urinary catheter.

Medical technicians and non-specialist nursing staff are suitable for this task.

#### Level 4: Minimal dependency

These are patients who do not require nursing attention in-transit, but who might need assistance with mobility or bodily functions.

Medical technicians and non-specialist nursing staff are suitable for this task.

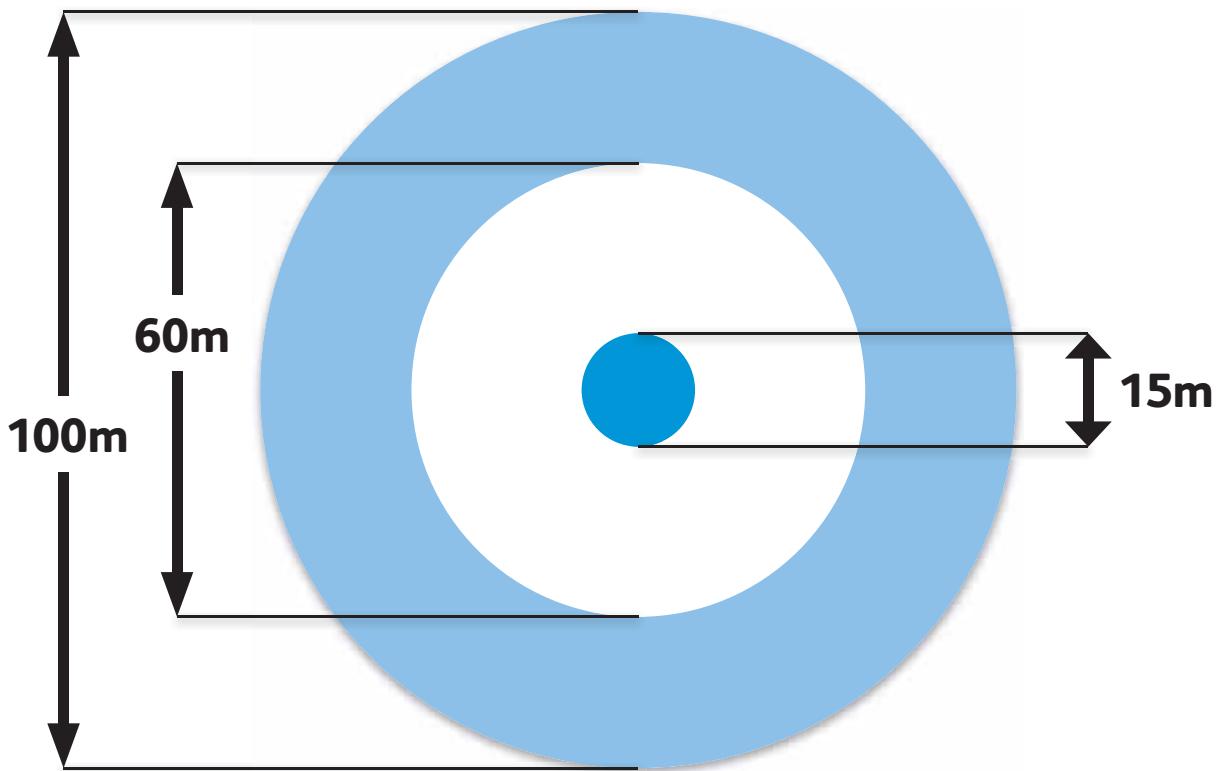
Principal source: *Army Medical Directorate Doctrine Note – 335 Medical Evacuation Regiment (V)*  
(this updates *AMS Core Doctrine Volume 4, Part 1 – Pre-Hospital Care*)

# Helicopter landing site

## Transport 2

### Selection

This is the recommended landing site preparation when the exact details of the aircraft are unknown



All areas must be cleared of loose objects

1 metre = 1 pace



Ideally ground should be level:  
if sloping, slope should be  
uniform and <10°

# Helicopter landing site

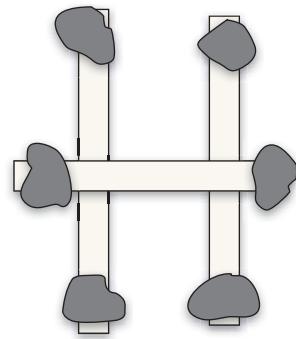
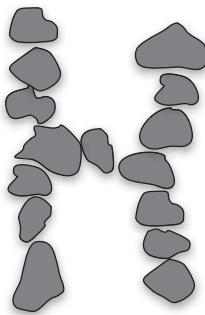
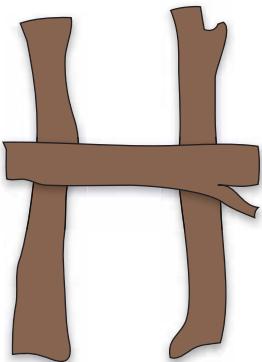
2

## Transport 2 (Cont'd)

Transport

### Marking by day

H

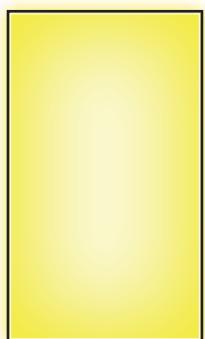
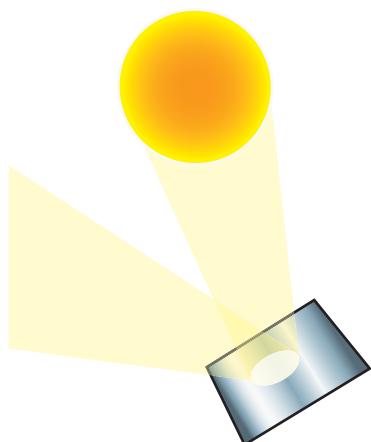


securely

OR

(vehicle roof beacons)

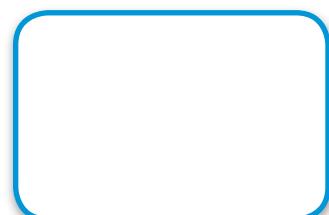
will be visible)



OR



OR

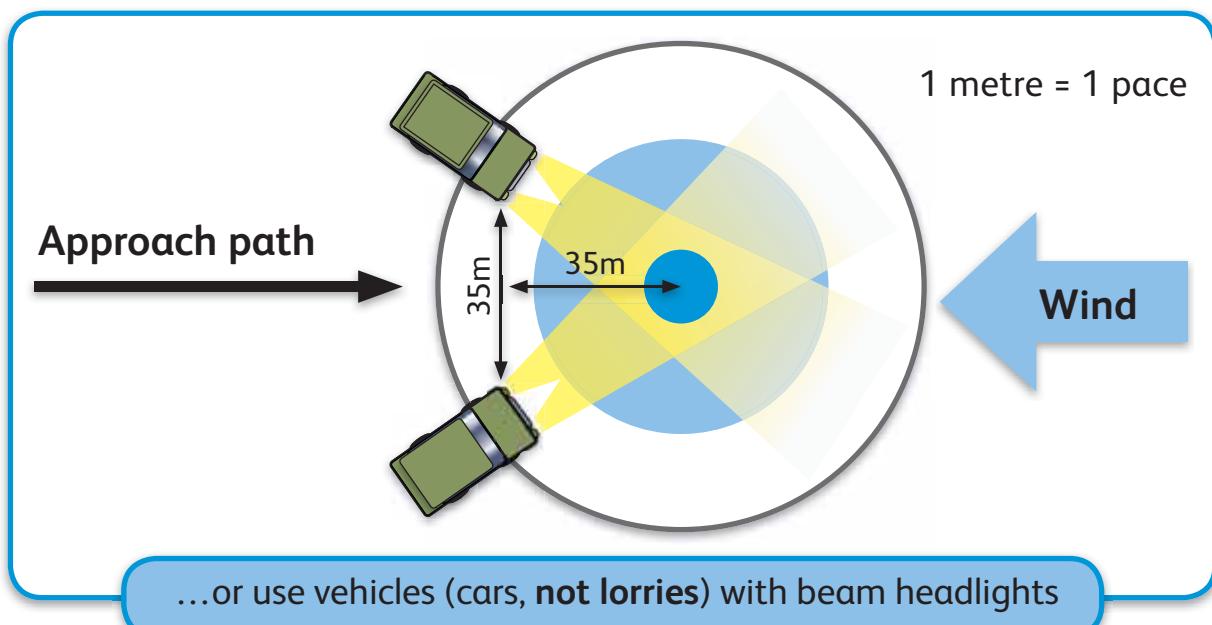
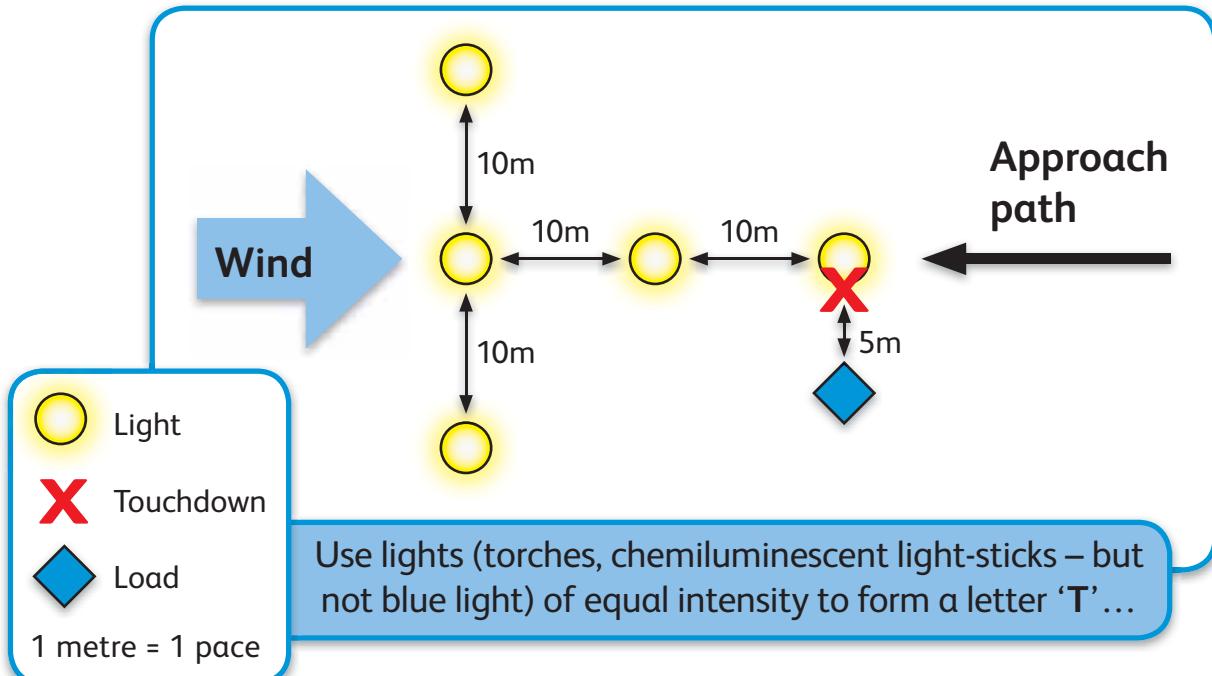


Reference: Hodgetts T, Porter C: *Major Incident Management System*. BMJ Books. London (2002)

# Helicopter landing site

## Transport 2 (Cont'd)

### Marking by night



**In an emergency a light-stick (infrared in tactical situations) can be attached to a long string and swung overhead to create a “buzz saw” effect visible from the air**

# Aircraft drills: CH47

2-3

## Transport 3

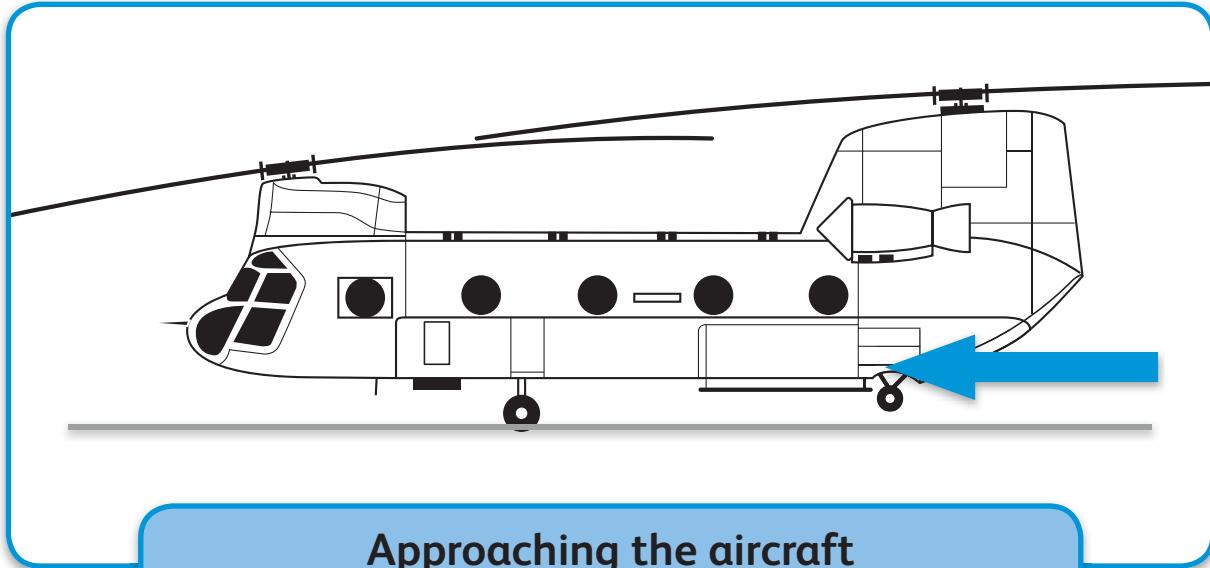
Transport

### Peacetime configuration

- When used for casualty transfer in peace a stretcher fit will be used.
- 24 stretcher casualties may be transported in this role.

### Operational configuration

- When used for emergency CASEVAC stretchers are placed on the floor and secured by strops.
- A maximum of 10 stretcher casualties may be transported in this role (but less if a combination of stretcher and walking/sitting patients are transported).



### Approaching the aircraft

Follow the instructions from the Loadmaster

Approach the rear of the aircraft

Standard approach on operations is “4-5 & 7-8 o’clock”

# Aircraft drills: Puma

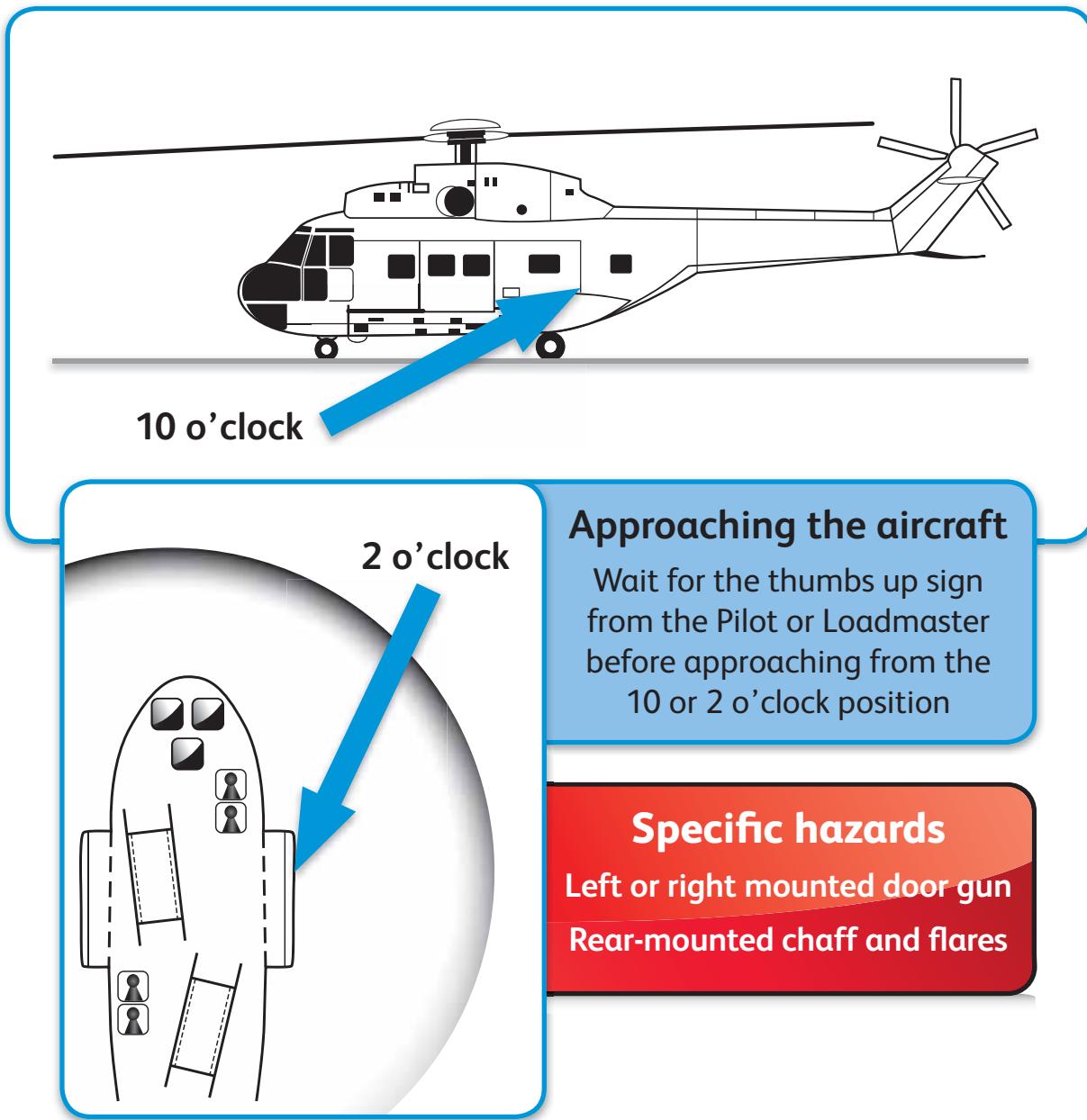
## Transport 4

### **Peacetime configuration**

- When used for casualty transfer in peace a stretcher fit will be used.
- 6 stretcher casualties may be transported in this role.

### **Operational configuration**

- When used for emergency CASEVAC the stretchers are placed on the floor and secured by strops.
- A maximum of 3 stretchers may be transported in this role (but if walking patients are on board only 1 stretcher can be transported).



# Aircraft notes (alphabetical)

4-5

## Transport 5

Transport

### Blackhawk

- Medical teams need to be familiar with all helicopters supporting them, including those of coalition forces. One of the most commonly encountered by UK forces is the Blackhawk.
- The Blackhawk may be fitted for dedicated CASEVAC role, in which case it will have a stretcher carousel which can take six stretchers (and one seated casualty). The aircraft can be awkward to load if unfamiliar with the process. Medics should closely follow the instructions given by the crew. Once the carousel is loaded and doors closed, it may be impossible to move from one side of the carousel to the other. It is therefore crucial that some thought is given to where the individuals of a medical team position themselves for flight.
- Blackhawks without the stretcher carousel fitted will take fewer casualties (usually four stretcher or up to seven seated casualties), being limited by the aircraft's specific role at the time of tasking.

### Chinook (CH47)

- The Chinook is a tandem rotored medium lift helicopter designed to operate in all weather conditions. It has multiple uses and configurations. With removal of seats, up to ten stretchers can be secured directly to the floor although in practice this leaves minimal room to move around and work effectively. Of particular note with the Chinook are the following points:
  - At the front of the aircraft, the front rotor disc can drop as low as 1.3m on level ground.
  - The exhaust gases from the engine and auxiliary power unit are very hot and are blown directly to the rear of the aircraft. Loading and unloading is therefore in the 4/5 o'clock and 7/8 o'clock positions, 6 o'clock being avoided where possible.
  - The Chinook is a particularly noisy aircraft and hearing protection is a must for all passengers, including casualties.

### Gazelle

- The Gazelle is a single rotored helicopter, most commonly used in surveillance role operationally. It can be fitted to carry a single stretcher casualty, although the medical carer has very poor access during flight. It takes time to configure the aircraft for the stretcher role (port side pilot's seat and flying controls need to be removed). The Gazelle can alternatively take three sitting casualties.

### Lynx

- The Lynx is a single rotored helicopter with a number of operational roles. It can carry up to nine seating casualties if troop carrying seats are fitted or up to three stretcher casualties, usually on the floor. Space is very limited when carrying stretchers and in practice it is difficult to carry, and work on, any more than two stretcher cases. Further restriction occurs if door guns are fitted.

# Aircraft notes (alphabetical)

## Transport **5** (Cont'd)

### **Merlin**

- The Merlin is a single main rotored medium support helicopter. It can carry up to 16 stretcher casualties or 24 walking casualties.

### **Puma**

- The Puma is a single main rotored helicopter. Its main role is to provide tactical support but it is often used in CASEVAC role. This extremely versatile aircraft can usually accommodate two stretchers (although it can take three), six walking casualties or a combination thereof.

### **Sea King**

- The Sea King is a single main rotor, all weather support helicopter. The aircraft is extremely versatile with many operational roles. In the rapid reaction role, up to six stretchers can be secured to the floor, although operationally four is more normal. **Do not approach the aircraft during engine shutdown** as the blades drop dangerously low when not at full power.

# Section 5

# Pathways

# Pathways

## Introduction

### **PATH – Intro.1**

Pathways contains overarching guidance for specific patterns of injury. The experienced user (e.g. the Team Leader) may prefer this often single page *aide memoire* approach, with cross references to other relevant sections should additional guidance be needed.

### **PATH – Intro.2**

This section also include a series of critical care pathways designed to aid a systematic approach to common clinical problems encountered on the intensive care unit.

# Pathways

## Contents

Contents

### Ballistic

Pathways **1**

### Blast

Pathways **2**

### Blunt trauma

Pathways **3**

### Burn

- Thermal.....Pathways **4a**
- Electrical .....Pathways **4b**
- Chemical.....Pathways **4c**

### Common critical care pathways

- ICU ventilator care bundle .....Pathways **5a**
- ICU neuro care bundle .....Pathways **5b**
- Enteral feeding protocol ..... Pathways **5c**
- Bath insulin protocol version 5.4 .....Pathways **5d**
- Bowel management flow chart .....Pathways **5e**

# Pathways

## Contents (Cont'd)

### Genitourinary Trauma and Catheters

- Genitourinary Trauma Role 2 & 3.....Pathways **6a**
- Genitourinary Trauma Role 4.....Pathways **6b**
- Urinary Catheters ..... Pathways **6c**

# Ballistic: Role 1

## Pathways 1

1

Pathways

### Interventions

&lt;C&gt;ABCDE approach

#### Limbs

##### Haemorrhage control

Go to Sec 3 → 2  
Treatment guidelines

If appropriate to re-examine wounds prior to surgery, redress with iodine soaked gauze and secure with crepe bandage  
Splint long bone injuries

##### Analgesia

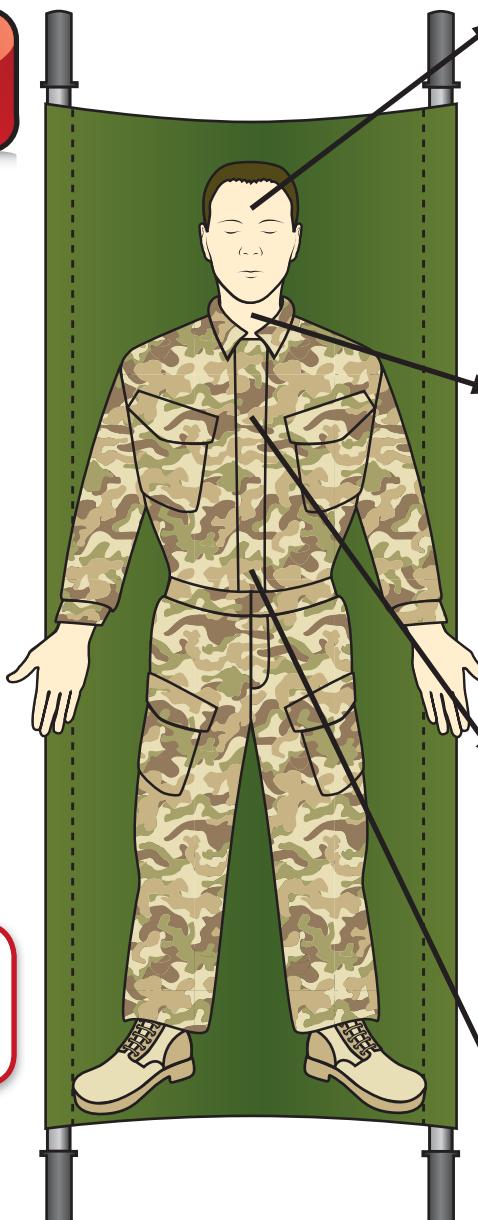
Go to Sec 3 → 11i  
Treatment guidelines

##### Antibiotics

Benzylpenicillin 1.2g IV/IM

##### Fluid resuscitation

Go to Sec 3 → 6a  
Treatment guidelines



#### Penetrating head injury

Low GCS = airway at risk:

Go to Sec 3 → 3  
Treatment guidelines

Lateralising signs = need surgical assessment.

#### Antibiotics

Benzylpenicillin 1.2g IV/IM

#### Airway injury

Above cricothyroid membrane think cricothyroidotomy:

Go to Sec 3 → 3e  
Treatment guidelines

Below cricothyroid membrane think tracheostomy and **evacuate to surgeon**

#### Chest

Pneumothorax?  
Haemothorax?

Go to Sec 3 → 5a-c  
Treatment guidelines

#### Antibiotics

Benzylpenicillin 1.2g IV/IM

#### Abdomen

Internal bleeding?  
Evacuate for surgery.  
Consider need for NG tube.

#### Antibiotics

Benzylpenicillin 1.2g IV/IM

### Critical decisions

Identify time-critical injuries (non-compressible haemorrhage) requiring urgent evacuation for surgery  
C-collar is not required for penetrating neck injury unless there are signs of abnormal neurology

### Caveats

- Check front and back of casualty
- Bullets and fragments cross cavities

# Ballistic: Roles 2 & 3

## Pathways 1 (Cont'd)

**Interventions**

<C>ABCDE approach

**Penicillin allergy**  
Clindamycin 600mg IV qds

**Limbs**  
Follow guidance for Role 1  
**plus antibiotics:**  
Co-amoxiclav 1.2g IV  
(instead of benzylpenicillin)  
**or alternatively**  
cefuroxime 1.5g IV for fractures  
+ metronidazole 500mg IV for complex compound fracture with soft tissue injury

**Fluid resuscitation**

Go to Sec 3 → **6a**  
Treatment guidelines

**Tetanus prophylaxis**  
for the non-immune

**Urinary catheter**  
with hourly measurement for critical patients

**Penetrating head injury**  
Follow guidelines for Role 1  
**Plus consider RSI:**

Go to Sec 3 → **3c**  
Treatment guidelines

Obtain CT unless expectant (T4)  
**Antibiotics:** cefotaxime 1g IV; add metronidazole 500mg IV if air sinus or middle ear clinically breached

**Airway injury**  
Above cricothyroid membrane think cricothyroidotomy:

Go to Sec 3 → **3e**  
Treatment guidelines

Below cricothyroid membrane think tracheostomy: move to emergency surgery.

**Chest**  
Follow guidelines for Role 1  
**Plus antibiotics**  
Co-amoxiclav 1.2g IV  
(instead of benzylpenicillin)

**Abdomen**  
Internal bleeding?  
Confirm with FAST USS or DPL  
**Antibiotics**  
Co-amoxiclav 1.2g IV  
(instead of benzylpenicillin)

**Critical decisions**

Consider absolute requirement for surgery at Role 2 Enhanced, or whether transfer to Role 3 is more appropriate

Decision must be tempered by casualty's condition, timeline to next Role, and anticipation of further casualties inbound

**Investigations**

- FBC
- Cross match blood
- Blood gases (I-STAT) for critical patients
- Urea & electrolytes where indicated
- Plain radiology/USS/CT where indicated

# Blast

## Pathways 2

1-2

Pathways

### Management

#### <C>ABCDE approach

ICRC (International Committee of the Red Cross) describe **3 injury patterns** for an antipersonnel mine.

Source: BMJ 1991;303:1509–12.

#### Blast lung

- Is uncommon in survivors who reach hospital
- May develop over 24–48 hours

Consider rFVIIa

Go to

**Sec 3**

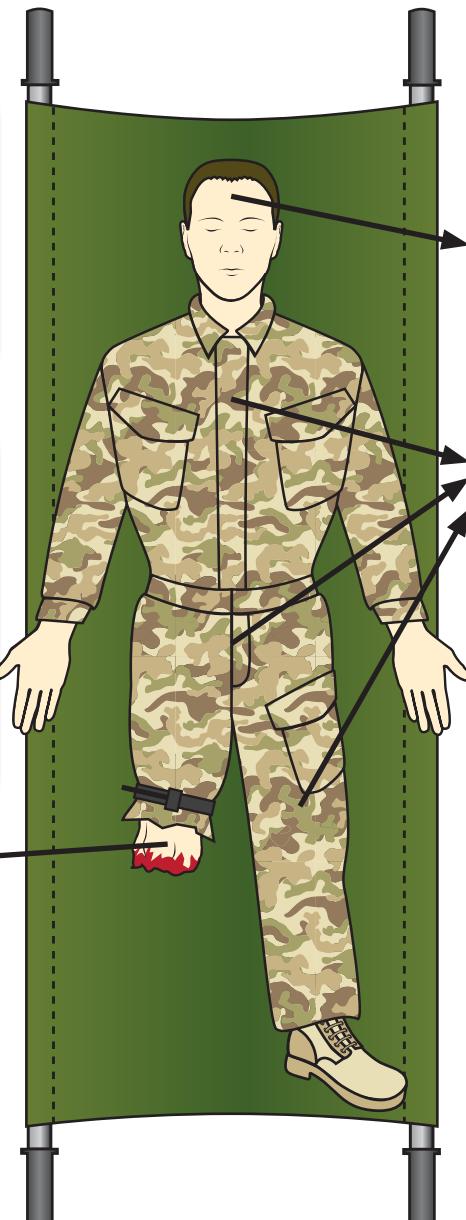
2d  
Treatment guidelines

#### Pattern 1

Usually from standing on buried mine

- Usually sustain traumatic amputation of foot or leg
- Other leg often affected
- One or both legs may need amputation
- Injuries to genitalia are common

**Have a high index of suspicion for bowel injury – clinical diagnosis, ultrasound and CT can be inconclusive: diagnostic peritoneal lavage may reveal vegetable matter and raised amylase/white count**



#### Perforated ear drums

- Perforated TMs are **not** a reliable indicator that blast lung will develop
- Hearing loss and/or balance disorder requires urgent ENT assessment

#### Pattern 3

From handling mines: deminers removing mines or children playing with them. **Severe head, face, eye injuries**

#### Pattern 2

Multiple fragments from mine triggered near casualty  
**Injuries to face, head, chest, abdomen and limbs**

In suicide IED consider blood sample for Hep B immunoglobulin/immunisation HIV PEP

#### Associated ballistic injury?

Go to

**1**

Pathways

#### Associated blunt injury?

Go to

**3**

Pathways

#### Associated burn?

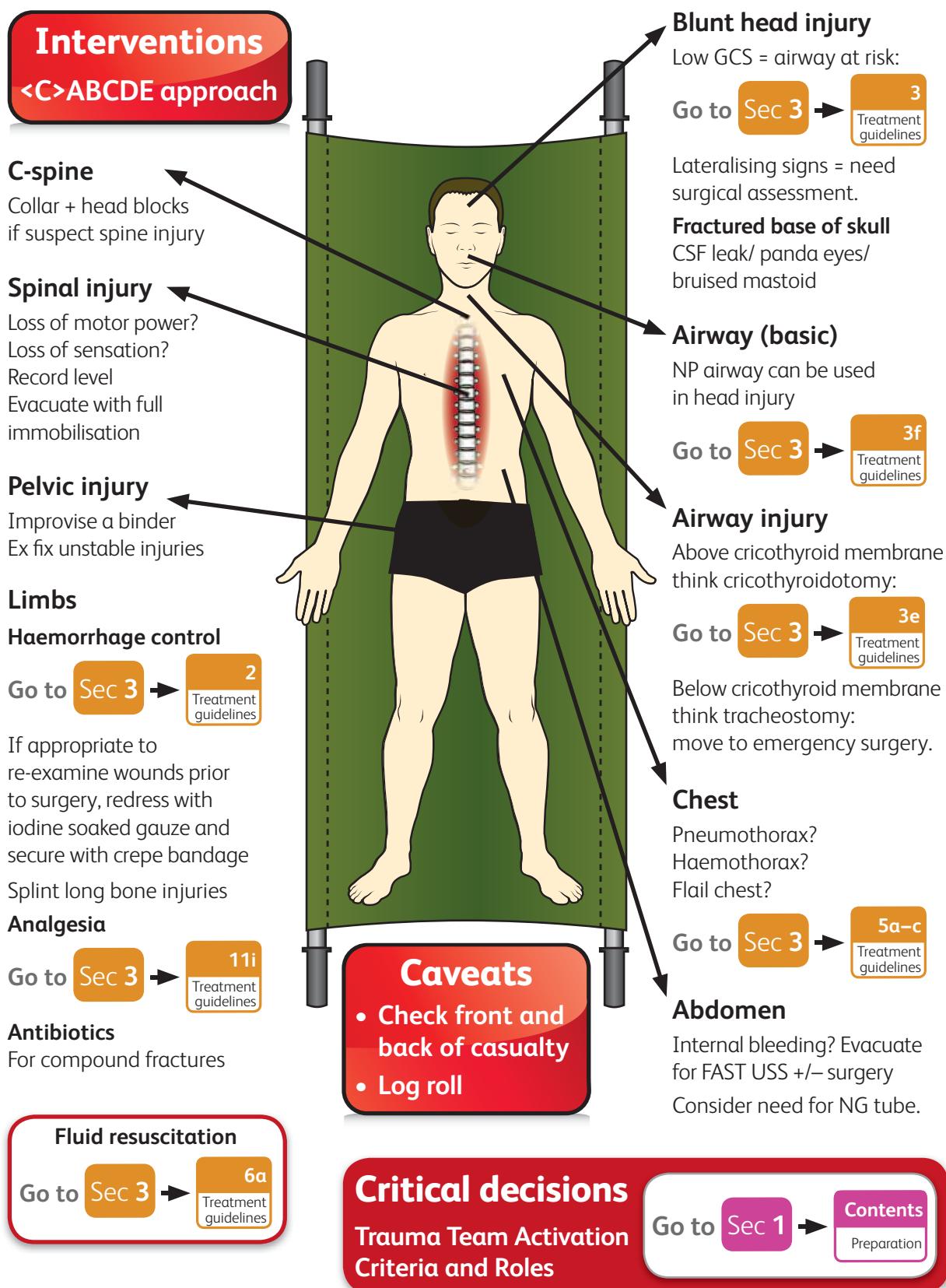
Go to

**4**

Pathways

# Blunt trauma

## Pathways 3



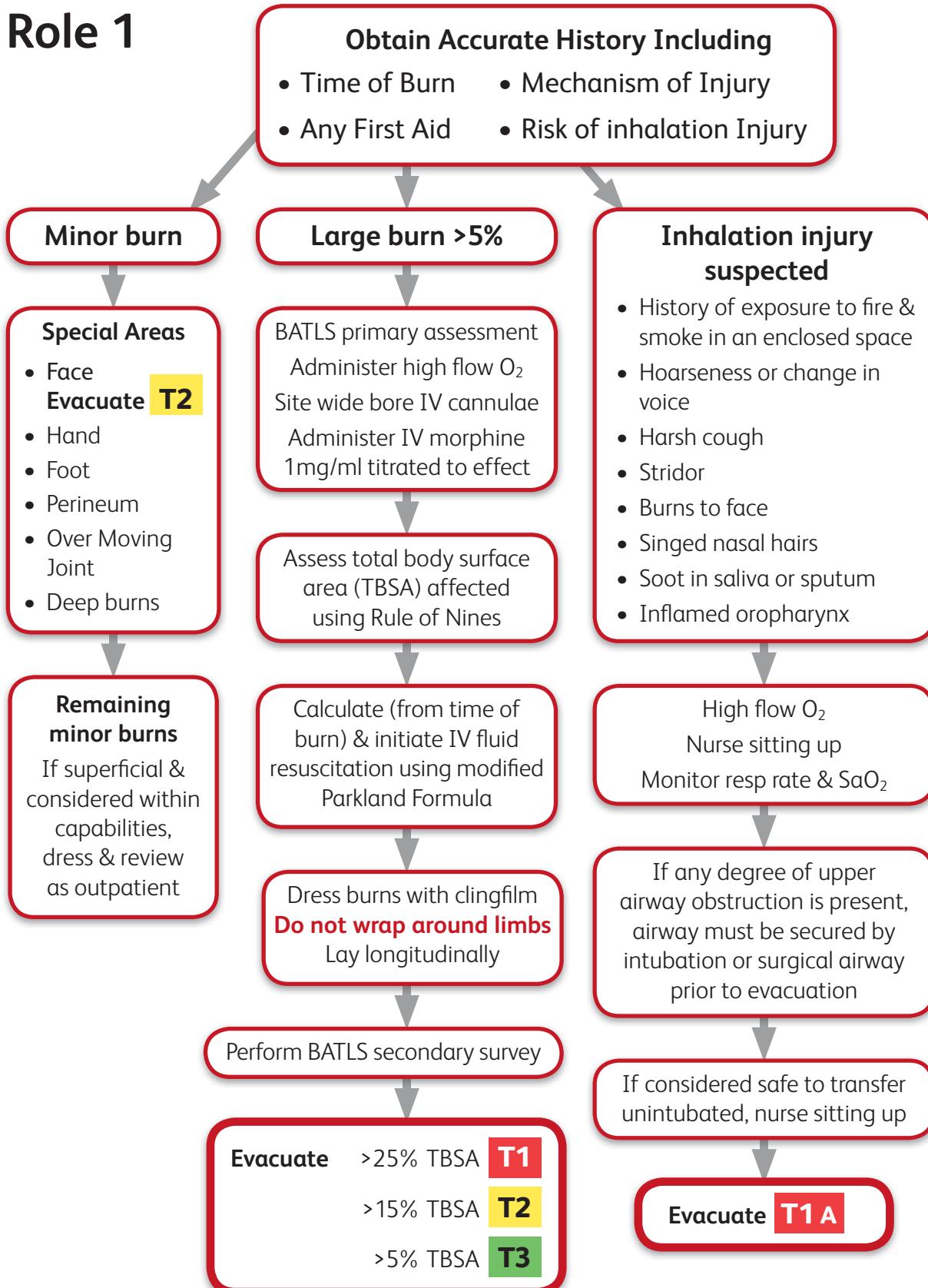
# Burn: Thermal

3-4a

## Pathways 4a

Pathways

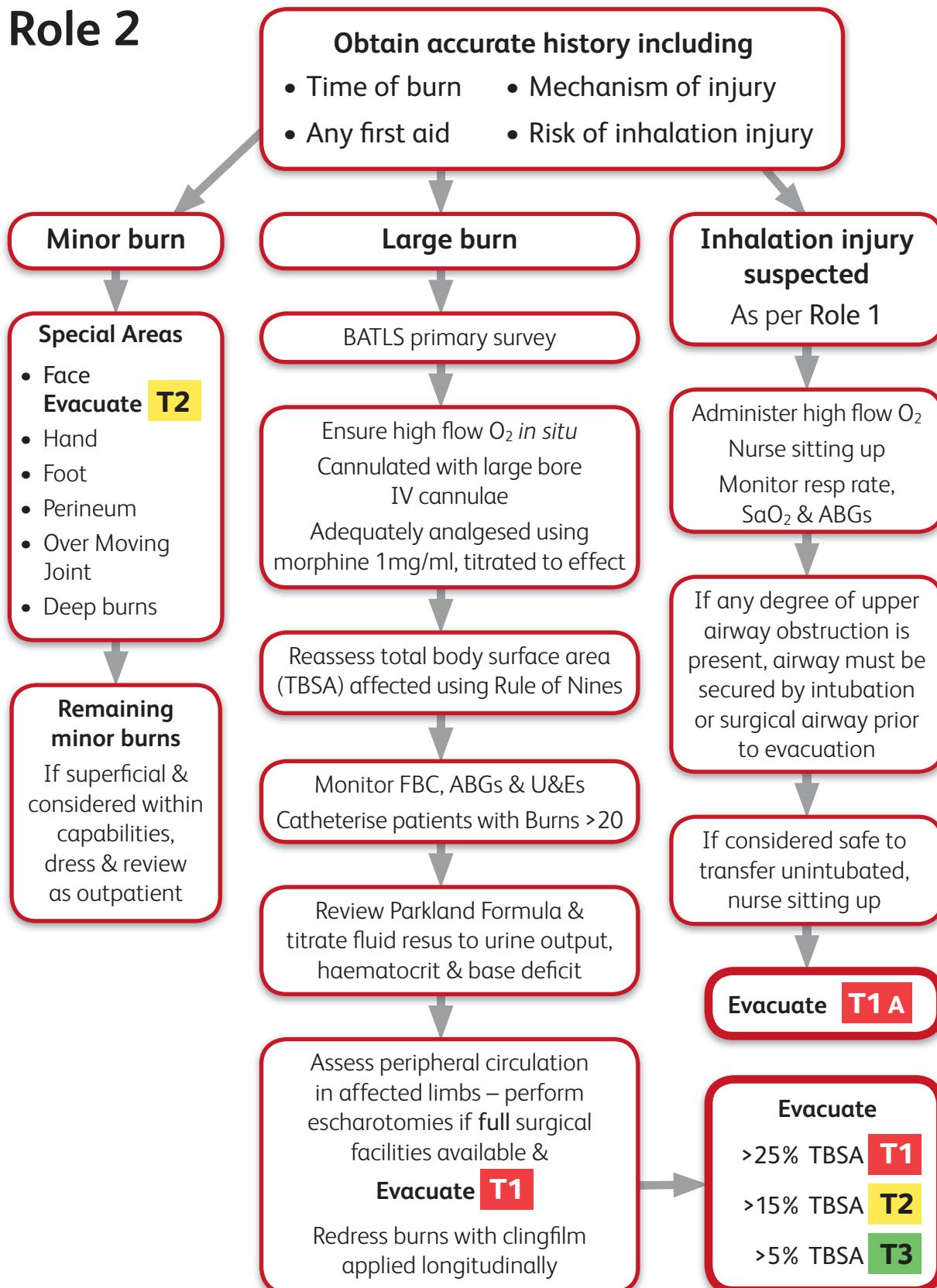
### Role 1



# Burn: Thermal

## Pathways 4a (Cont'd)

### Role 2



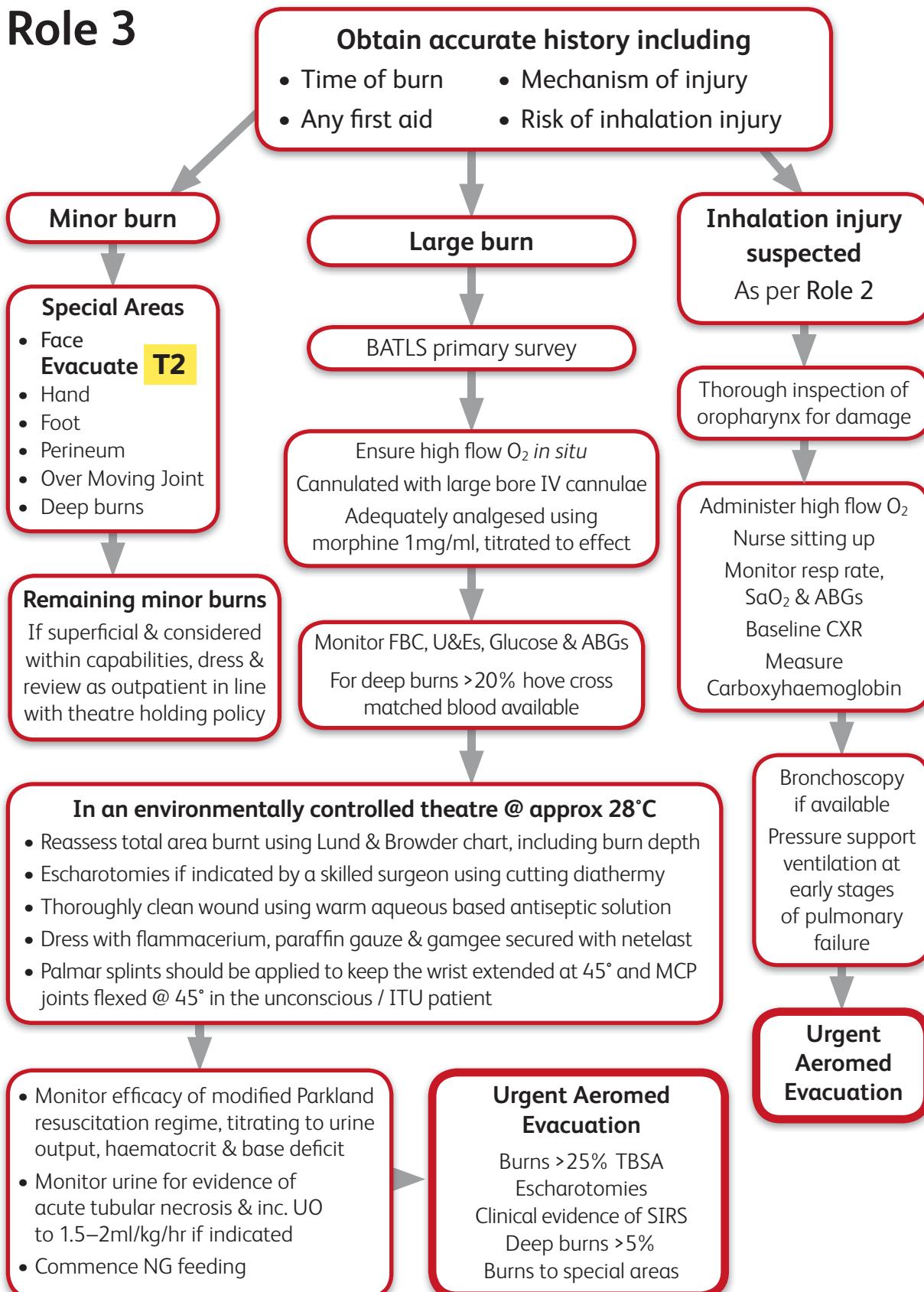
# Burn: Thermal

## Pathways 4a (Cont'd)

4a

Pathways

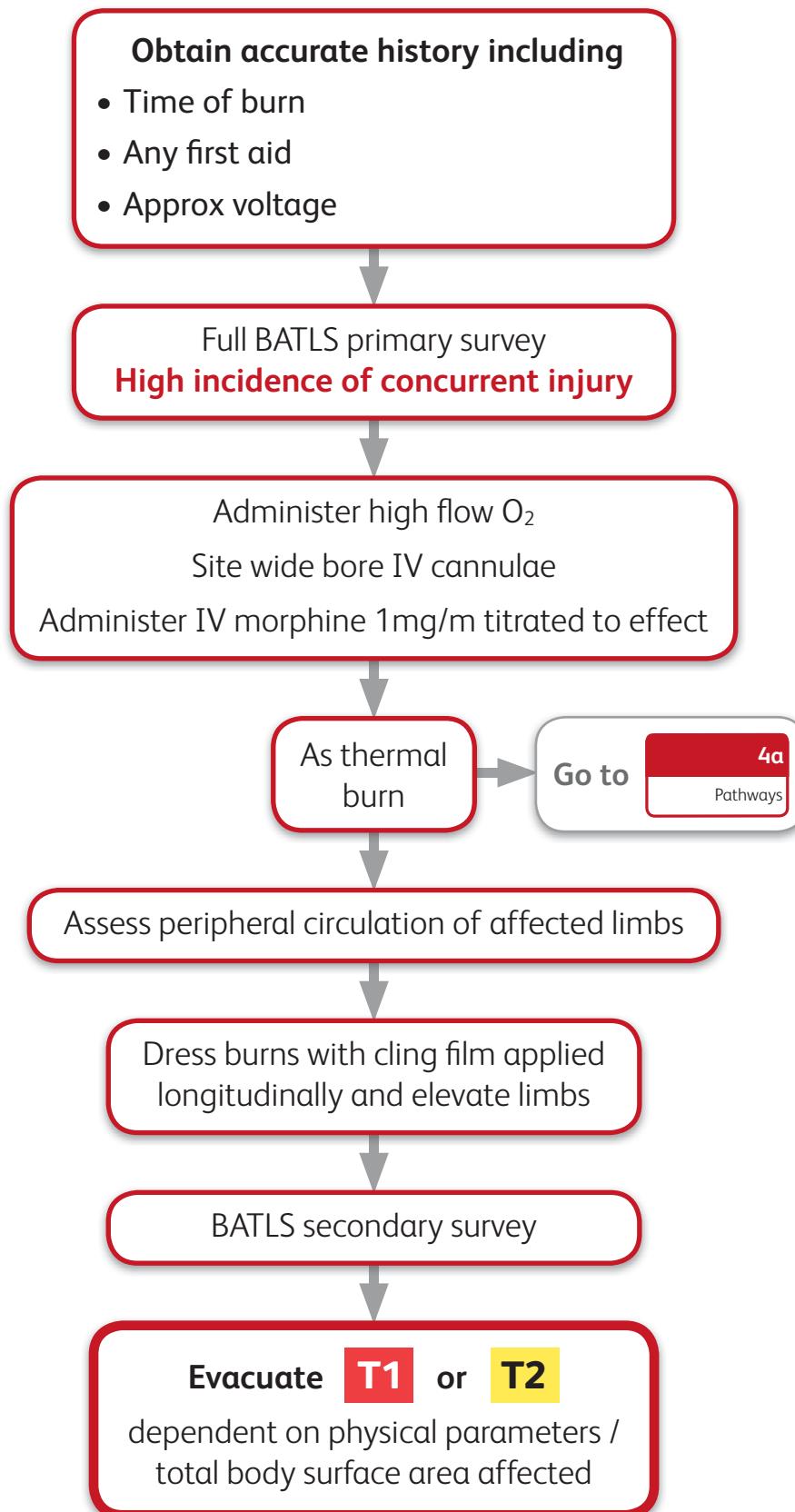
### Role 3



# Burn: Electrical

## Pathways 4b

### Role 1



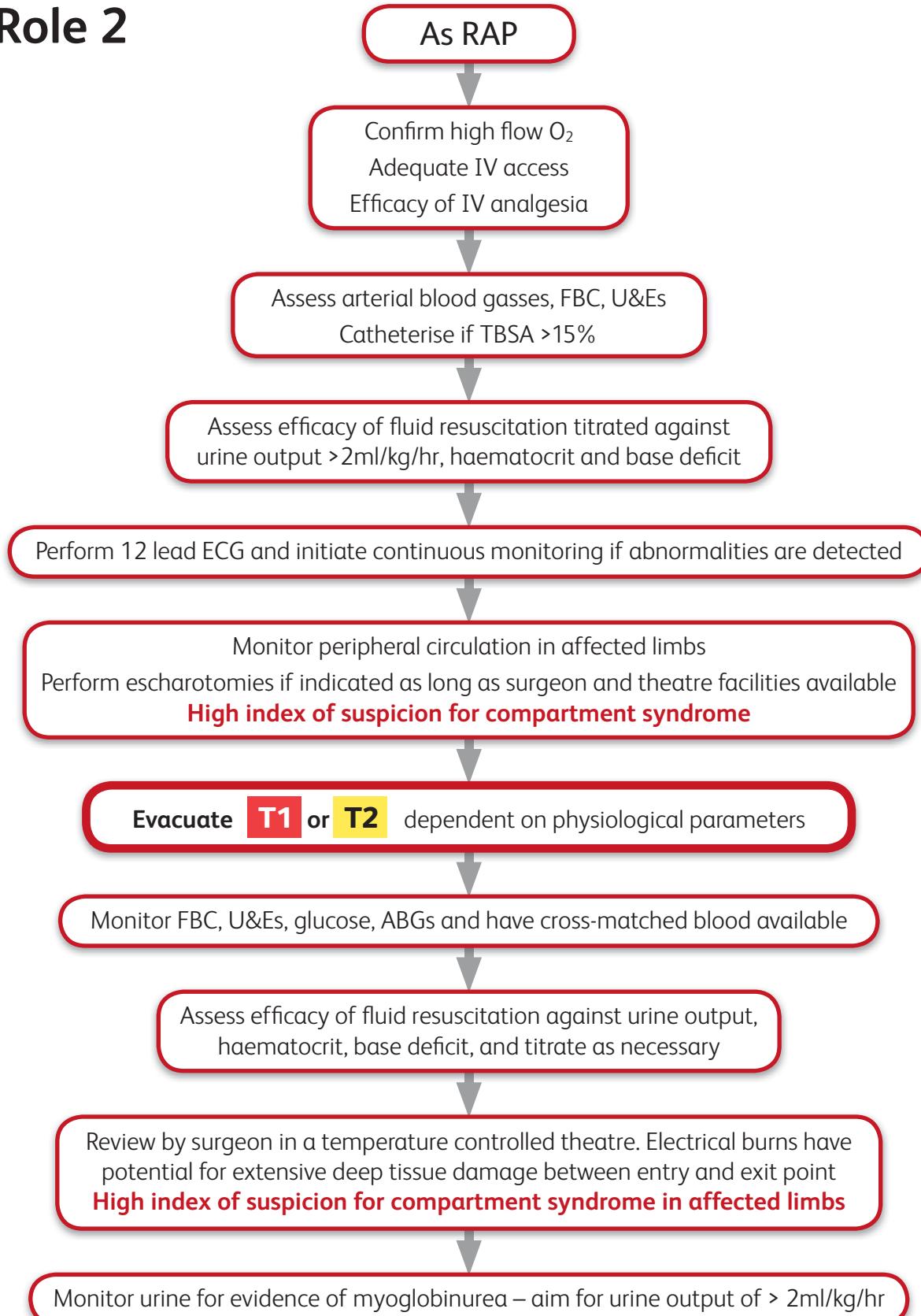
# Burn: Electrical

## Pathways 4b (Cont'd)

4b

Pathways

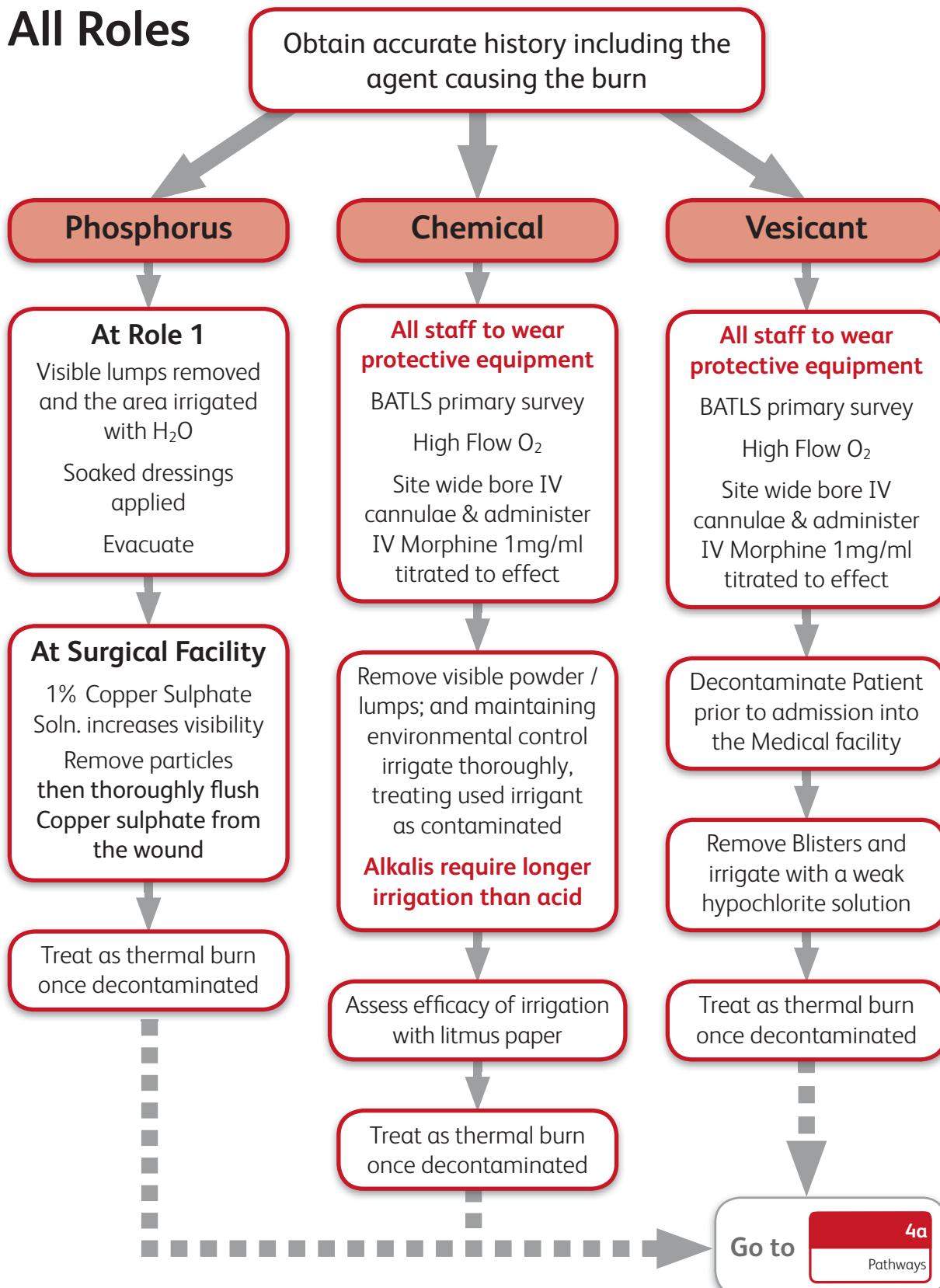
### Role 2



# Burn: Chemical

# Pathways **4c**

# All Roles



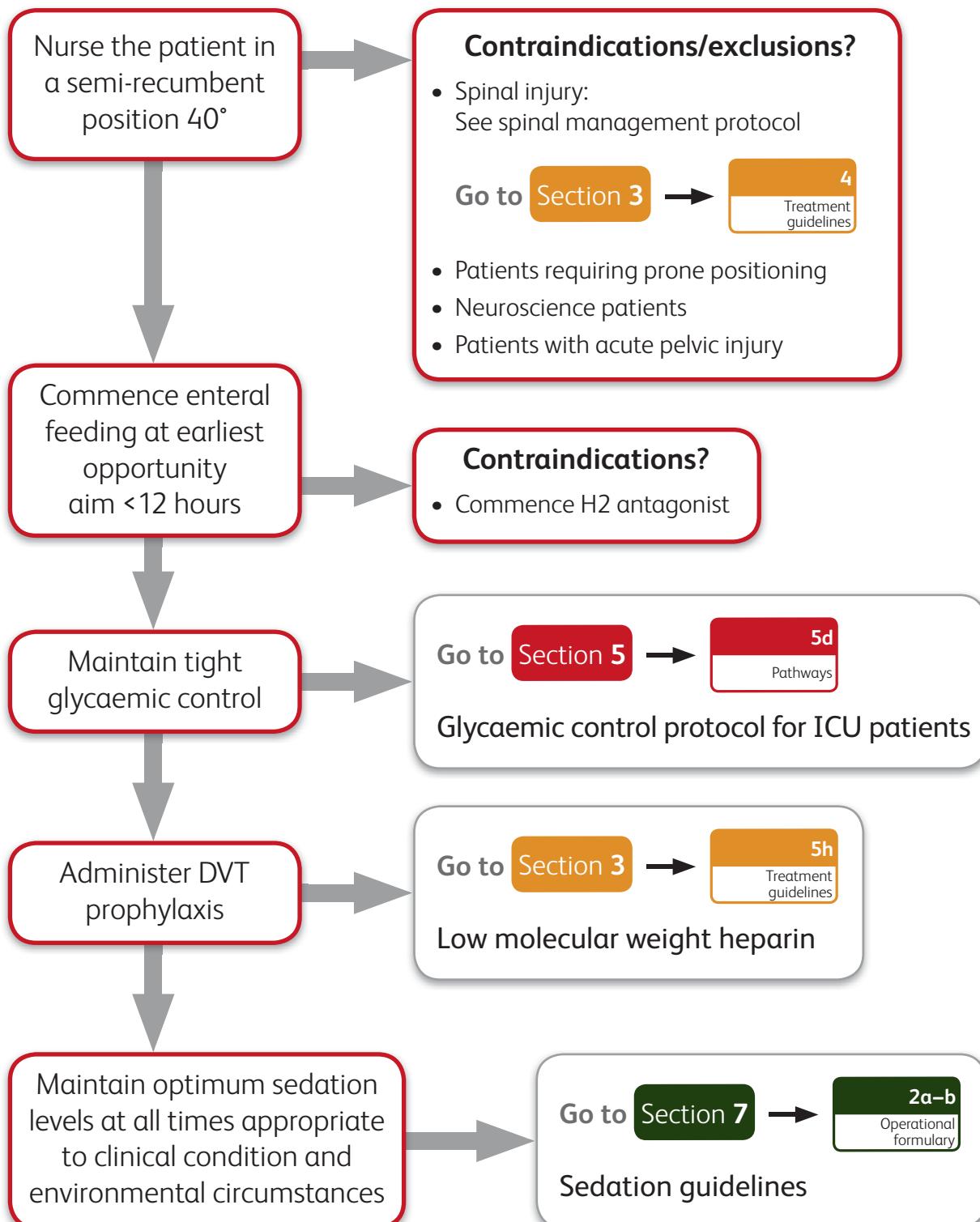
# Common critical care pathways: ICU ventilator care bundle

4c-5a

Pathways

## Pathways 5a

**Is the patient ventilated and admitted to ICU?**

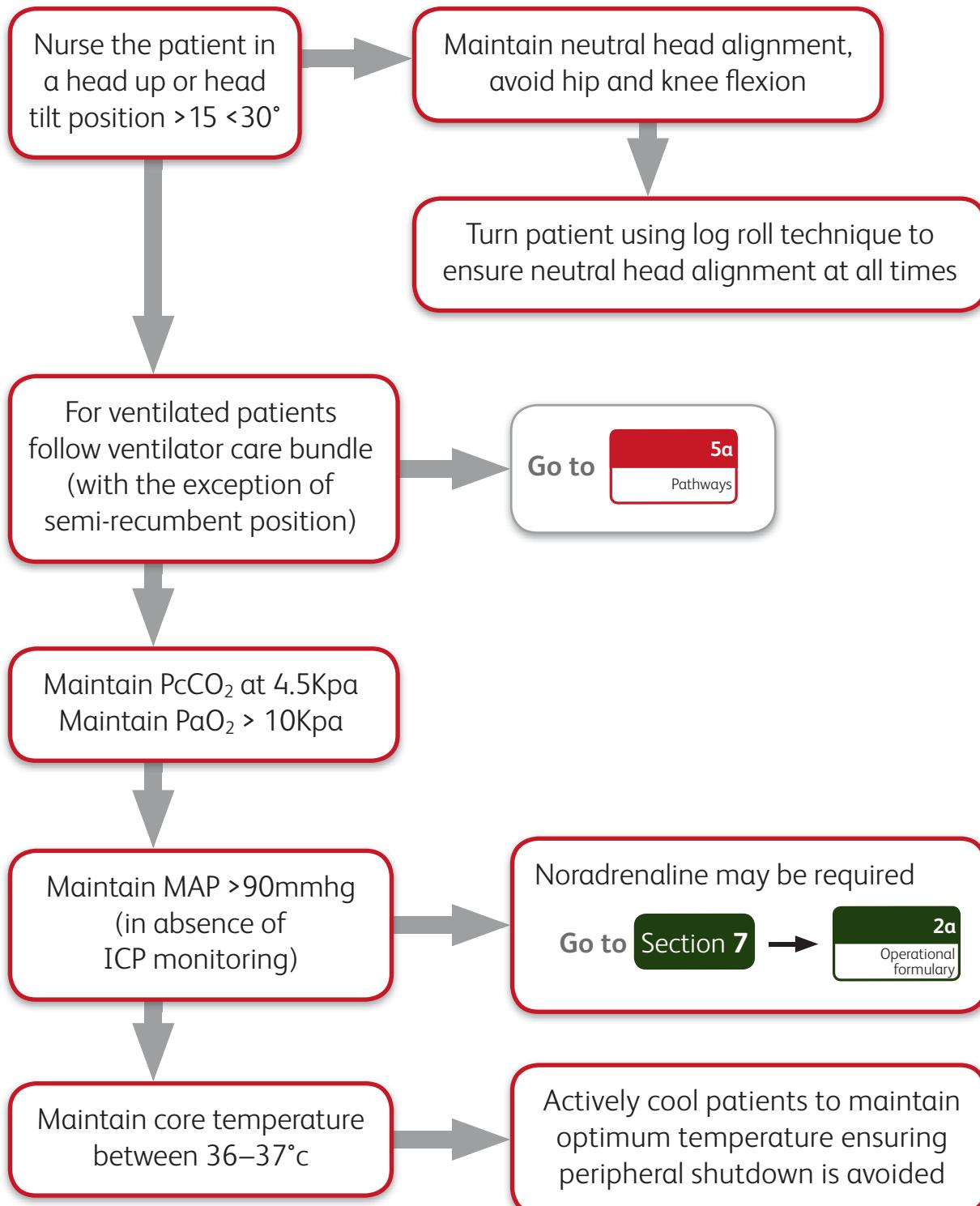


# Common critical care pathways:

## ICU neuro care bundle

### Pathways 5b

**Is there a severe head injury and a suspicion of raised ICP?**



# Common critical care pathways:

## Enteral feeding protocol

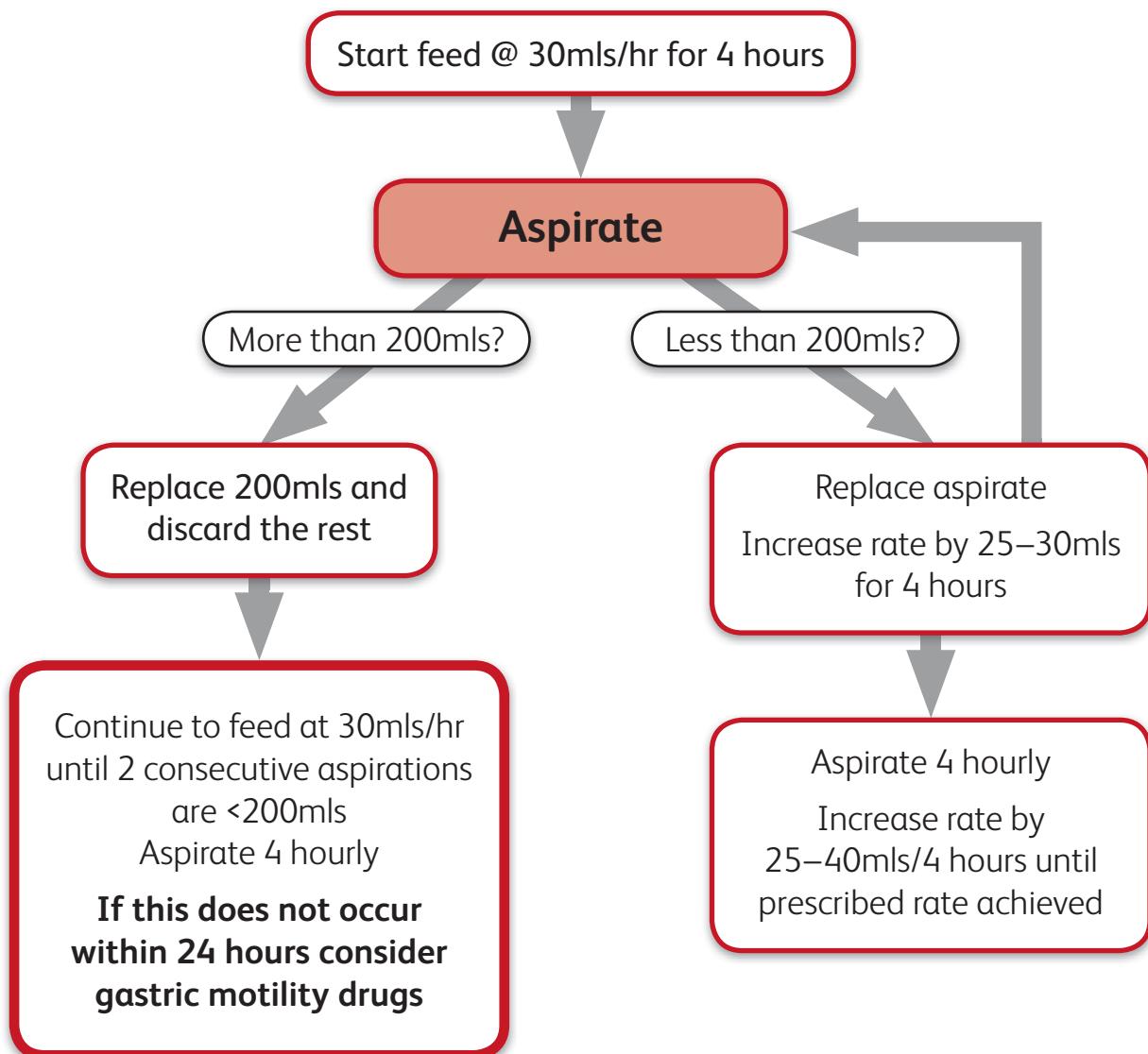
5b–5c

Pathways

### Pathways 5c

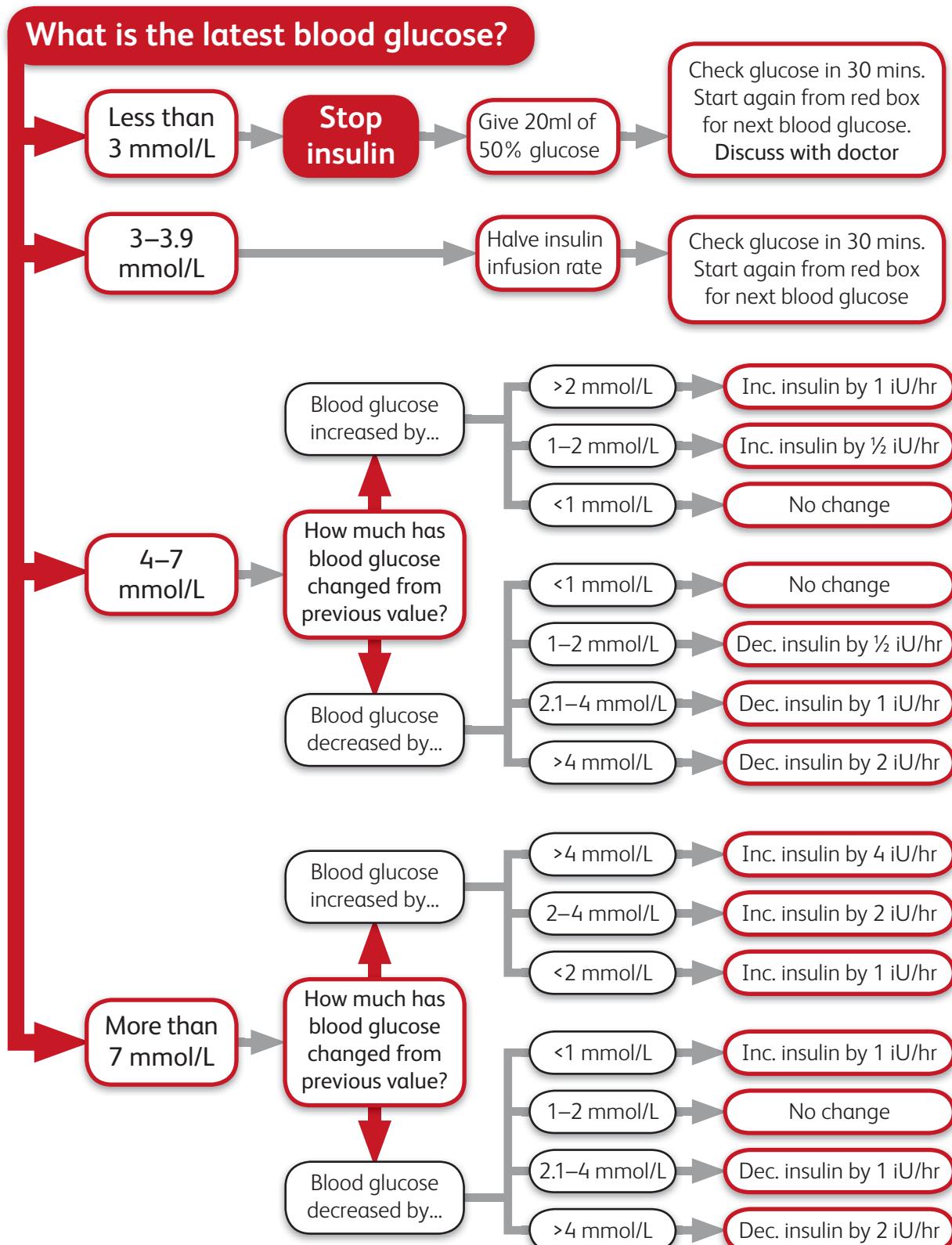
#### Key points

1. Use a large bore nasogastric feeding tube (NGT) when commencing enteral feeding.
2. Introduce feed gradually and according to flow diagram.
3. Once feeding is established, aspirate NGT minimum of once daily.
4. Critically ill patients should commence feeding as soon as possible.
5. Perform blood glucose monitoring 4 hourly.
6. Any drugs administered by NGT should be liquid and given separately from the feed with flushing before and after with water.
7. To minimise aspiration, patients should be fed sat at 30° or greater.



# Common critical care pathways: Bath insulin protocol version 5.4

## Pathways 5d



# Common critical care pathways: Bath insulin protocol version 5.4

5d

Pathways

## Pathways 5d (Cont'd)

### Exclusions

- This protocol is not suitable for patients with diabetic ketoacidosis, patients who are eating or children under the age of 16.
- Start protocol immediately if blood glucose rises above 7mmol/L for two consecutive hours, or of there is a single blood glucose above 8mmol/L.

### Insulin infusion

- Use Insulin Actrapid 50iU in 50ml 0.9% NaCl running through a dedicated cannula or central like lumen. Round insulin infusion rate to the nearest 0.5ml/hr.

### Starting rate for insulin infusion

Blood Glucose	Rate (ml/hr)
>12	4
7.1–12	2
3–7	0
<3	Give 20ml 50% glucose, recheck glucose in 30 mins, discuss with doctor

### Blood glucose testing

- Test blood glucose each hour if blood glucose is more than 7mmol/l.
- Use the same blood glucose testing machine each time.
- If blood glucose is stable between 4 and 7 and the insulin dose has only changed by 1ml/hr or less in the last 2 hours, blood glucose can be measured every 2 hours.

### Feeding

- Continuous feeding is recommended with this protocol. If enteral feeding is stopped, halve the insulin infusion and measure blood glucose hourly.
- When enteral feed is restarted, measure the blood glucose hourly and simply follow the protocol (i.e. do not automatically increase insulin infusion when feed goes on).
- Stop protocol when patient takes food orally (even if NG supplements being given at night). Consider if insulin necessary by another route.

### Other infusions (especially antibiotics)

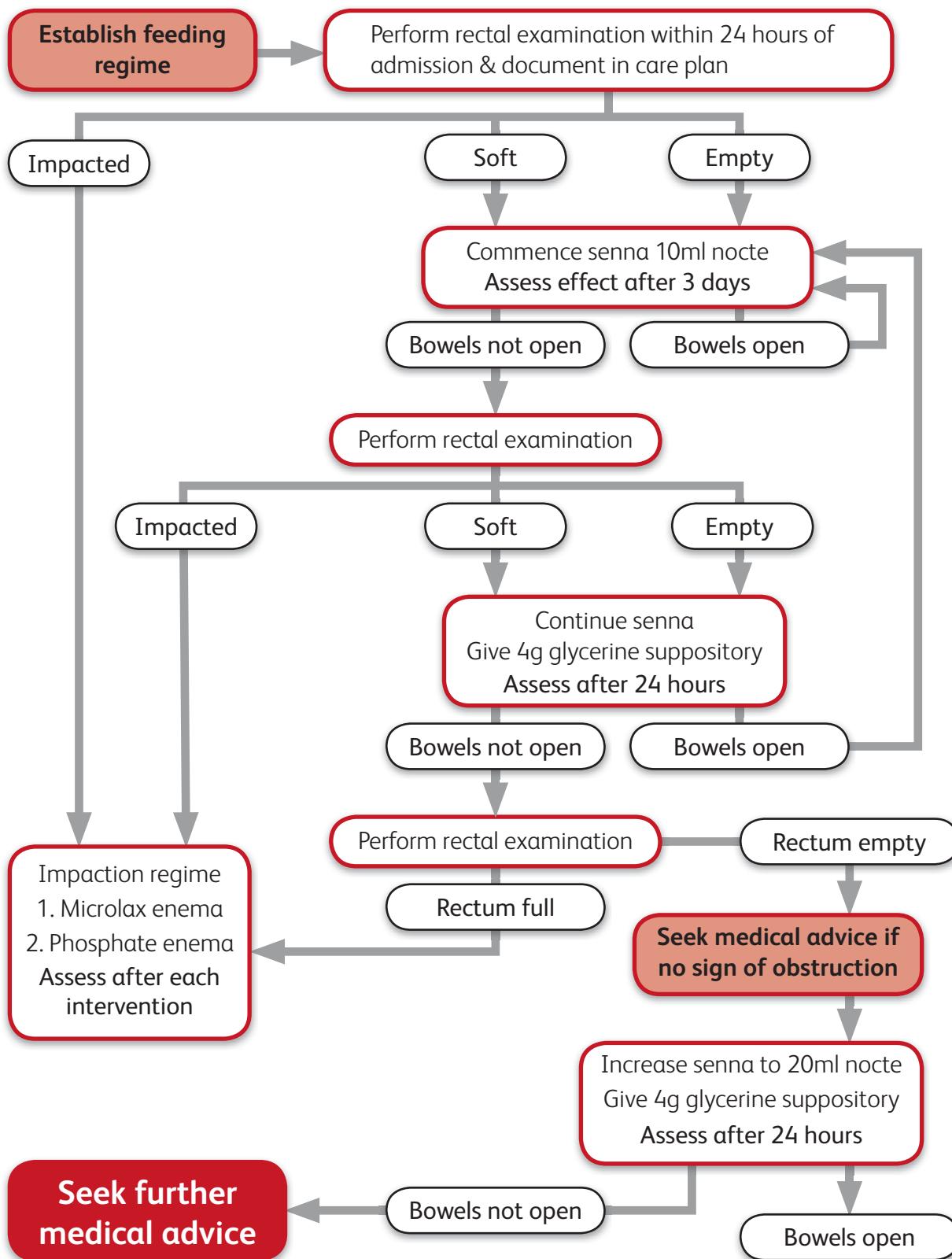
- Should be made up with water or saline if possible, or if not, with the minimum volume of glucose. Immunoglobulin infusion may cause over reading of blood glucose with Advantage II glucometer.

### Ward discharge

- Patients should be converted to a standard sliding scale before ward discharge. This should always run with a glucose or TPN infusion.

# Common critical care pathways: Bowel management flow chart

## Pathways 5e

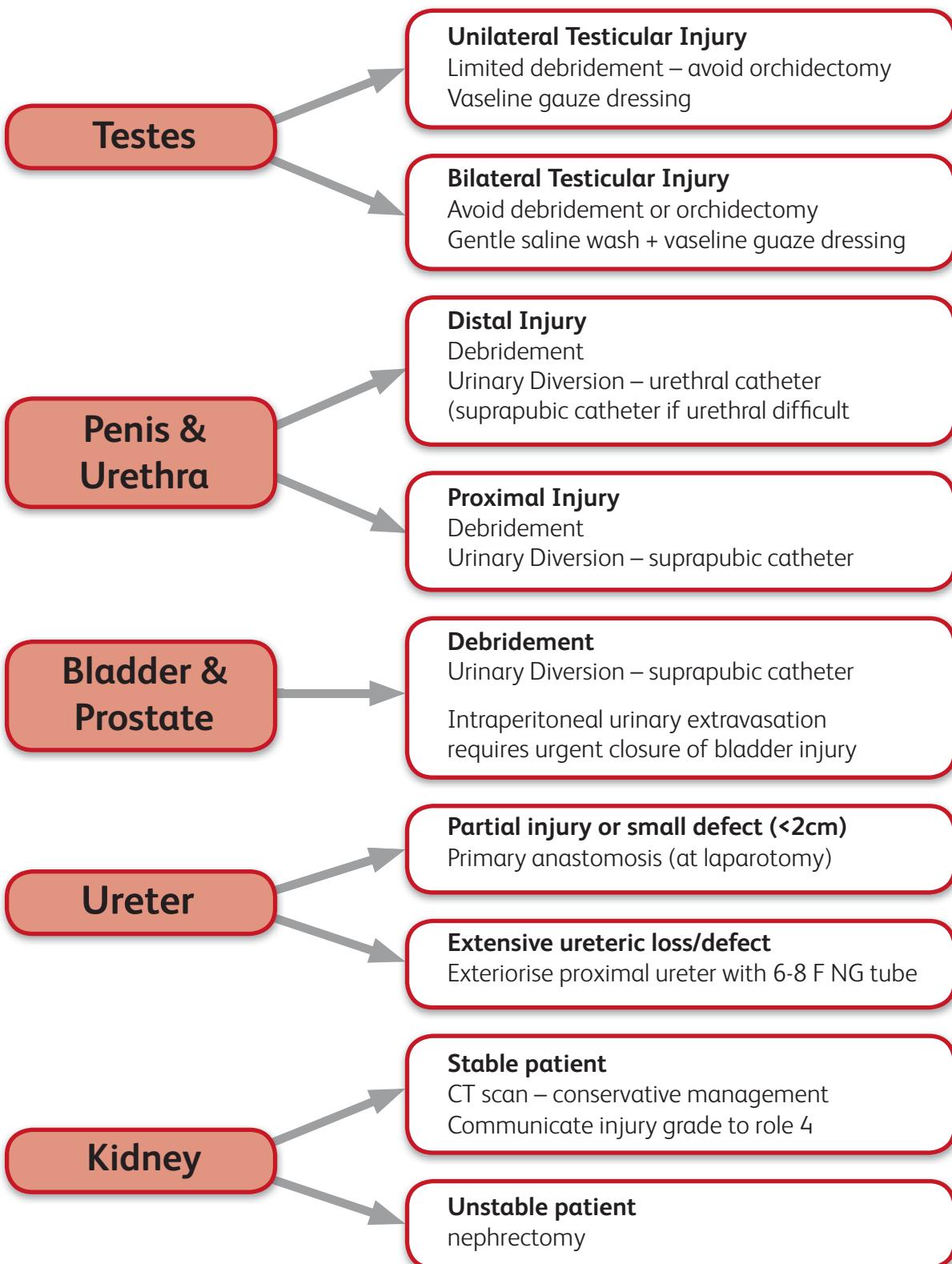


# Genitourinary Trauma Role 2 & 3

5e - 6a

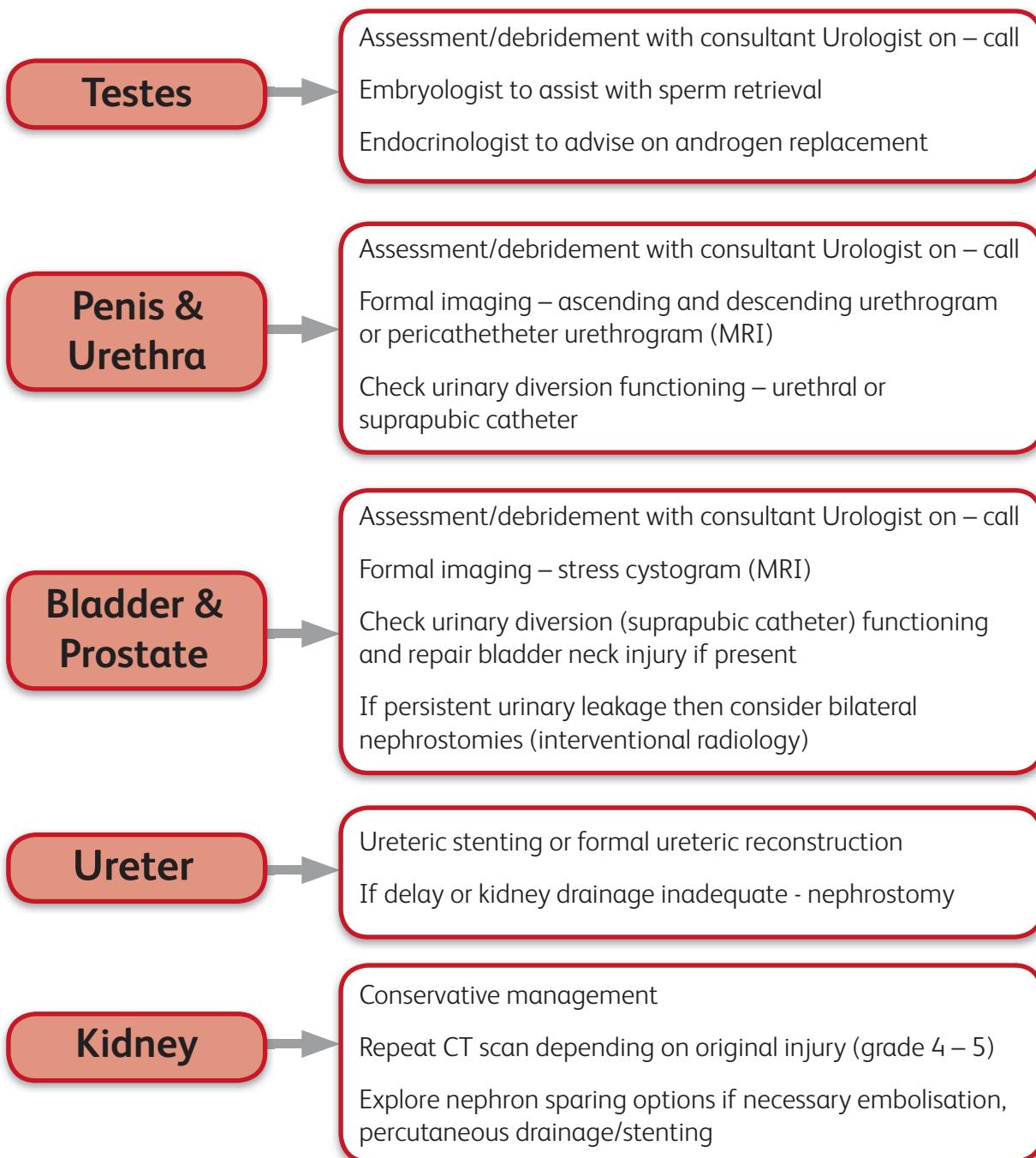
## Pathways 6a

Pathways



# Genitourinary Trauma Role 4

## Pathways 6b



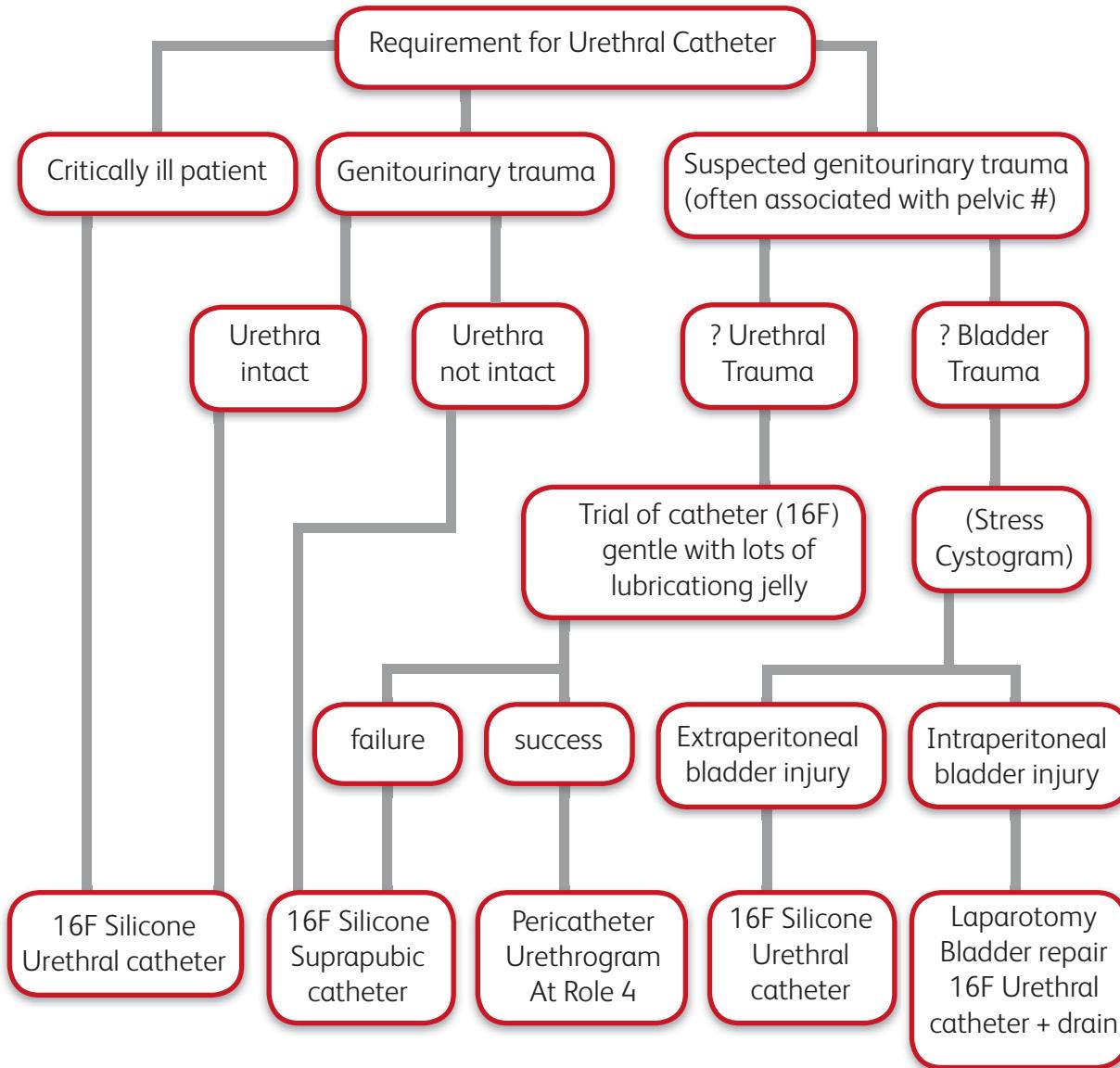
All cases referred to Genitourinary reconstruction team at RCDM

# Urinary Catheters

## Pathways 6c

6b – 6c

Pathways



### Role 4

If urinary catheterisation is prolonged, then daily clamping for 2-3 hours by nursing staff should be commenced as soon as it is clinically safe.

If the patient is alert and able to use his upper limbs, then he should be converted to a flip – flow valve as soon as it is clinically safe.

The catheter should be cleaned daily with an aseptic technique and changed every six weeks.

All casualties with genitourinary trauma should be referred to the Military Genitourinary Reconstruction team.

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# Section 6

# Toolbox

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# Toolbox

## Contents

### Contents

Toolbox

### Burns

- Rule of Nines ..... Toolbox **1a**
- Lund and Browder chart ..... Toolbox **1b**
- Burns calculator ..... Toolbox **1c**

### CW agent differentiation

- Quick look features ..... Toolbox **2a**
- Chemical primary survey ..... Toolbox **2b**

### ECG and rhythm recognition

- Cardiac arrest rhythm ..... Toolbox **3a**
- Peri-arrest rhythm ..... Toolbox **3b**
- Heart block ..... Toolbox **3c**
- Myocardial infarct ..... Toolbox **3d**

### Normal values

- Biochemistry ..... Toolbox **4a**
- Haematology and coagulation ..... Toolbox **4b**
- Recognising acid base disorders ..... Toolbox **4c**
- Urinalysis and cardiac enzyme markers ..... Toolbox **4d**

### Paediatrics

- Assessment of the sick child ..... Toolbox **5a**
- Assessment of pain ..... Toolbox **5b**

### Glasgow Coma Scale

- Adult ..... Toolbox **6a**
- Child ..... Toolbox **6b**

### Calculating drip rates ..... Toolbox **7**

### Early warning score ..... Toolbox **8**

### Asthma management ..... Toolbox **9**

# Toolbox

## Contents (Cont'd)

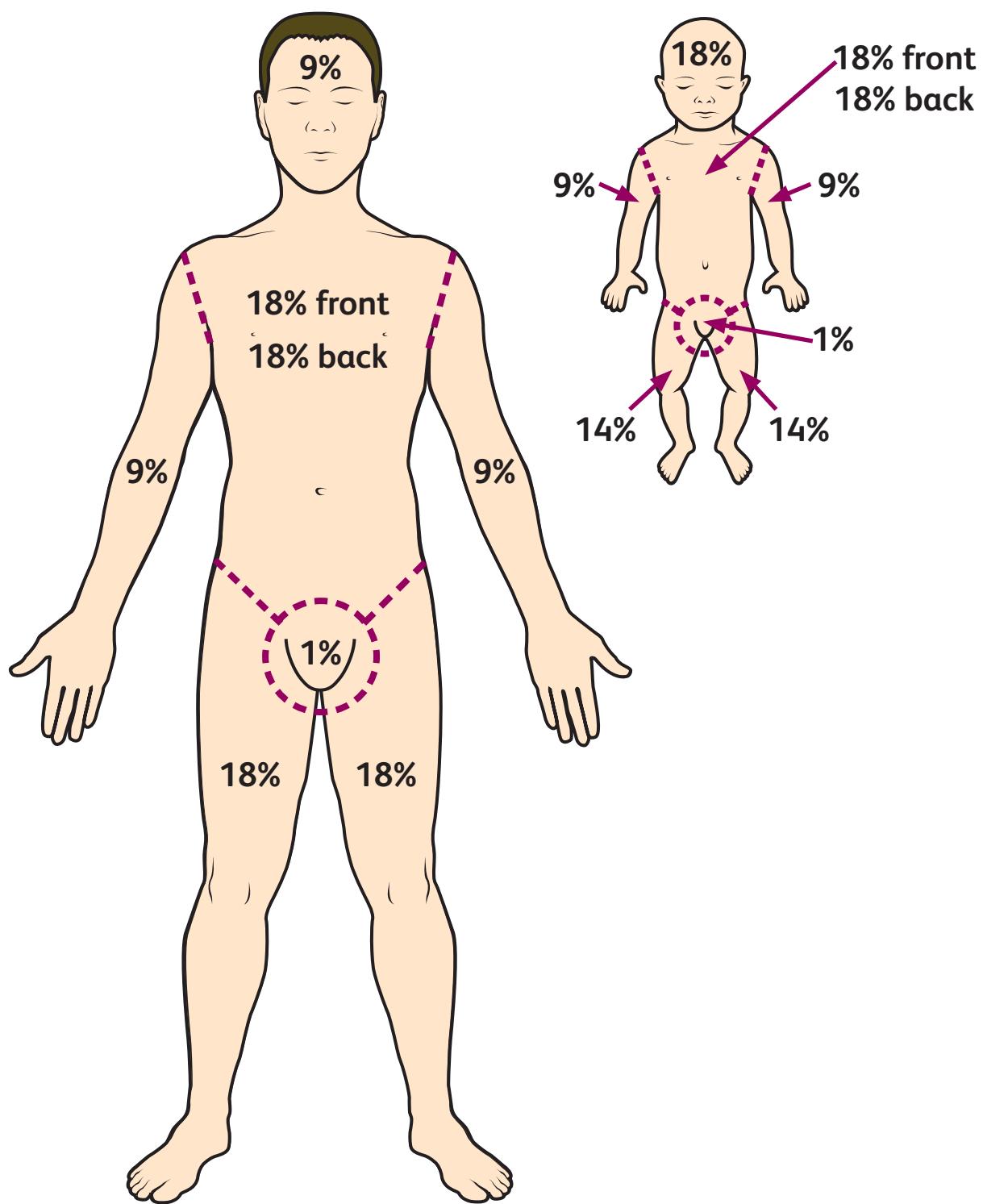
Military Medical Listing Categories .....	Toolbox <b>10</b>
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# Burns: Rule of Nines

## Toolbox 1a

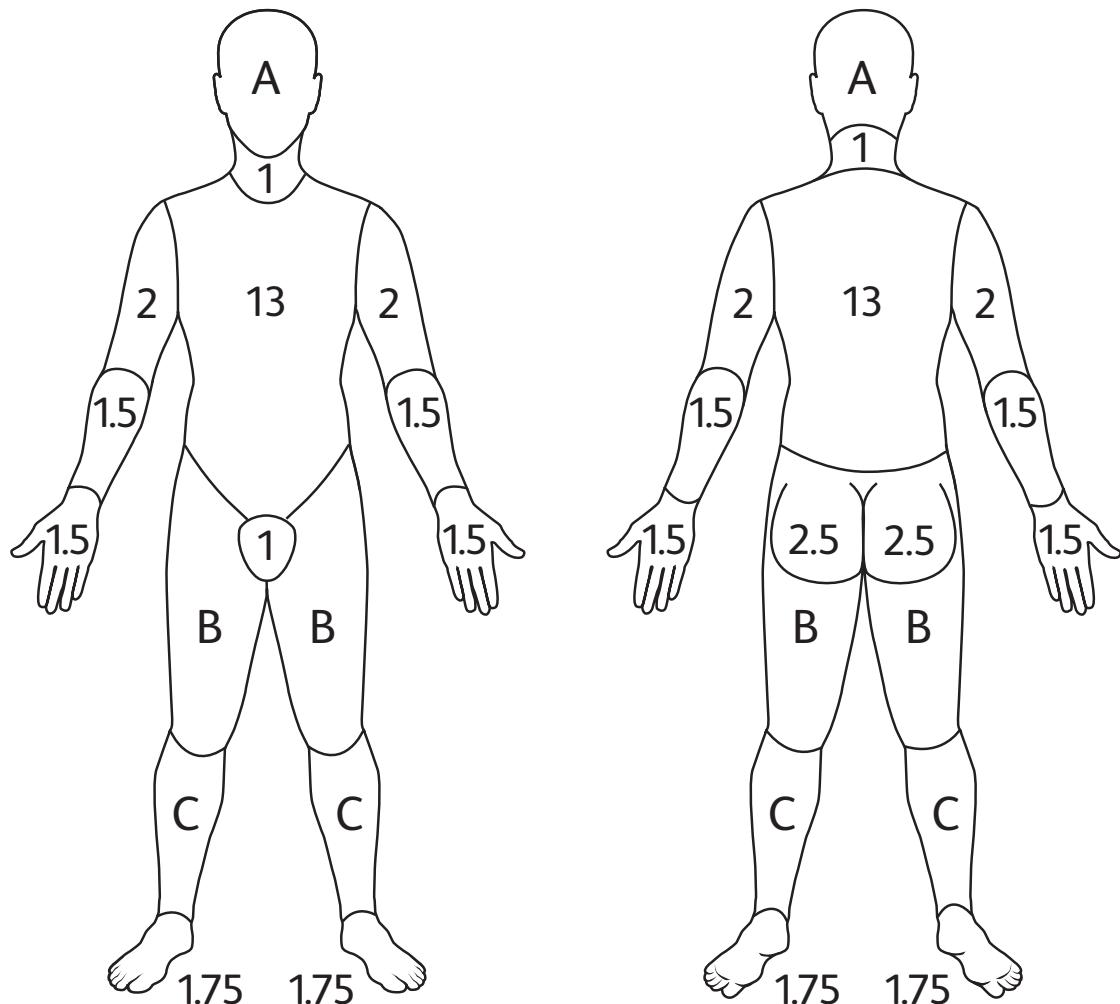
1a

Toolbox



# Burns: Lund and Browder chart

## Toolbox 1b



Ignore simple erythema



Partial thickness



Full thickness

Age	A%	B%	C%
0	9.5	2.75	2.5
1	8.5	3.25	2.5
5	6.5	4	2.75
10	5.5	4.5	3
15	4.5	4.5	3.25
Adult	3.5	4.75	3.5

Region	%
Head	
Neck	
Trunk (anterior)	
Trunk (posterior)	
Arm (right)	
Arm (left)	
Buttocks	
Genitalia	
Leg (right)	
Leg (left)	
TOTAL	

# Burns: Burns calculator

1b-c

Toolbox

## Toolbox 1c

### Instructions

#### A. Fluid deficit after burn

1. Calculate total burn area (Rule of Nines; Lund and Browder Chart). Round to nearest 10%.
2. Estimate/measure the patient's weight and round to nearest 10kg.
3. Read off the fluid deficit (in millilitres – white section) from time elapsed since burn (in hours – grey section).
4. Deduct the volume of any fluid already administered.
5. Replace deficit with Hartmann's solution only.

#### B. Maintenance fluid after burn

1. Read the hourly maintenance requirement (ml) from the purple section and replace as Hartmann's solution.
2. Start this replacement at the same time the deficit is replaced.
3. Note that the hourly requirement changes after 8 hours from the burn.
4. Colloid is required after the first 8 hours following burn for children and after the first 24 hours for adults.

time elapsed from burn in hours			fluid deficit in millilitres									
			40 PER CENT BURNS									
Weight (kg)			10	20	30	40	50	60	70	80	90	100
Fluid Deficit	Time Post Burn (Hours)	8	940	1600	2100	2600	4000	4800	5600	6400	7200	8000
		7	825	1400	1840	2275	3500	4200	4900	5600	6300	7000
		6	710	1200	1575	1950	3000	3600	4200	4800	5400	6000
		5	590	1000	1315	1625	2500	3000	3500	4000	4500	5000
		4	470	800	1050	1300	2000	2400	2800	3200	3600	4000
		3	355	600	790	975	1500	1800	2100	2400	2700	3000
		2	235	400	525	650	1000	1200	1400	1600	1800	2000
		1	120	200	265	325	500	600	700	800	900	1000
		0-8	120	200	265	325	500	600	700	800	900	1000
Fluid Maintenance		9-24	!	!	!	!	250	300	350	400	450	500

hourly maintenance requirement in millilitres



Specialist burns advice essential

# Burns: Burns calculator

## Toolbox 1C (Cont'd)

10 PER CENT BURNS												
Weight (kg)			10	20	30	40	50	60	70	80	90	100
Fluid Deficit	Time Post Burn (Hours)	8	590	1000	1315	1625						
		7	515	875	1150	1425						
		6	440	750	985	1220						
		5	370	625	820	1020						
		4	295	500	655	815						
		3	220	375	500	600						
		2	150	250	330	400						
		1	75	125	165	200						
		0–8	75	125	165	200						
Fluid Maintenance		9–24	!	!	!	!	!					

ORAL FLUIDS ONLY

20 PER CENT BURNS													
Weight (kg)			10	20	30	40	50	60	70	80	90	100	
Fluid Deficit	Time Post Burn (Hours)	8	705	1200	1575	1950	2000	2400	2800	3200	3600	4000	
		7	620	1050	1380	1710	1750	2100	2450	2800	3150	3500	
		6	530	900	1180	1460	1500	1800	2100	2400	2700	3000	
		5	440	750	985	1220	1250	1500	1750	2000	2250	2500	
		4	350	600	790	975	1000	1200	1400	1600	1800	2000	
		3	265	450	590	730	750	900	1050	1200	1350	1500	
		2	180	300	395	490	500	600	700	800	900	100	
		1	90	150	200	245	250	300	350	400	450	500	
		0–8	90	150	200	245	250	300	350	400	450	500	
Fluid Maintenance		9–24	!	!	!	!	!	125	150	175	200	225	250

30 PER CENT BURNS													
Weight (kg)			10	20	30	40	50	60	70	80	90	100	
Fluid Deficit	Time Post Burn (Hours)	8	825	1400	1840	2275	3000	3600	4200	4800	5400	6000	
		7	720	1225	1575	2075	2625	3150	3675	4200	4725	5250	
		6	620	1050	1380	1780	2250	2700	3150	3600	4050	4500	
		5	515	875	1150	1420	1875	2250	2625	3000	3375	3750	
		4	410	700	920	1140	1500	1800	2100	2400	2700	3000	
		3	310	525	690	855	1125	1350	1575	1800	2025	2250	
		2	210	350	460	570	750	900	1050	1200	1350	1500	
		1	105	175	230	285	375	450	525	600	675	750	
		0–8	105	175	230	285	375	450	525	600	675	750	
Fluid Maintenance		9–24	!	!	!	!	!	190	225	260	300	340	375

# Burns: Burns calculator

1c

Toolbox

## Toolbox 1c (Cont'd)

40 PER CENT BURNS												
Weight (kg)			10	20	30	40	50	60	70	80	90	100
Fluid Deficit	Time Post Burn (Hours)	8	940	1600	2100	2600	4000	4800	5600	6400	7200	8000
		7	825	1400	1840	2275	3500	4200	4900	5600	6300	7000
		6	710	1200	1575	1950	3000	3600	4200	4800	5400	6000
		5	590	1000	1315	1625	2500	3000	3500	4000	4500	5000
		4	470	800	1050	1300	2000	2400	2800	3200	3600	4000
		3	355	600	790	975	1500	1800	2100	2400	2700	3000
		2	235	400	525	650	1000	1200	1400	1600	1800	2000
		1	120	200	265	325	500	600	700	800	900	1000
	0–8	120	200	265	325	500	600	700	800	900	1000	
Fluid Maintenance	9–24	!	!	!	!	250	300	350	400	450	500	

50 PER CENT BURNS												
Weight (kg)			10	20	30	40	50	60	70	80	90	100
Fluid Deficit	Time Post Burn (Hours)	8	1060	1800	2360	2925	5000	6000	7000	8000	9000	10000
		7	925	1575	2065	2560	4375	5250	6125	7000	7875	8750
		6	795	1350	1770	2195	3750	4500	5250	6000	6750	7500
		5	660	1125	1475	1830	3125	3750	4375	5000	5625	6250
		4	530	900	1180	1460	2500	3000	3500	4000	4500	5000
		3	400	675	885	1100	1875	2250	2625	3000	3375	3750
		2	265	450	590	730	1250	1500	1750	2000	2250	2500
		1	130	225	295	365	625	750	875	1000	1125	1250
	0–8	130	225	295	365	625	750	875	1000	1125	1250	
Fluid Maintenance	9–24	!	!	!	!	315	375	440	500	565	625	

60 PER CENT BURNS												
Weight (kg)			10	20	30	40	50	60	70	80	90	100
Fluid Deficit	Time Post Burn (Hours)	8	1175	2000	2625	3260	6000	7200	8400	9600	10800	12000
		7	1030	1750	2300	2850	5250	6300	7350	8400	9450	10500
		6	880	1500	1970	2445	4500	5400	6300	7200	8100	9000
		5	735	1250	1640	2040	3750	4500	5250	6000	6750	7500
		4	590	1000	1310	1630	3000	3600	4200	4800	5400	6000
		3	440	750	985	1220	2250	2700	3150	3600	4050	4500
		2	295	500	655	815	1500	1800	2100	2400	2700	3000
		1	150	250	330	410	750	900	1050	1200	1350	1500
	0–8	150	250	330	410	750	900	1050	1200	1350	1500	
Fluid Maintenance	9–24	!	!	!	!	375	450	525	600	675	750	

# Burns: Burns calculator

## Toolbox 1C (Cont'd)

70 PER CENT BURNS												
Weight (kg)			10	20	30	40	50	60	70	80	90	100
Fluid Deficit	Time Post Burn (Hours)	8	1295	2200	2890	3575	7000	8400	9800	11200	12600	14000
		7	1130	1925	2530	3180	6125	7350	8575	9800	11025	12250
		6	970	1650	2170	2680	5250	6300	7350	8400	9450	10500
		5	810	1375	1805	2235	4375	5250	6125	7000	7875	8750
		4	650	1100	1445	1790	3500	4200	4900	5600	6300	7000
		3	485	825	1085	1345	2625	3150	3675	4200	4725	5250
		2	325	575	725	900	1750	2100	2450	2800	3150	3500
		1	160	290	360	450	875	1050	1225	1400	1575	1750
	0–8	160	290	360	450	875	1050	1225	1400	1575	1750	
	9–24	!	!	!	!	!	440	525	615	700	790	875
Fluid Maintenance												

80 PER CENT BURNS												
Weight (kg)			10	20	30	40	50	60	70	80	90	100
Fluid Deficit	Time Post Burn (Hours)	8	1410	2400	3160	3900	8000	9600	11200	12800	14400	16000
		7	1235	2100	2765	3415	7000	8400	9800	11200	12600	14000
		6	1060	1800	2370	2925	6000	7200	8400	9600	10800	12000
		5	880	1500	1975	2440	5000	6000	7000	8000	9000	10000
		4	705	1200	1580	1950	4000	4800	5600	6400	7200	8000
		3	530	900	1185	1465	3000	3600	4200	4800	5400	6000
		2	335	600	790	975	2000	2400	2800	3200	3600	4000
		1	175	300	395	490	1000	1200	1400	1600	1800	2000
	0–8	175	300	395	490	1000	1200	1400	1600	1800	2000	
	9–24	!	!	!	!	!	500	600	700	800	900	1000
Fluid Maintenance												

90 PER CENT BURNS												
Weight (kg)			10	20	30	40	50	60	70	80	90	100
Fluid Deficit	Time Post Burn (Hours)	8	1530	2600	3415	4225	9000	10800	12600	14400	16200	18000
		7	1340	2275	2990	3700	7875	9450	11025	12600	14175	15750
		6	1150	1950	2490	3170	6750	8100	9450	10800	12150	13500
		5	960	1625	2135	2640	5625	6750	7875	9000	10125	11250
		4	765	1300	1710	2115	4500	5400	6300	7200	8100	9000
		3	575	975	1280	1585	3375	4050	4725	5400	6075	6750
		2	380	650	855	1055	2250	2700	3150	3600	4050	4500
		1	190	325	430	530	1125	1350	1575	1800	2025	2250
	0–8	190	325	430	530	1125	1350	1575	1800	2025	2250	
Fluid Maintenance												

# Burns: Burns calculator

1c

## Toolbox 1c (Cont'd)

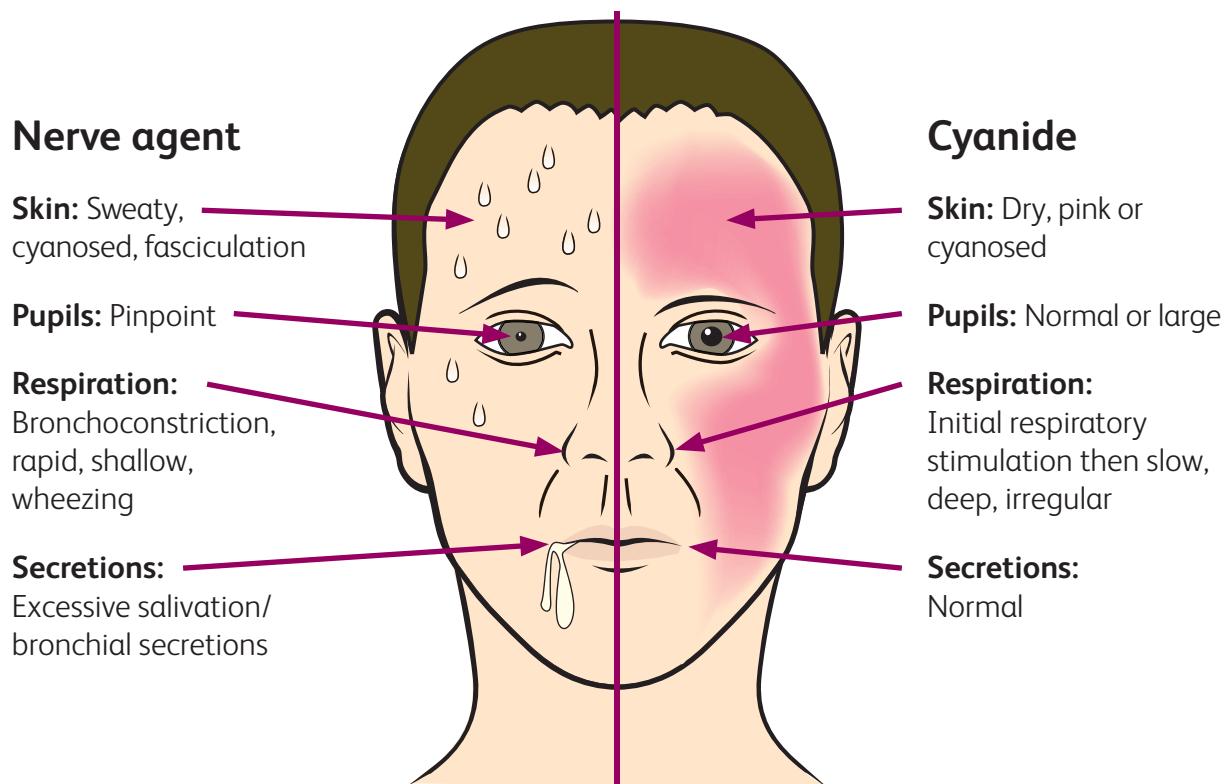
Toolbox

100 PER CENT BURNS												
Weight (kg)			10	20	30	40	50	60	70	80	90	100
Fluid Deficit	Time Post Burn (Hours)	8	1645	2800	3675	4550	10000	12000	14000	16000	18000	20000
		7	1440	2450	3150	3985	8750	10500	12250	14000	15750	17500
		6	1235	2100	2755	3415	7500	9000	10500	12000	13500	15000
		5	1030	1750	2300	2845	6250	7500	8750	10000	11250	12500
		4	825	1400	1840	2275	5000	6000	7000	8000	9000	10000
		3	620	1050	1380	1710	3750	4500	5250	6000	6750	7500
		2	410	700	920	1140	2500	3000	3500	4000	4500	5000
		1	210	350	460	570	1250	1500	1750	2000	2250	2500
Fluid Maintenance	0–8	210	350	460	570	1250	1500	1750	2000	2250	2500	
	9–24	!	!	!	!	!	625	750	875	1000	1125	1250

# CW agent differentiation:

## Quick look features

### Toolbox 2a



# CW agent differentiation:

## Chemical primary survey

2a-b

Toolbox

### Toolbox 2b

#### Airway

Secretions

Increased?

Nerve Agent

Decreased?

Atropine/BZ

Secretions

Bad Eggs?

Hydrogen Sulphide

#### Breathing

Breathing

Bronchospasm?

Nerve Agent

Cough and  
frothy Sputum?

Lung damager

Skin colour

Cyanosis?

Cyanide

Methaemoglobinaemia

Pink?

Cyanide

Carbon Monoxide

#### Circulation

Heart rate

Bradycardia?

Nerve Agent

Chocolate  
coloured blood?

Methaemoglobinaemia

Venous blood

Arterialised  
venous blood?

Cyanide

#### Disability

Pupils

Pinpoint?

Nerve Agent

Opiate

Dilated?

Botulin

Atropine/BZ

CNS involvement – confusion, coma

Nerve Agent

Atropine/BZ

#### Exposure

Erythema/  
Burns

Immediate (&lt;1 hr)?

Hydrofluoric acid

Lewisite

Delayed (&gt;1 hr)?

Mustard

Muscle

Fasciculation?

Nerve Agent

Skin

Flaccid Paralysis?

Botulin

Excessive sweating?

Nerve Agent

Dry?

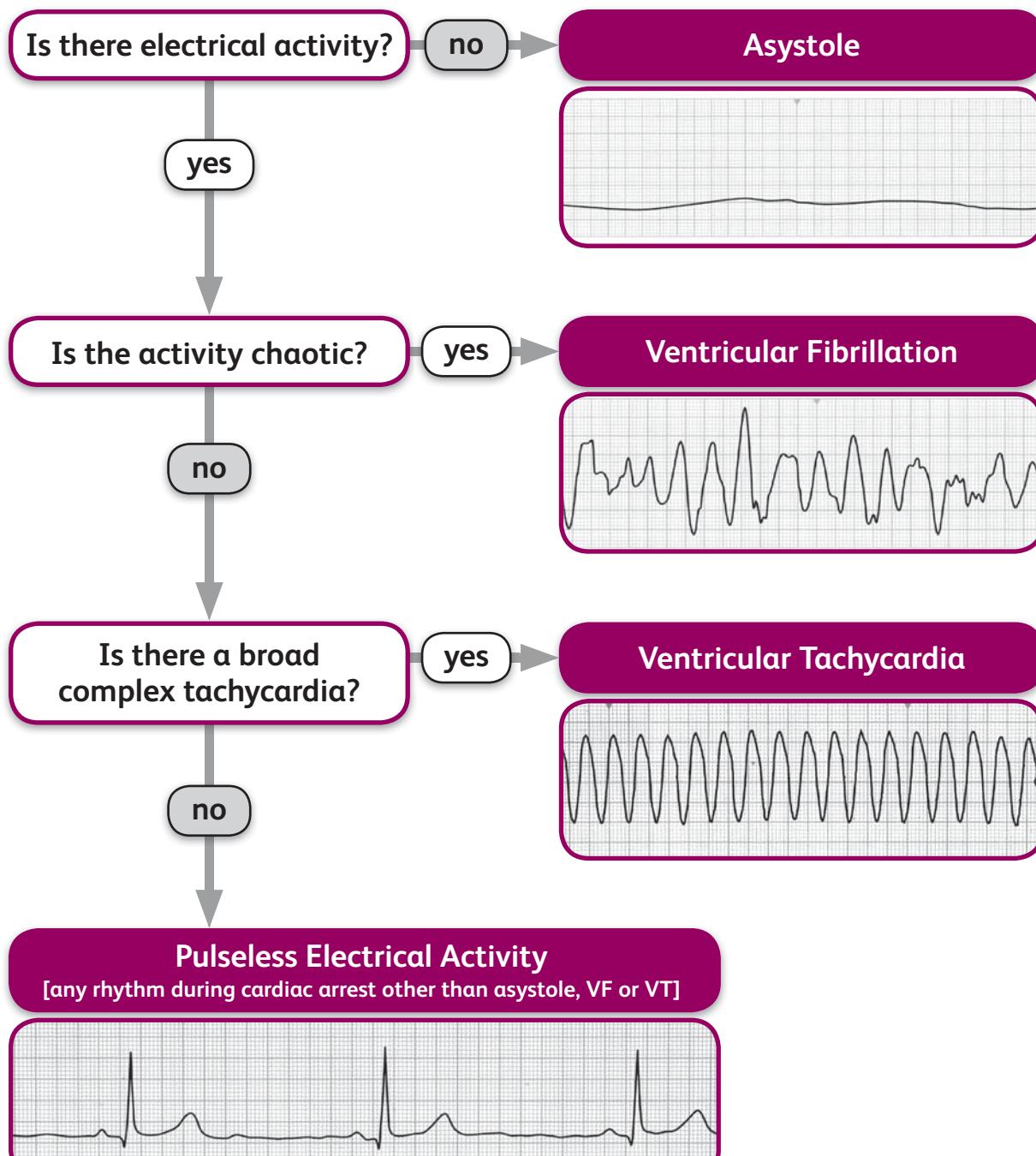
Atropine/BZ

Concurrent with  
BATLS Primary  
Survey (includes  
biological toxins)

The list is not exclusive but highlights signs and symptoms more specific to CW & Toxic industrial chemicals with specific and antidotal treatment

# ECG and rhythm recognition: Cardiac arrest rhythm

## Toolbox 3a



See cardiac arrest Go to Section 3 →

1  
Treatment guidelines

# ECG and rhythm recognition: Peri-arrest rhythm

3a-b

Toolbox

## Toolbox 3b

### What is the ventricular rate?

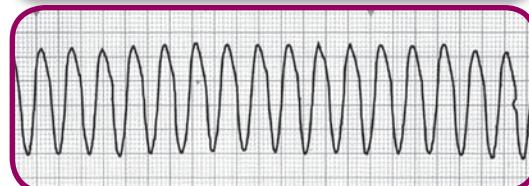
Count the small squares between two R waves and divide into 300

>100 = tachycardia  
<60 = bradycardia

### Are there 'P' waves?

no

Regular broad complex tachycardia?  
VT with pulse



yes

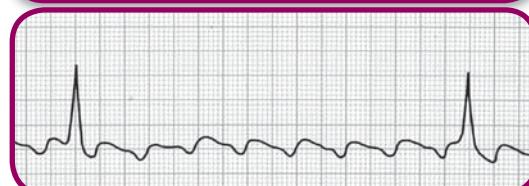
Irregular rhythm?  
Atrial fibrillation



One P per QRS?  
Sinus rhythm



P wave ~300/min  
Atrial flutter



More Ps than QRS?  
Heart block

**Look at the PR and RR intervals**

# ECG and rhythm recognition: Heart block

## Toolbox **3c**

### First degree heart block



This is simply a prolongation of PR interval >0.12ms (3 small squares)

If there are more P waves than QRS complexes this is **2nd or 3rd degree heart block**

### Look at the PR and RR intervals

PR variable	RR variable	2nd degree type I
PR constant	–	2nd degree type II
PR variable	RR constant	3rd degree (complete)

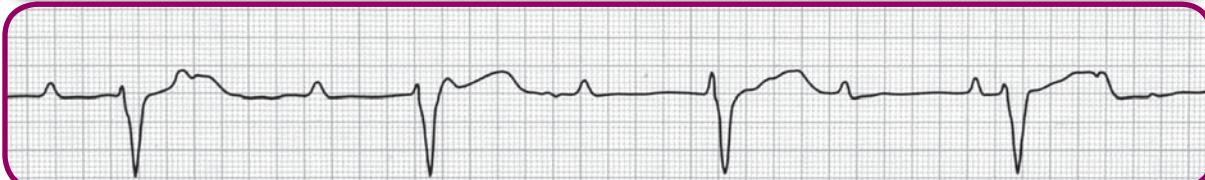
### 2nd degree type I (Wenkebach)



### 2nd degree type II



### 3rd degree (complete heart block)



# ECG and rhythm recognition: Myocardial infarct

3c-d

Toolbox

## Toolbox 3d

A myocardial infarction is principally recognised from the history and ECG changes

### History

The characteristic history is central chest pain (tightness/crushing) +/- radiation to the jaw or arm(s) that lasts >20 minutes, is unrelieved by rest or GTN, and is accompanied by nausea/vomiting and sweating. Not all of these features need be present.

### ECG

The characteristic change on the ECG is a raised ST segment (pericarditis also causes a raised ST segment, but has a different morphology and tends to give more generalised lead changes).

**To diagnose MI there must be 2mm of ST elevation  
in an inferior lead (II, III, AVF) and/or 1mm of ST  
elevation in 2 or more consecutive chest leads (V<sub>1</sub>–V<sub>6</sub>)**

- **Anterior MI** manifests in V<sub>2</sub>, V<sub>3</sub>, V<sub>4</sub> and indicates a left coronary artery/left anterior descending (LAD) artery occlusion.
- **Anterolateral MI** manifests in I, AVL, V<sub>3</sub>–V<sub>6</sub> and indicates LAD, diagonal, circumflex and marginal branch occlusion.
- **Anteroseptal MI** manifests in V<sub>1</sub>–V<sub>4</sub> and indicates LAD occlusion.
- **Inferior MI** manifests in II, III and AVF and indicates right coronary artery occlusion.
- **Lateral MI** manifests in I, AVL, V<sub>5</sub>–V<sub>6</sub> and indicates circumflex branch of left coronary artery occlusion.
- **Posterior MI** manifests in V<sub>8</sub>–V<sub>9</sub> (reposition V<sub>1</sub>–V<sub>2</sub> more laterally) and indicates right coronary artery or circumflex branch occlusion. In V<sub>1</sub>–V<sub>4</sub> the R wave is greater than the S wave and in V<sub>1</sub>–V<sub>2</sub> there is ST segment depression: the T wave is elevated.

# Normal values: Biochemistry

## Toolbox 4a

### Biochemistry

Test	Conventional units	SI units
Albumin	3.5–5g/dl	35–50g/L
Alkaline phosphatase	45–115IU/ml	45–115U/L
ALT	Male: 10–40U/L Female: 7–35U/L	0.17–0.68µkat/L 0.12–0.60µkat/L
Amylase	26–102U/L	0.4–1.74µkat/L
Anion gap	8–14mEq/L	8–14mmol/L
AST	12–31U/L	0.21–0.53µkat/L
Bilirubin, total	0.2–1mg/dl	3.5–17µmol/L
BUN	8–20mg/dl	2.9–7.5mmol/L
Calcium ( $\text{Ca}^{2+}$ )	8.2–10.2mg/dl	2.05–2.54mmol/L
Chloride ( $\text{Cl}^-$ )	100–108mEq/L	100–108mmol/L
Creatine Kinase	Male: 55–170U/L Female: 30–135U/L	0.94–2.89µkat/L 0.51–2.3µkat/L
Creatinine	Male: 0.8–1.2mg/dl Female: 0.6–0.9mg/dl	62–115µmol/L 53–97µmol/L
Glucose	70–100mg/dl	3.9–6.1mmol/L
Potassium ( $\text{K}^+$ )	3.5–5mEq/L	3.5–5mmol/L
Sodium ( $\text{Na}^+$ )	135–145mEq/L	135–145mmol/L

# Normal values: Haematology and coagulation

4a–b

Toolbox

## Toolbox 4b

### Haematology

Test	Conventional units	SI units
RBCs	Male: $4.2\text{--}5.4 \times 10^6/\text{mm}^3$ Female: $3.6\text{--}5 \times 10^6/\text{mm}^3$	$4.2\text{--}5.4 \times 10^{12}/\text{L}$ $3.6\text{--}5 \times 10^{12}/\text{L}$
Hb	Male: 14–17.4g/dl Female: 12–16g/dl	140–174g/L 120–160g/L
Hct	Male: 42%–52% Female: 36%–48%	0.42–0.52 0.36–0.48
Lymphocytes	25%–40%	0.25–0.40
– B lymphocytes	$270\text{--}640/\text{mm}^3$	–
– T lymphocytes	$1,400\text{--}2,700/\text{mm}^3$	–
Monocytes	2%–8%	0.02–0.08
Neutrophils	54%–75%	0.54–0.75
Platelets	$140000\text{--}400000/\text{mm}^3$	$140\text{--}400 \times 10^9/\text{L}$
ESR	Male: $\leq 10\text{mm/hr}$ Female: $\leq 20\text{mm/hr}$	0–10mm/hr 0–20mm/hr

### Coagulation

Test	Conventional units	SI units
INR (target therapeutic)	2.0–3.0	2.0–3.0
PTT	21–35 sec	21–35 sec
Fibrinogen	200–400mg/dl	2–4g/L
D-Dimer	<250mcg/L	<1.37nmol/L

# Normal values: Recognising acid base disorders

## Toolbox 4c

### Recognising acid-base disorders

Disorder	ABG findings	Possible causes
Respiratory Acidosis (excess CO <sub>2</sub> retention)	<ul style="list-style-type: none"> <li>pH &lt;7.35</li> <li>HCO<sub>3</sub><sup>-</sup> &gt;26mEq/L (if compensating)</li> <li>PaCO<sub>2</sub> &gt;45mm Hg</li> </ul>	<ul style="list-style-type: none"> <li>Central nervous system depression from drugs, injury, or disease</li> <li>Hypoventilation from respiratory, cardiac, musculoskeletal, or neuromuscular disease</li> </ul>
Respiratory alkalosis (excess CO <sub>2</sub> loss)	<ul style="list-style-type: none"> <li>pH &gt;7.45</li> <li>HCO<sub>3</sub><sup>-</sup> &lt;22mEq/L (if compensating)</li> <li>PaCO<sub>2</sub> &lt;35mm Hg</li> </ul>	<ul style="list-style-type: none"> <li>Hyperventilation due to anxiety, pain, or improper ventilator settings</li> <li>Respiratory stimulation from drugs, disease, hypoxia, fever, or high room temperature</li> <li>Gram-negative bacteraemia</li> </ul>
Metabolic acidosis (HCO <sub>3</sub> <sup>-</sup> loss or acid retention)	<ul style="list-style-type: none"> <li>pH &lt;7.35</li> <li>HCO<sub>3</sub><sup>-</sup> &lt;22mEq/L</li> <li>PaCO<sub>2</sub> &lt;35mm Hg (if compensating)</li> </ul>	<ul style="list-style-type: none"> <li>Depletion of HCO<sub>3</sub><sup>-</sup> from renal disease, diarrhoea, or small-bowel fistulas</li> <li>Excessive production of organic acids from hepatic disease, endocrine disorders such as diabetes mellitus, hypoxia, shock, or drug toxicity</li> <li>Inadequate excretion of acids due to renal disease</li> </ul>
Metabolic alkalosis (HCO <sub>3</sub> <sup>-</sup> retention or acid loss)	<ul style="list-style-type: none"> <li>pH &gt;7.45</li> <li>HCO<sub>3</sub><sup>-</sup> &gt;26mEq/L</li> <li>PaCO<sub>2</sub> &gt;45mm Hg (if compensating)</li> </ul>	<ul style="list-style-type: none"> <li>Loss of hydrochloric acid from prolonged vomiting or gastric suctioning</li> <li>Loss of potassium from increased renal excretion (as in diuretic therapy) or corticosteroid overdose</li> <li>Excessive alkali ingestion</li> </ul>

# Normal values: Urinalysis and cardiac enzyme markers

4c-d

Toolbox

## Toolbox 4d

### Urinalysis

Test	Conventional units	SI units
Colour	Straw to dark yellow	—
Specific gravity	1.005–1.035	—
pH	4.5–8	—
Glucose	None	—
Sodium	40–220mEq/L/24hr	40–220mmol/day
Potassium	25–125mmol/24hr	25–125mmol/day
Chloride	110–250mEq/24hr	110–250mmol/day
Protein	50–80mg/24hr	50–80mg/day
Osmolality	50–1,400mOsm/kg	—

### Cardiac enzyme markers

Enzyme	Conventional units	SI units	Initial evaluation	Peak	Time to return to normal
Troponin-I	< 0.35mcg/L	<0.35mcg/L	4–6 hours	12 hours	3–10 days
Troponin-T	<0.1mcg/L	<0.1mcg/L	4–8 hours	12–48 hours	7–10 days
CK	Male: 55–170U/L Female: 30–135U/L	0.94–2.89 $\mu$ kat/L 0.51–2.3 $\mu$ kat/L	— —	— —	— —
CK-MB	<5%	<0.05	4–8 hours	12–24 hours	72–96 hours
Myoglobin	0–0.9mcg/ml	5–70mcg/L	2–4 hours	8–10 hours	24 hours

# Paediatrics: Assessment of the sick child

## Toolbox 5a

The response of a pre-school child to serious illness can be deceptive and unpredictable. Non-specific symptoms and signs are important early indicators of serious underlying illness. A structured clinical assessment and interpretation of vital signs that cover several body systems can identify children who may be seriously ill.

Except when very high ( $>41^{\circ}\text{C}$ ), fever poses no threat to the child but may be a marker of overwhelming sepsis, localised infection, occult bacteraemia, or benign illness.

Key observations provide an overall appraisal of illness severity

### Ask about

- Behaviour Irritable, not responsive to parents, drowsy, difficult to wake
- Feeding  $>50\%$  reduction in intake; fatigue/sweating with feeds
- Dehydration Reduced urine output
- Gastrointestinal Vomiting bile or blood,  $>3$  vomits in 24 hrs,  $>5$  watery stools in 24 hrs, or blood in stools
- Risk factors  $<3$  months, chronic underlying disease, immune deficiency

### Vital signs (see table for approx. range of normal)

- Temperature  $<35.5^{\circ}\text{C}$ ,  $>39.5^{\circ}\text{C}$
- Respiratory rate Hypoventilation, tachypnoea
- Heart rate Bradycardia, tachycardia
- Blood pressure Hypo/hypertension,  $\downarrow$  pulse pressure
- Oxygen saturation  $<95\%$

Age (Years)	< 1	2–5	5–12	> 12
Pulse (beats/min)	110–160	95–140	80–120	60–100
Resps (breaths/min)	30–40	25–30	20–25	15–20
Syst BP (mmHg)	70–90	80–100	90–110	100–120

### Look/Listen/Feel

- Breathing Grunting, rapid rate, irregular, nasal flaring, tracheal tug, sternal recession, exhausted
- Circulation Capillary refill  $>2$  sec, cool peripheries
- Dehydration Dry oral mucosa, sunken eyes, reduced skin turgor
- Skin Rash, mottled, pallor, cyanosed
- Cry Persistent, inconsolable, weak, high-pitched
- Eye contact No eye contact, glassy stare, unresponsive to visual stimuli
- Consciousness Lethargic, abnormal tone/posture, only rousable to pain, unresponsive

Any of the above should alert you about possible serious illness

# Paediatrics: Assessment of pain

5a–b

## Toolbox 5b

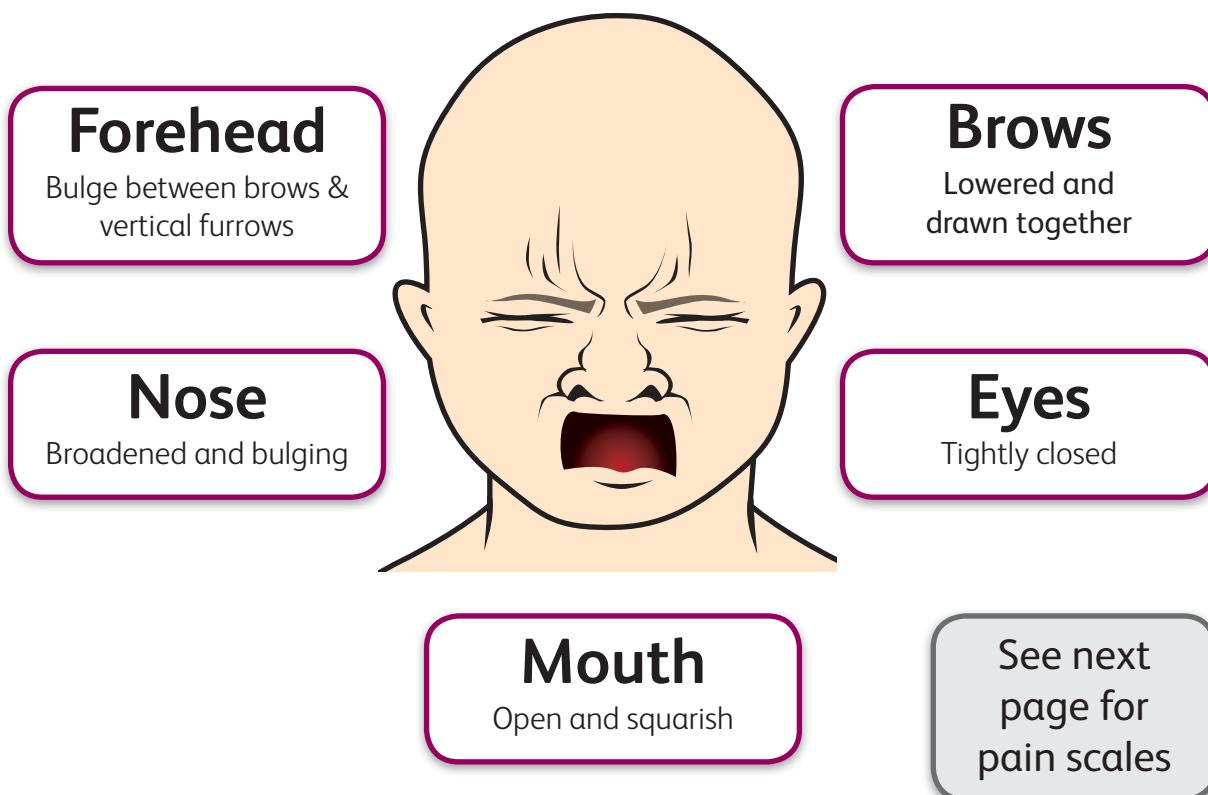
Toolbox

### QUESTT

#### QUESTT

- Q** Question the patient
- U** Use pain rating scale
- E** Evaluate behaviour and physiological signs
- S** Secure family's involvement
- T** Take cause of pain into account
- T** Take action and assess effectiveness

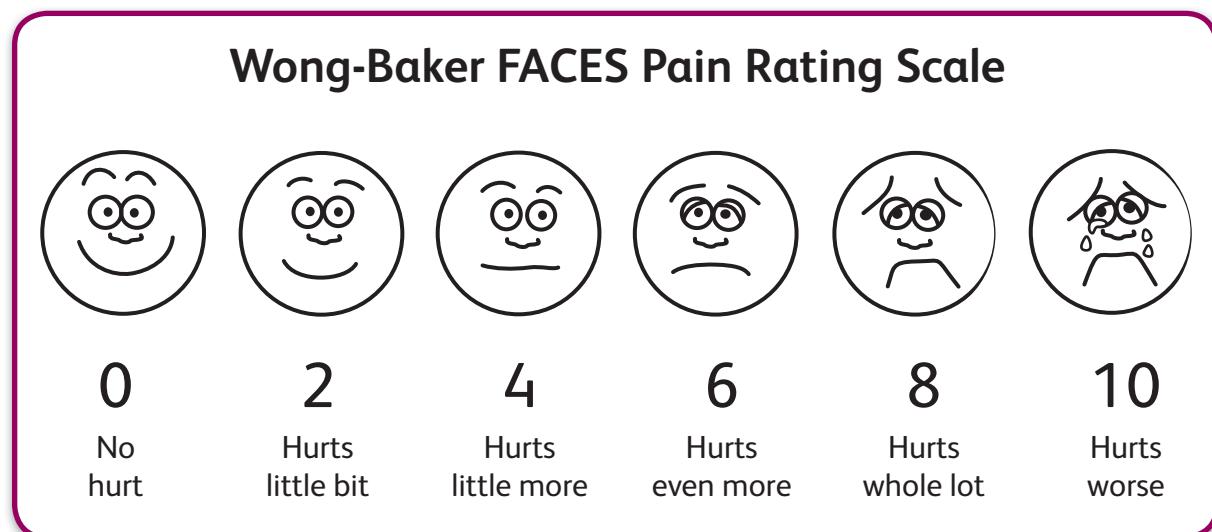
### Signs identifying an infant/small child in pain



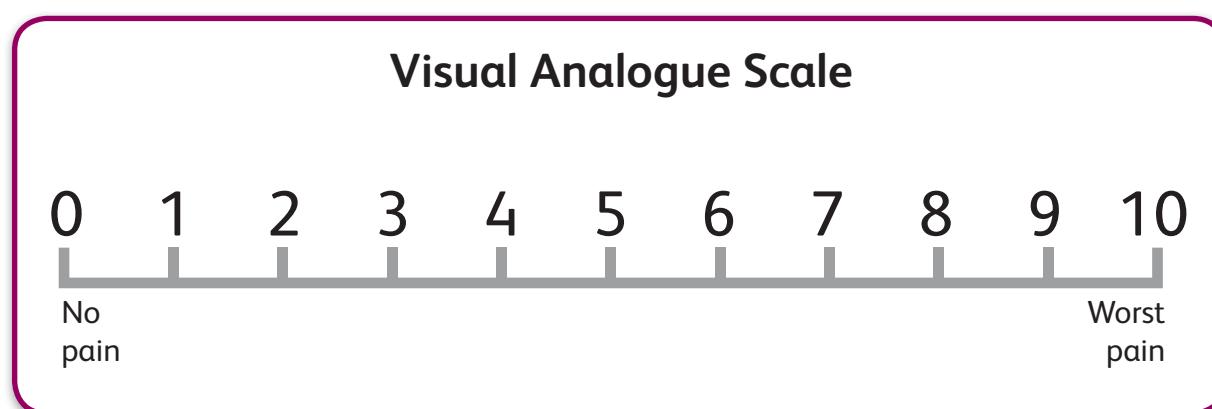
# Paediatrics: Assessment of pain

## Toolbox 5b (Cont'd)

Use one of the following pain rating scales



or



From: Hockenberry MJ, Wilson D, Winkelstien ML: *Wong's Essentials of Paediatric Nursing*, edition 7, p.1259.  
St Louis (2005) Used with permission. Copyright, Mosby.

# Glasgow Coma Scale: Adult

**5b-6a**

## Toolbox **6a**

Toolbox

Add the scores for the best response in each category to achieve the total score

Test	Score	Patient's response
<b>Eye opening</b>		
Spontaneously	4	Opens eyes spontaneously
To speech	3	Opens eyes to verbal command
To pain	2	Opens eyes to painful stimulus
None	1	Doesn't open eyes in response to stimulus
<b>Motor response</b>		
Obey	6	Reacts to verbal command
Localizes	5	Attempts to remove source of pain
Withdraws	4	Flexes and withdraws from painful stimulus
Abnormal flexion	3	Flexes, but does not localize pain
Abnormal extension	2	Extends limbs
None	1	No response; just lies flaccid
<b>Verbal response</b>		
Oriented	5	Is oriented and converses
Confused	4	Is disoriented and confused
Inappropriate words	3	Replies randomly with incorrect words
Incomprehensible	2	Incomprehensible sounds
None	1	No response
<b>Total score</b>		

Adapted from: The Joint Royal Colleges Ambulance Service Liaison Committee (JRCALC) (October 2006)

# Glasgow Coma Scale: Child

## Toolbox **6b**

### Modification of Glasgow Coma Scale for children under 4 years old

Test	Score
<b>Eye opening</b>	As per adult scale
<b>Motor response</b>	As per adult scale
<b>Best verbal response</b>	
• Appropriate words or social smiles, fixes on and follows objects	5
• Cries, but is consolable	4
• Persistently irritable	3
• Restless, agitated	2
• Silent	1

Adapted from: The Joint Royal Colleges Ambulance Service Liaison Committee (JRCALC) (October 2006)

# Calculating drip rates

6b-7

## Toolbox 7

Toolbox

When calculating the flow rate of IV solutions, remember that the number of drops required to deliver 1ml varies with the type of administration set you're using. To calculate the drip rate, you must know the calibration of the drip rate for each specific manufacturer's product. As a quick guide, refer to the chart below.

Ordered volume						
	500ml/ 24hr or 21ml/hr	1000ml/ 24hr or 42ml/hr	1000ml/ 20hr or 50ml/hr	1000ml/ 10hr or 100ml/hr	1000ml/ 8hr or 125ml/hr	1000ml/ 6hr or 167ml/hr
Drops/ml	Drops/minute to infuse					
<b>Macrodrip</b>						
10	4	7	8	17	21	28
15	5	11	13	25	31	42
20	7	14	17	33	42	56
<b>Microdrip</b>						
60	21	42	50	100	125	167

Adapted from: Weinstock D (Ed): *Critical Care Facts*. Lippincott, Williams & Wilkins (2005)

# Early Warning Score

## Toolbox 8

Follow this early warning score to activate a medical emergency team for a deteriorating patient, then follow evidence-based treatment guidelines (CGOs).

NEW symptoms	4	3	2	1	0	1	2	3	4
Nurse concerned			NEW						
Chest pain		NEW							
AAA pain		NEW							
SOB		NEW							
<b>Physiology</b>									
Pulse changes	<45	45–49	50–54	55–60		90–99	100–119	120–139	>139
Temp-core (rectal/tympanic)	<34	34.0–34.5	34.6–35.0	35.1–35.9			38.5–39.9	40.0–40.4	>40.4
RR (adult)	<8	8–9	10–11			21–25	26–30	31–36	>36
SpO <sub>2</sub> (O <sub>2</sub> )	<88	88–91	92–95						
SpO <sub>2</sub> (Air)	<85	86–89	90–93	94–96					
SBP (mmHg)	falls to <90	falls to 90–99	falls to 100–110			rises by 20–29	rises by 30–40	rises by >40	
or	falls >40	falls by 31–40	falls by 20–30			Pulse pressure narrows 10	Pulse pressure narrows >10		
GCS changes	<13		13–14				confused or agitated		
Urine output	<10mls/hr for 2 hours	<20mls/hr for 2 hours					>250mls/hr		
<b>Biochemistry</b>									
K <sup>+</sup>		<2.5	2.5–3.0				5.6–5.9	6.0–6.2	>6.2
Na <sup>+</sup>	<120	120–125	126–129				146–147	148–152	153–160
pH	<7.21	7.21–7.25	7.26–7.30	7.31–7.34			7.46–7.48	7.49–7.50	7.51–7.60
pCO <sub>2</sub> (acute changes)		<3.5	3.5–3.9	4.0–4.4					>7.60
SBE	<-5.9	-4.9 to -5.8	-3.8 to -4.8	-3 to -3.7					
pO <sub>2</sub> (acute changes)	<9.0	9.0–9.4	9.5–9.9	10–11					
Creatinine							6.1–6.9		>6.9
Hb	<80	80–89	90–100				121–170	171–299	300–440
Urea			<2	2.0–2.4					>440
							7.6–20	21–30	31–40
									>40

## MET scoring system

Score	Action
1	Observe
2–3	Repeat TPR, BP, GCS, calculate urine output last 2 hours (if known) Now recalculate score (if same, observe closely)
4	Bleep patient's SHO (to attend within 30 minutes)
5–7	Confirm with Senior Nurse then 333 SHO of patient's speciality
8 or more	Inform Senior Nurse then  <b>Activate MET</b>

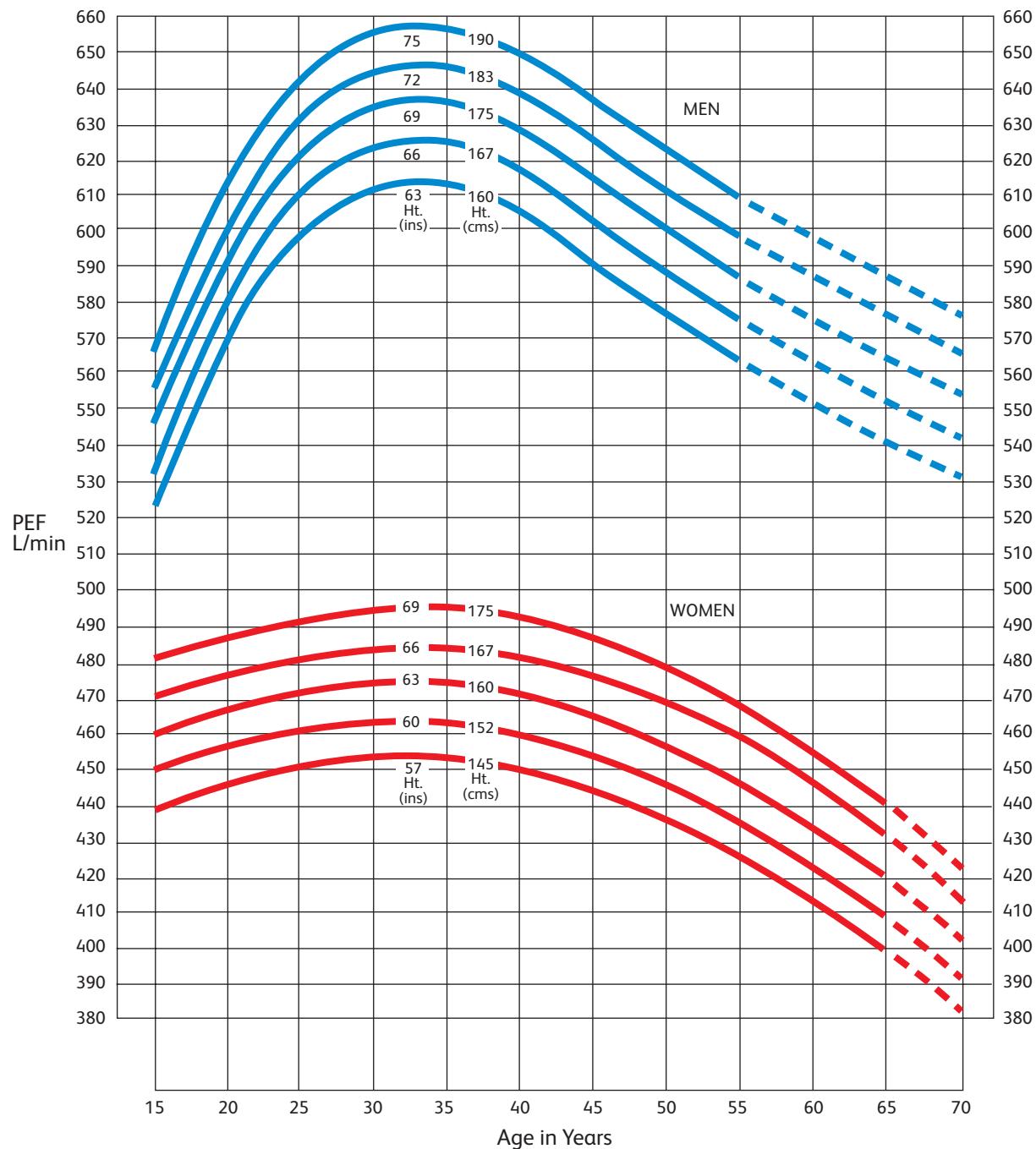
# Asthma management

8–9

Toolbox

## Toolbox 9

### Peak expiratory flow in normal adults



Standard deviation men = 48 litres/min

Standard deviation women = 42 litres/min

In men, values of PEF up to 100 litres/min, less than predicted, and in women less than 85 litres/min, less than predicted are within normal limits

Nunn AJ, Gregg I: New Regression Equations for Predicting Peak Expiratory Flow in Adults. BMJ 1989;298;1068–70.

# Military Medical Listing Categories

## Toolbox 10

**1. Very Seriously Ill (VSI).** A patient is termed ‘very seriously ill’ when his/her illness or injury is of such severity that life or reason is immediate endangered. An example would be a casualty who requires ventilation following injury.

**2. Seriously Ill (SI).** A patient is termed ‘seriously ill’ when his/her illness or injury is of such severity that there is cause for immediate concern, but there is no imminent danger to life. An example would be a patient who is extubated post - operatively, but has required a limb amputation.

**3. III.** This category applies to an individual whose illness or injury requires hospitalisation, whose condition does not warrant classification as VSI or SI.

**Unlisted Casualties (UL).** An individual whose illness or injury requires hospitalisation but whose condition does not warrant classification as VSI, SI or ILL.

# Section 7

# Operational formulary

Intentionally blank

# Operational formulary

## Contents

1  
Operational  
formulary

### Emergency drugs formulary

Operational formulary **1**

### Critical care

- IV drug infusions ..... Operational formulary **2a**
- Sedation guidelines ... Operational formulary **2b**

### Sedation scoring

Operational formulary **3**

### Antibiotic prescribing guidelines

Operational formulary **4**

This formulary is restricted to drugs that are included within the emergency treatment guidelines in this publication.

Details of interactions, contraindications and adverse effects are not given. This information is available by referring to the British National Formulary in hard copy or online at [www.bnf.org](http://www.bnf.org).

Intentionally blank

# Emergency drugs formulary

## Operational formulary 1

1  
Operational  
formulary

Drug	Dose	Interval
<b>Acetazolamide</b> Altitude emergencies	250mg PO	8 hourly
<b>Acyclovir</b> Encephalitis	10mg/kg IV	Every 8 hours
<b>Actrapid</b> Diabetic ketoacidosis	6u IV 6u/hr IV 3u/hr IV	Stat If blood sugar >14mmol/L If blood sugar <14mmol/L
...or use a sliding scale of insulin instead of an infusion:		
Hourly BM	Insulin infusion rate (U/hr)	With infections or Insulin resistance
0–3.9	0.5	1
4.0–7.9	1.0	2
8.0–11.9	2.0	4
12.0–16.0	3.0	6
>16	4.0	8
Switch to 5% dextrose when BM < 11		
Hyperkalaemia	10u IV	Over 15 minutes with glucose
<b>Adenosine</b> Narrow complex tachycardia	6mg IV stat dose and follow with up to 3 doses of 12mg every 1–2 minutes	
<b>Adrenaline (epinephrine)</b> Cardiac arrest (adult)	1:10000 10ml Pre-filled syringe	3 minutes
Cardiac arrest (child)	10 mcg/kg (0.1ml/kg of 1 in 10000 solution)	3 minutes
<b>Adrenaline (epinephrine)</b> Anaphylaxis (adult) Bradycardia	1:1000 0.5ml IM 2–10mcg/min IV	Can repeat after 5 minutes

# Emergency drugs formulary

## Operational formulary 1 (Cont'd)

Drug	Dose	Interval
<b>Amiodarone</b>		
Cardiac arrest	300mg IV	Pre-filled syringe
Broad complex tachycardia	300mg IV 900mg IV	over 10–20 minutes over 24 hours
Atrial fibrillation	300mg IV	over 20–60 minutes
<b>Aspirin</b>		
Myocardial infarction & ACS	300mg chewed	Single dose
<b>Atropine</b>		
Cardiac arrest	3mg IV	Single dose
Bradycardia	500mcg IV	Repeat to max 3mg
<b>Benzylpenicillin</b>		
Meningococcal disease	1200mg (adult) IV/IM 600mg (child) IV/IM 300mg (infant) IV/IM	
<b>Calcium gluconate</b>		
Hyperkalaemia	10ml 10% IV	Repeat every 10 minutes as required, max 50ml
<b>Cefotaxime</b>		
Sepsis	1–2g IV	TDS
Meningococcal disease	1–2g IV	TDS
<b>Chloramphenicol</b>		
Sepsis	25mg/kg IV	If penicillin allergy
Meningococcal disease	25mg/kg IV	If penicillin allergy
<b>Chlorpheniramine</b>		
Anaphylaxis (adult)	10–20mg IM/ slow IV	Single dose
<b>Clarithromycin</b>		
Antimicrobial recommendations	250mg PO 500mg IV	BD for 7 days BD
<b>Codeine</b>		
	Go to Section 3 →	11i Treatment guidelines
<b>Dexamethasone</b>		
Septic shock	0.15mg/kg IV	QDS
Meningococcal disease	0.15mg/kg IV	QDS
Altitude emergencies	4mg PO	6 hourly

# Emergency drugs formulary

## Operational formulary 1 (Cont'd)

1  
Operational  
formulary

Drug	Dose	Interval
<b>Diamorphine</b> Myocardial infarction Pulmonary oedema	2.5–5mg IV 2.5–5mg IV	PRN for pain PRN
<b>Diazepam (rectal)</b> Fitting	10mg PR (adults)	PRN
<b>Diazepam (emulsion, Diazemuls)</b> Fitting	10–20mg IV (adults)	30–60 minutes PRN
<b>Diclofenac</b>	Go to Section 3 →	11i Treatment guidelines
<b>Digoxin</b> Atrial fibrillation	0.75–1mg IV over at least 2 hours (emergency) 1–1.5mg PO in divided doses over 24 hours (rapid)	
<b>Dobutamine</b> Meningococcal disease child	10–20mcg/kg/min [make up with 50ml 5% dextrose and run at 10mcg/kg/min]	
<b>Doxycycline</b> Non-gonococcal urethritis Typhus	100mg BD for 7 days 100mg BD	
<b>Etomidate</b>	Go to Section 3 →	3d Treatment guidelines
<b>Fentanyl</b>	Analgesic; pre-induction agent	Go to Section 3 →
<b>Furosemide</b> Pulmonary oedema	50mg IV	PRN
<b>Gentamicin</b> Septicaemia	2mg/kg IV	Over at least 3 minutes
<b>Glucagon</b> Hypoglycaemia	1mg IM	Stat
<b>Glucose</b> Hypoglycaemia	50% 25ml IV	Stat

# Emergency drugs formulary

## Operational formulary 1 (Cont'd)

Drug	Dose	Interval
<b>Glyceryl trinitrate (buccal)</b>		
Pulmonary oedema	2–5mg buccal	Titrate vs BP
Acute coronary syndrome	2–5mg buccal	Titrate vs pain/BP
<b>Glyceryl trinitrate (spray)</b>	400mcg under tongue	PRN
<b>Hydrocortisone</b>		
Anaphylaxis	100–500mg IM/IV	Stat
Asthma adult	100mg IV	Stat
Asthma child	4mg /kg IV	Stat
<b>Ipratropium (nebuliser)</b>		
Asthma (adult)	0.5mg NEB	QQH PRN
<b>Isosorbide dinitrate (infusion)</b>		
Angina	2–10mg/hr	Titrate vs pain/BP
Pulmonary oedema	2–10mg/hr	Titrate vs BP
<b>Ketamine</b>		
Anaesthesia	2mg/kg IV	Go to Section 3 → <span style="border: 1px solid orange; padding: 2px;">3d Treatment guidelines</span>
Analgesia	0.25–0.5mg/kg IV	Go to Section 3 → <span style="border: 1px solid orange; padding: 2px;">11i Treatment guidelines</span>
<b>Lidocaine hydrochloride</b>		
Broad complex tachycardia	50mg IV (max dose 200mg)	Repeat every 5 mins as required Max dose 200mg
Local anaesthesia	1% solution (10mg/ml)	Max dose 200mg
<b>Magnesium sulphate</b>		
Asthma (adult)	1.2–2g IV	Over 20 minutes
Broad complex tachycardia	50% 5ml IV	In 30 minutes
<b>Metoclopramide</b>		
Nausea/vomiting	10mg IV/IM	8 hourly max
<b>Midazolam</b>		
Sedation	2–10mg IV (adults)	Titrated
<b>Morphine</b>		
Myocardial infarction & ACS	5–10mg IV	Go to Section 3 → <span style="border: 1px solid orange; padding: 2px;">11i Treatment guidelines</span>

# Emergency drugs formulary

## Operational formulary 1 (Cont'd)

1

Operational  
formulary

Drug	Dose	Interval
<b>Naloxone</b> Opiate overdose	0.4–2mg IV 0.8mg IM	Every 2 minutes PRN PRN
<b>Nifedipine</b> Altitude emergencies	20mg SR PO	6 hourly
<b>Nimodipine</b> Subarachnoid haemorrhage	60mg PO 1mg/hr IV	4 hourly
<b>Paracetamol</b>	Go to Section 3	11i Treatment guidelines
<b>Phenytoin (infusion)</b> Fitting	15mg/kg	Loading dose (rate not exceeding 50mg/min)
<b>Potassium chloride</b> Hypokalaemia	Up to 60mmol	30mmol/hr max
Plasma potassium mmol/L	Potassium added to bag mmol/L	
<2	40	
3–4	30	
4–5	20	
>5	None	
<b>Prednisolone</b> Asthma adult	40mg PO	Reducing dose daily
<b>Quinine</b> Malaria	20mg/kg IV	Max dose 1400mg
<b>Recombinant Factor VIIa (consultant use only)</b> Intractable haemorrhage	100mcg/kg IV	Stat dose: Can repeat after 20 minutes (Anecdotal evidence only for benefit)
Blast lung	80mcg/kg	
Paralysing agent when suxamethonium contraindicated	Go to Section 3	3d Treatment guidelines

# Emergency drugs formulary

## Operational formulary 1 (Cont'd)

Drug	Dose									Interval			
<b>Salbutamol (nebuliser)</b> Asthma (adult)	5mg NEB									QQH PRN			
<b>Salbutamol (infusion)</b> Asthma adult	5mg in 500ml sodium chloride 0.9% or glucose 5%												
Dose (mcg/min)	3	4	5	6	7	8	9	10	11				
Infusion rate (ml/min)	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1				
Pump rate (ml/hr)	18	24	30	36	42	48	54	60	66				
Dose (mcg/min)	12	13	14	15	16	17	18	19	20				
Infusion rate (ml/min)	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2				
Pump rate (ml/hr)	72	78	84	90	96	102	108	114	120				
Table adapted from <i>West Mercia Clinical Guidelines</i>													
<b>Streptokinase</b> Thrombolysis	1500000 units IV									Over 60 minutes			
<b>Suxamethonium</b> Paralysing agent for RSI	Go to <b>Section 3</b> →				<b>3d</b> <small>Treatment guidelines</small>								
<b>Tenectoplaste</b> Thrombolysis	500–600mcg/kg									Stat			
Follow Tenectoplaste with heparin as specified below:													
Weight kgs	Weight stones			Dose	Reconstituted volume								
Less than 60kgs	Less than 9st 6lb			30mg	6mls								
60–70kgs	9st 7lb to 11st			35mg	7mls								
70–80kgs	11st 1lb to 12st 8lb			40mg	8mls								
80–90kgs	12st 9lb to 14st 2lb			45mg	9mls								
over 90kgs	over 14st 3lb			50mg	10mls								
Weight	Heparin bolus			Maintenance infusion (concentration 1000 units per ml)									
Less than 67kgs	4000 units			0.8ml per hour (800 units per hour)									
67kgs or above	5000 units			1ml per hour (1000 units per hour)									

# Critical care: IV drug infusions

## Operational formulary 2a

1-2a

Operational  
formulary

<b>Actrapid</b>	<b>50iu made to 50mls with 0.9% NaCl</b>
Infuse via peripheral or central line	Change infusion line 24 hours
<b>Adrenaline</b>	<b>4mg made up to 50mls with 5% dextrose</b>
Infuse via central line Continuous blood pressure and cardiac monitoring required	Change infusion line 72 hours
<b>Alfentanil</b>	<b>50mg made up to 50mls with 0.9% NaCl</b>
Infuse via peripheral or central line	Change infusion line 72 hours
<b>Amiodarone</b>	Loading dose infused over 1 hour <b>300mg in 100mls of 5% dextrose</b>  Maintenance dose infused over 24 hours <b>900mg made to 500mls with 5% dextrose (21mls/hr)</b>
Infuse via central line. Continuous cardiac and blood pressure monitoring required  During cardiac arrest or treatment of VT with pulse amiodarone may be given via peripheral line using pre-filled syringe	Change infusion line 204 hours
<b>Dobutamine</b>	<b>250mg made to 50mls with 5% dextrose</b>
Infuse via central line. Continuous blood pressure and cardiac monitoring required	
<b>Dopamine</b>	<b>200mg made to 50mls with 5% dextrose</b>
Infuse via central line. Continuous blood pressure and cardiac monitoring required	Change infusion line 72 hours

# Critical care: IV drug infusions

## Operational formulary 2a (Cont'd)

<b>Furosemide</b>	<b>50mg made to 50mls with 0.9% NaCl</b>
Infuse via peripheral or central line	Change infusion line 72 hours
<b>Magnesium sulphate</b>	<b>10mls (5g) made to 50mls with 0.9% NaCl. Infuse over 1 hour</b>
Infuse via peripheral or central line	Change line 72 hours
<b>Midazolam</b>	<b>50mg made to 50mls with 0.9% NaCl</b>
Infuse via peripheral or central line	Change line 72 hours
<b>Morphine</b>	<b>50mg made to 50mls with 0.9% NaCl</b>
Infuse via peripheral or central line	Change line 72 hours
<b>Noradrenaline</b>	<b>4mg made to 50mls with 5% dextrose</b>
Infuse via central line. Continuous blood pressure and cardiac monitoring required	Change line 72 hours
<b>Potassium chloride</b>	<b>39mmols in 100mls 0.9% NaCl given over 1–2 hours</b>
Infuse via central line. Continuous cardiac monitoring required	
<b>Propofol</b>	<b>1% undiluted</b>
Infuse via peripheral or central line	Change line 24 hours
<b>Streptokinase</b>	<b>1.5 million units in 100mls 0.9% NaCl over 1 hour</b>
Continuous cardiac monitoring	
<b>Vecuronium</b>	<b>50mg in 50mls of water for injections (powder reconstituted with water)</b>
Infuse via peripheral or central line	Change line 72 hours

# Critical care: Sedation guidelines

## Operational formulary **2b**

**2a–b**Operational  
formulary

### Key points

- Sedation must be managed effectively.
- When commencing a sedative infusion administer a loading dose (bolus) titrated to effect.
- When increasing a sedative infusion administer a bolus titrated to effect and then increase the infusion by a small increment and reassess.
- Combinations of sedatives that act via different mechanisms are more effective than single agents at high doses.
- Tolerance to sedatives develops more quickly at high doses.

# Sedation scoring

## Operational formulary 3

- The patient's sedation level should be assessed and documented hourly.
- The score can be used as an objective measurement in order to promote effective management of sedation.
- The desired level of sedation (i.e. Sedation score) must be considered for each individual patient according to circumstance.
- There will always be exceptions and some patients to whom the scoring is not applicable.

Score	Sedation level	Guidelines
3	Agitated and restless	Give a bolus. Start or increase infusion
2	Awake and uncomfortable	Give a bolus. Start or increase infusion
1	Aware but calm	No change
0	Roused by voice	Try decreasing infusion rate
-1	Roused by touch	Try decreasing infusion rate
-2	Roused by painful stimuli	Stop infusion
-3	Unrousable	Restart infusion at lower rate when sedation score is at the desired level
A	Natural sleep	
P	Paralysed	

# Antibiotic prescribing guidelines

## Operational formulary 4

3-4

Operational  
formulary

### Key points Key Points from Antibiotic Policy

- Right Drug, Right Place, Right Route
- Appropriate Dose (high enough)
- **STOP** when no longer indicated
- Target drug whenever possible to likely pathogen(s)

### Operation Restraints

- Knowledge of local microbial epidemiology is helpful
- Apply to Military & Civilian patients
- Modify treatment once microbiology results available  
OR with clinical microbiology/infectious disease advice
- Therapeutic drug monitoring is NOT available
- Multi-drug resistant organisms ARE important in deployed facilities, and antibiotic policies are integral part of infection control

### Empiric Antibiotic Therapy Guidelines (Role 3)

	<b>First Line Therapy</b>	<b>Penicillin Allergy</b>	<b>Additional Notes</b>
<b>CNS Infection</b>			
<b>Bacterial Meningitis</b>	ceftriaxone 2g 12 hrly	meropenem 2g iv 8hrly (see notes on penicillin allergy)	<i>If the patient is considered at risk of penicillin / cephalosporin resistant pneumococcal infection then additional therapy will be required pending CSF culture &amp; sensitivity results.</i>  <i>Suggested therapy :</i> <u><i>add</i></u> linezolid 600mg iv 12 hrly to standard regimen
<b>Cerebral Abscess</b>	ceftriaxone 2g daily + metronidazole 500mg iv 8hrly + flucloxacillin 1-2g iv 6hrly		
<b>Viral Encephalitis</b>	aciclovir 10mg/kg iv 8hrly		

# Antibiotic prescribing guidelines

## Operational formulary 4 (Cont'd)

Empiric Antibiotic Therapy Guidelines (Role 3)			
	First Line Therapy	Penicillin Allergy	Additional Notes
<b>Respiratory Tract Infection</b>			
Hospital Acquired Pneumonia			
Onset < 5 days:	co-amoxiclav 1.2g iv 8hrly	levofloxacin 500mg po / iv once daily	
Onset > 5days:	piperacillin/tazobactam 4.5g iv 8hrly +/- teicoplanin 400mg 12 hrly for 3 doses then once daily thereafter ( <i>only if patient considered at risk of MRSA infection*</i> )  (* the risk of MRSA colonisation / infection should be assessed with due consideration of both local epidemiology and patient factors).	levofloxacin 500mg po / iv once daily +/- teicoplanin 400mg 12 hrly for 3 doses then once daily thereafter ( <i>only if patient considered at risk of MRSA infection*</i> )  (* the risk of MRSA colonisation / infection should be assessed with due consideration of both local epidemiology and patient factors).	<i>The treatment of ventilator associated pneumonia (VAP) should be guided wherever possible by the results of surveillance cultures. Empiric treatment of VAP occurring within 48 hrs of intubation should be treated as for early onset hospital acquired pneumonia. Empirical treatment of VAP occurring &gt;48 hrs post-intubation should be treated as for late onset hospital acquired pneumonia.</i>
Aspiration Pneumonia	co-amoxiclav 1.2g iv 8hrly	clindamycin 300-600mg po 6hrly	<i>Depending upon the material aspirated, and severity of illness – penicillin allergic patients may require additional Gram-negative antibiotic cover e.g. ciprofloxacin.</i>
Post-influenza pneumonia	co-amoxiclav 1.2g iv 8hrly	levofloxacin 500mg po once daily	<i>Bacterial super-infections with <i>Staphylococcus aureus</i>, <i>Streptococcus pneumoniae</i> and <i>Haemophilus influenzae</i> have all been described as pathogens post-influenza. In patients with severe, necrotising pneumonia complicating a recent 'flu-like' illness, treat as for PVL –staphylococcal pneumonia pending cultures.</i>
Exacerbation COPD	doxycycline 200mg po stat, 100mg daily thereafter.		

# Antibiotic prescribing guidelines

## Operational formulary 4 (Cont'd)

4  
Operational  
formulary

### Empiric Antibiotic Therapy Guidelines (Role 3)

	First Line Therapy	Penicillin Allergy	Additional Notes
<b>Skin &amp; Soft Tissue Infection</b>			
Cellulitis	flucloxacillin 1-2g iv 6hrly		
Abscess(es) / Furunculosis	flucloxacillin 1-2g iv 6hrly	clindamycin 300-600 mg po 6hrly	<p><i>Management of skin &amp; soft tissue infections may be affected by consideration of both meticillin –resistance and/or the possible presence of the Panton-Valentine Leucocidin (PVL) gene. As resistance patterns vary greatly between strains – treatment should be guided by culture results wherever possible</i></p> <p>(i) <i>Healthcare associated MRSA</i>            Suggested therapy - linezolid 600mg po/iv 12 hrly</p> <p>(ii) <i>Community associated MRSA (+/- PVL)</i>            Suggested therapy</p> <ul style="list-style-type: none"> <li>- mild infections : - doxycycline 100mg 12 hrly + rifampicin 300mg po 12 hrly</li> <li>- severe infections: - linezolid 600mg po/iv 12 hrly + clindamycin 1.2-1.8g 6 hrly + rifampicin 600mg iv 12 hrly</li> </ul> <p>(iii) <i>MSSA (+PVL)</i>            Suggested therapy</p> <ul style="list-style-type: none"> <li>- mild infections: - flucloxacillin 500mg 1g po/iv 6hrly</li> <li>- severe infections: - linezolid 600mg po/iv 12 hrly + clindamycin 1.2-1.8g 6 hrly + rifampicin 600mg iv 12 hrly</li> </ul>
Acute Osteomyelitis / Pyogenic discitis / Septic Arthritis	flucloxacillin 2g iv 6hrly (if staphylococcal infection confirmed on culture suggest <u>add</u> rifampicin 300-600mg po 12 hourly)		
Peri-orbital cellulitis	co-amoxiclav 1.2g 8hrly		
Diabetic foot infections	co-amoxiclav 1.2g iv 8hrly	clindamycin 150-300mg po 6hrly +/- ciprofloxacin 500mg po 12hrly	<p><b>Septic arthritis</b> in young people is commonly due to staphylococcal infection. More rarely gonococcal and meningococcal infection may be the aetiology. In patients with severe sepsis <u>or</u> where early Gram-stain fails to rule-out possible infection with Gram negative diplococci, then appropriate antibiotic treatment should be initiated pending culture results.</p> <p>Suggested therapy:            ceftriaxone 2g iv 12 hrly</p> <p><b>Lumbar discitis</b> in the elderly or those with previous urinary tract sepsis may be associated with gram negative pathogens.            Suggested therapy:            ceftriaxone 2g iv daily.</p>

# Antibiotic prescribing guidelines

## Operational formulary 4 (Cont'd)

Empiric Antibiotic Therapy Guidelines (Role 3)			
	First Line Therapy	Penicillin Allergy	Additional Notes
Necrotising Soft Tissue Infection	linezolid 600mg iv 12hrly + meropenem 1g iv 8hrly + clindamycin 900mg iv 6hrly	<i>The key treatment for necrotising soft tissue infections is aggressive surgical treatment. The first line regimen suggested will also provide good coverage of resistant Gram-positive organisms including PVL-associated staphylococcal infections. This regimen is also appropriate for those with penicillin allergy. Consider patient isolation pending culture results – liaise with infection control team.</i>	
Bite injuries	co-amoxiclav 1.2g iv 8hrly	doxycycline 200mg po stat, 100mg daily thereafter + metronidazole 500mg po 8hrly	<i>All animal bites must be risk assessed for possibility of rabies and tetanus and managed appropriately.</i>
Urinary Tract Infection			
Uncomplicated Lower UTI	trimethoprim 200mg po 12 hrly	ciprofloxacin 500mg po 12 hrly	<i>The treatment of all urinary tract infections should be guided by urine culture whenever possible.</i> <i>There is increasing recognition of community-onset urinary tract infections caused by coliforms carrying extended-spectrum beta-lactamase (ESBL) enzymes. Patients with a history of ESBL-carriage or who are deemed at high risk of carriage <u>and who require empiric antibiotic therapy</u> should receive a carbapenem. This group of patients often have a history of persistent/recurrent urinary tract infection which is poorly responsive to first-line oral therapy.</i> Suggested therapy: meropenem 1g 8hrly iv
Complicated Lower UTI / Acute Pyelonephritis	co-amoxiclav 1.2g 8hrly +/- <u>single dose</u> of gentamicin 5mg/kg stat (max dose 500 mg)		
CVS Infection			
Native valve endocarditis	Acute presentation: flucloxacillin 2g iv 4hrly  Indolent presentation: benzylpenicillin 1.2g iv 4hrly	teicoplanin 10mg/kg 12 hrly for 3 doses, then 10mg/kg daily + rifampicin 600mg iv 12 hrly	

# Antibiotic prescribing guidelines

## Operational formulary 4 (Cont'd)

4

Operational  
formulary

### Empiric Antibiotic Therapy Guidelines (Role 3)

	First Line Therapy	Penicillin Allergy	Additional Notes
<b>Severe Sepsis – community acquired</b>			
No localising signs	ceftriaxone 2g once daily	meropenem 1g 8hrly (see notes on penicillin allergy)	<i>Patients presenting from the community without localising signs or symptoms may require empiric broad spectrum antibiotic therapy. Malaria must be excluded. Causes of this syndrome include meningococcal disease, invasive pneumococcal disease, staphylococcal bacteraemia, Group A beta-haemolytic streptococcal bacteraemia and more rarely enteric fever and leptospirosis. The recommended antibiotics provide adequate initial cover for these pathogens. If a rickettsial infection or Q-fever is epidemiologically plausible then additional antibiotic therapy should be given pending culture results.</i> Suggested therapy: <u>add</u> doxycycline 100mg 12 hrly po
<b>Intra-abdominal Infection</b>			
Biliary Tree Infection	co-amoxiclav 1.2g 8hrly		<i>Patients presenting (i) during hospital admission with intra-abdominal infection, or (ii) with severe sepsis arising from community onset intra-abdominal infections, should receive more potent broad spectrum antibiotic therapy</i> Suggested therapy: piperacillin/tazobactam 4.5g iv tds
Peritonitis secondary to stomach /proximal small bowel perforation	co-amoxiclav 1.2g 8hrly	teicoplanin 400mg 12 hrly for 3 doses, then once daily thereafter + ciprofloxacin 400mg 12 hrly iv +/- metronidazole 500mg 8hrly iv	<i>Whilst co-amoxiclav and piperacillin/tazobactam provide sufficient anaerobic cover in most instances, the addition of metronidazole may be an option in the presence of extensive faecal soiling. There is no indication for the empiric use of anti-MRSA or anti-fungal agents in the absence of positive cultures</i>
Peritonitis secondary to distal small bowel perforation / large bowel perforation / complicated appendicitis	co-amoxiclav 1.2g 8hrly		
Bacterial Gastroenteritis	ciprofloxacin 500mg po bd		<i>Antibiotic therapy is not indicated in the majority of patients with uncomplicated diarrhoeal illness.</i> <i>In patients with signs of sepsis, diarrhoea may be due to a non-enteric source of bacteraemia / parasitaemia.</i> <i>Exclude malaria and consider treating as for "Sepsis – no localising signs" - pending cultures.</i>

# Antibiotic prescribing guidelines

## Operational formulary 4 (Cont'd)

Empiric Antibiotic Therapy Guidelines (Role 3)			
	First Line Therapy	Penicillin Allergy	Additional Notes
<b>Fungal Infection</b>			
<b>Suspected candidaemia (or deep-seated Candida infection)</b>	fluconazole 12mg/kg stat iv – then 6mg/kg iv/po once daily		<p><i>Therapy with liposomal amphotericin may be appropriate;</i></p> <p>(i) <i>In patients with suspected or confirmed candidaemia or deep-seated fungal infection with exposure to fluconazole in the previous 4 weeks.</i></p> <p>(ii) <i>In patients with candidaemia or deep-seated Candida infection due to a non-albicans Candida species</i></p> <p>Suggested therapy: Ambisome® 1 mg/kg once daily increasing to 3mg/kg daily.</p> <p><i>The management of all patients with possible or confirmed invasive fungal infection should be discussed with a clinical microbiologist.</i></p>

# Section 8

# Policies

# Policies

## Introduction

### **POL – Intro.1**

All clinicians are to be familiar with the content of CJO's Clinical Governance Directive which encompasses all relevant aspects of the various central and single Service policies identified below.

**These policies are extracts of selected Surgeon General's Policy Letters that are specifically relevant to the deployed clinician, or provide a basis for policy in areas uncovered by SGPL.**

# Policies

## Contents

**Contents**

Clinical CT guidelines.....	Policies <b>1</b>
Clinical Governance in the Defence Medical Services....	Policies <b>2</b>
Clinical operational infection control at Role 2e/Role 3 .....	Policies <b>3</b>
Communicable disease control .....	Policies <b>4</b>
Confidentiality & protection of patient information....	Policies <b>5</b>
Consent for examination and treatment	Policies <b>6</b>
Immunological protection of military personnel .....	Policies <b>7</b>
Inoculation accidents to staff .....	Policies <b>8</b>
Management of irradiated and contaminated casualties.....	Policies <b>9</b>
Management of massive haemorrhage on operations .....	Policies <b>10</b>
Medical support to persons detained by UK Forces ...	Policies <b>11</b>
Prevention, identification, referral & follow up of Leishmaniasis .....	Policies <b>12</b>
Preventing malaria in military populations .....	Policies <b>13</b>
Religious beliefs guidelines.....	Policies <b>14</b>
Deaths on operations .....	Policies <b>15</b>
Treatment of Non Entitled Children on Operations...	Policies <b>16</b>

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# Clinical CT guidelines

## Policies 1

1

Policies

A CT scanner may be available in a deployed medical unit. These guidelines specify the indications for a CT examination.

- All requests for CT must be made only on the specific instruction of a consultant.
- The CT scanner is to be used for emergency indications only. Under no circumstances is it to be used for routine, non-emergency cases or where the result will not alter management or evacuation plans for the patient.
- If there is any doubt as to the appropriateness of the referral the Duty Radiologist is to be contacted (may be deployed or UK based).

### Pre-authorised indications<sup>1</sup>

- CT may be undertaken for the following indications without prior discussion with the Duty Radiologist.

<b>Acute stroke</b>	A policy of CT for most strokes as soon as reasonably possible is to be encouraged, but at least within 48 hours, as this will ensure accurate diagnosis of the cause, site, and appropriate primary treatment and secondary prevention.
<b>Headache: acute, severe; subarachnoid haemorrhage (SAH)</b>	CT will provide evidence of haemorrhage in up to 98% of patients with SAH if performed within the first 48 hours of ictus. A lumbar puncture should still be performed on all patients (delayed 12 hours after ictus for xanthochromia) with suspected SAH, but with negative CT. CT is indicated in patients with acute onset headache with focal neurological signs, nausea or vomiting, or GCS (Glasgow Coma Score) below 14.
<b>Head injury</b>	<p>Any of the following clinical features indicates that there is a risk of a clinically significant brain injury requiring neurosurgical intervention:</p> <ul style="list-style-type: none"> <li>• GCS &lt;13 at any point since the injury</li> <li>• GCS 13 or 14 with failure to regain GCS 15 within 2 hours of injury</li> <li>• Suspected open or depressed skull fracture</li> <li>• Any sign of basal skull fracture (haemotympanum, ‘raccoon eyes’, CSF otorrhoea, Battle’s sign)</li> <li>• More than one episode of vomiting</li> <li>• Age &gt;64 years</li> <li>• Post-traumatic seizure</li> <li>• Coagulopathy, including anticoagulant therapy</li> <li>• Focal neurological deficit</li> </ul>

Cont'd on next page

<sup>1</sup> Modified from Royal College of Radiologists: *Making the Best Use of a Department of Clinical Radiology: Guidelines for Doctors*. Fifth edition

# Clinical CT guidelines

## Policies 1 (Cont'd)

<b>Head injury (Cont'd)</b>	The following two features in the absence of any of the above indicates a risk of a clinically significant brain injury that does <b>not</b> require neurosurgical intervention: <ul style="list-style-type: none"> <li>• Retrograde amnesia of greater than 30 minutes</li> <li>• Dangerous mechanism of injury: pedestrian struck by motor vehicle, occupant ejected from a motor vehicle, fall from a height &gt;3 feet or 5 stairs</li> </ul>
<b>Cervical spine in unconscious patient with head injury</b>	CT may be used as an alternative to XR, and is essential if the cervico-thoracic junction is not clearly seen on XR.
<b>Thoracic spine trauma: with neurological deficit, with or without pain</b>	Detailed analysis of bone injury is achieved with CT, with or without reconstructions. Imaging is undertaken through area of interest only.
<b>Lumbar spine trauma: with neurological deficit, with or without pain</b>	Detailed analysis of bone injury is achieved with CT, with or without reconstructions. Imaging is undertaken through area of interest only.
<b>Major trauma: abdomen/pelvis</b>	Sensitive and specific. Indicated unless patient's condition is too unstable. Ultrasound can show free fluid, but is less sensitive at identifying solid organ damage.
<b>Major trauma: chest</b>	Especially useful to exclude mediastinal haemorrhage and aortic injury.
<b>Chest pain: aortic dissection</b>	CT with IV contrast is the most reliable and practical technique.
<b>Complex limb trauma</b>	CT to show complex fracture and/or vascular damage is indicated.
<b>Pulmonary embolism</b>	Indicated only when clinical probability is high ( <b>see below</b> ). Spiral CT is as accurate as pulmonary angiography in the detection of pulmonary emboli and reliably excludes clinically important pulmonary embolism.
<b>Suspected ureteric colic</b>	CT is indicated as an alternative to IVU as it is more sensitive and specific. Dose is 1.5 times greater than a 5 film IVU.

**Clinical probability** is defined by (A) breathlessness and tachypnoea, with or without chest pain or haemoptysis that occurs (B) in the absence of another reasonable explanation and (C) in the presence of a major risk factor. A + B + C = high probability; A + either B or C = intermediate probability; A without either B or C = low probability.

# Clinical CT guidelines

## Policies 1 (Cont'd)

1

Policies

### Indications requiring radiological approval

- CT for the following indications may only be undertaken after discussion with the Duty Radiologist (may be deployed or UK based).

<b>Altered level of consciousness without trauma</b>	Enhanced CT of the brain may be of value in detecting cerebral abscess or tumour. Contrast should not be given if acute stroke is suspected.
<b>Acute abdominal pain warranting hospital admission for consideration of surgery</b>	CT should not be used as a screening tool for undiagnosed abdominal pain. The most clinical benefit will be gained from a request which poses a particular diagnostic question, and which has been preceded by both a thorough clinical appraisal of the patient and plain films of the abdomen and erect chest.
<b>Pancreatitis: acute</b>	CT with IV contrast enhancement is used early in severe cases to assess the extent of necrosis, which is helpful in prognosis.
<b>Pelvis: fall with inability to weight-bear</b>	CT can be useful when reported XR is normal or equivocal.
<b>Urethral bleeding and pelvic injury</b>	Delayed post-contrast CT should be considered if urethra is normal and haematuria is present to assess for other urinary tract injuries.
<b>Soft tissue neck injury</b>	May be valuable when there is penetrating or complex trauma.
<b>Facial trauma</b>	CT is indicated with major facial trauma where the investigation will affect immediate management.

### Other indications

- All other requests for CT must be discussed with the Duty Radiologist.

### Referrals from outside Field Hospital

- Direct referrals for CT from outside the Field Hospital will not be accepted. All potential referrals must be discussed with the relevant Field Hospital consultant. If the consultant considers it to be an appropriate case they are to arrange the CT examination. The Field Hospital consultant is responsible for the care of the patient whilst on site and is responsible to ensure that appropriate action is taken with the scan result.

# Clinical Governance in the Defence Medical Services

## Policies 2

### Clinical Governance (CG) definition

“A framework through which health care organisations are accountable for continually improving the quality of their services and safeguarding high standards of care by creating an environment in which excellence in clinical care will flourish.”<sup>2</sup>

- The Defence Medical Services (DMS) aspires to match the same standards of care and supervision as provided by the NHS.
- Good practice, evidence based medicine and audit are to be systematically adopted.
- All those involved in health care delivery are to work in teams to a consistently high standard and identify ways to provide safer and better care for their patients.
- Risks and hazards to patients are to be reduced to as low a level as possible, creating a safety culture throughout the health care system.
- Patient-centred care is at the heart of health care provision. Patients must be kept fully informed and given the opportunity to participate in their care and the development/implementation of CG.
- Developing and implementing effective CG will significantly reduce the risk of an adverse event for the patient, and significantly reduce the risk of litigation for the practitioner/commander.

### The aims of CG are as follows:

- To ensure that systems to monitor the quality of clinical practice are in place and are functioning correctly.
- To ensure that clinical practice is reviewed and improved where appropriate.
- To ensure that clinical practitioners meet standards, such as those issued by the national professional regulatory bodies.
- To identify points of accountability and responsibility throughout the Chain of Command.

### The Joint and Operational environment

- PJHQ is responsible for the coordination and implementation of CG in the Joint and Operational environment.
- PJHQ is responsible for directing local Commanders Medical to implement and report on CG within their areas of responsibility and for directing how CG is to operate in these environments through CJO’s CG Directive.
- They, in turn, will be supported by designated senior medical and dental officers.

Source: SGPL 01/03

<sup>2</sup> Clinical Governance in Action: Quality in the new NHS. HSC 199/065. DH, London (1999)

# Clinical operational infection control at Role 2e/Role 3

2-3

Policies

## Policies 3

### Infection control

- Infection control comprises prevention and control of infectious disease both communicable and non-communicable.
- Universal precautions are to be used to minimise the risk of cross infection between patients and health care workers (HCWs).
- Within the Role 2 Enhanced/Role 3 clinical setting universal precautions should be used by all HCWs regardless of the known infectious state of a patient and are to be adopted when handling blood, body fluids, secretions, excretions and contaminated items.

### Hands

- Hands of HCWs are the most common vehicle by which microorganisms are transmitted.
- Effective hand decontamination by HCWs is the single most effective action that can be taken to prevent the spread of infection.
- Alcohol gel and antiseptic hand scrubs should be available in conjunction with soap and water and their use should be confined to clinical areas only.

### PPE

- PPE should be used by all HCWs where any direct contact with body fluids from patients is anticipated. PPE comprises the following: gloves, apron, mask and eye protection.
- Sharps comprise needles (hollow bore or suture), scalpels, stitch cutters, glass ampoules, sharp instruments and bone/tooth fragments. **Sharps safety within the clinical environment is paramount and extreme care must always be taken.**

### Clinical waste

- Clinical waste consists of waste generated from patient care and comprises five groups:
  - Group A consists of soiled surgical dressings, swabs and all other contaminated waste from clinical areas. It also includes materials other than reusable linen from cases of infectious disease, all human tissue from hospitals or laboratories and all related swabs and dressings.
  - Group B consists of discarded syringes, needles, cartridges, broken glass and any other contaminated disposable sharp instrument or item.
  - Group C consists of clinical laboratory waste.
  - Group D consists of drugs or pharmaceutical waste.
  - Group E consists of items used to dispose of urine, faeces and other bodily secretions or excretions not found in Group A.

# Clinical operational infection control at Role 2e/Role 3

## Policies **3** (Cont'd)

- All clinical/domestic waste bags and sharps boxes must be secured and marked with the ward/department they have originated from.
- All used linen (lightly soiled or not) from a patient not suspected to be infected, should be placed into a white plastic laundry bag.
- Linen heavily blood stained or soiled and/or from an infected patient should be placed in a water-soluble bag and then inside a red plastic bag and marked with the ward/department it has originated from.

### Blood spills

- Blood spills may expose HCWs to blood borne viruses (BBV) or other pathogens.
- The cleaning of blood spill can be carried out more safely if any pathogens in the spillage are first destroyed by a disinfectant.
- The two methods of achieving this are by the use of high concentration granules or a hypochlorite solution of 10000 parts per million (ppm).

### Isolation & Cohort Nursing

- Isolation & Cohort Nursing is required to prevent the transfer of microorganisms from infected patients to other patients and/or staff. There are two types of isolation nursing:
  - Source Isolation/Cohort Nursing. This confines the infection by nursing the infected patient away from other non-infected patients and thus preventing transmission by blocking the routes of spread.
  - Protective Isolation. This confines the susceptible immunosuppressed patient(s) away from other patients, thus preventing exposure to microorganisms and infection by various routes.
- The Role 2 Enhanced/Role 3 hospital should have a designated isolation ward. This ward will have to instigate source isolation/cohort nursing.

# Communicable disease control

3-4

## Policies 4

Policies

- PJHQ is responsible for the provision of deployment-specific preventive medicine advice and a CDC advisory service for joint deployments through DMSD CDC.
- There is a statutory requirement to notify designated infectious diseases. This is a responsibility of medical personnel in primary and secondary care units.
- PJHQ is responsible for promulgating Medical Warning Notices based on Medical Intelligence Assessments, detailing the particular preventive medical requirements for joint deployments.
- Formal notification is only part of communicable disease surveillance and does not include some diseases whose importance reflects their potential severity, or on the management of incidents occurring on operations or other joint deployments. Further specialist advice may be sought from DMSD CDC who will be the preferred initial point of contact for the civilian authorities on issues or incidents of national significance, those that cross NHS Regional boundaries and those involving more than one Service on more than one site.
- Successful communicable disease control depends on the adoption of appropriate preventive measures and training to minimise the risks of incidents. Once an incident has occurred, timely diagnosis and reporting (even if the diagnosis is only provisional) is an essential factor in the identification of the problem and the institution of control measures.

### Service sources for communicable disease advice

#### Royal Navy

Telephone: Civilian 02392 723934      Military 93802 3934  
 E-mail: so1phm@dial.pipex.com

#### Army

Telephone: Civilian 01276 412931      Military 94261 2931  
 E-mail: zorria@epinet.co.uk

#### Royal Air Force

Telephone: Civilian 01462 851515      Military 95381 6359  
 E-mail: occdc@rafcam.mod.uk

# Confidentiality & protection of patient information

## Policies 5

- All patients have the right to expect that information held about them will be kept in confidence and will not be used or revealed inappropriately. In this respect, the rights of Service personnel are identical to those enjoyed by civilians.
- Confidentiality is defined as the statutory and professional duty to safeguard personal information by preventing its improper disclosure.
- Confidentiality is an essential component of the clinical consultation, and any perception that personal information may be improperly disclosed will seriously undermine the trust between the patient and health care professional. However the sharing of information is integral to the auditing of clinical practice and the planning of health services. It is important that the boundaries between patients' expectations of confidentiality and the information needs of both the health care provider and the organisation are clearly defined.
- **Protection against improper disclosure of personal information and informed consent to appropriate disclosure underpin the principles of medical confidentiality.**
- Information concerning the physical or mental health of an individual has the legal status of "sensitive personal data" under the provisions of the Data Protection Act 1998 and must be safeguarded in accordance with the Act.
- **Caldicott Report**<sup>3</sup> set out the principles under which each organisation should handle confidential patient information:
  - Justify the purpose(s).
  - Do not use patient-identifiable information unless it is absolutely necessary.
  - Use the minimum necessary patient-identifiable information.
  - Access to patient-identifiable information should be on a strict need to know basis.
  - Everyone should be aware of their responsibilities.
  - Understand and comply with the Law.
- Personal information may not be disclosed to a patient's employer without the patient's explicit consent. In exceptional circumstances only, this may be over-ridden by health and safety, operational, legal or security considerations.

<sup>3</sup> Report on the Review of Patient-Identifiable Information. NHS Executive (1997)

# Consent for examination or treatment

5–6

Policies

## Policies 6

### Consent from patients

1. Consent needs to be obtained before you examine, treat or care for patients.
2. Adults are always assumed to be competent unless demonstrated otherwise. The question to ask if you have any doubts about their competence is, “Can this patient understand and weigh up the information needed to make the decision?”
3. Patients may be competent to make some health care decisions, even if they are not competent to make others.
4. Patients can change their minds and withdraw consent at any time.
5. Young people aged 16 and 17 are presumed to have the competence to give consent for themselves.
6. Younger children who understand fully what is involved in the proposed procedure can also give consent. In other cases, someone with parental responsibility must give consent on the child’s behalf, unless they cannot be reached in an emergency.
7. It is always best practice for the person actually treating the patient to seek the patient’s consent.
8. Patients need sufficient information before they can decide whether to give their consent. The patient’s consent may not be valid if they are not offered as much information as they reasonably need to make their decision, and in a form they can understand. All treatment options discussed must be documented in the notes.
9. Consent must be given voluntarily: not under any duress or undue influence from health professionals, family or friends.
10. Consent can be written, oral or non-verbal. A signature on a consent form does not in itself prove the consent is valid – the point of the form is to record the patient’s decision, and also increasingly the discussions that have taken place.
11. Competent adult patients are entitled to refuse treatment, even where it would clearly benefit their health.
12. No-one can give consent on behalf of an incompetent adult. However, you may still treat such a patient if the treatment would be in their best interests.

Source: Department of Health 12 key points on consent. For more detail consult the Reference guide to consent for examination or treatment, available at [www.doh.gov.uk/consent](http://www.doh.gov.uk/consent)

# Immunological protection of military personnel

## Policies 7

### Wound contamination

Incidents where multiple casualties arise from a single contact such as IED, increase the possibility of casualty's wounds being contaminated with blood, other body fluids or tissue from another. This introduces the risk of transmission of blood borne viruses (particularly Hepatitis B, Hepatitis C, and HIV). Where such an incident has occurred a risk assessment should be undertaken to determine the correct course of action after the event. The risk assessment should take into account the type of wound, level of tissue contamination and source. A knowledge of the prevalence of BBV in the resident population is also required as is, for hepatitis B, prior vaccination status. Where post exposure action is required the following action is to be taken:

#### a. HIV

One Combivir tablet (300mg zidovudine + 150mg lamivudine) b.d., and two Kaletra tablets (200mg lopinavir + 50mg ritonavir) b.d. There is also a requirement to assess whether repatriation should occur in order to complete HIV PEP, counselling and follow up care.

#### b. Hepatitis B

Post exposure prophylaxis is required if there is no history of previous vaccination. If the source is known to be HBsAG positive then the accelerated vaccination course at zero, one month and 2 months should be given. In addition HBIG should be given. If the source is felt to be at high risk but hepatitis B status is unknown, only the accelerated course should be given. A shorter accelerated course may be given to those over the age of 18. Engerix B vaccine is the only vaccine licensed for this indication and should be given at day zero, 7 and 21 days.

#### c. Hepatitis C

There is currently no post exposure prophylaxis for hepatitis C. If hepatitis C is suspected, then a baseline blood sample should be taken for serological testing. Repeat samples need to be taken at 3 and 6 months post exposure.

### Service sources of advice on immunisations

#### Defence Medical Services Department

Telephone: Civilian 020 7218 1433      Military 96218 1433

#### Royal Navy

Telephone: Civilian 02392 625583      Military 93832 5583

#### Army

Telephone: Civilian 01276 412938      Military 94261 2938

#### Royal Air Force

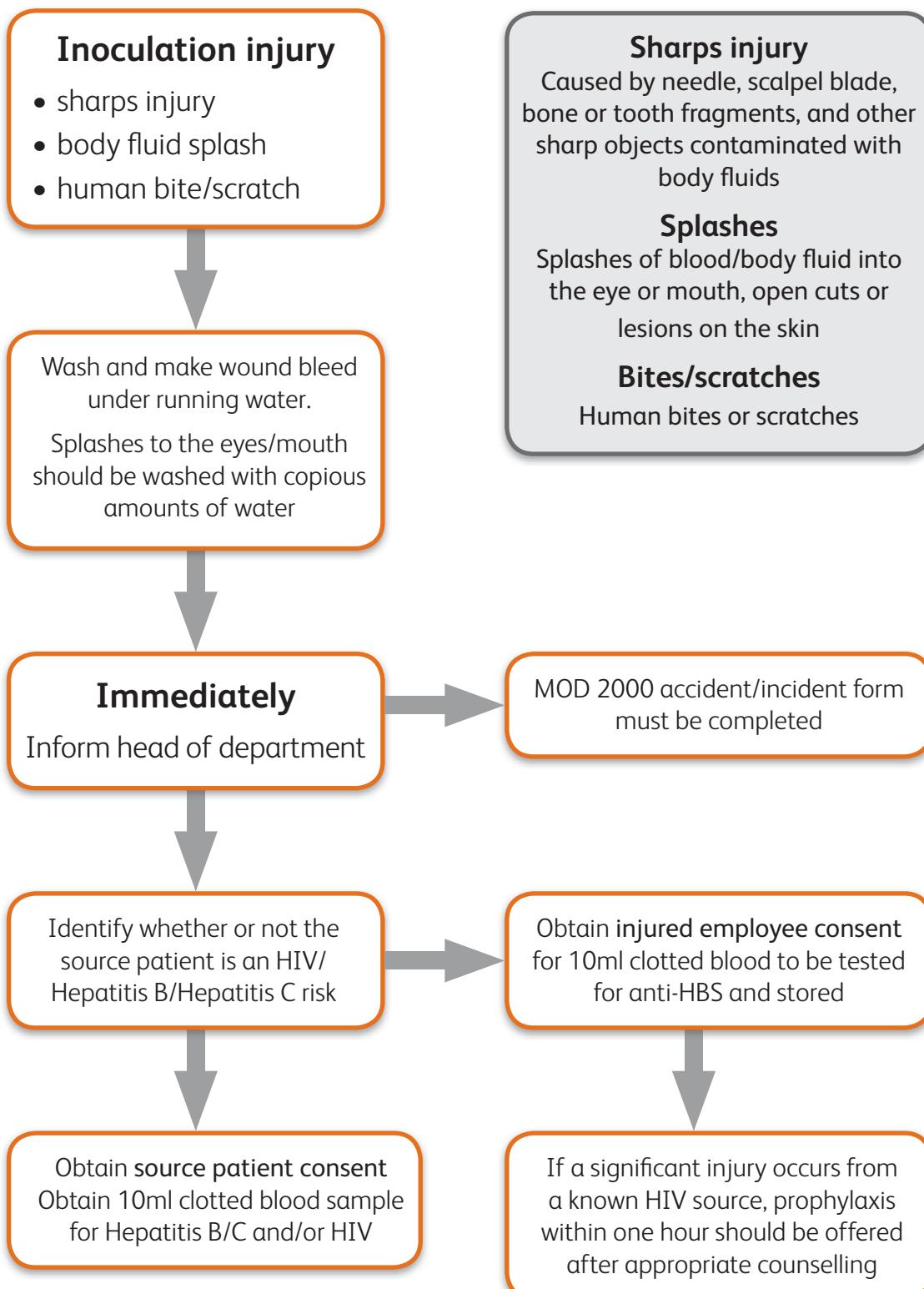
Telephone: Civilian 01494 494332      Military 95221 4332

# Inoculation accidents to staff

## Policies 8

7-8

Policies



# Management of irradiated and contaminated casualties

## Policies 9

- The early management of irradiated casualties can be divided into acute care, emergency care and intensive care. Definitive care at Role 4 should involve pre-designated hospitals with experience whenever possible.
- The basic principles of radiation management (time, distance, shielding) coupled with the basic principles of casualty management (<C>ABCDE and CSCATT) are enduring alongside the specialist aspects of radiation medicine.
- This guidance provides a template of care from POW to Role 4 for operational radiation exposures in remote locations where definitive/expert medical help is unobtainable for up to 48 hours. In all circumstances clinicians must use their clinical judgement and take advice from SME whenever possible. The Institute of Naval Medicine maintains a 24 hour SME service contactable via +44 2392 768020.
- Casualties may be conventional, irradiated, contaminated (externally or internally) or may suffer combined wounds. Casualties with combined wounds have a significantly worse prognosis.
- Radiation produces deterministic (threshold effects) as well as stochastic (probability based) effects. For a given dose of radiation the risk/benefit of any therapy needs to be considered, and the long term psychological welfare of an individual must also be considered.
- Broadly speaking deterministic effects occur over 500mSv with 5% of individuals suffering acute nausea and vomiting over 750mGy. Time to emesis provides a fair approximation of dose and prognosis above this level<sup>4</sup>.

Dose	Relative Hazard
About 10 milli-Gray	No acute effects
About 0.1 Gray	No acute effects, subsequent additional risk of cancer about 0.5%, dependent upon dose rate
About 1 Gray	N & V possible, mild bone marrow depression, subsequent risk of cancer 5%, dependent upon dose rate
Greater than 2 Gray	Definite nausea, vomiting, medical evaluation and treatment required

<sup>4</sup> IAEA: *Diagnosis and Treatment of Radiation injuries*. Safety Report, Series 2. Vienna (1998)

# Management of irradiated and contaminated casualties

9

Policies

## Policies 9 (Cont'd)

### Acute Radiation Syndrome

Acute Radiation Syndrome (ARS) is an acute illness caused by irradiation of the body by a high dose of penetrating radiation in a very short period of time. The major cause of this syndrome is depletion of immature parenchymal stem cells in specific tissues<sup>5</sup>.

#### The three traditional ARS Syndromes<sup>6</sup>

- Bone marrow syndrome (sometimes referred to as haematopoietic syndrome) the full syndrome will usually occur with a dose between 0.7 and 10Gy though mild symptoms may occur as low as 0.3 Gy. Survival rate of patients with this syndrome decreases with increasing dose. The primary cause of death is the destruction of the bone marrow, resulting in infection and haemorrhage.
- Gastrointestinal (GI) syndrome: the full syndrome will usually occur with a dose between 10 and 100Gy, but some symptoms may occur as low as 6Gy. Survival is extremely unlikely with this syndrome. Destructive and irreparable changes in the GI tract and bone marrow usually cause infection, dehydration, and electrolyte imbalance. Death usually occurs within 2 weeks.
- Cardiovascular (CVS)/Central Nervous System (CNS) syndrome: the full syndrome will usually occur with a dose greater than 50Gy, but some symptoms may occur as low as 20Gy. Death occurs within 3 days. Death is likely due to collapse of the circulatory system as well as increased pressure in the confining cranial vault as the result of increased fluid content caused by oedema, vasculitis, and meningitis.

#### The three stages of ARS

- Prodromal stage: The characteristic symptoms for this stage are nausea, vomiting, and possibly diarrhoea (depending on dose) that occur from minutes to days following exposure. The symptoms may last up to several days.
- Latent stage: In this stage the patient looks and feels generally healthy for a few hours or even up to a few weeks.
- Manifest illness stage: In this stage the symptoms depend on the specific syndrome and last from hours up to several months. Most patients who do not recover will die within several months of exposure. The recovery process lasts from several weeks up to two years.

<sup>5</sup> CDC: *Acute radiation syndrome* – [www.bt.cdc.gov/radiation/index.asp](http://www.bt.cdc.gov/radiation/index.asp)

<sup>6</sup> CDC: *Radiation Emergencies* (fact sheet) – [www.bt.cdc.gov/radiation/index.asp](http://www.bt.cdc.gov/radiation/index.asp)

# Management of irradiated and contaminated casualties

## Policies 9 (Cont'd)

### Roles of care

**Management is based on roles of care.**

- **Role 1:** This is based on <C>ABCDE. Exposed individuals should evacuate the area and decontaminate themselves as early as possible. Radiation dose is directly related to radioactivity and exposure time and inversely proportional to distance from the source. Casualties should undergo normal trauma management and early decontamination. Use antiemetics symptomatically and other countermeasures with SME advice.
- **Role 2:** The management continues along <C>ABCDE pathway. Irradiated troops need to be decontaminated, receive resuscitative treatment and be evacuated to specialist care.
- **Medical Triage:** It is necessary to assess traumatic injury and medical conditions prior to consideration of radiation exposure. See Triage algorithms in Incident Management guidelines.



- **Rapid Radiological Triage:**
  - Time to vomiting <4hours: Refer for immediate evaluation.
  - Time to vomiting >4hours: Refer for delayed evaluation (24–72 hours) if no concurrent injury.
- **Role 3:** Continued medical management and surgical care as required. If available, consideration should be given to the use of appropriate chelating agents and cytokines.
- **Role 4:** Definitive care provided by Radiation Medicine specialists.

Radiation induced nausea and vomiting is a debilitating feature of acute radiation syndrome. Nausea is controlled by the automatic nervous system, and vomiting by the vomit centre and Chemoreceptor Trigger Zone (CTZ). Radiation causes nausea and vomiting by either direct effects on the brain or by release of serotonin and histamines:

- Nausea and vomiting associated with radiation usually occurs 30 minutes to several hours after exposure.
- 5-HT receptor blockers have been shown to be effective against radiation-induced nausea and vomiting.

# Management of irradiated and contaminated casualties

9

Policies

## Policies 9 (Cont'd)

### Dose estimation

- Dose estimation will not initially be possible, and can often prove to be inaccurate. An estimate can be extrapolated from the time to vomiting:

<b>Estimation of Dose Related to Onset of Vomiting (Single Acute Exposure)<sup>7</sup></b>	
<10 minutes	>8Gy
10–30 minutes	6–8Gy
<1 hour	4–6Gy
1–2 hours	2–4Gy
>2 hours	<2Gy

- Alternative methods use lymphocyte counts at 6 hourly intervals utilising calibrated graphs, and DNA dicentric counts in specialist laboratories.

### Management of casualties – initial

- Initial management of casualties should be on <C>ABCDE principles. Triage should be for conventional injury initially. Radiation doses sufficient to disable an individual within 1–4 hours signify a high and potentially fatal dose that requires assessment (or use of T4 category in MASCAL). If radiological contamination is considered likely no mouth-to-mouth or mouth-to-nose resuscitation should occur (even with a face shield device).
- Gross decontamination should occur at the earliest opportunity, but should not delay life saving treatment. The removal of outer cloths will reduce contamination by 85–90%. Contamination of casualties will not pose an immediate threat to medical personnel if correctly managed from first principles. Decontamination teams should be supervised to ensure that they receive the lowest possible dose.
- The collection of samples to assist in dose estimation and further casualty management has a high priority even in the early stages of treatment. These include wound swabs, nasal swabs, urine and faces (after 12 to 24 hours).

<sup>7</sup> From IAEA Safety Report, Series 2, Table 8

# Management of irradiated and contaminated casualties

## Policies **9** (Cont'd)

### **Management of casualties – surgical**

- Surgical care should proceed routinely. Surgical decontamination may be necessary in a small number of cases (those with incorporated emitting foreign bodies). To achieve this wound probes and portable ultrasound devices may be required.
- Effective wound debridement is important as primary closure offers significant survival advantages over delayed primary closure, but this window of opportunity closes between 36–48 hours. After this time surgery should be delayed until the recovery of the immune system. Surgeons must use their best judgement as to which approach should be used.
- Visible radioactive particles should be removed, and a search made for beta and gamma emitters using a contamination probe in the wound. Alternatively, the wound should be swabbed and the swab exposed to a contamination probe until contamination levels are minimized.

### **Continuing medical care**

- For casualties with a significant dose of radiation, the use of selective anti-infective therapy needs to be considered. A balance must be drawn between the inappropriate use of antibiotics to reduce gut microbial load and the appropriate use in an infected casualty who will be at risk of overwhelming infection due to a radiation induced fall in leucocytes.
- The use of cytokine therapy should be considered in any casualty with a dose greater than 2Gy. This is a specialist field and will usually take place at Role 4. It involves the potential use of a granulocyte-macrophage colony-stimulating factor.
- The use of appropriate chelating agents should also be considered, especially Prussian Blue and Ca-DPTA. This should ideally be given at the earliest opportunity particularly within the first 4–6 hours<sup>8</sup>. These drugs appear to have few side effects and should be given to patients with a significant incorporated load. This will be assessed on clinical grounds, using judgement, the time of emesis, and the isotope as a guide. However, as identification of isotopes, body burden and potential future risk vs treatment benefit may be difficult to calculate in the field, these casualties may require urgent return to Role 4. The use of chelating agents will be at the direction of Radiation Medicine Specialists from the Institute of Naval Medicine.
- Casualties should be evacuated at the earliest opportunity to a Role 4 hospital with all specimens to allow dose estimation and continued care.

<sup>8</sup> The Radiation Emergency Assistance Centre – [www.orau.gov/reacts](http://www.orau.gov/reacts)

# Management of massive haemorrhage on operations

9-10

Policies

## Policies 10

### Definition of massive transfusion

Massive transfusion is defined as:

- The replacement of an equivalent amount of blood to an entire circulating blood volume of the patient within 24 hrs; or
- More than 10 units of red blood cells within 24 hours (which ever comes first).

### The military operational setting

In the acute military operational setting, additional criteria include:

- The transfusion of over 4 units of red cells in 1 hour; or
- The replacement of 50% of the total blood volume in 3 hours; or
- A rate of loss of >150ml/min.

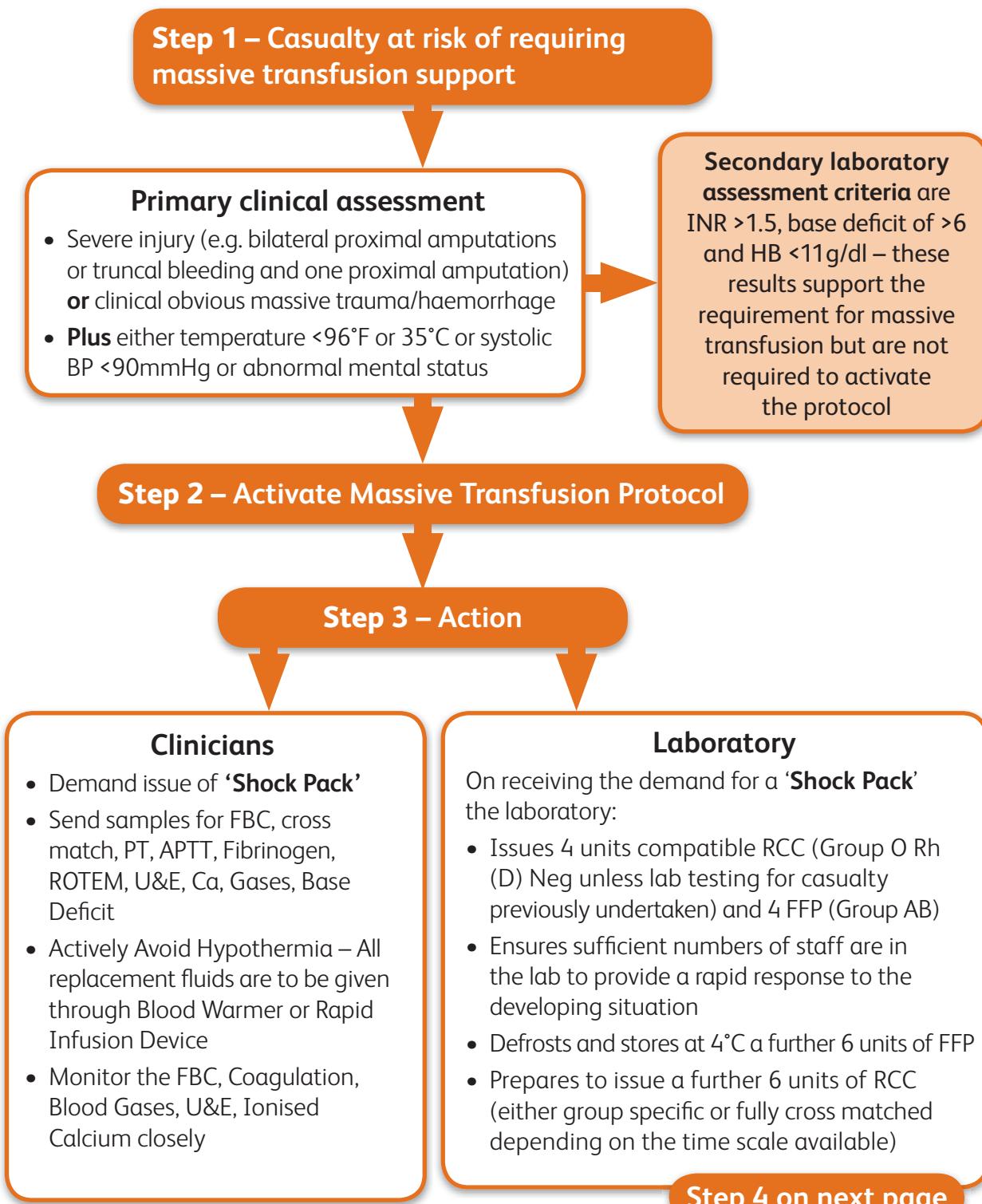
### Principles of the DMS Operational Massive Transfusion Protocol (MTP)

- Activate avoidance of hypothermia by the use of fluid warmers and rapid infusion devices.
- Maintain the Hct at 35%.
- Use of FFP to RCC in a 1:1 ratio as soon as practicable.
- Early use of cryoprecipitate in order to maintain the level of fibrinogen above 1.0g/l.
- Early intervention with platelet support to maintain the platelet count above  $100 \times 10^9/l$  using UK (or more local source if appropriate) derived platelet components, or platelets donated using field apheresis, both in preference to whole blood from the Emergency Donor Panel (EDP).
- Frequent measurement of FBC and coagulation studies to confirm successful application of the MTP.
- Frequent measurement of calcium and potassium levels in order to identify the presence of hyperkalaemia or hypocalcaemia so that appropriate therapy can be commenced.
- Appropriate intervention with rFViiia in accordance with current military guidelines.
- Regular assessments of the base deficit in order to monitor (along with hypothermia and coagulopathy) the lethal triad associated with massive trauma.

# Management of massive haemorrhage on operations

## Policies 10 (Cont'd)

### Operational Massive Transfusion Protocol



# Management of massive haemorrhage on operations

10

Policies

## Policies 10 (Cont'd)

### Operational Massive Transfusion Protocol (Cont'd)

#### Step 4 – Requirement for massive transfusion support continues

##### Laboratory issues

- 6 units of RCC (preferably group specific or fully cross matched depending on time frame)
- 6 units of FFP (group selected)

##### Prepare to issue

- Cryoprecipitate if required
- Platelets (to maintain platelet count above  $100 \times 10^9/l$ ).
- 6 units of FFP (unless the EDP has been used to supply whole blood)

#### Step 5 – Requirement for massive transfusion support continues

##### Laboratory issues

- 6 units of group selected RCC
- 6 units of FFP
- 2x5 pooled units of cryoprecipitate
- Platelets – dosage being dependant on FBC results. Each Adult Equivalent Dose of platelets can be expected to increase the platelet count by  $30–40 \times 10^9/l$
- Cryoprecipitate - dosage dependent on fibrinogen results or clinical assessment

**or**

- Consider giving one unit FFP, one pool of cryoprecipitate, one unit of platelets and rVIIa ('Bastion glue')

**or**

- 6 units of cross matched fresh whole blood derived from the EDP

**Laboratory actively manages blood stocks and request urgent resupply if appropriate  
and**

- Consider tranexamic acid early in the massive transfusion protocol, and specifically if there is evidence of fibrinolysis on ROTEM trace

#### Step 6 – Requirement for massive transfusion support continues

**Repeat  
Step 5**

# Medical support to persons detained by UK forces

## Policies 11

- The provisions and principles that can be applied to the medical support of detainees are based upon medical ethics, UK law, United Nations declarations and international law, including the Geneva Conventions. The humanitarian principles that these instruments embody are to be applied on all military operations by UK forces.
- The medical care provided must be ethical and comply with best practice. Additionally, medical personnel have a responsibility for monitoring the standards of health and hygiene within a detention facility.
- The normal rules and standards of consent, record keeping, use of chaperones and medical confidentiality apply.<sup>9</sup> Informed consent for examinations and treatment may be verbal or written and must be recorded in the medical records.<sup>10</sup> Special rules relating to the consent for medical photography apply and this consent must be obtained in writing.
- Health personnel are **not** to:
  - Apply their knowledge and skills in order to assist in the interrogation of prisoners and detainees in a manner that may adversely affect their physical or mental health; this includes certifying or stating that a detainee meets a specific mental or physical standard for interrogation.
  - Question detainees about matters unless they are relevant to their medical care.<sup>11</sup>

<sup>9</sup> General Medical Council: *Good Medical Practice* (2001)

<sup>10</sup>General Medical Council: *Protecting and Providing Information* (2004)

<sup>11</sup>*Prisoners of War Handling*. Joint Warfare Publication 1-10, Annex 3B, Para 3B2.c (March 2001)

# Medical support to persons detained by UK forces

11

Policies

## Policies 11 (Cont'd)

### Minimum standards for provision of medical treatment

- All sick or injured detainees should be treated according to medical need and without regard to status or national origin.
- Detainees are to be treated humanely and are entitled to the same medical attention as that afforded to friendly forces.<sup>12</sup> This does not necessarily imply the provision of additional resources.
- The medical officer shall, at least daily, see all sick detainees, all who complain of illness, and any detainee to whom their attention is specially directed. Detainees should not be prevented from presenting themselves to the medical officer for examination.
- Detainees should be treated, evacuated and “returned to duty” (i.e. transferred back to normal detention facilities) using the same clinical criteria that are applied to the detaining nation’s own injured.
- Detainees requiring specialist treatment should be transferred to specialized institutions, military or civil hospitals. Where hospital facilities are provided within an institution, their equipment, furnishings and pharmaceutical supplies shall be proper for the medical care and treatment of sick prisoners, and there shall be a staff of suitable trained personnel.
- Nations may cooperate to provide centralised detainee treatment facilities, although legally the nation who first took the detainee into custody retains a responsibility for them wherever they are held or treated. If there are any doubts over a nation’s compliance with humanitarian principles or Treaties legal advice should be obtained before detainees are transferred to the care of that nation.
- Detainees, whilst detained, are to be provided free of charge their medical/dental care and the appliances necessary for their maintenance in good health, for example: pharmaceutical preparations, dressings, immunizations, spectacles, dentures and other prostheses.

<sup>12</sup>Joint Medical Doctrine. Joint Warfare Publication 4-03, Para 302b.

# Medical support to persons detained by UK forces

## Policies 11 (Cont'd)

- Medical examinations and inspections should only be conducted with the informed, written consent of the individual. Those who withhold consent are only to be subjected to an external visual inspection. Standard UK consent forms will need to be modified to suit the cultural and linguistic needs of the detainee. PJHQ should issue instructions relating to what format consent forms should take. The medical officer shall conduct medical inspections and examinations in the following circumstances:
  - As soon as reasonably practicable after admission to the detention facility, with a view to discovering any physical or mental illness.
  - When required, to determine the fitness of detainees for work. The medical officer may recommend the exemption of a detainee from work. (This only applies to EPW as other detainees cannot be required to work).
  - Medical inspections of detainees shall be held at least once a month.
  - Medical inspections of detainees shall be held prior to their transfer of care from one institution or facility to another and upon discharge or release.<sup>13</sup>
- The services of at least one qualified medical officer, with some knowledge of psychiatry, must be available at every detention facility.
- The services of a qualified dental officer shall be available to every detainee.
- The burial or cremation of a detainee shall be preceded by a medical examination of the body with a view to confirming death. Clinical records should be made that will enable a subsequent written report to be made and, where necessary, establish identity. The nature of the medical examination required will depend upon the circumstances of the death and will, whenever possible, be sensitive to local customs and religious practices. Where the cause of death or identity cannot be established advice must be obtained from the Executive and the medical chain of command.
- If a detainee brings in any drugs or medicine, the medical officer should decide what to do with them.
- Medical staff providing treatment to detainees should, when required, have access to an interpreter.
- Medical documents for detainees should be treated as **Restricted – Medical in confidence**. This means they are handled and protected with the same confidentiality as medical documents for UK Service and coalition allies.

<sup>13</sup>British Medical Association: *Health care of Detainees in Police Stations*. 2nd Edn (July 2004)

# Prevention, identification, referral & follow up of Leishmaniasis

11–12

Policies

## Policies 12

**Leishmaniasis is a parasitic infection that is usually transmitted by the bite of an infected sandfly**

Leishmaniasis may present with lesions of the skin (cutaneous leishmaniasis), mucous membranes (mucocutaneous leishmaniasis) or internal organs (visceral leishmaniasis). Its presentation varies enormously dependent on a number of parasite and host factors. Cutaneous leishmaniasis (CL) and its possible recurrence as mucocutaneous leishmaniasis (MCL), also known as espundia, are the forms of greatest concern to the Armed Forces.

### Prevention

- Education of military personnel.
- Bite avoidance measures.
- Sandfly vector control.
- Reservoir host control.

### Sandfly vector control

- Where operationally possible, the control of sandfly vector populations is an essential part of leishmaniasis prevention. The methods available include the use of knockdown and residual insecticides, to which sandflies are extremely susceptible, by suitably trained personnel.

### Reservoir host control

- Where operationally and environmentally possible, the control of potential reservoir hosts (e.g. dogs and rodents) should be considered, although this may not be feasible.

### Management

- The successful management of suspected cases of CL and MCL depends upon six key principles:
  - Identification of suspected cases.
  - Notification of suspected cases.
  - Referral of suspected cases.
  - Diagnosis of suspected cases.
  - Treatment of confirmed cases.
  - Follow-up confirmed cases.

### Identification

- CL should be suspected in military personnel who have a localised skin lesion that:
  - Occurs within two years of visiting an area where leishmaniasis is endemic – as indicated by the Medical Intelligence Assessment for the country involved.
  - Appears as a chronic ulcer or crusting lesion.
  - Persists for greater than two weeks duration.
  - Is refractory to appropriate antibiotic therapy for bacterial skin infections.

# Prevention, identification, referral & follow up of Leishmaniasis

## Policies **12** (Cont'd)

- MCL should be considered in military personnel who have a mucosal lesion (usually affecting the nose, mouth or ears) that:
  - Appears as a chronic ulcer, area of mucosal destruction or raised lesion.
  - Persists for greater than two weeks duration.
  - Is refractory to appropriate antibiotic therapy for bacterial infections of mucosa.
- Dental Presentations:** If a Dental Officer suspects that a persistent intraoral lesion may be Leishmaniasis he should consult with the Medical Officer before determining the appropriate management of the case.
- Any suspected case of CL or MCL is to be notified by the Medical Officer who first sees the patient. Notification is to be carried out by both F Med 85 form and telephone or electronic communication with the appropriate single Service focal point for communicable disease control.
- It is essential that all suspected CL or MCL cases are referred for specialist tropical disease opinion and diagnostic testing. As management of leishmaniasis is highly specialised and varies according to mode of presentation and species of parasite involved, treatment is not to be initiated by non-tropical medicine specialists.
- In deployed situations:** If the Medical Officer has direct communications with the centres, direct referral should be made with Aeromed being arranged according to extant procedures. It is unlikely that Aeromed will be required as a priority.

### Contact details for key military communicable disease control appointments

#### Royal Navy

SO1 PHM, Office of the Medical Director General (Naval), Room 139, Victory Building, HM Naval Base, Portsmouth PO1 3LS.

Telephone:  
Civilian 02392 723934  
Military 93802 3934

CHOtS:  
2SL-MDGN-SO1PHM

E-mail:  
so1phm@dial.pipex.com

#### Army

Army Health Unit,  
Army Medical Directorate,  
Former Army Staff College,  
Slim Road, Camberley,  
Surrey GU15 4NP.

Telephone:  
Civilian 01276 412931  
Military 94261 2931

CASH:  
AMD-Med Int S02

E-mail:  
zorria@amd.mod.uk

#### Royal Air Force

Officer Commanding,  
Communicable Disease Control Wing,  
RAF Centre of Aviation Medicine, RAF Henlow,  
Bedfordshire, SG16 6DN.

Telephone:  
Civilian 01462 851515  
Military 95381 6359

E-mail:  
occdc@rafcam.mod.uk

# Preventing malaria in military populations

12–13

Policies

## Policies 13

Protection follows the principles of awareness through education, bite prevention and chemoprophylaxis. A fourth principle, which is specific to the military, is the role of the chain of command in the integration of malaria protection measures into plans and risk assessments.

### **Chain of command**

- The chain of command is to identify where compliance cannot be achieved for operational reasons and is to acknowledge the risk that needs to be managed. Under these circumstances it is the responsibility of medical staffs to support the commander fully by developing appropriate contingencies to minimise the effects of any future malarial outbreak.

### **Awareness and education**

- Military personnel are to be briefed regularly on the risks of malaria. In particular, they are to be briefed on protective measures before deployment on operations or exercises and the message is to be reinforced whilst deployed.

### **Bite avoidance**

- Bite avoidance measures include the wearing of appropriate clothing in malarial areas, using bed-nets, door and window screens and insecticide sprays. Clothes and bed nets provide better protection when treated with insecticide.

### **Vector control**

- The reduction of the vector population at all stages of its life cycle, where operationally possible, remains an essential part of malaria prevention.

### **Chemoprophylaxis**

- Chemoprophylaxis refers to the use of drugs to prevent malaria.
- Prior to and during any deployments, personnel are to take their antimalarial drugs exactly as directed in the deployment medical instruction.
- Should personnel at any time experience what they believe to be Adverse Drug Events (ADEs) from their antimalarial drugs, they are to seek medical advice as soon as possible, but are not to stop their antimalarial drugs without first obtaining such advice.

### **Monitoring of adverse drug effects**

Medical officers are to report any unexpected and/or severe adverse reactions to antimalarial drugs to the Committee on Safety of Medicines, using the ‘yellow card’ system.

# Preventing malaria in military populations

## Policies **13** (Cont'd)

### **Early diagnosis and treatment on deployment**

- Medical personnel to whom individuals present with a history of feverish or flu-like illness in a malaria risk area are to be considered to have malaria until otherwise proven.
- Equipment to enable near-to-patient blood testing for malaria is to be deployed in support of all deployments to malaria-endemic areas. In the context of current practice the two test kits that are issued are the “ICT pF” (NSN 6550-99-244-9080) and “Optimal” (NSN 6550-99-191-1311).
- In the event of near-to-patient diagnostic tests being unavailable, the theatre medical instruction is to detail the location of the nearest appropriate laboratory services for microscopic investigation.
- If a diagnosis is made in theatre, medical staffs are to initiate treatment without delay in accordance with *Clinical Guidelines for Operations (Treatment Guideline 9g)* or alternative advice from CCDC issued in the theatre medical instruction or after direct consultation.

Go to **Section 3**



**9g**  
Treatment guidelines

- Once a diagnosis has been made, the patient is to be evacuated to the home base, or a designated regional destination for further treatment and observation. The priority for evacuation is to be based on clinical need. Advice and direction can be obtained from Aeromed staffs.

#### Aircrew

DDAvMed  
HQ Personnel and Training Command  
RAF Innsworth  
Gloucester  
Gloucestershire  
GL3 1EZ

#### Telephone:

Civil Voice:	01452 712612
	Extn 5816
Civil Fax:	01452 510841
Military Voice:	95471 5816
Military Fax:	95471 5977

#### Divers

Department of Underwater Medicine  
Institute of Naval Medicine  
INM Alverstoke  
Hampshire  
PO1 2DL

#### Telephone:

Civil Voice:	02392 768026
Civil Fax:	02392 504832
Military Voice:	93806 8026

# Preventing malaria in military populations

13

Policies

## Policies 13 (Cont'd)

### Malarial chemoprophylaxis and aircrew

- There are a number of drugs that can be used for the chemoprophylaxis of malaria in aircrew. The particular drug chosen from this list should be appropriate for the area to be visited and should be selected using the guidelines.
- Drugs that may be used by aircrew for malaria chemoprophylaxis are as follows:
  - Chloroquine
  - Proguanil
  - Malarone® (Proguanil 100mg and Atovaquone 250mg)
  - Doxycycline

- Aircrew likely to take Malarone®, are to have a one-off trial period of the drug during a non-flying phase.
- Aircrew are not to take mefloquine (Larium®) as there is a small, but significant, risk of side-effects, which could degrade concentration and coordination. There is also a risk of cardiac conduction defects with this drug.
- Aircrew who inadvertently take mefloquine, are to be grounded and made ‘unfit flying’ for a period of 3 months after the last dose of mefloquine.

### Malarial chemoprophylaxis and divers

- Divers may be prescribed Mefloquine if the risk assessment indicates it is the preferred prophylaxis, however, they are to be made temporarily unfit for diving for 3 weeks. If they have experienced no side effects during this time, they may recommence diving while continuing to take Mefloquine after consultation with a Medical Officer.
- Divers who suffer adverse drug effects (ADE) while taking Mefloquine should be made temporarily unfit for diving until 4 weeks after their last dose and only recommence diving after consultation with a Medical Officer.
- Divers may be prescribed Malarone if the risk assessment indicates it is the preferred prophylaxis. However, they are to be made temporarily unfit to dive for 3 days. If they have experienced no ADE during this time they may recommence diving after consultation with a Medical Officer. Divers who suffer ADE whilst taking Malarone should stop diving until reviewed by a medical officer who should seek advice from a diving medical specialist at INM. Alternative malaria chemoprophylaxis is doxycycline.

# Religious beliefs guidelines

## Policies 14

This guidance presumes that the body/body parts are not part of forensic evidence that may alter the availability to release for burial.

	<b>Christianity</b>	<b>Muslim</b>	<b>Jewish</b>	<b>Sikh</b>
The dying patient	May wish to receive the “sacrament of the sick”.	<p>The patient needs to repeat or hear repeatedly from other Muslims the Shahada.</p> <p>The patient should extend his/her index finger to signify his/her continuing belief in the Shahada.</p> <p>Members of the family should sit with the patient to pray and recite verses from the Quran.</p>	Where operationally available the Synagogue should be informed in accordance with patient/relatives wishes.	The patient should receive Spiritual comfort from readings from the Holy Scriptures performed by a relative or by a Granthi.
Death	Routine Last Rites are appropriate for all Christians.	<p>There should be minimal handling of the body by nursing staff. Gloves must be worn.</p> <p>Deceased males should be attended to by male staff and females by female staff.</p> <p>The body should be straightened immediately after death, arms and fingers straight, ankles fastened together with a bandage.</p> <p>Full last offices <b>will not</b> be performed as this will be done once the body has left the hospital.</p>	<p>There should be minimal handling of the body by nursing staff. Gloves must be worn.</p> <p>The deceased <b>will not</b> require full last offices as this will be performed by the Chevra Kedisha once the body has left the hospital.</p> <p>Jewish Religious Law requires burial to take place within 24–72 hours of death occurring.</p>	<p>The family must be asked if they wish to wash and lay out the body.</p> <p>The five Ks must be respected and left with the deceased.</p> <p><b>Kesh</b> (uncut hair)  <b>Kanga</b> (comb)  <b>Kara</b> (iron bangle)  <b>Kachhera</b> (undergarments)  <b>Kirpan</b> (a sword, if present to be left)</p> <p>Cremation should take place as soon as possible.</p>
Post-mortem	No religious objection	Potential religious objection	Potential religious objection	Potential religious objection

# Deaths on operations

14-15

## Policies 15

Policies

Death on operations falls under the remit of the Coroner's Office and may require post-mortem/inquest following repatriation of the body. The following advice is to enable medical personnel to assist in the preservation of evidence, thereby facilitating the forensic process. However, it is emphasised that **preservation of life takes priority over preservation of forensic evidence at all times.**

Circumstances	General advice	Labelling
Body parts	<ul style="list-style-type: none"> <li>• Do not clean.</li> <li>• Clothing to remain <i>in situ</i>.</li> <li>• Package individual parts separately unless certain from same body.</li> <li>• Use body bags. Plastic bags may be used for individual parts and placed in body bags.</li> </ul>	<p>Label each part, if determinable with the Name/Rank/Number of casualty where known.</p> <p>Include the Name/Rank/Number of the Medical Practitioner who pronounced life extinct.</p>
Dead on arrival	<ul style="list-style-type: none"> <li>• Do not clean.</li> <li>• Clothing to remain <i>in situ</i>.</li> <li>• Package in body bag.</li> <li>• To be evacuated with helmet and body armour inside body bag (for forensic examination).</li> </ul>	<p><b>Label:</b> Name/Rank/Number of casualty if known.</p> <p>Two labels should be attached – one on wrist and one on ankle. Labels should be tied to body, not to clothing.</p>
Death after medical intervention	<ul style="list-style-type: none"> <li>• <b>Body:</b> do not clean after life extinct pronounced; cap off lines and tubes which should remain <i>in situ</i>. Package body in body bag.</li> <li>• <b>Clothing:</b> if already removed, package separately. If items are wet, place in separate polythene bags, if dry place in separate brown paper bags, label and hand to Investigating Officer.</li> </ul>	<p>Name/Rank/Number of the Medical Practitioner who pronounced life extinct along with date and time.</p>

### Removal of clothing:

If possible clothing should be cut around any entry or exit holes, however, preservation of evidence should **not** compromise medical care at any time.

# Deaths on operations

## Policies 15 (Cont'd)

Circumstances	General advice	Labelling
Apparent natural causes/ sudden death	<ul style="list-style-type: none"> <li>Do not clean body after life extinct pronounced.</li> <li>If resuscitation attempt made cap off lines and tubes, which should remain <i>in situ</i>.</li> <li>Package body in body bag.</li> </ul> <p><b>Clothing:</b> Package separately. If items are wet, place in separate polythene bags, if dry place in separate brown paper bags, label and hand to Investigating Officer.</p>	<p><b>Label:</b> Name/Rank/ Number of casualty if known.</p> <p>Two labels should be attached – one on wrist and one on ankle. Labels should be tied to body, not to clothing.</p>
Suspicious circumstances (A) On scene	<ul style="list-style-type: none"> <li>Do not clean body after life extinct pronounced.</li> <li>If resuscitation attempt made cap off lines and tubes, which should remain <i>in situ</i>.</li> </ul> <p><b>Body should not be moved and medical team should await Investigating Officer unless operational environment dictates otherwise.</b></p> <p><b>If body moved:</b></p> <p><b>Clothing:</b> if already removed, package separately. If items are wet, place in separate polythene bags, if dry place in separate brown paper bags, label and hand to Investigating Officer.</p> <p><b>Body:</b> Package body in body bag.</p>	Name/Rank/Number of the Medical Practitioner who pronounced life extinct along with date and time.
Suspicious circumstances (B) Medical facility	<ul style="list-style-type: none"> <li>Do not clean body after life extinct pronounced.</li> <li>If resuscitation attempt made cap off lines and tubes, which should remain <i>in situ</i>.</li> </ul> <p><b>Body should not be packaged but left for the Investigating Officer unless there will be a delay.</b></p> <p>Any clothing removed should be packaged in separate polythene bags, labelled and handed to Investigating Officer.</p>	

# Deaths on operations

## Policies **15** (Cont'd)

15

Policies

### **Weapon (all circumstances)**

- If a weapon accompanies the body, make safe
- Package and label with Name/Rank/Number of individual who carried out procedure along with time/date
- Where practical the same individual to remain with weapon until handed to Investigating Officer; if not feasible, sign into Armoury or secure place to ensure chain of evidence is preserved

**If any doubt exists as to the handling of a dead body advice should be sought from Forensic Dept HQ SIB (UK): 01980 673666 or 673643**

**For aircraft crashes contact the Air Investigation Branch (Centre of Aviation Medicine) on 01462 851515 ext 8035**

### **Field burials**

#### **General**

Where possible dead will be recovered for interment in a cemetery. If this is not possible an emergency burial will be performed. Initial burial of own and enemy dead should take place at the earliest opportunity at or near the place of death. Sub-unit 2iCs are responsible for ensuring that all burials are conducted in the correct manner and are documented.

### **Types of burial**

#### **Individual burial**

Each identified remains is buried in an individual grave.

#### **Group burial**

Group burial uses a common grave for 2 or more individually identified remains.

#### **Trench burial**

Trench burial is only to be used for mass casualties. A trench is prepared and individual remains are laid in it side by side, thus obviating the necessity of digging and filling individual grave.

#### **Temporary burial**

If no refrigeration is available, but the aim is to repatriate, the body can be placed into bags and buried to slow down decomposition, preventing further damage by the elements and animal/insect activity. The body can then be recovered when appropriate. The recommended depth of a temporary burial is between 40–50cm, and it is further recommended to place a tarpaulin or similar covering over the burial site.

# Deaths on operations

## Policies 15 (Cont'd)

### Siting of graves

Graves are to be sited in accordance with the following guidelines:

- Graves should be as near to the scene of death as possible and should ensure ease of subsequent recovery and identification. Graves should, where possible, be sited out of sight of other troops. All graves should be placed in order to provide protection from water egress.
- Graves should be dispersed and where practical, individual remains should be buried separately.
- With the exception of temporary burial sites (outlined above) the minimum depth of a grave is to be one metre and the body is to be buried clothed and enclosed in a porous body bag, poncho or cloth cover. Sleeping bags, plastic bags and other impervious wrappings should only be used as a last resort.

### Marking of graves

All graves are to be marked as follows:

#### Individual graves

An appropriate religious marker, high enough to be seen, is to be placed on the grave.

At its base a bottle, can or other suitable container is to be half buried, open end downwards. This is to contain the following info written clearly in pencil or indelible ink on paper or card and then wrapped in polythene:

- Service Number, rank, surname, forename or initials and sex.
- National force, unit and date and place of birth if available.
- Date and cause of death.
- Date and by whom buried.
- Religious faith, if known.

#### Trench/group burial

For these types of burial a marker or row identification stake is to be placed at the beginning of each row and a list that coincides with the sequences of the bodies is to be maintained. One copy is to be attached to the Emergency Burial Report (F/CAS/753) and one copy is to be placed in a suitable container at the base of the row marker.

# Deaths on operations

## Policies **15** (Cont'd)

15

Policies

### Burial services

Whenever practicable, a brief burial service of the appropriate religion is to be held. Examples of approved burial services for Christian, Jewish, Hindu, Islamic and Buddhist religions can be found at Annexes A and E of Chapter 56 to the *Guide to the Administration of personnel in War* (AC 63481), which is to be carried by Coy Cps and BGLogO.

### Emergency burial report

An Emergency Burial Report (F/CAS/753) is to be completed for each emergency grave by the 2iC of the Coy responsible for the burial. Once completed it is to be passed to RAOWO in B Ech via BG MAIN. The RAOWO is responsible for copying each report and sending one copy to Field Records (P20(Fd)) and retaining the other.

### Personal effects

All personal effects are to be removed and marked using one ID disc; the other is to be buried with the body. An inventory is to be made (AFW 3190 in triplicate) and signed by an officer. One copy should be placed with the effects, the second forwarded to the Field Records through the RAOWO who is to retain the third.

### Projectiles and fragmentation

Any projectiles and/or fragmentation should be recovered, if they are loose and on the surface of the body in order that they are not lost. They should be packaged in plastic containers, with padding, and handed to the RMP CSI on arrival.

# Treatment of Non Entitled Children on Operations

## Policies 16

Medical forces on operations are configured to support only the deployed force and medical manpower and material is scaled to that end.

Current doctrine provides that the medical force can deliver support to non combatants in a disaster relief capacity or as part of the overall campaign. Doctrine specifies that any care given must be within existing capability, must not impact on the mission, and must not create a dependency among the local population. This doctrine fully recognises the duty under Common Article 3 of the Geneva Conventions requiring that the wounded and sick be collected and cared for but does not fully acknowledge the moral and ethical imperative to render all necessary care to any individuals who might present at military medical facilities whether or not it is within deployed capability.

While acknowledging an ethical obligation to treat civilians, defence doctrine remains that deployed military medical facilities are configured to support the deployed force.

This SGPL provides a framework to help clinicians to identify at which point their clinical responsibilities have been discharged and what actions need to be taken to ensure that civilian paediatric cases are returned either to the local health economy or NGO facilities at the earliest opportunity that their condition allows.

### Ethical Rationale

- It is accepted that medical support to the deployed force will continue to be configured to provide only acute services and that all post acute and chronic care and long term rehabilitation will be undertaken in the home base. Implicit in this is that a wounded member of the deployed force, who has completed the acute phase of his care but who has ongoing treatment needs, will be transferred from acute hospital care into the rehabilitation phase of their treatment in the UK.
- Consistent with this principle, a wounded member of the local population, if admitted to a UK Medical treatment facility, would also transfer from an acute Service facility to a chronic provider in their home base no later than the point at which they had reached the end of the acute component of their care pathway. Where this care is not available clinicians and commanders need to consider the best course of action on a case by case basis. For example in the presence of a devastating brain injury or a high spinal cord transection where the likely outcome is very poor it may be inappropriate to start critical care. Such considerations are made by NGO providers such as the International Committee of the Red Cross (ICRC) which does not usually provide ventilation for intensive care patients.
- Where cases have come to the end of the acute phase of their care and are ready for transfer to a post acute or chronic care setting, it is acknowledged that in many operational theatres such a setting will be within the family/community or in medical facilities which may have significant capability and capacity shortcomings and may be associated with greater risks of morbidity and mortality. Medical staffs must come to terms with this reality of modern expeditionary campaigning where our own treatment capability and ethical and

# Treatment of Non Entitled Children on Operations

16

Policies

## Policies **16** (Cont'd)

moral codes are at odds with the tactical reality of overwhelming demand.

DMS accepts the ethical and moral imperative to provide urgent life saving care to all those in need and inevitability that such cases will present to deployed medical treatment facilities from primary care posts through the IRT to the deployed emergency room.

### **Principles**

- The current spectrum of operations imposes a specified and implied task on DMS personnel to manage and treat civilians from outside their core areas of practice e.g. children, the elderly and pregnant women.
- The balance of clinical activity will always be in favour of treating the military population. However, where personnel do become involved in treating paediatric cases, training and equipment will be provided to allow them to undertake a suite of additional clinical interventions which will be required to meet the different clinical needs of these patients.
- There is a requirement for deployed personnel to be able to access paediatric advice from specialists in the UK and this will best be achieved using current telemedicine capability.
- On operations where genuinely unforeseen crises arise for which material and equipment has not been supplied or for which deployed clinical staff have not had basic training, MOD will still support and indemnify its practitioners who operate in a 'Good Samaritan' capacity using the skills, equipment and material to hand.

### **Command Implications**

- In addition to providing care to civilian populations, there is a requirement for Force and Medical Commanders to be pro-active in identifying and liaising with key community leaders and any deployed NGO healthcare providers who will be involved in the provision of post-acute care. This includes local medical providers, members of the family of the casualty and community leaders who will need to be advised as to what care is going to be provided within the military treatment facility, at which point that care will come to an end and, most importantly, informing them when a casualty has reached the end of the acute care pathway and is ready for discharge, or transfer to a local medical facility.
- Commanders must also provide appropriate moral support to clinical staffs to help them overcome any negative feelings that they may have when discharging patients into an uncertain clinical setting.

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# Section 9

# Documentation and audit

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# Documentation and audit

## Contents

Documentation  
and audit

## Contents

### Major trauma audit data collection

Documentation and audit **1**

### Major Trauma Data Analysis

Documentation and audit **2**

### Standard documentation

- UK Defence Medical Services Pre-hospital Report Form
- UK Defence Medical Services Trauma Resuscitation Chart
- Operational Trauma Audit Form
- Emergency Department Clinical Record

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# Major trauma audit data collection

1

Documentation  
and audit

## Documentation and audit 1

- Collection of data is crucial for an effective audit cycle of major trauma systems. If there is no written evidence that care has been provided then legally it must be assumed that it was not given. Documentation is a vital part of patient care and remains a priority even in high intensity operations. Data collection needs to be done while the case notes are still available and is best started as soon as possible by a trained individual who has experience in care of the major trauma patient.
- The **Operational trauma audit data collection form** is reproduced in this JTTP as a fail-safe for copying and operational use. Optimally effective major trauma audit requires training in data collection and use of these forms. Training for Major Trauma Audit is available to units via DMETA and consists of one day to be completed by personnel who will be taking on this responsibility during deployment.
- The **MACE package operations** is issued to personnel who complete the training day, with one copy for the individual and one to be held by the unit admin cell as a spare. The package includes all the codes required to complete the data collection forms fully.
- Monthly returns from theatre are required. The completed forms should be returned to RCDM for analysis, with nil returns also required.

# Major Trauma Data Analysis

## Documentation and audit 2

### Aim

Major Trauma Audit for Clinical Effectiveness (MACE) has one principal aim:

To improve the care of the seriously injured patient from the point of injury to the point of discharge from hospital treatment

### Meeting clinical governance needs

MACE follows on from the successful Major Trauma Clinical Effectiveness Project established in MDHU Frimley Park Hospital in 1997 and critically appraises the clinical management of the seriously injured patient. MACE has evolved to evaluate practice on military operations using the same standards as those applied to the seriously injured within a civilian ‘best practice’ setting. Clinical management is judged against predetermined standards (‘performance indicators’) in four areas of activity – pre-hospital care, resuscitation, definitive care, and documentation. Areas of strength are identified and reinforced as good practice. Any failure to meet an individual standard is investigated and education provided to avoid recurrences. In particular, trends in poor management are sought which demand a change in the system of care.

### Functions of operational data collection & analysis

- Analyse the epidemiology of the seriously injured treated at a deployed hospital, for example age and sex distribution, the place and mechanism of injury, and the nationality (including civilian or military).
- Calculate the severity of injury using accepted international models.
- Calculate the probability of survival to identify unexpected survivors (markers of best practice) and unexpected deaths (markers of poor practice).
- Provide education through regular multidisciplinary clinical case conferences to improve local standards of care.
- Facilitate the comparison of standards of trauma care in peace with those in a military operational setting.
- Provide a record of experience of clinical lessons for future operations.
- The models for data analysis are described: in an operational setting it is realistic to use the Abbreviated Injury Scale, Injury Severity Score and New Injury Severity Score as tools to assist early feedback to clinicians through regular trauma clinical case conferences.

# Major Trauma Data Analysis

## Documentation and audit **2** (Cont'd)

2

Documentation  
and audit

### Abbreviated injury scale

- The Abbreviated Injury Scale (AIS) is a directory that codes every injury by anatomical description and severity. The severity codes range from 1 **minor** to 6 **fatal**.

### Injury severity score

- The Injury Severity Score (ISS) is an anatomical scoring system that can be used to predict probability of survival ( $P_s$ ) following injury. The score ranges from zero (no injury) to 75 (injuries incompatible with life), although the probability of survival does not fall in a linear fashion with a rising score. An ISS of 16 is associated with a mortality of ~10%. For this reason it has been used as the benchmark to identify cases of 'major trauma' (ISS 16 or more).
- The ISS will not recognise multiple injuries within the same body region. For example, a patient with a single fractured femur will have the same score as a patient with bilateral fractured femurs. A patient with an extradural haematoma in isolation may score the same as a patient with a combined extradural, subdural, and intracerebral haemorrhage. It takes little imagination to see that the second patient has less chance of survival, or if they do survive will have a worse morbidity.
- Additionally, an isolated closed head injury with a maximum AIS score of 3 will have an ISS of 9. But these patients often die. They would not be included in any major trauma outcome statistics which are compiled using ISS.
- The New Injury Severity Score (NISS) overcomes many of the criticisms of ISS and is the preferred anatomical scoring system within DMS. NISS takes account of multiple injuries within the same body region. It is simpler to calculate and more predictive than the ISS. It is unlikely to completely replace the ISS until the TRISS methodology is widely superseded (see later – TRISS is a formula to estimate probability of survival, which incorporates the Injury Severity Score).

# Major Trauma Data Analysis

## Documentation and audit 2 (Cont'd)

### Probability of survival (Ps)

Probability of survival (Ps) outcome measures are designed to identify both unexpected survivors (who are markers of good practice) and unexpected deaths (who are markers of poor practice). Probability of survival can be estimated using measures of anatomical injury severity, measures of the body's response to injury (changing physiological signs) or a combination of these. The most accurate predictive methods combine anatomy with physiology.

#### Anatomical methods

- These are the **Injury Severity Score** (ISS) and the **New Injury Severity Score** (NISS), and are described on the previous page.
- An ISS of 16 equates to a mortality of ~10%. It is for this reason that an ISS of 16 has been adopted as the benchmark to identify 'major trauma'.

#### Physiological methods

- The most robust of these is the **Revised Trauma Score** (RTS). It is a retrospective audit tool and is not used prospectively to predict the survival of a patient at the roadside or in the resuscitation room.

#### TRISS methodology

- This probability of survival estimate is based on a combination of the Revised TRauma Score (RTS) and the Injury Severity Score (ISS) – hence **TRISS**. It is a more reliable predictor than RTS or ISS alone. A crude account is taken of the patient's age (above or below 55 years old). A series of coefficients is used in the calculation, and these differ for blunt or penetrating injury.

#### ASCOT

- The limitations of ISS have been described. If **ISS** has limitations, then so will **TRISS**. A further refinement in estimating the probability of survival has been the development of **A Severity Characterisation Of Trauma** (ASCOT). This includes an assessment of injury severity by body region, and has an improved classification to take account of the patient's age. It also uses a series of coefficients that differ for blunt or penetrating injury.

# Major Trauma Data Analysis

## Documentation and audit 2 (Cont'd)

2

Documentation  
and audit

### 'E' value & SMR

- Wesson's Criteria is a crude methodology for evaluating the clinical effectiveness (or 'E' value) of a trauma system. It is a simple formula:

$$E = \frac{\text{Salvageable patients who survived}}{\text{Salvageable patients who survived and died}} \times 100$$

- A 'salvageable' major trauma patient is one with an Injury Severity Score of 16–59. Patients with very high scores of 60–75 are excluded, which includes those with AIS 6 in any body region. Patients with a head injury of AIS 5 are also considered 'unsalvageable' and are excluded.
- The Standardised Mortality Ratio (SMR) is the ratio of observed deaths to expected deaths using TRISS-generated survival probabilities. An SMR >1.0 implies reduced performance, and <1.0 improved performance compared to Major Trauma Outcome Study norms.
- SMR is a very crude measure. Where the number of cases in a study is comparatively small (often so in recent military operations) any unexpected death will alter the SMR disproportionately. Remember, the limitations of ISS are transferred to TRISS and therefore to limitations of the SMR. If a patient is underscored on ISS (compared to NISS) then the probability of survival is artificially inflated on TRISS.

Term (abbreviation)	Definition
Revised Trauma Score (RTS)	Systolic blood pressure, respiratory rate and Glasgow Coma Score are each coded from 1–4, multiplied by a weighting coefficient that relates to their prognostic power, then summed.
Abbreviated Injury Scale (AIS)	A directory that codes every injury by anatomical description and severity (severity codes range from 1 <b>minor</b> to 6 <b>fatal</b> ).
Injury Severity Score (ISS)	A score that takes account of up to three injuries from three separate body regions (most severe AIS codes are squared then summed). Score ranges from 1 to 75.
Major trauma	An Injury Severity Score of 16 or more <sup>1</sup> .
New Injury Severity Score (NISS)	A score that takes account of up to three injuries from <b>any</b> body region (most severe AIS codes are squared then summed). Score ranges from 1 to 75. More reliable than ISS.
TRISS	A complex formula using Napierian logarithms that combines RTS and ISS to predict probability of survival.

<sup>1</sup> A score of 16 equates to a mortality of 10%.

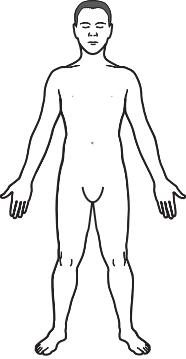
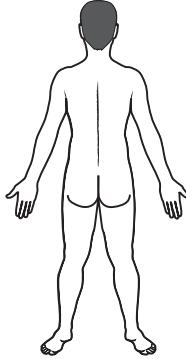
# Major Trauma Data Analysis

## Documentation and audit 2 (Cont'd)

Term (abbreviation)	Definition
Probability of Survival (Ps)	A prediction used to describe <b>unexpected deaths</b> and <b>unexpected survivors</b> that encourages a specific case to be reviewed to identify system weaknesses or strengths.
A Severity Characterisation of Trauma (ASCOT)	An alternative complex formula to TRISS using both physiological and anatomical data to predict probability of survival. Believed to overcome some of the limitations of ISS.
Wesson's Criteria <sup>2</sup> (E)	<p>This is a crude evaluation of system effectiveness.</p> $E = \frac{\text{Salvageable patients who survived}}{\text{Salvageable patients who survived and died}} \times 100$ <p>An unsalvageable patient has ISS 60–75, or has an isolated head injury with Abbreviated Injury Scale 5 (ISS 25).</p>
Standardised Mortality Ratio (SMR)	<p><b>SMR</b> = <math>\frac{\text{observed deaths}}{\text{expected deaths (TRISS)}}</math></p> <p>SMR &gt;1.0 implies reduced performance against the norm.</p>

<sup>2</sup> Wesson D et al: *J Trauma*; 28:1266–1231 (1988)

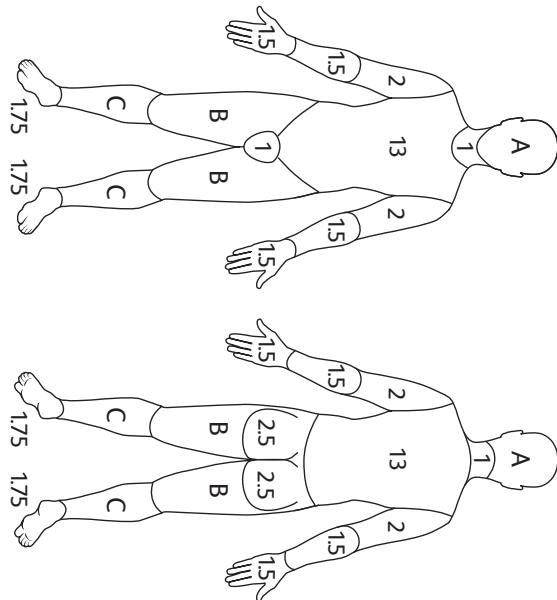
# UK Defence Medical Services Pre-hospital Report Form

Name:			Date: / /	Nationality/Service/Unit:			PRF No:			
Sex: M / F	Age: _____	or	DOB: / /	Service No/Rank:		Location:				
Incident time: : (L)		Call time: : (L)	Deployed time: : (L)	On-Scene: : (L)	Off-Scene: : (L)					
Team: Physician:		Paramedic:	Nurse:		Medic:					
Mechanism:										
<input type="checkbox"/> MVC Type: ..... <input type="checkbox"/> Driver <input type="checkbox"/> Front Seat <input type="checkbox"/> Rear Seat <input type="checkbox"/> Top Cover <input type="checkbox"/> Rollover <input type="checkbox"/> Wearing Seat Belt <input type="checkbox"/> Trapped duration: .....										
<input type="checkbox"/> Mines <input type="checkbox"/> IED <input type="checkbox"/> GSW <input type="checkbox"/> Fall ht.: .....m <input type="checkbox"/> Heat <input type="checkbox"/> Cardiac <input type="checkbox"/> Other state: ..... <input type="checkbox"/> Wearing CBA <input type="checkbox"/> Wearing Helmet										
Injuries:						Events/Free Text				
 										
Symptoms and Signs:										
C.A.T. Haemorrhage: Site: .....										
Airway: <input type="checkbox"/> Clear <input type="checkbox"/> Obstructed Breathing: <input type="checkbox"/> Normal <input type="checkbox"/> Difficulty <input type="checkbox"/> No Spont Resps Circulation: <input type="checkbox"/> Ext. bleed Site: ..... <input type="checkbox"/> Int. Bleed Location: <input type="checkbox"/> Chest <input type="checkbox"/> Abdo <input type="checkbox"/> Pelvis <input type="checkbox"/> Femur <input type="checkbox"/> Radial pulse <input type="checkbox"/> Femoral Pulse <input type="checkbox"/> Carotid Pulse <input type="checkbox"/> No Pulse Cap Refill: <input type="checkbox"/> < 2 secs <input type="checkbox"/> > 2 secs Disability: <input type="checkbox"/> Pupils equal <input type="checkbox"/> Unequal: R ..... L ..... Reactive: <input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Loss of sen <input type="checkbox"/> Loss of mov Posture: .....										
Obs (time)						Drugs/Fluid	Route	Dose	Time	Signature
PR (/min)										
RR (/min)										
BP (mmHg)										
SpO <sub>2</sub> (%)										
GCS/AVPU:										
Pain score:										
Temp (°C):										
Treatment:										
C.A.T. Haemorrhage: <input type="checkbox"/> C.A.T Applied Time: ..... <input type="checkbox"/> QuikClot/HemCon Time: ..... <input type="checkbox"/> FFD Site: ..... No: ..... Airway: <input type="checkbox"/> Suction <input type="checkbox"/> OPA/NPA Size: ..... <input type="checkbox"/> ETT/LMA Size: ..... <input type="checkbox"/> RSI <input type="checkbox"/> Surgical Airway C-Spine: <input type="checkbox"/> Manual Immobilisation <input type="checkbox"/> Collar <input type="checkbox"/> Head Blocks <input type="checkbox"/> Spinal Board <input type="checkbox"/> Not Tolerated Breathing: <input type="checkbox"/> BVM Asherman Seal: <input type="checkbox"/> L <input type="checkbox"/> R Needle: <input type="checkbox"/> L <input type="checkbox"/> R Thoracostomy: <input type="checkbox"/> L <input type="checkbox"/> R Chest-drain: <input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Oxygen Flow rate: ..... L/min Circulation: <input type="checkbox"/> FFD Site: ..... No: ..... <input type="checkbox"/> IV/IO Site: ..... Size: ..... <input type="checkbox"/> CPR Other: .....										
H/O Time : T1      T2      T3      D	Triage Category: Circle one			Disposal: A&E Hospital No: ..... Hospital Name: .....			Next level of care: <input type="checkbox"/> Ward <input type="checkbox"/> Theatre <input type="checkbox"/> ITU <input type="checkbox"/> CCAST			
Completed by:	Name: _____	Rank: _____	Signature: _____	Clinical Lead: _____	Initials: _____					

Additional information overleaf Entered on database Debriefed

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# Operational Trauma Audit Form

Trauma form Version 1.0 June 07

RESTRICTED – MEDICAL (when completed)

Trauma Audit Form Version 2.0b Sep 2008	<input type="checkbox"/> Scored	<input type="checkbox"/> Database	<input type="checkbox"/> Completed	DB No.
---	---------------------------------	-----------------------------------	------------------------------------	--------

<b>DEMOGRAPHICS</b>		Op Theatre	Country	
Force	Supplying Country	Designation		
Regt/Corps	Service No.	Rank	Gender	
Surname	First Name	DOB	Age	
	F/Med 830 No.	Trust ID		
<b>INJURY</b>	Date of injury	Time hrs	Intent	
Type of injury	<input type="checkbox"/> Blunt <input type="checkbox"/> Penetrating <input type="checkbox"/> Mixed <input type="checkbox"/> Burn	<input type="checkbox"/> Blast Exposure Suspected		
Mechanism of Injury	Location of Incident			
Trapped: How Long min				
Body Armour <i>If other, state:</i> Helmet <i>If other, state:</i> Eye Protection <i>If other, state:</i>	Vehicle Vehicle (more) <i>If other, state:</i> Location Restraint			
<b>Brief incident history</b> (including any delay in evacuation with reason):				

RESTRICTED – MEDICAL (when completed)

# Operational Trauma Audit Form (Cont'd)

RESTRICTED – MEDICAL (when completed)

PRE-HOSPITAL / ROLE 1		Unit providing treatment:						
			Time at scene		Time left scene			
Treatment by: <input type="checkbox"/> MO <input type="checkbox"/> Nurse <input type="checkbox"/> Paramedic <input type="checkbox"/> CMT/MA <input type="checkbox"/> Team Medic <input type="checkbox"/> Buddy <input type="checkbox"/> Other (state)								
Interventions: Airway #1 Airway #2 Airway #3 Airway #4 Airway #5 Airway #7 Airway #7 Airway #8 <input type="checkbox"/> Asherman Chest Seal <input type="checkbox"/> Needle Decompression <input type="checkbox"/> Was tension pneumothorax present? <input type="checkbox"/> ICD <input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Thoracostomy <input type="checkbox"/> Thoracotomy <input type="checkbox"/> Morphine <input type="checkbox"/> IV mg <input type="checkbox"/> IM mg			(GCS prior )		Vitals: GCS Total / 15 E /4 V /5 M /6 AVPU A <input type="checkbox"/> V <input type="checkbox"/> P <input type="checkbox"/> U <input type="checkbox"/> BP / mmHg			
Access: <input type="checkbox"/> IV <input type="checkbox"/> Central <input type="checkbox"/> IO <input type="checkbox"/> Sternal <input type="checkbox"/> Limbs <input type="checkbox"/> CPR Spinal Immobilisation: <input type="checkbox"/> Collar <input type="checkbox"/> Head blocks <input type="checkbox"/> Long board Limb traction: <input type="checkbox"/> Sager splint <input type="checkbox"/> Box splint <input type="checkbox"/> Neoprene splint <input type="checkbox"/> Sam splint					Pulse Rate	<input type="checkbox"/> Radial <input type="checkbox"/> Femoral <input type="checkbox"/> Carotid		
					Resp Rate	SPO2 %	Temp °C	
					Pain score before Pain score after			
Haemorrhage: <input type="checkbox"/> HemCon <input type="checkbox"/> Quikclot <input type="checkbox"/> rFVIIa								
1 <sup>st</sup> Tourniquet applied to Time applied			Time released					
2 <sup>nd</sup> Tourniquet applied to Time applied			Time released					
3 <sup>rd</sup> Tourniquet applied to Time applied			Time released					
Pre-Hospital drugs:			Pre-Hospital fluids:					
Drug Name	Dose	Route						
	mg/units							
	mg/units							
	mg/units							
	mg/units							
	mg/units							
	mg/units							
	mg/units							
	mg/units							
	mg/units							
	mg/units							

RESTRICTED – MEDICAL (when completed)

# Operational Trauma Audit Form (Cont'd)

RESTRICTED – MEDICAL (when completed)

<b>MERT / BLM</b>	<b>Unit providing treatment:</b>																																																									
<b>Transport:</b> (If other, state: )		<b>Time at scene</b>	<b>Time left scene</b>																																																							
<b>Treatment by:</b> <input type="checkbox"/> MO <input type="checkbox"/> Nurse <input type="checkbox"/> Paramedic <input type="checkbox"/> CMT/MA <input type="checkbox"/> Team Medic <input type="checkbox"/> Buddy <input type="checkbox"/> Other (state)																																																										
<b>Interventions:</b> Airway #1 Airway #2 Airway #3 Airway #4 Airway #5 Airway #6 Airway #7 Airway #8 <input type="checkbox"/> Asherman Chest Seal <input type="checkbox"/> Needle Decompression <input type="checkbox"/> Was tension pneumothorax present? <input type="checkbox"/> ICD <input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Thoracostomy <input type="checkbox"/> Thoracotomy		<b>(GCS prior )</b> <b>Vitals:</b> GCS Total / 15 E /4 V /5 M /6 AVPU A <input type="checkbox"/> V <input type="checkbox"/> P <input type="checkbox"/> U <input type="checkbox"/> BP / mmHg	<b>Pulse Rate</b> <input type="checkbox"/> Radial <input type="checkbox"/> Femoral <input type="checkbox"/> Carotid																																																							
<b>Access:</b> <input type="checkbox"/> IV <input type="checkbox"/> Central <input type="checkbox"/> IO <input type="checkbox"/> Sternal <input type="checkbox"/> Limbs <input type="checkbox"/> CPR Spinal Immobilisation: <input type="checkbox"/> Collar <input type="checkbox"/> Head blocks <input type="checkbox"/> Long board <b>Limb traction:</b> <input type="checkbox"/> Sager splint <input type="checkbox"/> Box splint <input type="checkbox"/> Neoprene splint <input type="checkbox"/> Sam splint		<b>Resp Rate</b> SPO <sub>2</sub> % Temp °C	<b>Pain score before</b> <b>Pain score after</b>																																																							
<b>Haemorrhage:</b> <input type="checkbox"/> HemCon <input type="checkbox"/> Quikclot <input type="checkbox"/> rFVIIa 1 <sup>st</sup> Tourniquet applied to Time applied Time released 2 <sup>nd</sup> Tourniquet applied to Time applied Time released 3 <sup>rd</sup> Tourniquet applied to Time applied Time released																																																										
<b>In-transit drugs:</b> <table border="1"> <thead> <tr> <th>Drug Name</th> <th>Dose</th> <th>Route</th> </tr> </thead> <tbody> <tr><td></td><td>mg/units</td><td></td></tr> </tbody> </table>			Drug Name	Dose	Route		mg/units		<b>In-transit fluids:</b> <table border="1"> <thead> <tr> <th>Fluid Name</th> <th>Volume</th> </tr> </thead> <tbody> <tr><td></td><td>mls</td></tr> </tbody> </table>	Fluid Name	Volume		mls																																													
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RESTRICTED – MEDICAL (when completed)

# Operational Trauma Audit Form (Cont'd)

RESTRICTED – MEDICAL (when completed)

FD HOSPITAL RESUS	Date	Time	Trauma Team Called <input type="checkbox"/> Yes <input type="checkbox"/> No																			
Trauma Team Leader:		Reason for Trauma Call:																				
Interventions: (GCS prior ) Airway #1 Airway #2 Airway #3 Airway #4 Airway #5 Airway #6 Airway #7 Airway #8 <input type="checkbox"/> Needle Decompression <input type="checkbox"/> Was tension pneumothorax present? <input type="checkbox"/> ICD <input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Thoracostomy <input type="checkbox"/> Thoracotomy			Vitals: GCS Total / 15 E /4 V /5 M /6 BP / mmHg Pulse Rate  Resp Rate SPO2 % Temp °C Pain score on arrival ED Pain score depart ED White cell count																			
Access: <input type="checkbox"/> IV <input type="checkbox"/> Central <input type="checkbox"/> IO <input type="checkbox"/> Sternal <input type="checkbox"/> Limbs <input type="checkbox"/> CPR Spinal Immobilisation: <input type="checkbox"/> Collar <input type="checkbox"/> Head blocks <input type="checkbox"/> Long board Limb traction: <input type="checkbox"/> Sager splint <input type="checkbox"/> Box splint <input type="checkbox"/> Neoprene splint <input type="checkbox"/> Sam splint																						
Pupil reaction (left) Pupil reaction (right)		Pupil size (left) Pupil size (right)																				
Haemorrhage: <input type="checkbox"/> HemCon <input type="checkbox"/> Quikclot 1 <sup>st</sup> Tourniquet applied to Time applied Time released 2 <sup>nd</sup> Tourniquet applied to Time applied Time released 3 <sup>rd</sup> Tourniquet applied to Time applied Time released <input type="checkbox"/> rFVIIa (complete the following if administered) <table style="margin-left: 20px; border-collapse: collapse;"> <tr><td><input type="checkbox"/> 1st dose</td><td>mg</td><td>Time</td><td>Temp.</td><td>pH</td><td>PO<sub>2</sub></td><td>PCO<sub>2</sub></td><td>BE</td><td>Where</td></tr> <tr><td><input type="checkbox"/> 2nd dose</td><td>mg</td><td>Time</td><td>Temp.</td><td>pH</td><td>PO<sub>2</sub></td><td>PCO<sub>2</sub></td><td>BE</td><td>Where</td></tr> </table>					<input type="checkbox"/> 1st dose	mg	Time	Temp.	pH	PO <sub>2</sub>	PCO <sub>2</sub>	BE	Where	<input type="checkbox"/> 2nd dose	mg	Time	Temp.	pH	PO <sub>2</sub>	PCO <sub>2</sub>	BE	Where
<input type="checkbox"/> 1st dose	mg	Time	Temp.	pH	PO <sub>2</sub>	PCO <sub>2</sub>	BE	Where														
<input type="checkbox"/> 2nd dose	mg	Time	Temp.	pH	PO <sub>2</sub>	PCO <sub>2</sub>	BE	Where														
<input type="checkbox"/> Massive transfusion protocol initiated  <input type="checkbox"/> CT Time <input type="checkbox"/> Head <input type="checkbox"/> Chest <input type="checkbox"/> Abdo <input type="checkbox"/> Pelvis <input type="checkbox"/> Limbs <input type="checkbox"/> C Spine <input type="checkbox"/> T Spine <input type="checkbox"/> L Spine			<input type="checkbox"/> FAST US Time  <input type="checkbox"/> X-Ray Time <input type="checkbox"/> Skull <input type="checkbox"/> Chest <input type="checkbox"/> Abdo <input type="checkbox"/> Pelvis <input type="checkbox"/> Limbs <input type="checkbox"/> Spine																			
Drug Name      Dose      Route <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>			<b>Total fluids given during ED resus</b>																			
			Fluid Name																			
			Total Crystalloids given																			
			Total Colloids given																			
			Total Blood given																			
			Fresh whole blood given																			
			Total FFP given																			
			Total platelets given																			
			Apheresis platelets given																			
			<b>Total fluids given during Immediate Surgery</b>																			
Total Crystalloids given																						
Total Colloids given																						
Total Blood given																						

RESTRICTED – MEDICAL (when completed)

# Operational Trauma Audit Form (Cont'd)

RESTRICTED – MEDICAL (when completed)

	mg/units			Fresh whole blood given	Units		
	mg/units			Total FFP given	Units		
	mg/units			Total platelets given	Units		
	mg/units			Apheresis platelets given	Units		
	mg/units			Other fluids given			
	mg/units				mls		
	mg/units				mls		
	mg/units				mls		
	mg/units				mls		
	mg/units				mls		
Disposal:	<input type="checkbox"/> Ward	<input type="checkbox"/> Surgery	<input type="checkbox"/> ITU	<input type="checkbox"/> Morgue	<input type="checkbox"/> RTD	Disposal Date:	Time:

Progress Notes:

**Red Cross Wound Classification:** Classify the 2 most serious injuries prior to surgery and in conjunction with surgical opinion, refer to explanatory notes

Injury No.	E	X	C	F	V	M	G
Injury No. below	E	X	C	F	V	M	G
Date	Injuries						AIS 05 Code
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
<u>ISS</u>		<u>NISS</u>		<u>RTS</u>		<u>TRISS</u>	<u>ASCOT</u>

RESTRICTED – MEDICAL (when completed)

# Operational Trauma Audit Form (Cont'd)

RESTRICTED – MEDICAL (when completed)

<b><u>OPERATIONS PERFORMED</u></b>		<b>Surgeon(s):</b>	Commenced	Finished	Lowest & Highest Temp
Date	Procedure:				/
1					/
2					/
3					/
4					/
5					/
6					/
7					/
8					/
9					/
10					/
11					/
12					/
13					/
14					/

RESTRICTED – MEDICAL (when completed)

# Operational Trauma Audit Form (Cont'd)

RESTRICTED – MEDICAL (when completed)

<b>Performance Indicators appropriate to patient pathway</b>			
	<input type="checkbox"/> Pre-Hospital	<input type="checkbox"/> ED	<input type="checkbox"/> Theatre
	<input type="checkbox"/> Critical Care	<input type="checkbox"/> Ward	<input type="checkbox"/> Burns
<i>Tick those areas where the patient has been treated and record the appropriate performance indicators by speaking to staff in those areas.</i>			

<b>Pre-Hospital Care Performance Indicators</b>	<b>Yes</b>	<b>No</b>	<b>NA</b>	<b>Comments</b>
Time from point of wounding to BATLS skills <1 hour?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Time from point of wounding to appropriate surgical care <2 hours?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
IV fluid boluses given to maintain radial pulse?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
GCS measured prior to intubation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was ETCO <sub>2</sub> measured if the patient was intubated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Hypothermia mitigation equipment used where appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Full spinal immobilisation used where appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Vital signs recorded to a minimum standard (RR, SpO <sub>2</sub> , PR, radial pulse present, AVPU, pain score)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pain score <3 after analgesia.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Did the patient receive antibiotics within 1 hour of wounding?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Long bone fractures stabilised <1 hour of injury?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
MIST handover performed at the ED?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Emergency Department Performance Indicators</b>	<b>Yes</b>	<b>No</b>	<b>NA</b>	<b>Comments</b>
Temperature >36°C on arrival?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Vital signs recorded on arrival (minimum data: RR, SPO <sub>2</sub> , BP, PR, GCS, pain score, blood gases, BM Stix)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Repeat vital signs recorded every 10 minutes in 1st hour (minimum data: RR, SPO <sub>2</sub> , BP, PR, GCS, pain score)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
GCS <9 - RSI/ETT completed within 10 minutes of arrival in ED?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
ETCO <sub>2</sub> recorded every 10 minutes in all patients ventilated in ED?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Emergency thoracotomy for patients in extremis <10 minutes of arrival in the ED?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Surgical airway secured (if required) within 10 minutes of arrival in the ED?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
GCS <9 with isolated closed head injury - CT head performed <1 hour minutes arrival?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Penetrating extremity wounds x-rayed pre-debridement?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Betadine soaked dressing applied to wounds within 1 hour of arrival in ED?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Tetanus IgG given in heavily contaminated wounds within 4 hours of arrival in ED?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Indications for novel haemostatic use clearly documented?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Tourniquet (if used) reviewed by a surgeon within 2 hours of application?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pain score maintained at 2 or below?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
CK measured for crush and burns patients and/or when CAT applied for above 1 hour?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Theatre Performance Indicators</b>	<b>Yes</b>	<b>No</b>	<b>NA</b>	<b>Comments</b>
Penetrating abdominal injury with BP <90 Systolic undergo laparotomy <30 minutes from arrival in ED?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Urgent thoracotomy performed for shocked patients with penetrating chest injury <1 hour of arrival in the ED?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Casualties with continuing haemorrhage with shock taken to theatre <30 minutes from arrival in ED?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Damage control laparotomy (if performed) performed in <90 minutes from ED arrival?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was the laparotomy if performed therapeutic?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fasciotomies performed for confirmed vascular injuries?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Acute compartment fasciotomies performed <1 hour of arrival in ED?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Revascularisation surgery performed <6 hours of injury?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Decompressive craniotomy/craniectomy performed <4 hours of a blunt head injury?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Closure of penetrating head injuries performed <6 hours of injury?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
All wounds photographed pre and post debridement with copies available in UK?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
All wounds ICRC scored at initial surgery?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Limb salvage scoring performed pre amputation (2 surgeon agreement)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Appropriate initial wound surgery performed <6 hours of injury?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Bacteriological specimens taken pre and post each debridement with results available to clinicians?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Appropriate antibiotics commenced within 6 hours of open fracture?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Off table temperature >34°C?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Nutritional assessment plan documented post surgery?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Critical Care Performance Indicators</b>	<b>Yes</b>	<b>No</b>	<b>NA</b>	<b>Comments</b>
Minimum monitoring standards followed during anaesthesia?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Hb maintained >8 g/dL during hospital admission and AEROMED?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

RESTRICTED – MEDICAL (when completed)

# Operational Trauma Audit Form (Cont'd)

RESTRICTED – MEDICAL (when completed)

Glycaemic level 4-8mmol/L sustained during admission and AEROMED?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
30 degree head up maintained on ITU & during AEROMED (ventilated patient)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
ITU patients evacuated within 48 hours of admission to ITU?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Post-operative period Performance Indicators	Yes	No	NA	Comments
No CSF leak post neurosurgery?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
No missed penetrating/sight threatening ocular injury?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
No missed eardrum injury?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
No unplanned re-laparotomies or re-thoracotomies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
No unplanned admission to critical care?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Post operative temperature maintained > 34°C?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Full tertiary survey (including spine) carried out <24 hours of arrival in ED?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
LMWH started within 24 hours of admission?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
TED stockings fitted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Ward Performance Indicators	Yes	No	NA	Comments
Waterlow score performed on admission to ward?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Follow-up Performance Indicators	Yes	No	NA	Comments
Case discussed at a weekly MDT meeting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Significant events fed back to the theatre of operation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Case discussed at a 6 monthly morbidity and mortality meeting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Burns Performance Indicators	Yes	No	NA	Comments
BSA, location, depth estimate and fluid resuscitation begun <1 hour of burn?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Inhalation/airway injury identified <1 hour following burn?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Formal burn assessment (dressing and accurate fluid resuscitation) performed <4 hours following burn?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Limb escharotomy within <4 hours of burn?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
NG feeding begun within 6 hours of burns >15% BSA?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

RESTRICTED – MEDICAL (when completed)

# Operational Trauma Audit Form (Cont'd)

RESTRICTED – MEDICAL (when completed)

<b>COMPLICATIONS</b>		Where there any complications yes/no/unknown (see complication list)	
	Date/Time	Details	Code
<b>Pre Hospital</b>			
Airway			
Fluids			
Miscellaneous			
<b>Hospital</b>			
Airway			
Pulmonary			
Cardiovascular			
GIT			
Hepatic			
Haematological			
Infection			
Renal / GU			
Musculoskeletal			
Neurological			
Vascular			
Ophthalmology			
Psychiatric			
Other			
Provider			

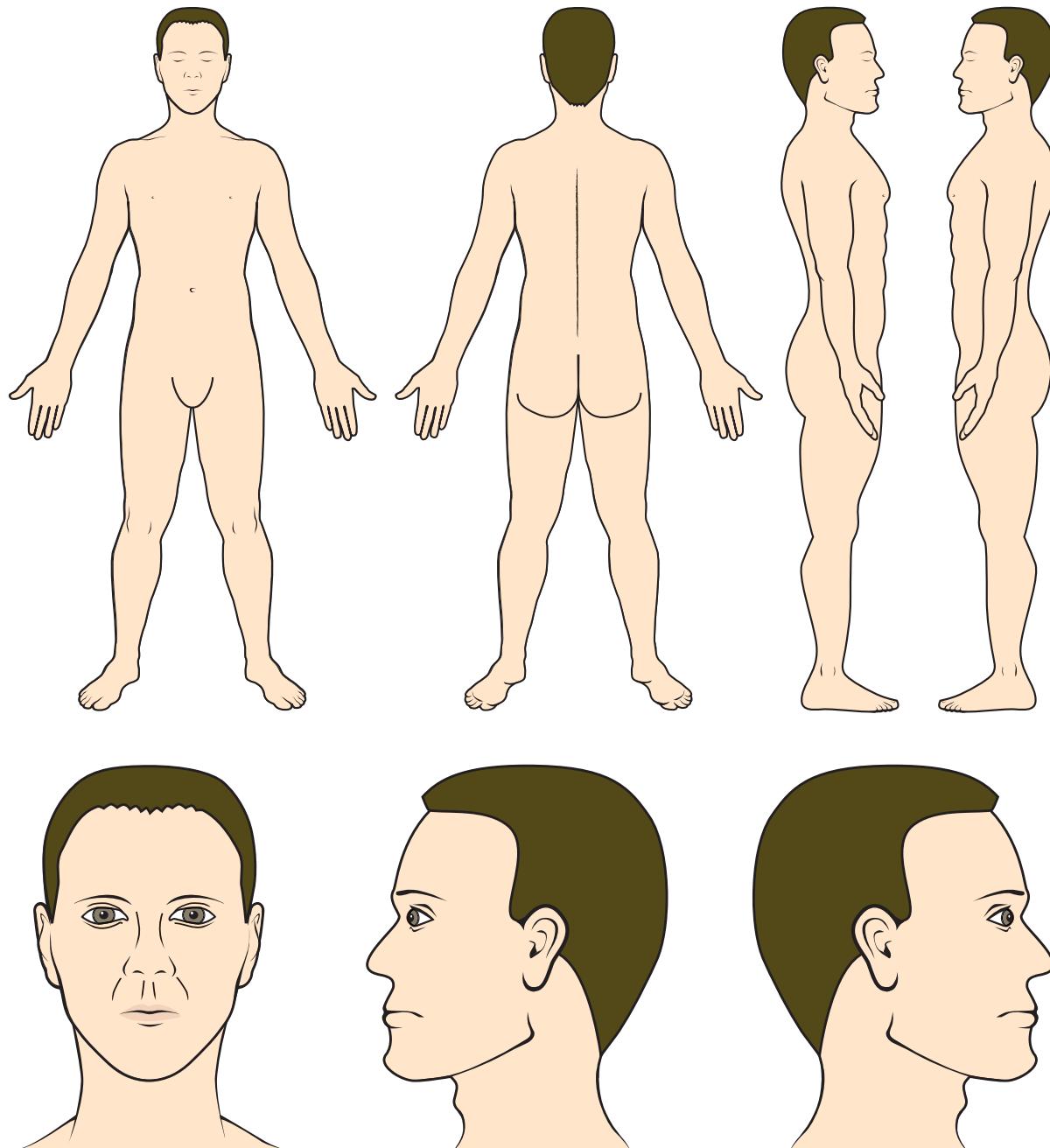
<b>DISCHARGE / TRACKING</b>		Aeromed Priority <input type="checkbox"/> P1 <input type="checkbox"/> P2 <input type="checkbox"/> P3 <input type="checkbox"/> CCAST <input type="checkbox"/> N/A	
Date Admitted	Location	Date Discharged / Transferred	Length of stay (days)

On Completion of this form please return to: Trauma Nurse Coordinator, Academic Department of Military Emergency Medicine, Royal Centre for Defence, Medicine Institute of Research And Development, Birmingham Research Park, Vincent Drive, Edgbaston, Birmingham, B15 2SQ.

RESTRICTED – MEDICAL (when completed)

## Operational Trauma Audit Form (Cont'd)

Restricted medical when complete

**C#** = Closed Fracture**O#** = Open Fracture**B** = Burn (Shade Area)**L** = Laceration**F** = Foreign Body**A** = Abrasion**—** = Amputation (across the level of limb/head)

Use arrows to indicate direction of projectile (if known)

Name:

Date of injury:

F/Med 830 No.

**EMERGENCY DEPARTMENT  
CLINICAL RECORD**

*Attach copies of blood results, ECG, etc. here*

EMERGENCY DEPARTMENT CLINICAL RECORD	
Receiving medical unit:	
Hospital number:	
Operation name:	
Surname:	Service number:
First name(s):	Rank:
Sex:	Date of birth:
Status:	Service: <input type="checkbox"/> Royal Navy <input type="checkbox"/> Army <input type="checkbox"/> Royal Air Force <input type="checkbox"/> Unknown
	UK Service personnel <input type="checkbox"/> UK Civilian <input type="checkbox"/> Coalition forces/other <input type="checkbox"/> Coalition/contractors/NGO <input type="checkbox"/> Local national <input type="checkbox"/> Enemy prisoner of war
Unit in theatre:	Unit in UK/BFG:
PRESENTATION	
Allergies:	
Date of arrival:	Time of arrival:
Mode of arrival:	Ambulance <input type="checkbox"/> <input type="checkbox"/> Self <input type="checkbox"/> <input type="checkbox"/> Other ..... 
Presenting complaint:	
Date & time of incident/onset of symptoms:	No. casualties in incident:
Activity (tick one box)	Mechanism (tick one box)
1 <input type="checkbox"/> Unintentional injury 2 <input type="checkbox"/> Suspected intentional self harm 3 <input type="checkbox"/> Alleged/suspected assault 4 <input type="checkbox"/> Operations of war or civil conflict 5 <input type="checkbox"/> Disease/illness 6 <input type="checkbox"/> Sport 98 <input type="checkbox"/> Unknown	1 <input type="checkbox"/> Fall 2 <input type="checkbox"/> Blunt force (struck, crashed) 3 <input type="checkbox"/> Gunshot 4 <input type="checkbox"/> Piercing force (stab, bite, cut, shot) 5 <input type="checkbox"/> Explosive blast (improvised device) 6 <input type="checkbox"/> Explosive blast (other) 7 <input type="checkbox"/> Traffic injury 8 <input type="checkbox"/> Poisoning 9 <input type="checkbox"/> Burn (flame/cold/chemical) 10 <input type="checkbox"/> Environmental (heat stress/hypothermia)
Appropriate PPE (tick one box) (eye protection/CBA/seat belt etc.)	RTA Circumstances (tick all appropriate)
1 <input type="checkbox"/> Worn 2 <input type="checkbox"/> Not worn 7 <input type="checkbox"/> Unavailable 98 <input type="checkbox"/> Unknown 99 <input type="checkbox"/> Not applicable	1 <input type="checkbox"/> Single vehicle involved 2 <input type="checkbox"/> Multiple vehicles involved 3 <input type="checkbox"/> Vehicle rolled over 4 <input type="checkbox"/> Patient was ejected 5 <input type="checkbox"/> Top cover
Alcohol involvement (tick one box)	
Y <input type="checkbox"/> Suspected of confirmed N <input type="checkbox"/> No/information unavailable	

**BASELINE OBSERVATIONS**

GCS	Blood Pressure	Pulse	Resp. Rate	Saturation O <sub>2</sub>	Temperature	BM

**URINALYSIS (initial each performed)**

NAD:	Protein:	Ketones:	Leukocytes:
RBCs:	Nitrites:	Urobilinogen:	

**ASSESSMENT NOTES**

Name:

Time: \_\_\_\_\_ Signature: \_\_\_\_\_

**CLINICAL NOTES**

Time seen: \_\_\_\_\_ Clinician: \_\_\_\_\_ Grade: \_\_\_\_\_

**CLINICAL NOTES (Cont'd)**Speciality  
(tick one box)

- 1  ED  
2  Orthopaedics  
3  Surgery  
4  Medicine  
97  Other

Time of referral:

Immediate disposal  
(tick one box)

- 1  RTU  
2  Primary Health care  
3  Planned review  
4  Ward: \_\_\_\_\_  
5  Theatre  
6  HDU or ITU  
7  Mortuary

# Section 10

## Red card reporting

Intentionally blank

# Red card reporting

## Introduction

1

Red card reporting

### **Development of Clinical Guidelines for Operations requires feedback from clinicians using the guidelines in practice**

The following are to be reported through the command chain to Commander by completing the submission form:

- Conditions that are not included in the guidelines where guidance is perceived to be required
- Instances where the guideline does not give enough depth of guidance for a specific condition
- Perceived errors of fact.

#### **For the submission form**

Go to

2

Red card reporting

Commander Medical is to forward suggestions to PJHQ who are to inform:

- DMSD, SO1 Mil Med (guideline sponsor on behalf of DMEDPOL)
- DCDC, SO1 Med (guideline coordinator)
- RCDM, Academic Department of Military Emergency Medicine (guideline initiator).

Intentionally blank

# Red card reporting

## Submission form

2

Red card reporting

### Reporting officer (all fields are mandatory)

Number..... Rank..... Name.....

Unit.....

Operational deployment.....

Role & Capability where guideline applied (e.g. Role 2/Nurse).....

### Guideline

Number.....

or

Condition not covered.....

### Reason for reporting

(give as much detail as possible)

Signature..... Date.....

Intentionally blank