HMC EM Evidence-Based Clinical Algorithm:

Management of Acute Exacerbation of Asthma in Adults

مؤسسة حمد الطبية
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EMERGENCY MEDICINE
طب الطوارئ

Version date: 16th April 2019

Authors: M Hamza(EM), Wanees Ibrahim(IM & Pulm.), Maha M(EM), Marwa A(EM), ED EBCA Committee, A Elmoheen(EM), S Thomas(EM)

Evidence basis:

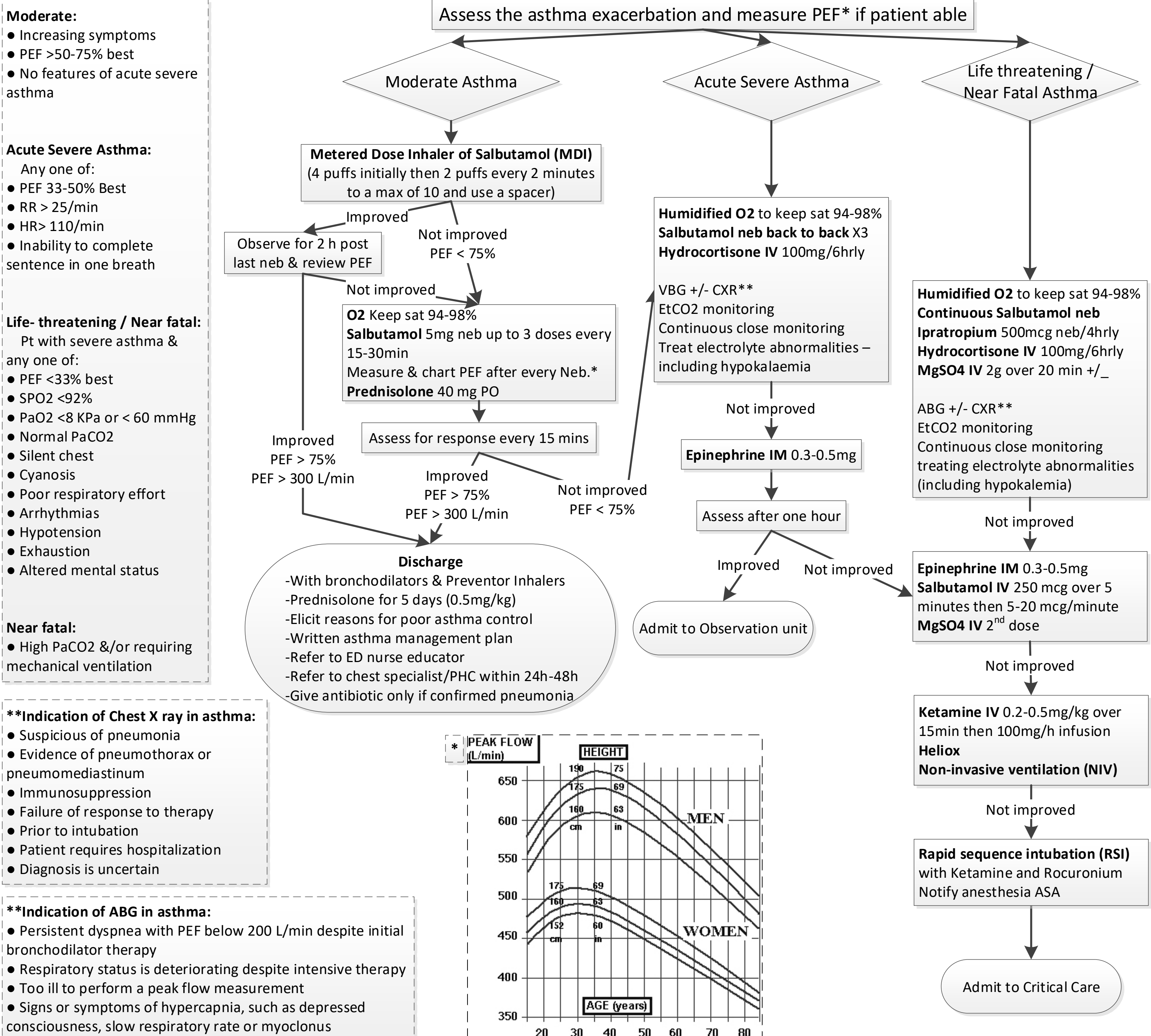
- Global Initiative for Asthma (GINA), 2017 GINA Report, Global Strategy for Asthma Management and Prevention. www.ginasthma.org (March 08, 2018)
- National Asthma Education & Prevention Program. www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm (Accessed on March 17, 2016)
- British guideline on the management of asthma, SIGN 153, September 2016. http://www.sign.ac.uk/assets/sign153.pdf
- Guidelines for the diagnosis and management of asthma: A look at the key differences between BTS/SIGN and NICE, White J, et al. Thorax 2017;0:1–5.

This EBCA:

- has been endorsed by HMC EM and other consultants for education and assistance with clinical practice in HMC's EDs.
- is intended to complement any related multispecialty Clinical Practice Guideline prepared as per HMC policy.
- is not presented as the binding "standard of care" but is rather a reference tool to inform clinical judgment.

Algorithm aim & applicability:

This algorithm is applied to all adult patients (more than 18 years old) who present to the emergency department with asthma exacerbation. The aim is to provide appropriate management in timely manner. This EBCA is intended to complement – and in any disagreement, yield to – applicable HMC Policy.



HMC EBCA Evaluation of adults with possible ACS

Version 2.2 February 2022

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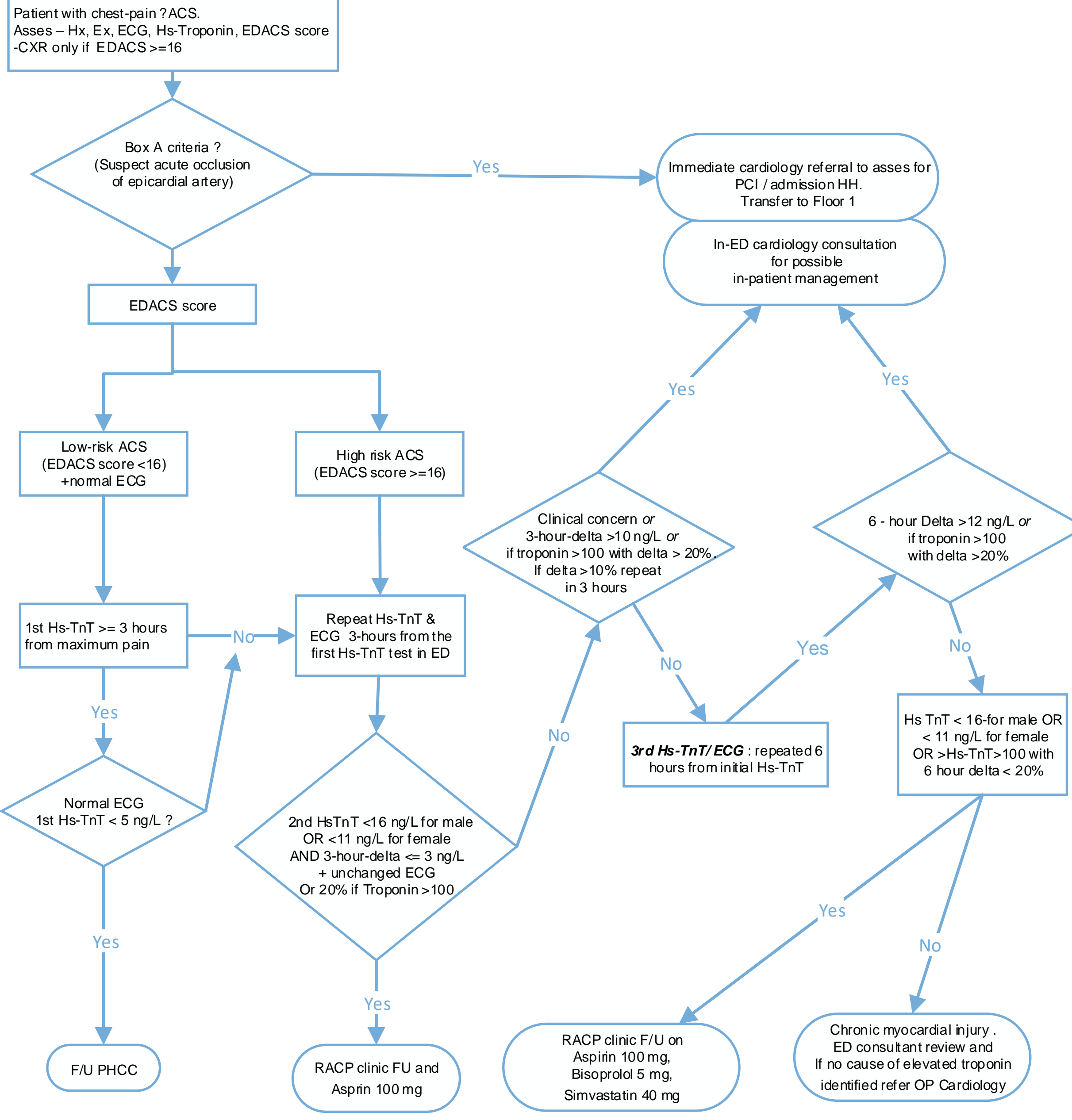
DEFINITIONS Hs-TnT : High Sensitive Troponin-T measured on Roche platform with
Reference: 4-10 ng/L for women,
and 4-15 ng/L for men

1st Hs-TnT : initial Hs-TnT performed in ED at >3 hours from last occurrence of pain episode
2nd Hs-TnT: repeated 3 hours from 1st Hs-TnT
3rd Hs-TnT: repeated 6 hours from 1st Hs-TnT
Delta - increase / decrease in Hs-TnT value compared to initial (1st) Hs-TnT
If Troponin < 100 Significant delta is defined as:
3-hours-Delta : 2nd Hs-TnT minus 1st Hs-TnT
6-hours-Delta : 3nd Hs-TnT minus 1st Hs-TnT

Significant Hs-TnT results :
- Hs-TnT > 15 ng/L for male
- > 10 ng/L for female
- If baseline Troponin value < 100 delta-3 hours > 10 ng/L or delta-6 hours >12 ng/L
- If baseline Troponin >100 Significant delta is ≥20% in 3 hours.

EDACS SCORE

Clinical charecteristics	Score +
A) Age (please circle single best answer)	
28-45	2
46-50	4
51-55	6
56-60	8
61-65	10
66-70	12
71-75	14
76-80	16
81-85	18
86+	20
B) Male (please circle if true)	6
C) This component is to be used only for ages 18-50 with either known CAD (previous AMI,CABG, or PCI in men < 55 yrs of age and women < 65 yrs of age .	OR
≥ 3 risk factors present (family history of premature CAD, diabetes, hypertension, dyslipidemia, current smoker)	4
D) Signs & symptoms (circle each that present)	
Diaphoresis (in association with pain)	3
pain occurs or worsens with inspiration	-4
pain radiates to the arm or shoulder	5
pain reproduced by palpation	-6
EDACS TOTAL (please add score of all circled figures)	



BOX A: Criteria for immediate/urgent cardiology consultation in ED
Clinical:
- Classic history or crescendo pattern
- Cardiogenic shock: SBP < 90 mmHg
- Cardiac failure (acute or chronic) due to CAD

Or STEMI : ST elevation myocardial infarction defined by *ST elevation of*
- >1mm any lead except V2, 3
- For V2 and V3
  - > 1.5 mm for females;
  - > 2 mm for > 40 years males,
  - > 2.5 mm for < 40 years males
- or > 1 mm (new) ST depressions in V1-3

Or ECG findings:
- Transient ST elevation or ST elevation aVR
- Dynamic ST depression > 1mm 2 consecutive leads
- T wave inversion V1-4 (LAD syndrome)
- Dynamic T wave inversion >2mm in 2 consecutive leads
- Hyper-acute T waves
- LBBB with Sgarbossa 1, 2 or 3
- DeWinter ST-T
- VT or new dysrhythmia due to ischemia

OR Hs-TnT
1st Hs-TnT >=100ng/L (not knownto be long standing/ due to renal failure (assess delta), or type II infarct).

Management box
- If patient has EDACS >=16, or anytime Hs-TnT >15 for male and >10 for female, treat with Aspirin 300 mg and Clopidogrel 300 mg after checking contraindications.
- LMWH for all NSTEMI with Cr Cl > 30 - UFH for NSTEMI with Cr Cl <=30

Abbreviations
Cr Cl- Creatinine clearance
CXR- Chest X-ray
Ex- Examination
F/U- Follow up
Hx- History
LMWH- Low-molecular weight heparin UFH- Unfractionated Heparin
PHCC- Primary Health care center
RACP- Rapid access chest pain clinic

Discharge if normal physiology
- No other clinical concern
- Patient educated regarding ED return instructions + diagnosis
Ensure correct contact details for the patient are registered in the system

This EBCA is to augment not replace clinical judgement- if concern consult senior or cardiology.

HMC EM EBCA Management of DKA in adult patients in ED

Version date : December 2021

Algorithm Aim and applicability

The algorithm applies to all adult patients (more than 18 years old) who present to Emergency Department with DKA. This EBCA is intended to complement- and in any disagreement, yield to- applicable HMC policy

Waseem Malik (EM), Mohsen Eledrisi (Medicine), Zeenat KBakhsh (EM), Amr ElMoheen(EM), Tim Harris(EM), EBCA committee

DKA criteria:
Glucose >13.9 mmol (250 mg)
pH ≤7.3 or HCO_3 ≤ 18 mmol, high anion gap
Ketones (in urine or blood)

Initial assessment
Perform focused history & physical exam
Evaluate & treat precipitating cause

Initial monitoring:
- Blood glucose every hour
- VBG on arrival and at 1 hour
- Serum electrolytes every 2 hours
- Urine output

Consider MICU consultation if:
Hemodynamic instability
Mental obtundation
Pregnancy
pH <7.0
Heart failure
Chronic kidney disease

Intravenous fluids

0.9% NaCl 1 liter over 1st hour
↓
Hypovolaemic shock (e.g. SBP ≤90 mmHg)?
- Yes → 0.9% NaCl 1-2 liters/hr until SBP > 90 mmHg → 0.9% NaCl 500 ml/hr for 4 hours...
- No ↓

0.9% NaCl 500 ml/hr for 4 hours then 250-500 ml/hr (depending on clinical condition) until euvolaemic
↓
Once euvolemic calculate corrected serum Na^+
[measured serum Na^+ + [0.3 × (serum glucose in mmol-5)]
↓
- Na ≥ 135 mmol → 0.45 % NaCl 125-250 ml/hr (depending on clinical condition)
- Na < 135 mmol → 0.9 % NaCl 125-250 ml/hr (depending on clinical condition)

↓
When glucose is ≤ 11.1 mmol (200 mg)
Change to Dextrose 5% with 0.45% NaCl 125-250 ml/hour (depending on clinical condition)
Target glucose: 8.3-11.1 mmol (150-200 mg)

Insulin

Regular insulin IV infusion 0.14 units/kg/hr (withhold until serum K > 3.3 mmol)
↓
If glucose is not decreasing by ≥2.8 mmol/hr, or HCO_3 is not increasing by ≥3 mmol/hr then increase insulin infusion rate by 1 unit/hr
↓
When glucose ≤ 11.1 mmol (200 mg)
↓ Insulin infusion to 0.02-0.05 units/kg/hr
Target glucose: 8.3-11.1 mmol (150-200 mg)

Criteria of DKA resolution : Glucose <11.1 mmol (200 mg) and 2 of the following : serum HC03 ≥15, venous pH >7.3, anion gap ≤ 12

Switching from IV to SC insulin
When the patient is clinically stable, can take orally & on resolution of DKA
Stop IV fluids
For newly diagnosed DM: insulin 0.5 u/kg/day (50% basal + 50% meal)
For established DM: resume home insulin regimen (basal/meal) if previously controlled or adjust insulin if previously uncontrolled
Stop IV insulin after 2 hours

Potassium

Target serum K^+: 4-5 mmol

- K^+ > 5.2 mmol → Monitor serum K^+
- K + 3.3-5.2 mmol → Give 20-30 mEq K^+ in each liter of IV fluids
- K + <3.3 mmol → Do not start insulin until K^+ > 3.3; Give 20-30 mEq/L per hour

Euglycemic DKA:
Glucose < 13.9 mmol (250 mg) with ketosis and acidosis
Management follows same pathway
Some causes: sodium glucose cotransporter inhibitors (SGLTi), pregnancy, pancreatitis

HMC EM EVIDENCE-BASED CLINICAL ALGORITHM:

EBCA - Head Injury Management in Adults

Hamad Medical Corporation — EMERGENCY MEDICINE

Version date: 29th July 2021

Expiry date :28th July 2023

Authors: Ayesha Parveen(EM), Navid Iqbal(EM), Rabab Abdelrahman(EM), T Kumar(EM), Prof. Tim Harris(EM), ED EBCA Committee

Evidence basis:

- Head injury: Triage, assessment, investigation and early management of head injury in adults. National Institute for health and Care excellence (NICE) guidelines, United Kingdom, [CG176] Published date: January 2014.
- Andy S. Jagoda, Jeffrey J. Bazarian, et al; ACEP Clinical Policy: Decision making in Adult Mild Traumatic Brain Injury in the Acute Setting. Ann Emerg Med. 2008;52:714-748. December 2008.

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Algorithm aim & applicability:

This algorithm is applied to all adult patients (above 18 years) who present to the emergency department with closed head injury

Box 1

Head Injury is defined as any trauma to the head other than superficial injuries to the face

Box 2

- GCS < 13 on initial assessment
- GCS < 15 at 2 hours after injury on assessment in the emergency department
- Suspected open or depressed skull fracture
- Any sign of basal skull fracture
- Post-traumatic seizure
- Focal neurological deficit
- More than one episode of vomiting since the head injury

Box 3 – On any of the following ?

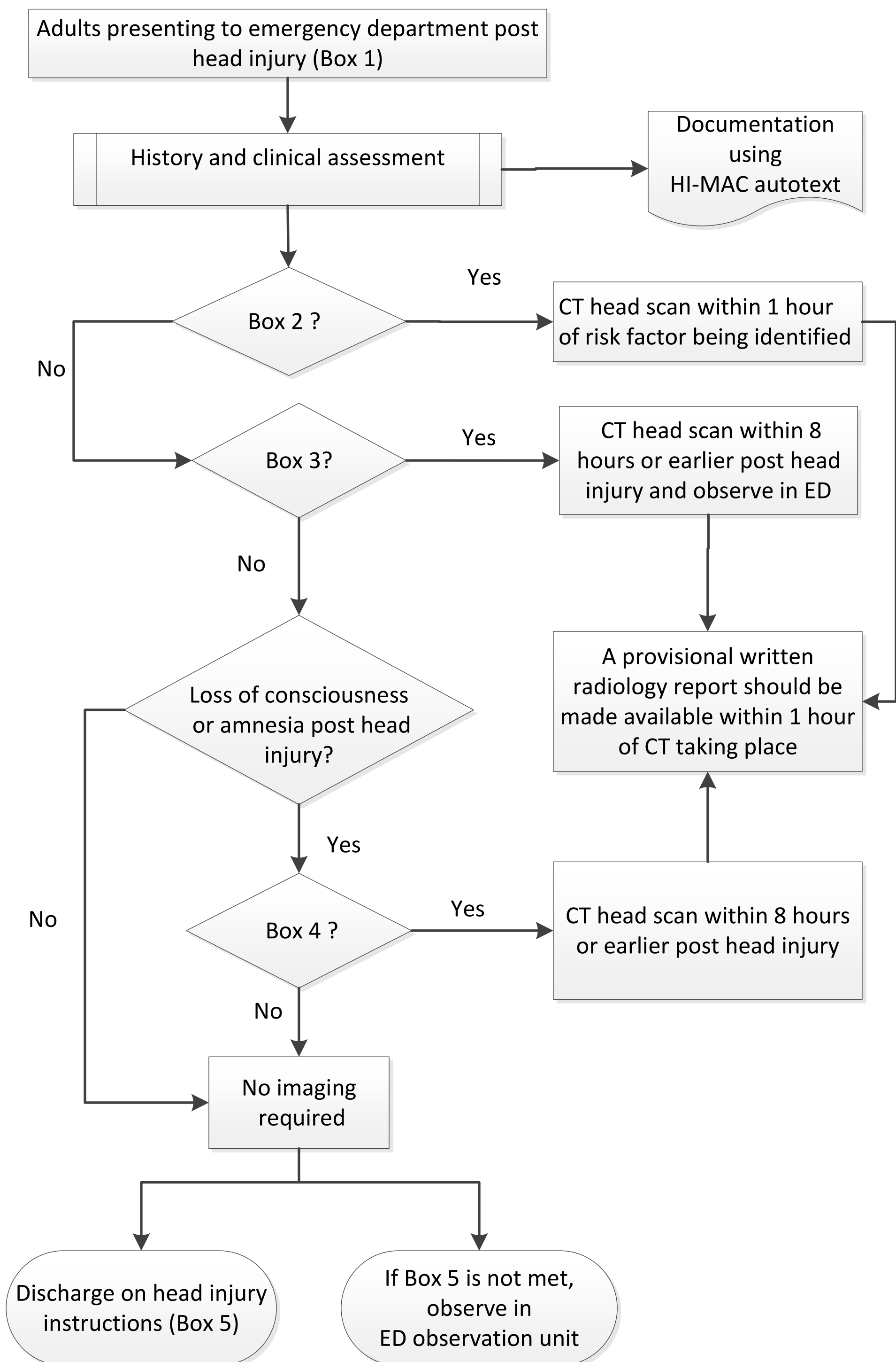
1) Anti coagulant
   - -DOAC
   - -Aspirin/clopidpgrel
   - -Warfarin
2) A history of bleeding or clotting disorder

Box 4

- Age > 65 years
- Dangerous mechanism of injury (a pedestrian or cyclist struck by a motor vehicle, an occupant ejected from a motor vehicle or a fall from height > 1 metre or 5 stairs)
- More than 30 minutes retrograde amnesia

Box 5

- Able to mobilize independently
- Has someone to take care once discharged
- Head Injury instructions should be printed and verbal



HMC EM EVIDENCE-BASED CLINICAL ALGORITHM:
Heat Related Illness in Adults EBCA

HMC Hamad Medical Corporation — EMERGENCY MEDICINE

Version date: 6th August 2021 — Expiry date: 6th August 2024

Authors: Dina Sheko (EM), Wala Sati (EM), Shadi Albeiruti (EM), T Kumar (EM), Prof. Tim Harris, ED EBCA Committee

Evidence basis:

Hifumi, T., Kondo, Y., Shimizu, K. et al. Heat stroke. j intensive care 6, 30 (2018). https://doi.org/10.1186/s40560-018-0298-4

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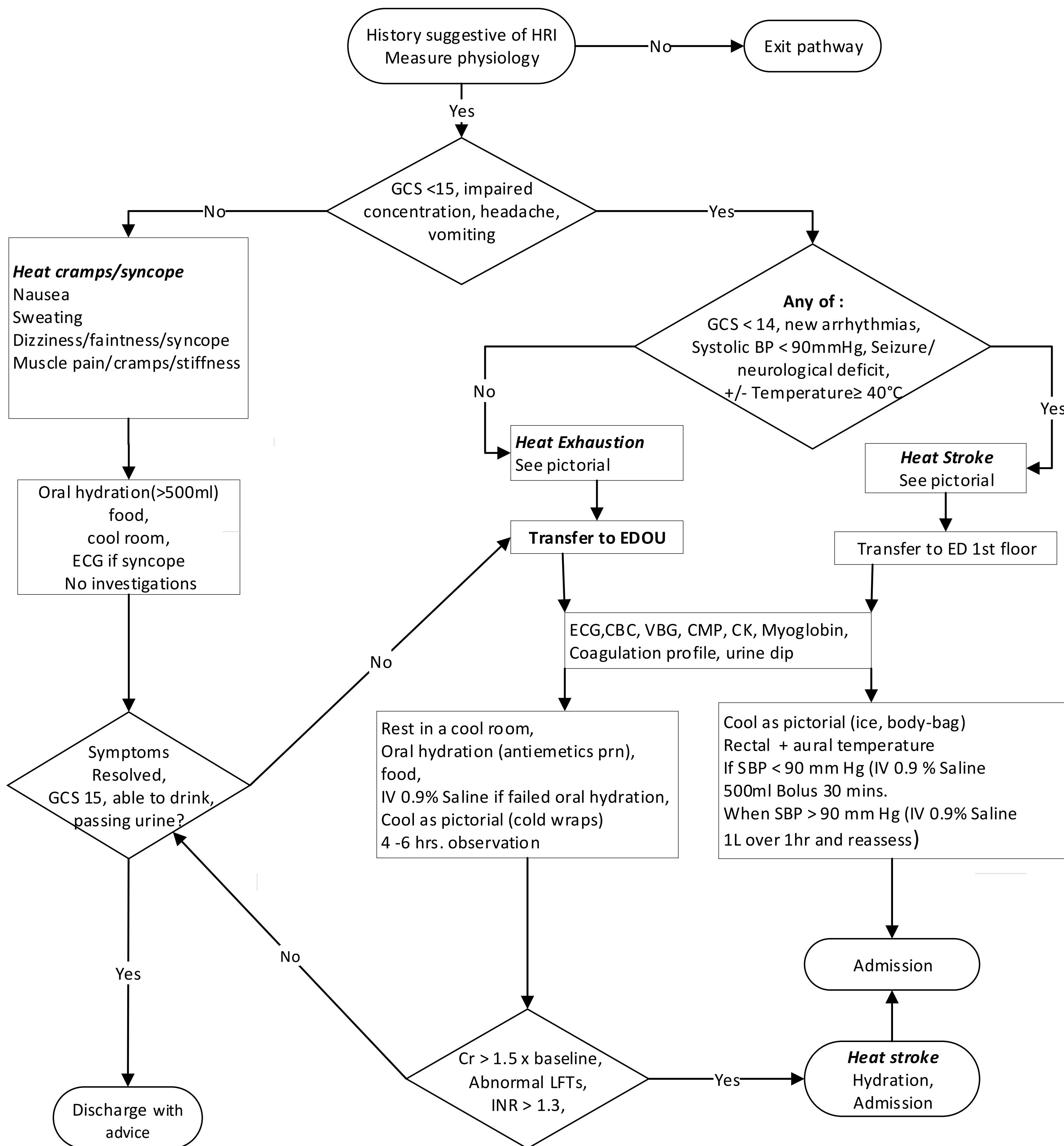

HMC EM EVIDENCE-BASED CLINICAL ALGORITHM:
Pregnant Women with Hypertension in the Emergency Department

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EMERGENCY MEDICINE

Version date: September 10, 2019
Authors: Amjad Ali (EM), Asma Gul (Obs), Nada Saleh (Obs), Arabo Ibrahim (Obs), A Elmoheen (EM), ED EBCA Committee, S Thomas (EM)

Evidence basis:
- Clinical practice guidelines – HMC (hypertension in pregnant women) - CG 10136
- Antihypertensive drug therapy for mild to moderate hypertension during pregnancy. Cochrane Database of Systematic Reviews. 2014(2).
- The CHIPS Randomized Controlled Trial; AHA Journals; 2016 Nov;68(5):1153-9
- Chronic hypertension and pregnancy outcomes: systematic review and meta-analysis, BMJ 2014;348:g2301

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Algorithm aim & applicability:
This algorithm applies to all the pregnant patients presenting to ED with elevated blood pressure

BOX A

Symptoms
- Severe epigastric pain
- Visual disturbance
- New & persistent headache

Signs
- Papilledema
- Clonus
- Liver tenderness
- Pulmonary edema
- Oliguria

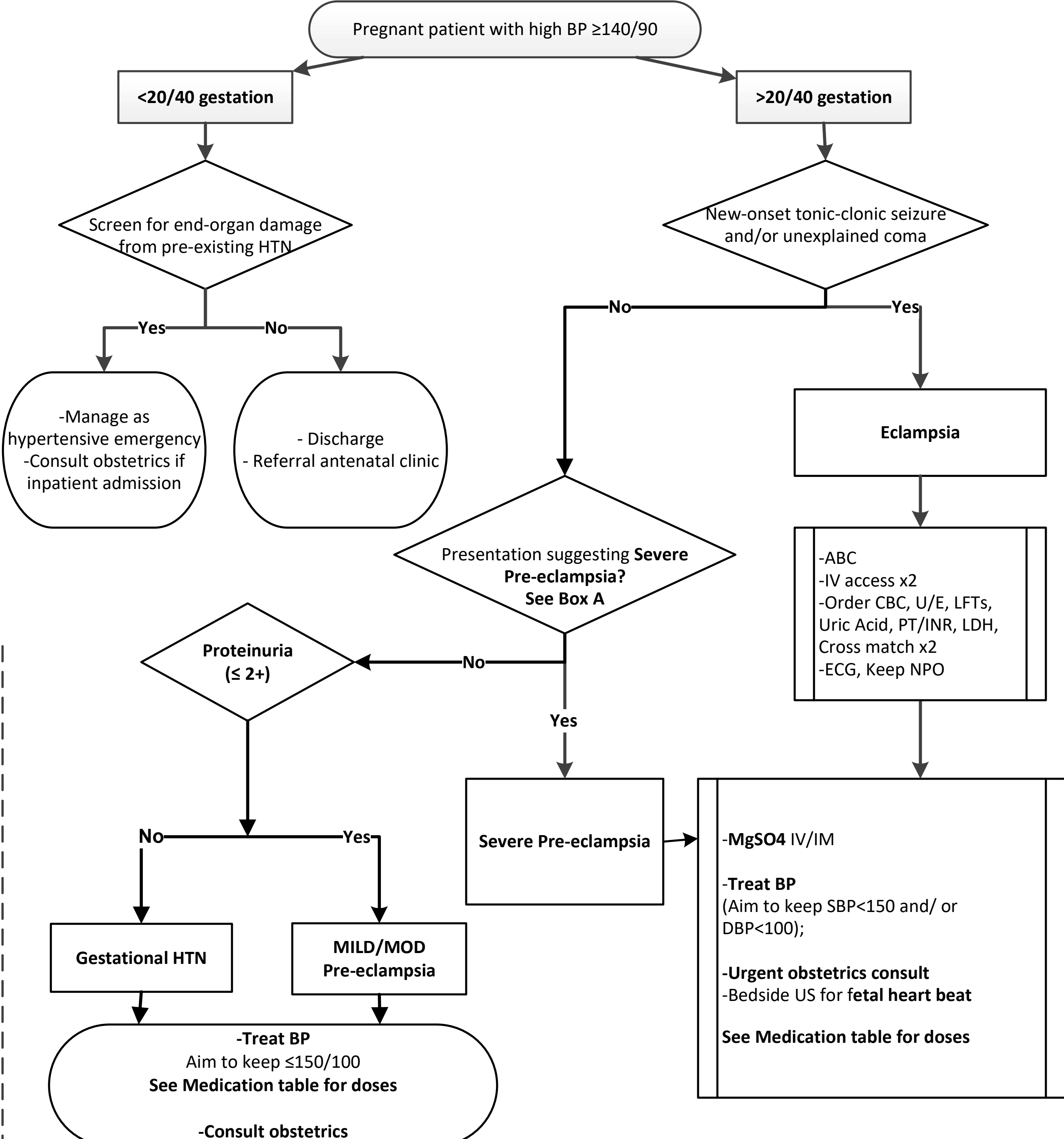
BP
- Systolic BP >160mmHg
- Diastolic BP>110mg

Laboratory parameters
- Platelets <100
- LFTs (twice normal)
- LDH elevation ≥600
- Nephrotic range proteinuria (≥3+)
- Progressive renal insufficiency

Medication Table

MgSO4
4gm IV bolus; over 5mins; followed by 1gm/hr infusion
(contraindicated in Myesthenia Gravis)
Monitor RR, reflexes & urine output

Antihypertensive Meds
-Labetalol:
20mg IV; repeat after 10mins if required; max dose 300mg IV
If no response; switch to
-Hydralazine:
5mg IV; repeat after 20mins if required; max dose 30mg



HMC EM EVIDENCE-BASED CLINICAL ALGORITHM:
EMERGENCY LOWER SPINE MRI

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EMERGENCY MEDICINE
طب الطوارئ

Version date: 12 May 2017
Authors: A Shuaib (*Neurosciences*), A Own (*Neuroradiology*), G Al Sulaiti (*Neurosurgery*), D Jenkins (*EM*), S Thomas (*EM*)
Evidence basis:
1) American College of Radiology Appropriateness Criteria (www.acr.org);
2) Borczuk P, Evidence-based approach to the evaluation and treatment of low back pain in the ED; *EM Practice* 2013; 15.
3) *Tintinalli's Emergency Medicine*, 8th edition 2017 (www.accessem.com)

This EBCA:
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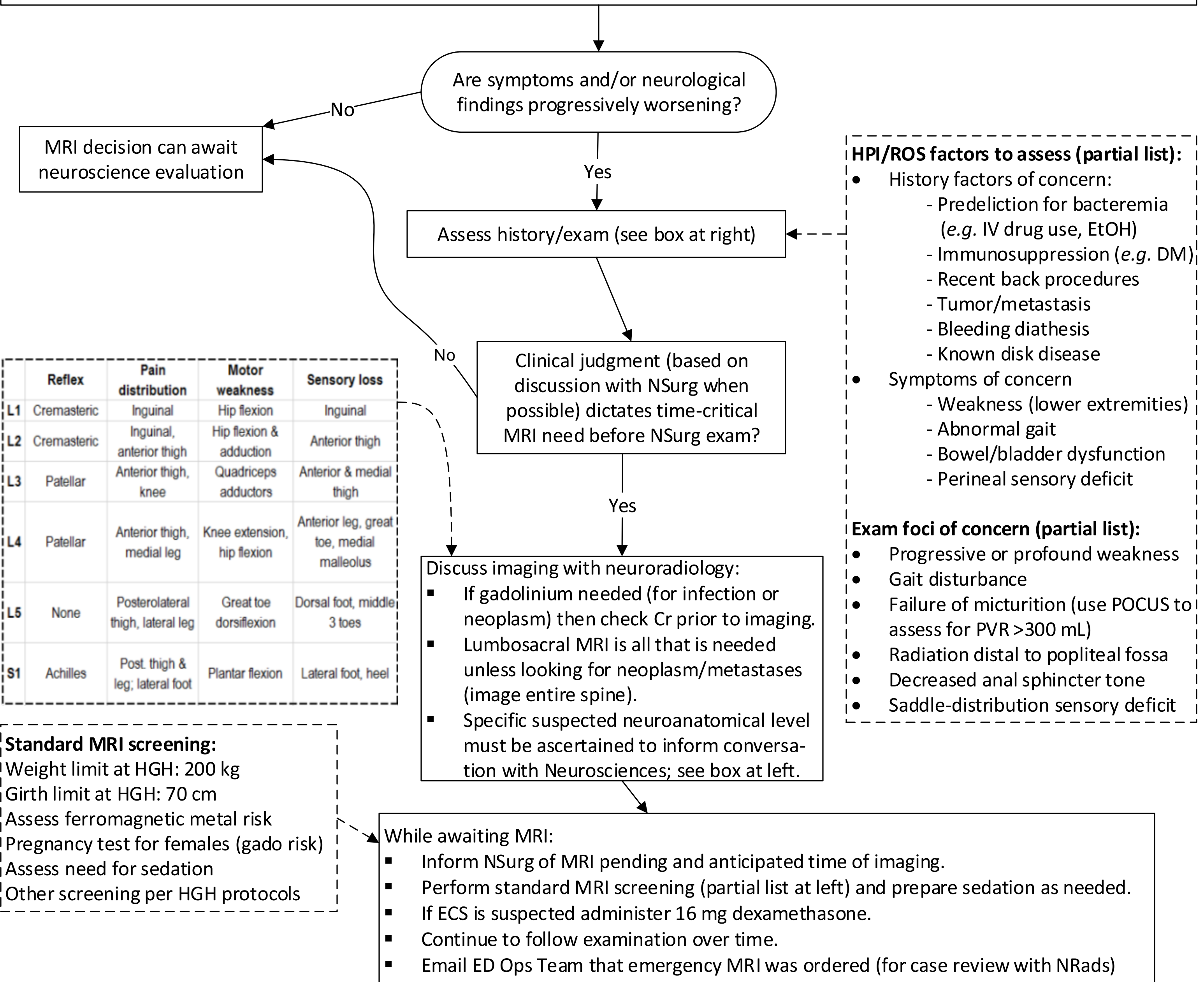
Algorithm aim & applicability:
This algorithm applies to adult (>14) ED patients who do not have major trauma but in whom EM Consultants have concern for epidural compression syndrome (ECS, includes spinal cord compression, cauda equina syndrome, conus medullaris syndrome) from disk disease, infection/inflammation, hematoma, or neoplasm. The aim of this EBCA is to inform decisions regarding rare cases in which emergency MRI needs to be ordered in parallel with (instead of after) neurosurgery (NSurg) consultation. This EBCA aims only to guide this *emergency* MRI ordering, which is intended to be executed only by the EM Consultant in direct conversation with Neuroradiology.



	Reflex	Pain distribution	Motor weakness	Sensory loss
L1	Cremasteric	Inguinal	Hip flexion	Inguinal
L2	Cremasteric	Inguinal, anterior thigh	Hip flexion & adduction	Anterior thigh
L3	Patellar	Anterior thigh, knee	Quadriceps adductors	Anterior & medial thigh
L4	Patellar	Anterior thigh, medial leg	Knee extension, hip flexion	Anterior leg, great toe, medial malleolus
L5	None	Posterolateral thigh, lateral leg	Great toe dorsiflexion	Dorsal foot, middle 3 toes
S1	Achilles	Post. thigh & leg; lateral foot	Plantar flexion	Lateral foot, heel

HMC EM Evidence-Based Clinical Algorithm: Management of Scorpion Sting

Hamad Medical Corporation — EMERGENCY MEDICINE

Version date: 26th July 2020

Authors: Waleed Salem(EM), Amr Elmoheen(EM), Galal Alessai(EM), Warda Al Saad(EM), Aftab Azad(EM), EBCA committee

Evidence basis:

- Goldfrank's Toxicologic Emergencies, 9e | AccessEmergency Medicine | McGraw-Hill Medical.
- Scorpion Sting TOXINZ - Poisons Information.
- CUPO, Palmira. Clinical update on scorpion envenoming. Rev. Soc. Bras. Med. Trop. 2015, vol.48, n.6, pp.642-649.

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Algorithm aim & applicability:

This algorithm is applied to all patients who present to the emergency department with suspected or confirmed scorpion sting. The aim is to provide appropriate management in a timely manner. This EBCA is intended to complement – and in any disagreement, yield to – applicable HMC Policy.

***Systemic signs:**

- Increased lachrymal, nasal, salivary and bronchial secretions
- Diaphoresis
- Hypertension and/or arrhythmias
- Signs of shock
- Respiratory distress
- Pulmonary oedema
- Agitation or CNS depression
- Parasthesias, fasciculations
- Muscular weakness/paralysis
- Seizures

****Scorpion Antivenom**

Administration:

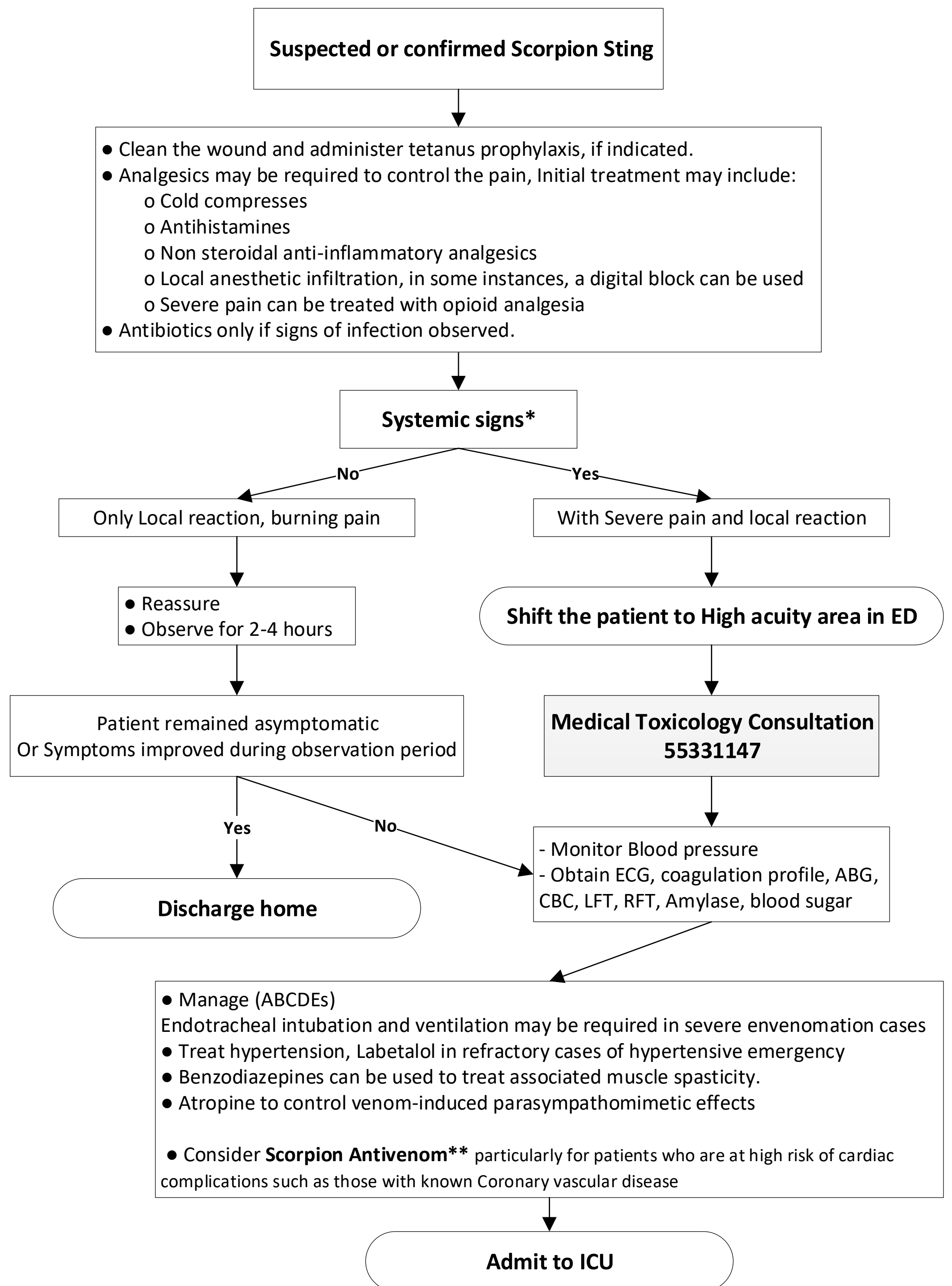
- Scorpion antivenom is the treatment of choice for patients showing signs of systemic toxicity.
- Should be given in facility with critical care and ICU sitting for possible anaphylaxis.
- Check that antivenom is clear, replace if cloudy.
- Do NOT give test dose.
- Have 1:1000 adrenaline, syringe and needle ready at the bedside.

Dose:

- Adult: 2-5 vials diluted in 20-50 mL, half-normal saline, IV over 30 minutes. Repeat if no improvement after 2 hours up to 4 doses.
- Child: 2-5 vials diluted in 20 mL of one-quarter normal saline, IV over 30 minutes.

For anaphylaxis:

- First hold antivenom then give IM adrenaline, antihistamine, corticosteroid and follow the resuscitation guidelines.
- At this point, the decision to resume or discontinue antivenom therapy involves a complex balancing of risk and benefit that could not reduce to an algorithm.



HMC EM EVIDENCE-BASED CLINICAL ALGORITHM:

Management of Syncope in the Emergency Department

Hamad Medical Corporation
EMERGENCY MEDICINE

Version date: 2nd June 2022

Authors: Moataz Younis(EM), Dina Sheko(EM), Amr Elmoheen(EM), Prof. Tim Harris(EM), EBCA Team, AoD group

Evidence basis:

- Brignole M, Moya A, et al., ESC Scientific Document Group. 2018 ESC Guidelines for the diagnosis and management of syncope. Eur Heart J. 2018 Jun 1;39(21):1883-1948.
- Writing Committee Members, Shen WK, et al., 2017 ACC/AHA/HRS guideline for the evaluation and management of patients with syncope, 2017 Aug;14(8):e155-e217.
- Viau JA, et al., The Yield of Computed Tomography of the Head Among Patients Presenting With Syncope: A Systematic Review. Acad Emerg Med. 2019 May;26(5):479-490.
- Ozturk, K., Soylu, E., Bilgin, C. et al., Predictor variables of abnormal imaging findings of syncope in the emergency department. Int J Emerg Med 11, 16 (2018).

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- is not presented as the binding "standard of care" but is rather a reference tool to inform clinical judgment.

Algorithm aim & applicability:

This algorithm only applies for patients more than 18 years old who present to the Emergency Department with **syncope**. The aim is to provide appropriate management in a timely manner. This EBCA is intended to complement – and in any disagreement, yield to – applicable HMC Policy.

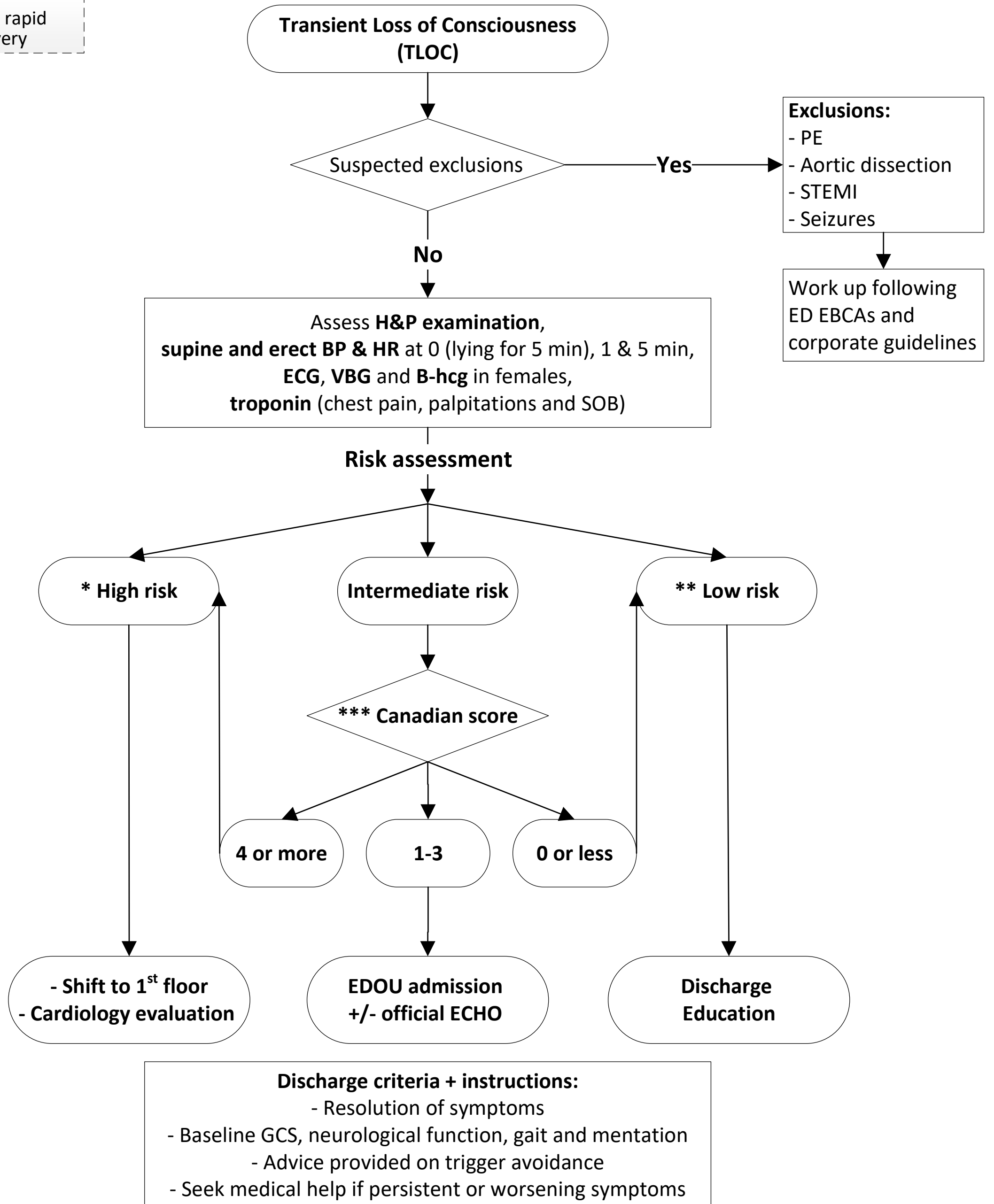
Syncope:
TLOC due to cerebral hypoperfusion, characterized by a rapid onset, short duration, and spontaneous complete recovery

*** High-risk**
Hx: during exertion or in supine, sudden onset palpitation, FHx of SCD, severe structural or CAD (HF, low LVEF, previous MI)
Physical exam: unexplained SBP <90mmHg, +ve PR, persistent bradycardia <40 bpm, undiagnosed systolic murmur, suspected carotid sinus hypersensitivity (e.g. shaving, tight collar), orthostatic hypotension (drop of SBP ≥ 20mmHg or DBP ≥ 10 mmHg after 2-5 minutes).
POCUS FAST +ve, ECHO pericardial tamponade
ECG: persistent sinus bradycardia <40bpm or sinus pauses >3 s, Mobitz II second-and third-degree AV blook, alternating Lt and Rt BBB, VT or rapid paroxysmal SVT, non-sustained episodes of polymorphic VT and long or short QT interval, pacemaker or ICD

**** Low-risk**
Hx: prodrome (e.g. light-headedness, warmth, sweating, nausea, vomiting), after unexpected, unpleasant sight/sound/smell/pain, after prolonged standing or crowded/hot places, during meal or postprandial, triggered by cough/ defecation/micturition, with head rotation, standing from supine/sitting position, long hx (years) of recurrent syncope.
Physical exam: normal
ECG: normal

***** Canadian score:**
- VV symptoms (-1)
- Hx of heart disease (CHF, CAD, arrhythmia, valve disease) (+1)
- SBP <90 or >180mmHg (+2)
- Elevated cTn (+2)
- QRS axis <30◦ or > 100◦ (+1)
- QRS duration > 130 ms (+1)
- QTc interval > 480 ms (+2)
- Dx of VV in ED (-2)
- Dx of cardiac syncope in ED (+2)

CT head in syncope:
- Neurological deficit
- HX of cancer
- Significant trauma 2ry to syncope
- Suspected SAH
- Age more than 60
- Unclear if 1st seizure or syncope



Abbreviations:
TLOC: transient loss of consciousness, **SCD:** sudden cardiac death, **CAD:** coronary artery disease, **HF:** heart failure, **LVEF:** low ventricular ejection fraction, **MI:** myocardial infarction, **SBP:** systolic blood pressure, **HR:** heart rate, **PR:** per rectal examination, **FAST:** focussed assessment sonography in trauma, **VT:** ventricular tachycardia, **SVT:** supraventricular tachycardia, **ICD:** intracardiac device, **ECG:** electrocardiogram, **SAH:** subarachnoid hemorrhage, **CT:** computed tomography, **VV:** vasovagal, **VBG:** venous blood gases, **H&P:** history and physical examination, **EDOU:** emergency department observation unit

HMC EM EVIDENCE-BASED CLINICAL ALGORITHM:

Initial management of undifferentiated pain

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EMERGENCY MEDICINE
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Version date: 5 August 2017
Authors: A Elemamali (EM), W Khalaf (EM), A Elmoheen (EM), M Mekky (EM), Z Bakhsh (EM), A Azad (EM)
This EBCA approved by Prof Stephen Thomas and Dr Claire Richards

Evidence basis:

- Todd KH, *et al*. Survey of pain etiology, management and patient satisfaction in two urban EDs. *CJEM* 2002; 4(4):252-6.
- Motov SM, *et al*. Problems and barriers of pain management in the ED: Are we getting better? *Journal of Pain Research* 2009; 2: 5-11.
- Thomas SH. Management of Pain in the Emergency Department. *ISRN Emergency Medicine* 2013.
- British National Formulary. BMJ Group and the Royal Pharmaceutical Society. November 2014.

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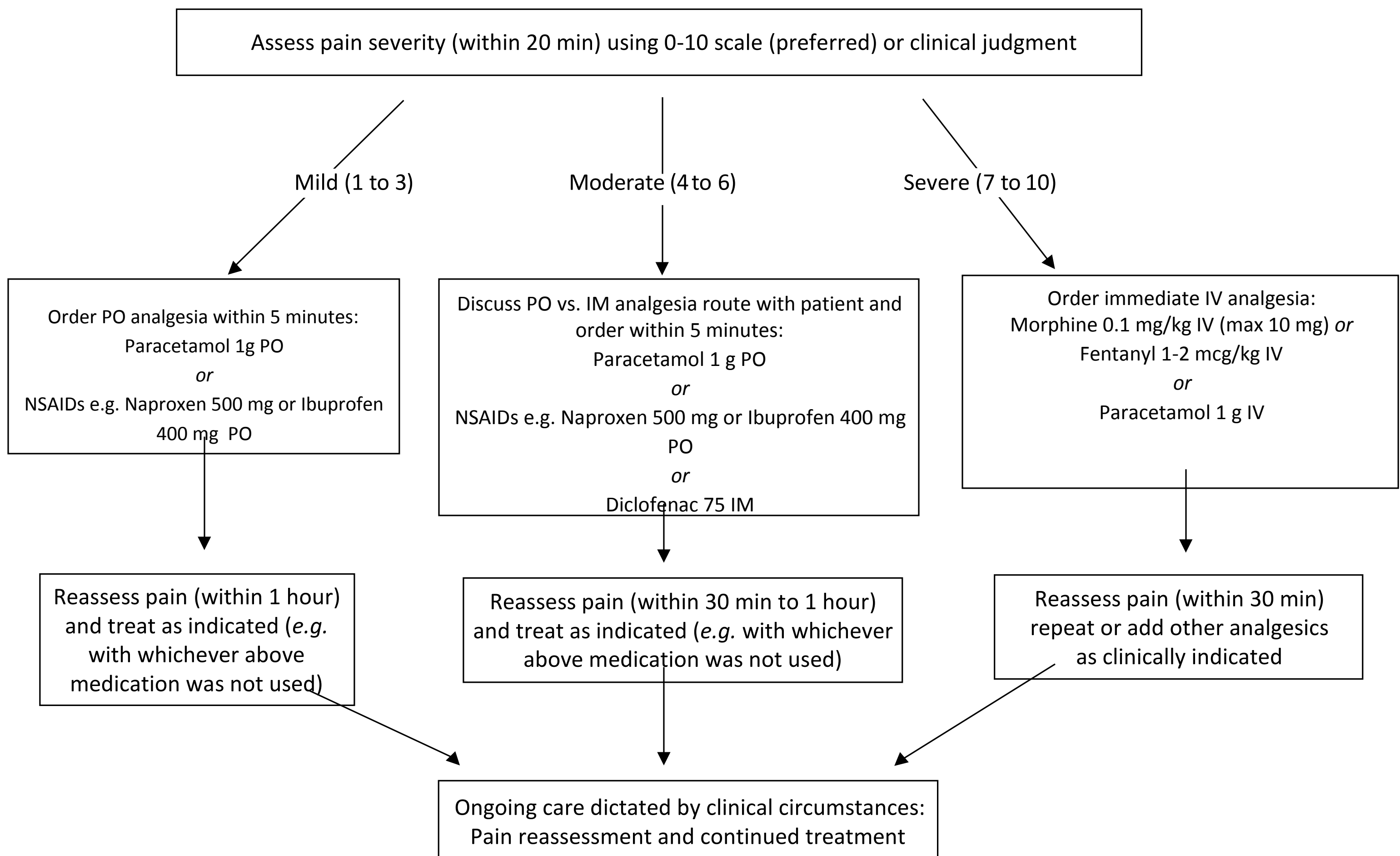
Algorithm aim & applicability:
This algorithm is applied to all adult patients (more than 14 years old) with pain that does not have a diagnosis -driven specific analgesic approach; the aim is to provide early effective pain relief. This EBCA is intended to complement – in disagreement, yield to – HMC policy.



Notes on pain assessment and management:

- This EBCA s general approach will need to be tailored to specific patient scenarios.
- Evidence clearly establishes there is high risk to ED personnel underestimating patients pain levels.
- Analgesic pharmacology is beyond the scope of this EBCA. Sometimes synergism is desired (*e.g*. opioids and NSAIDs) but traditional co-administration approaches can compound risk and are not always evidence-based (*e.g.* always administering anti-emetic with opioids).
-The EM clinician should aim to always either treat pain quickly, or explain to patients why pain is not being treated (keeping in mind that most, if not nearly all, of the time-proven reasons for withholding analgesia are refuted by robust evidence).
-NSAIDs are best avoided in pregnancy but can only be used in the 2nd trimester if essential.
-NSAIDs should be used with caution in elderly patients over 60 yrs of age.
-Opioid dose in elderly should be prescribed at the lowest effective dose and titrate it to minimize adverse effect.

HMC EM Evidence-Based Clinical Algorithm:

Management of Paracetamol Overdose in Adults

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EMERGENCY MEDICINE
طب الطوارئ

Version date: 2nd May 2020

Authors: Waleed Salem(EM), Amr Elmoheen(EM), Galal Alessai(EM), Adel Zahran(EM), Badria Alhatali(EM&Tox), EBCA committee

Evidence basis:

- Chiew AL, Gluud C, Brok J, Buckley NA. Interventions for paracetamol (acetaminophen) overdose. Cochrane Database Syst Rev 2018; 2:CD003328.
- Daly FS, Fountain JS, Murray L et al. Guidelines for the management of paracetamol poisoning in Australia and New Zealand, Medical Journal of Australia 2008; 188:296-301.
- Murray L et al. Toxicology Handbook 3rd Edition. Elsevier Australia 2015. ISBN 9780729542241.

This EBCA:

- has been endorsed by HMC EM and other consultants for education and assistance with clinical practice in HMC's EDs.
- is intended to complement any related multispecialty Clinical Practice Guideline prepared as per HMC policy.
- is not presented as the binding "standard of care" but is rather a reference tool to inform clinical judgment.

Algorithm aim & applicability:

This algorithm is applied to all adult patients (more than 18 years old) who present to the emergency department with paracetamol overdose. The aim is to provide appropriate management in a timely manner. This EBCA is intended to complement – and in any disagreement, yield to – applicable HMC Policy.

* N-Acetyl cysteine (NAC) Infusion Instructions:

- IV infusion, preferably using Glucose 5% as the infusion fluid. Sodium Chloride 0.9% solution may be used if Glucose 5% is not suitable.
- The patient should receive a total of 300 mg/kg over 21 hours as below infusion preparation:
  - O **First infusion:** 150 mg/kg of NAC in 200 mL of infusion fluid, to be infused over 1 hr, then:
  - O **Second infusion:** 50 mg/kg of NAC in 500 mL of infusion fluid & infuse over the following 4 hrs, then:
  - O **Third infusion:** 100 mg/kg of NAC in 1 liter of infusion fluid and infuse over the next 16 hrs.

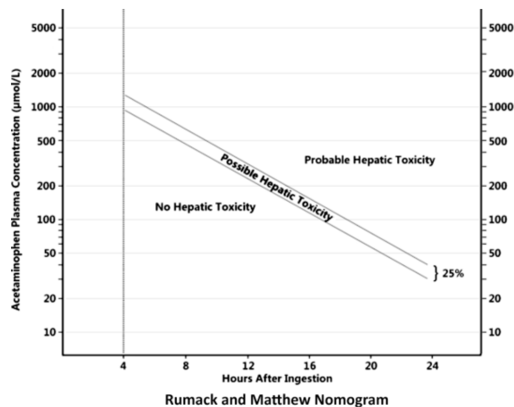
For pts > 110 kg, calculate the dose based on 110 kg

Indications to stop NAC:

After the 21-hour protocol, recheck liver function tests (LFTs), INR and Paracetamol level.
If Paracetamol level (> 60µmol/l), or AST/ALT > 100, or INR > 1.5, continue/restart IV NAC at the Third infusion dose (100 mg/kg in 1 L of 5% dextrose over 16 hours) until complete elimination of Paracetamol and resolution of any LFT abnormalities.

NAC adverse reactions:

- **Anaphylactoid reactions:** Typically, this reaction occurs after the first bag of NAC. It is manifested by rash, wheeze or mild hypotension
  - Stop the infusion
  - Treat with IV diphenhydramine 50mg
  - Once symptoms settle, restart NAC infusion at half rate for 30min & then resume as per normal protocol.
- **Anaphylactic reaction:** It is rare, (reported cases of a true anaphylactic reaction), and the patient should be treated along with conventional guidelines.



Rumack and Matthew Nomogram

- This nomogram is only appropriate for patients who had an acute single ingestion of paracetamol.
- Interpretation of a toxic level depends on the time since ingestion of paracetamol.
- Drug levels done before the 4 hour point may not represent the true peak of absorption.
- Please note the unit used (µmol/L)

King's College Criteria (refer for liver transplant):
INR > 6.7, Creatinine > 300, PH < 7.3, Hepatic encephalopathy III, IV

Algorithm

Significant ingestion?
- Acute ingestion > 150 mg/kg or Repeated ingestion > 75mg/kg/24h
- Reported dose unreliable

→ **No:** Adress self-harm

→ **Yes:**
- **Medical Toxicology Consultation**
- The patient should stay in ER until paracetamol level result seen

Any:
- Acute single ingestion >24hr ago
- or
- Staggered ingestion (taken over more than 1 hr)
- or
- Timing uncertain

→ **Yes:** **Start NAC protocol*** → Obtain INR, LFT, U&E, VBG, Paracetamol level → **Any:**
- Paracetamol still detectable (>20µmol/l)
- or
- INR >1.5
- or
- AST elevated >100

  - **No:** **Discontinue NAC** → Adress self-harm
  - **Yes:** **Start NAC protocol*** Or continue if started

→ **No:** **Acute single ingestion >8h & <24h**

- **Yes:** **Start NAC protocol* ASAP** → Obtain Paracetamol level, INR, LFT, U&E, VBG
- **No:** **Acute single ingestion >4h and <8h**
  - **Yes:** (Will you know Paracetamol level within 8 h of ingestion)
    - **No:** Start NAC protocol* ASAP
    - **Yes:** Obtain Paracetamol level, INR, LFT, U&E, VBG
  - **No:** **Acute single ingestion <4h?**
    - **Ingestion <1h** → Give Charcoal 50g PO if not contraindicated → Delay any blood sampling until 4h post-ingestion
    - **Ingestion >1h & <4h** → Delay any blood sampling until 4h post-ingestion
    - → Obtain Paracetamol level, INR, LFT, U&E, VBG

Obtain Paracetamol level, INR, LFT, U&E, VBG → **Nomogram** → **Any:**
- Paracetamol above the treatment line
- or
- INR >1.5
- or
- AST elevated >100

(Evidence of new liver damage)

- **Yes:** **Start NAC protocol*** Or continue if started → Adress self-harm
- **No:** **Discontinue NAC** If started → Adress self-harm

HMC EM EVIDENCE-BASED CLINICAL ALGORITHM: SEPSIS

Version date: 8 Nov 2015
Authors: X (Critical Care), X (Critical Care), X (Critical Care), M Shuaib (EM), S Thomas (EM)
Evidence basis:
- Yealy D *et al*. A randomized trial of protocol-based care for early septic shock (ProCESS). *NEJM* 2014; 370: 1683.
- Levy M et al. The Surviving Sepsis Campaign. *Crit Care Med* 2010; 38: 367.

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Algorithm aim & applicability:
This algorithm applies to adult ED patients in whom sepsis is the presumptive or confirmed ED diagnosis.

Therapeutic steps & targets for 1st hour in ED

Antimicrobials:
- Administer ASAP (cx 1st if at all possible)
- Consult HGH antibiogram and applicable guidelines

Urine output monitoring:
- Consider Foley catheterization
- Monitor hourly urine output

Oxygenation: SpO2 >93% (90-90% target if retainer)
Hydration: 1-2 L Ringer's lactate if no contraindications
Cultures: Minimum blood cx; other cx as indicated
Consult: Critical care and other applicable specialties
Repeat lactate assessment: Every 4 hours while abnormal
Other labs: CBC, urinalysis, LFTs, glucose, clotting profile

After 1st hour, are there signs of severe sepsis (shock)?

- SBP <90 or MAP <65
- SpO2 <90% on oxygen therapy
- Cr > 177 µmol/L
- Urine output < 0.5 mL/kg/hr for 2 hours
- Bilirubin >34 µmol/L
- Thrombocytopenia (<100,000)
- INR >1.5 or APTT >60 secs
- Lactate > 4 mmol/L

Note: It is not necessary to wait a full hour before making the clinical judgment that severe sepsis/shock is present and taking appropriate steps

No → Continue supportive care and monitoring

Yes ↓

Therapy for severe sepsis (septic shock) in ED – To be executed in consultation with Critical Care service

Oxygenation:
- Endotracheal intubation (ETI) is not mandatory but is often useful to optimize oxygenation and ventilation
- Non-invasive ventilatory support may improve patient comfort, reduce work of breathing, and avoid need for ETI

Vasopressors:
- Norepinephrine should be started if 2 L crystalloids do not achieve target MAP of 65
- Usual norepinephrine dosing range in septic shock is 0.01 to 3.3 mcg/kg/min

Invasive lines:
- Central venous access (for CVP and SCVO2) is usually necessary, particularly if lactate ≥4 mmol/L or there is persistent hypotension
- Arterial catheterization often useful, especially if patient is intubated or if oscillometric BP reliability is questionable

Noninvasive monitoring: Use ultrasound for baseline and ongoing assessment of fluid status – IVC collapse and ventricular filling

HMC EM Evidence-Based Clinical Algorithm:
Sepsis screening

Hamad Medical Corporation — EMERGENCY MEDICINE

Version date: 8 Nov 2015
Authors: X (Critical Care), X (Critical Care), X (Critical Care), M Shuaib (EM), S Thomas (EM)

Evidence basis:

- Yealy D *et al*. A randomized trial of protocol-based care for early septic shock (ProCESS). *NEJM* 2014; 370: 1683.
- Levy M et al. The Surviving Sepsis Campaign. *Crit Care Med* 2010; 38: 367.

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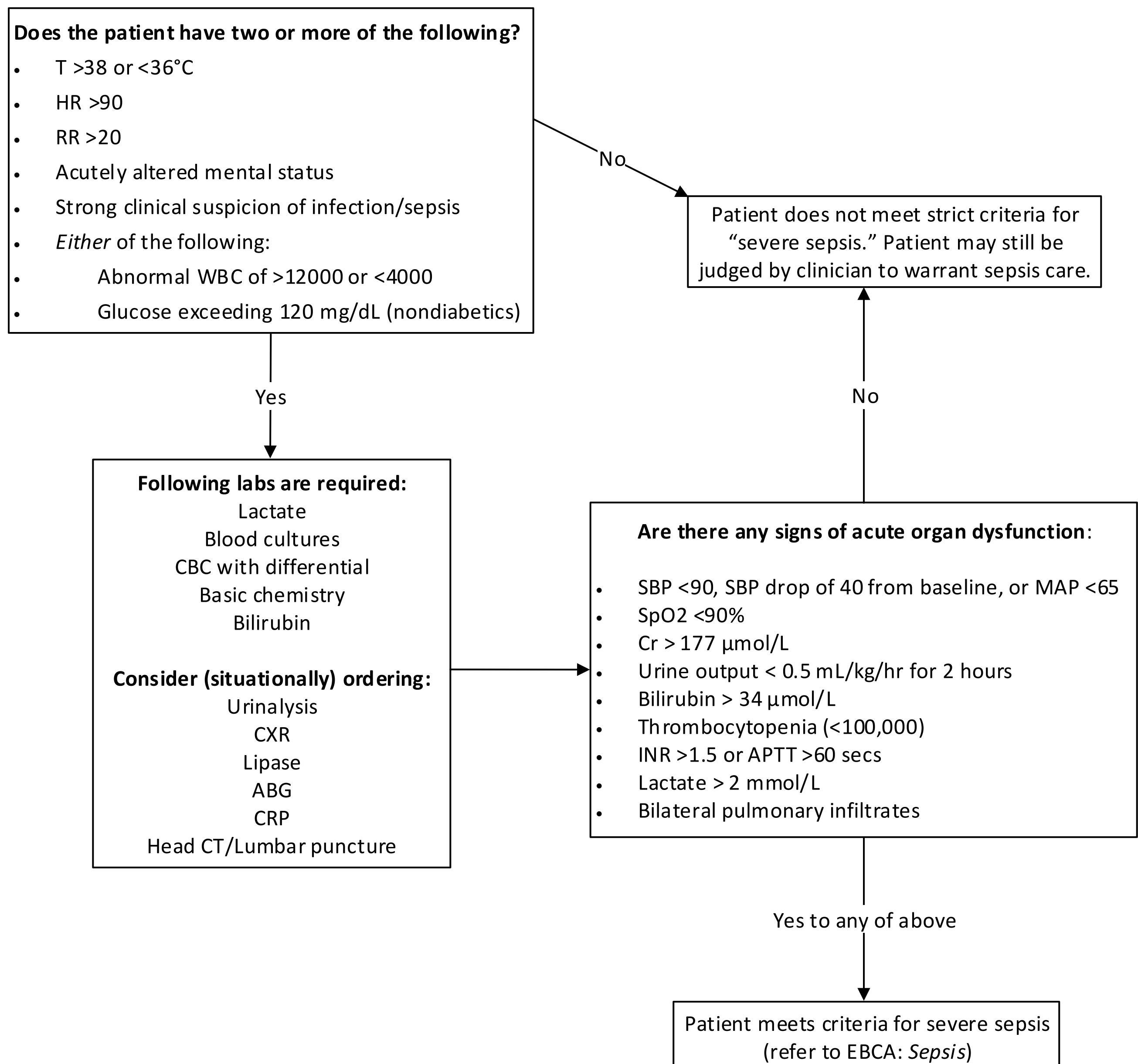

HMC EM EVIDENCE-BASED CLINICAL ALGORITHM:

Initial management of sickle cell vaso-occlusive crisis

Version date: 30 Sep 2018
Authors: U Al-Homsi & H El-Derhoubi (Hem/Onc), A Kartha (IM), S Saleh (SSU), P Woodruff (Psych), W Saleem (Pain Service), S Thomas (EM)

Evidence basis:

- Williams-Johnson J, *et al*. Chapter 236: Sickle cell disease. *Tintinalli's EM 8th ed.* on AccessEM.com, accessed 16 Sep 2018.

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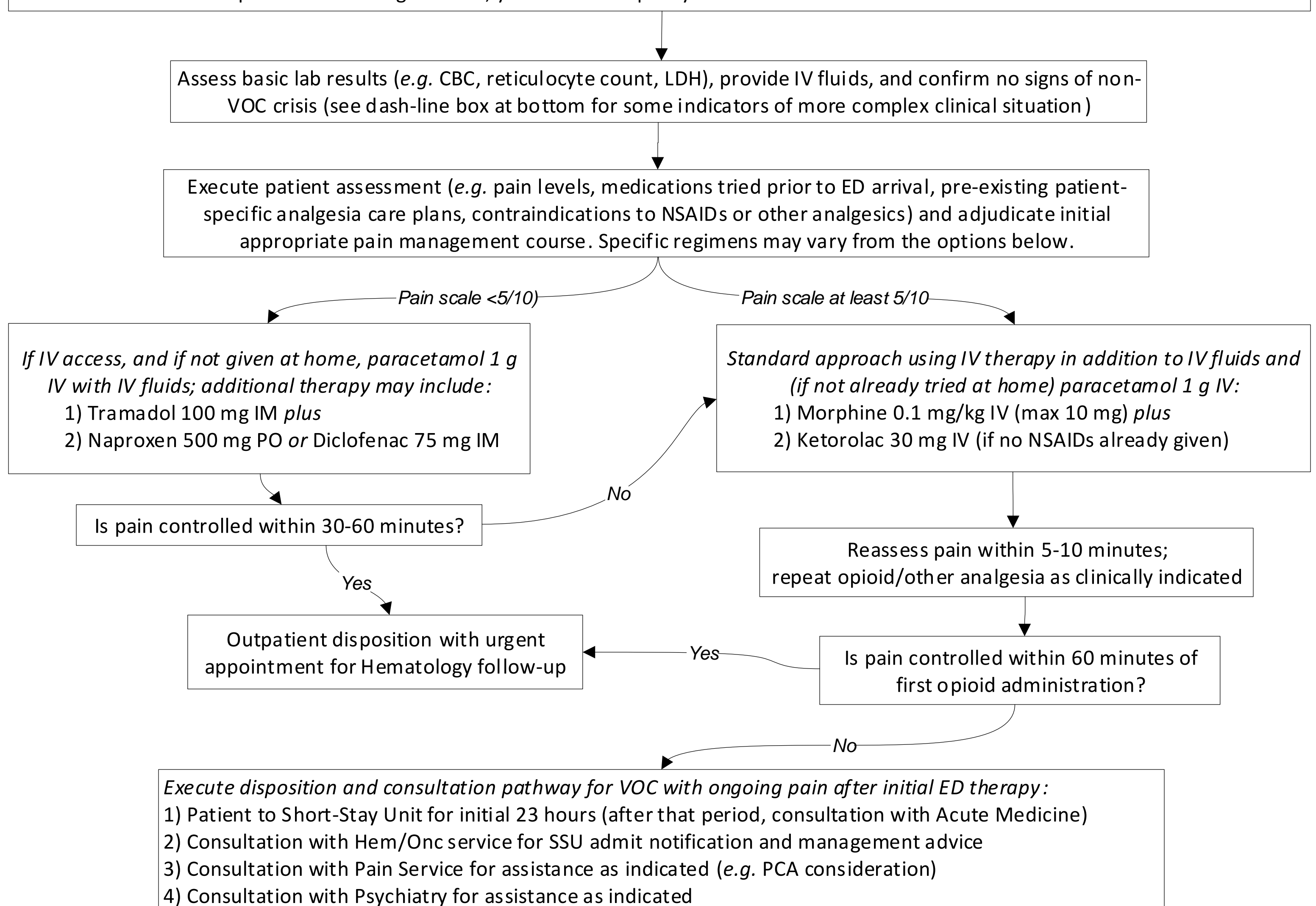

Notes on confirming VOC as the patient's diagnosis (*caveat*: this EBCA is not intended to comprehensively outline SSA workup):

- Low-grade fever and mild WBC elevation often seen with VOC; T>38, WBC >20,000, or bandemia suggest acute infection.
- Bone pain with VOC tends to be diffuse across back and/or extremities; localized pain or findings (redness, warmth, swelling) suggest presence of acute infectious focus such as cellulitis or osteomyelitis. Plain films (which don't show infarcts) may suggest osteomyelitis.
- Acute chest syndrome presents with new CXR infiltrate and *one* of the following: T>38.5, cough, wheezing, tachypnea, or CP.
- Peritonitis or point-tenderness on the abdominal examination indicate likelihood of non-VOC etiology for pain.
- Lower-than-baseline Hgb may indicate aplastic crisis (reticulocytes <1%), hemolytic crisis (baseline reticulocytosis), or sequestration.
- Above may be treated situationally (after consultation) with fluids, antibiotics, (exchange) transfusion, hydroxyurea, or nitric oxide.

HMC EM EVIDENCE-BASED CLINICAL ALGORITHM: Management of Steven-Johnson Syndrome (SJS)/ Toxic Epidermal Necrolysis (TEN)

Version Date: July 2020

Authors: Dr. Sara Al Khawaga (Derma, lead), Professor Tim Richard Edmund Harris (ED), Prof. Stephen Thomas (ED) and Prof. Martin Steinhoff (Derma, PI).

This EBCA:
- Is written by dermatology and emergency medicine (ED) to improve the care of patients with Steven Johnson syndrome, toxic epidermal necrolysis and overlap syndromes *(mortality rate 25-40%).*
- Is intended to complement any related multispecialty HMC Clinical Practice Guidelines.
- Is a reference tool to optimize clinical management in then ED and not a “standard of care” document

Algorithm and applicability

This algorithm applies to all adult patients presenting to ED with a **painful (itchy)** rash with epidermal detachment and severe mucocutaneous ulceration suggestive of SJS(<10% epidermal involvement(/TEN(>30% epidermal involvement)/overlap SJS-TEN (10-30% epidermal involvement). The trigger is commonly medications or infection.

Diagnosis of SJS/ TEN [1]

- Focused history & physical examination
- Evaluation of precipitating cause (new medications, infection) [1]
- Immediate dermatology consultation (24/7), contact via switchboard "call dermatology 1st on-call"

Investigation

CBC, CMP, Mg, Phosphate, VBG, Crea, Glucose
Mycoplasma serology, Herpes serology, EBV, CMV, *HIV?*
Chest X-Ray
Swab for culture (*bacterial and fungal from 3 different sites of areas of necrolysis/erosions*) from three areas of lesioned skin.

Primary management plan

- **Withdraw causative agent immediately**
- IV fluid (see below) and monitored fluid balance from arrival.
- Biopsy immediately by dermatologist on-call.
- Assessment for pain: skin, mucosa, eyes, chest (trachea), esophagus (swallowing)
- Morphine 0.1-0.2 mg/kg in 2 mg boli every 3 minutes *and paracetamo*l for analgesia
- Insert urinary catheter if involvement BSA>30% rash or epidermal necrolysis, and/or if urogenital involvement.
- Calculate SCORTEN[1] for severity assessment
- **Fluid Replacement** (0.9% Saline or Ringers lactate):
2 ml/kg ideal BW/% BSA epidermal detachment
(half 1st 8 hours, half next 16 hours).

Multi-disciplinary Team Care

- Isolation room & Barrier nursing
- ENT, ophthalmology & urology review if local involvement.
- Admission to MICU if >10% epidermal loss

SCORTEN score for Stevens –Johnson syndrome/toxic epidermal necrolysis

Independent prognostic factor		Weight
Age	≥40 years	1
Malignancy *	Yes	1
Body surface area detached	≥10%	1
Tachycardia	≥120/min	1
Serum urea	≥10 mmol/L	1
Serum glucose	≥14 mmol/L	1
Serum bicarbonate	<20 mmol/L	1
SCORTEN#		7

SCORTEN: score of toxic epidermal necrolysis.
*Malignancy: evolving cancer and hematologic malignancies.

SCORTEN predicted mortality rate

SCORTEN	Mortality Rate
0-1	3.2
2	12.1
3	35.3
4	58.3
≥5	90

References:
1. Creamer, D., et al., *UK guidelines for the management of Stevens-Johnson syndrome/toxic epidermal necrolysis in adults 2016 (print summary - Full guidelines available at* http://dx.doi.org/10.1016/j.bjps.2016.01.034*).* J Plast Reconstr Aesthet Surg, 2016. **69**(6): p. 736-741.

HMC EM Evidence-Based Clinical Algorithm:
Management of Newly Diagnosed Type 2 Diabetes mellitus in ED (T2DM)

مؤسسة حمد الطبية Hamad Medical Corporation HEALTH • EDUCATION • RESEARCH صحة • تعليم • بحوث
EMERGENCY MEDICINE طب الطوارئ

Version date: July 2020

Authors:
AZahran (EM), AAbdalrubb (Endo), MMokhter (Endo), MZirie (Endo), WSalem (EM), EBCA committee

Evidence basis:
American Diabetes Association (ADA) guidelines
European Association for the Study of Diabetes (EASD) guidelines

This EBCA:

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(1) Assess Risk

- Current lifestyle & mental health
- Comorbidities: CKD, HF, Atherosclerosis.
- Clinical characteristics: age, weight, HbA1C.
- Cultural and socio-economic context.

(2) Diabetic educator :

- The clinic is located in OPD building 2nd floor.
- Patient seen 0700-1500 on same or following day as referral. Walk in service.
- Patients may request phone consultation
- Refer via Cerner

(3) Contraindications for Metformin:

- Impaired renal function (S. Cr >124 micromol/L)
- Concurrent active or progressive liver disease
- Alcohol use disorder.
- Decompensated heart failure NY class III, IV
- Hypersensitivity to metformin
- Acute or chronic metabolic acidosis, including diabetic ketoacidosis, with or without coma.

(4) Medication box:
Oral hypoglycemic agents available at ED pharmacy:

DDP4:

- Sitagliptin 50mg/metformin 500 mg

OR Sitagliptin 50 mg/ metformin1000 mg

- Viladgliptin 50 mg/metformin 500 mg

Sulfonylurea:

- Gliclazide 60 mg daily
- Glimepiride: 2 mg daily

Thiazolidinedione:

- Pioglitazone 30 mg daily

Meglitinide:

- Repaglinide 1mg TID (before meal)

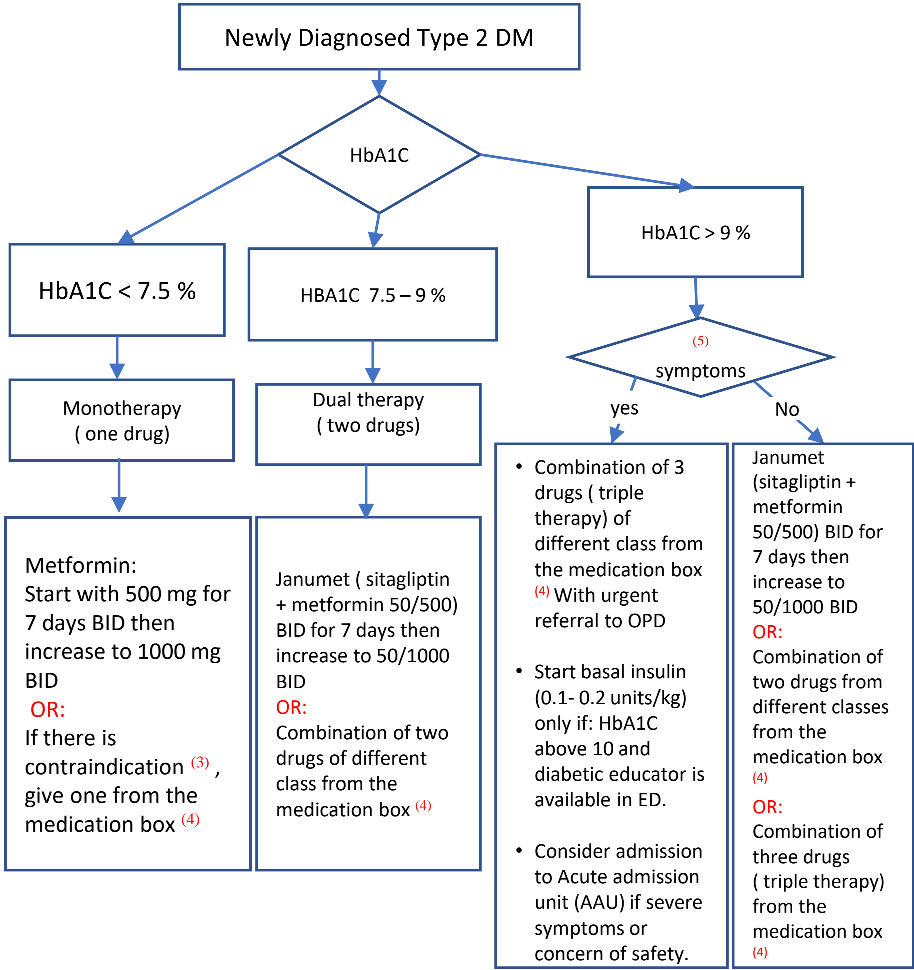
(5) symptoms:
Polyurea, polydipsia, blurred vision, weight loss

Algorithm Aim & Applicability
This algorithm applies to diabetes type 2 management in adult non pregnant patients presenting with new diagnosis to the emergency department.

New DM definition: Blood RBS > 11 mmol/L or > 200 mg/dL

All cases:

- Assess risk (1)
- Blood tests: CBC, CMP, VBG and HbA1C
- Consult to diabetic educator (2)
- Consult to dietitian
- Consult to pharmacy via Cerner for medication counseling
- Out-patient referral to: Diabetes OPD in Medical City Building 10 or PHCC.
- If HbA1C > 9 % or patient with complications urgent referral to Endocrine & Diabetes HGH out-patient



References:
https://care.diabetesjournals.org/content/diacare/suppl/2018/12/17/42.Supplement_1.DC1/DC_42_S1_2019_UPDATED.pdf
https://diabetologia-journal.org/2018/10/05/new-easd-ada-consensus-guidelines-on-managing-hyperglycaemia-in-type-2-diabetes-launched-at-easd-meeting-new-recommendations-include-specific-drug-classes-for-some-patients-and-enhancing-medication-a/
https://www.ncbi.nlm.nih.gov/pubmed?term=24405767
American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). American Psychiatric Association, Arlington, VA 2013

HMC EM Evidence-Based Clinical Algorithm:
Analgesia in Undifferentiated Abdominal Pain

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EMERGENCY MEDICINE
مؤسسة حمد الطبية
طب الطوارئ

Version date: 20 November 2015
Authors: R Mohammed (EM), Pathan S (EM), Ali S (Acute Surgery), S Thomas (EM)
Evidence basis:
- Thomas SH. *Emergency Department Analgesia: An evidence-based guide.* Cambridge University Press, 2008.
- Manterola C. The use of analgesia for acute abdominal pain does not mask clinical findings, nor does it delay diagnosis. *Cochrane Library* database of systemic reviews; published online 19 Jan 2011; accessed 13 Sept 2015.

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Algorithm aim & applicability:
This algorithm applies to patients in whom, after a brief initial evaluation, there is no clear explanation for abdominal pain (*i.e.* there is "undifferentiated abdominal pain") and in whom pain severity is judged sufficient to warrant analgesia. The EBCA is *not* aimed at cases where there is a very likely working diagnosis that dictates pain medication should be either aggressive (*e.g.* renal colic) or cautious (*e.g.* abdominal aortic aneurysm). The EBCA aims to guide analgesia provision in an effective yet judicious manner.

↓

If appropriate (*e.g.* not already tried at home, no severe hepatic disease): paracetamol 1 g IV (may be repeated in 6-8 h)

↓

Is the pain severity* high enough to warrant (more) analgesia?
- No → Continue to monitor and give analgesia *prn*
- Yes → Is there concern for hypotension?
  - No → morphine 0.05-0.1 mg/kg (repeated q30' to max 0.2 mg/kg)**
    - in truly undifferentiated pain: lower dosing preferred
    - if develop strong suspicion of renal colic:
      - start with 0.1 mg/kg and give 0.05 mg/kg in 10'
      - co-administer injectable NSAID
  - Yes → fentanyl 0.5-1.0 mcg/kg (repeated q15-20' to max 3 mcg/kg)**
    - lower doses are inherently safer & less controversial
    - avoid therapies that compound risk (*e.g.* midazolam)
    - clinically effective half-life about 20 minutes/dose:
      - re-dose earlier rather than later (minimizes dosage)
      - transition to longer-acting agents when safe

***Adjudicating pain severity**

- Assessment of pain severity should rely heavily on patient-expressed (not clinician-assigned) judgment.
- If patients want something stronger than paracetamol, they should nearly always receive it.
- Judgments on pain severity should be informed by patient age, gender, or origin *only* with the aim of assuring that we don't undertreat. Using any patient characteristics to discount patient-expressed pain severity is both biased and clinically wrong.

****Notes on analgesia approach in undifferentiated abdominal pain**

- This EBCA is for undifferentiated abdominal pain. When certain diagnoses are clinically very high-likelihood, therapy may be different (*e.g.* high-dose morphine plus NSAID for ovarian cyst pain).
- All medications should always be given intravenously. There is little or no role for IM or SQ analgesia in patients with significant degrees of pain in the ED.
- This EBCA does not aim to reproduce all contraindications and risk profiles of the medications involved. Clinicians should use judgment when selecting and dosing pain medications.
- In patients who may need general surgery operative intervention, NSAIDs should be avoided.

HMC EM EVIDENCE-BASED CLINICAL ALGORITHM:
UNFRACTIONATED & LOW-MOLECULAR-WEIGHT HEPARIN

مؤسسة حمد الطبية
Hamad Medical Corporation
HEALTH · EDUCATION · RESEARCH صحة · تعليم · بحوث
EMERGENCY MEDICINE
طب الطوارئ

Version date: 11 March 2016
Authors: A Beadsworth (EM), M Zahid (Medicine), A Mahfouz (Cardiology), I Fawzy (Critical Care), H Al Thani (Vascular Surg.), S Thomas (EM)
Evidence basis:
- National Guideline Clearinghouse, US Agency For Healthcare Research & Quality. www.guideline.gov (last updated May 2014)
- National Institute for Health and Care Excellence. www.nice.org.uk (*Guidelines*: CG144/June 2012; CG94/March 2010)
- *UpToDate* (accessed 9 March 2016)

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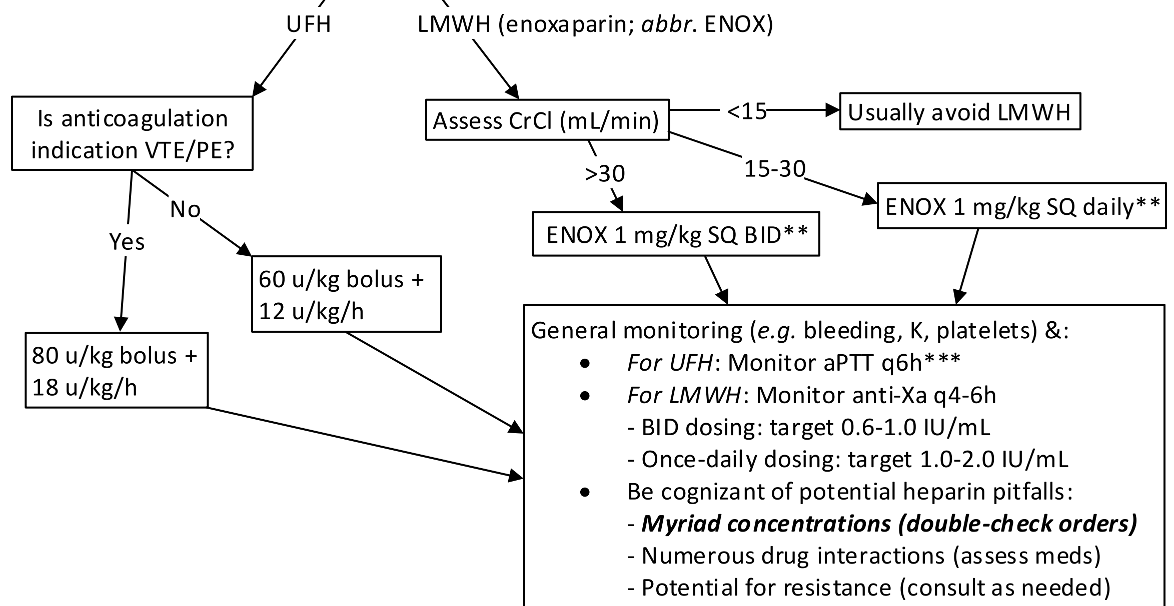
Algorithm aim & applicability:
This EBCA applies to adults with normal baseline coagulation (*e.g.* aPTT) in whom evaluation has led to decision to administer unfractionated heparin (UFH) or low-molecular-weight heparin (LMWH). The EBCA guides therapeutic (not prophylaxis) ED use of UFH or LMWH, by EM physicians. This drug-focused EBCA for EM use is superseded by admitting service preferences or HMC corporate clinical practice guidelines.

Determine which heparin – UFH or LMWH – is appropriate.* Regardless of choice, baseline K, coagulation parameters (PT, aPTT) and CBC/ platelet count are needed. If LWMH is to be given, send Cr; if UFH is to be used then send baseline transaminases.



*** UFH preferred over LMWH (partial listing)**

- Acute limb ischemia
- Pending cardiac surgery
- Late-term pregnancy
- STEMI
- NSTEMI with PCI plan
- PE with plan for lysis
- CrCl <15 mL/min
- Some stroke cases (note that HGH Stroke Service may not desire a bolus; discuss dosing with them)
- *Note*: HIT/HITT is a risk with UFH or LMWH

*****Heparin adjustment *must* be clarified with admitting service (preferences vary across HMC hospitals and services; information below is provided for EM general reference only)**

Heart Hospital preference (aPTT times in seconds) for UFH heparin adjustment based on aPTT
- If aPTT <50: Bolus 60 u/kg and increase infusion rate by 4 u/kg/h
- If aPTT 50-64: Bolus 30 u/kg and increase infusion rate by 2 u/kg/h
- If aPTT 64.1-95: No change
- If aPTT 95.1-106: Decrease infusion rate by 2 u/kg/h
- If aPTT >106: Hold infusion 1 h and decrease infusion rate by 3 u/kg/h

HGH (most services) preference for UFH heparin adjustment based on aPTT
- If aPTT <35 (< 1.2x control): Bolus 80 u/kg and increase infusion rate by 2 u/kg/h
- If aPTT 35-45 (1.2-1.5x control): Bolus 40 u/kg and increase infusion rate by 4 u/kg/h
- If aPTT 45.1-70 (1.5-2.3x control): No change
- If aPTT 70.1-90 (2.3-3.0x control): Decrease infusion rate by 4 u/kg/h
- If aPTT >90 (>3.0x control): Hold infusion 1 h and decrease infusion rate by 3 u/kg/h

**** LMWH dosing notes**

- There is lack of consensus for dosing:
  - In patients age >75
  - In obese or very thin patients
  - For low (or very low) CrCl
  - Depending on anti-Xa levels

  Discuss above cases with the clinical service admitting the patient

- Preservative-free preparation should be used in pregnant patients or cases where there is allergy risk

HMC EM Evidence-Based Clinical Algorithm:

Intranasal (IN) Fentanyl in Paediatric Patients

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EMERGENCY MEDICINE

Version date: 24 May 2017
Authors: C Richards (EM), R Hussein (EM), A Elmoheen (EM)

Evidence basis:

-Borland *et al*. RCT comparing IN fentanyl to IV morphine for managing acute pain in children in ED. *Ann Emerg Med* 2005; 49: 335-340.
-Cole *et al*. IN fentanyl in 1-3 years old. *Emergency Medicine Australasia* 2009; 21: 395-400.
-Clinical Practice Guidelines of Royal Children's Hospital, Melbourne, Australia.
-Finn M, *et al*. IN fentanyl for analgesia in the paediatric ED. *EMJ* 2010; 27: 300-301.
-IN fentanyl better than parenteral morphine for managing acute severe pain in children? *EMJ* 2011; 28: 1077-1078.

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Algorithm aim & applicability:
This algorithm applies to paediatric patients in whom IN fentanyl administered by mucosal atomizer device (MAD) is being considered for treatment of pain for which analgesia stronger than paracetamol or ibuprofen is required (*e.g.* fractures, burns, lacerations, painful procedures). The aim of this EBCA is to facilitate safe and effective pain relief by using an opioid route that does not require IV access.

IN fentanyl: Absolute contraindications:
- Age < 1 year
- Allergy to fentanyl
- Altered mental status
- Haemodynamic instability
- Occluded nostrils bilaterally
- Epistaxis

Does patient have a significantly painful condition for which paracetamol or NSAIDs have either failed or are not indicated?
- No → Do not use IN fentanyl (consider ketamine)
- Yes → Absolute contraindication to IN fentanyl?
  - Yes → Do not use IN fentanyl (consider ketamine)
  - No → Does patient weigh > 50 kg?
    - Yes → Relative contraindication to IN fentanyl; consider alternative approach
    - No → Prepare for administration of initial IN fentanyl dose

IN fentanyl dosing: Background information
1) For this EBCA, actual body weight is dosage basis.
2) The IV preparation of fentanyl (**100 mcg in 2 mL**) is used for all volume calculations in this EBCA.
3) MAD dead-space volume is 0.1 mL; thus an additional 0.1 mL (5 mcg) is added to the 1st IN fentanyl dose (but does not reach patient)

1st-dose calculation

Kg	1.5 mcg/kg	Total volume (1.5 mcg/kg + 0.1 mL)
7	10 mcg	.30 mL
10	15 mcg	.40 mL
12	18 mcg	.45 mL
14	20 mcg	.50 mL
16	24 mcg	.60 mL
18	27 mcg	.65 mL
20-24	30 mcg	.70 mL
25-29	37.5 mcg	.85 mL
30-34	45 mcg	1.00 mL
35-39	52.5 mcg	1.15 mL
40-44	60 mcg	1.30 mL
45-49	67.5 mcg	1.45 mL

2nd-dose calculation
1) Dose ranges from half of 1st-dose to repeat of full 1st-dose
2) If using same MAD as used to deliver 1st-dose, subtract 0.1 mL from above 1st-dose table for volume of a 2nd dose of 1.5 mcg/kg

Prepare for administration of initial IN fentanyl dose:
Discuss plan with patient/family
Position patient: Head up 45 degrees or head-tilt to side
Load MAD with proper IN fentanyl volume (see left)

Administer IN fentanyl
Step 1: Insert MAD loosely into one nostril
Step 2: Quickly depress plunger to deliver ½ of initial dose
Step 3: Repeat above in contralateral nostril
Step 4: Commence q5-minute assessment of BP, HR, S_pO_2 (will continue through 10 minutes after last dose of IN fentanyl)

Monitoring, repeat dosing, & discharge criteria:
- Standard opioid concerns, monitoring, & interventions apply
- *If need reversal*, naloxone 0.1 mg/kg IM or IV (max 2 mg)
- May give one additional IN fentanyl dose of 0.75-1.5 mcg/kg if needed, 7-10 minutes after 1st dose (see dosing table, left); use the same MAD for the 2nd dose as used with the 1st dose
- Discharge when mental status and vital signs are at baseline

HMC EM EVIDENCE-BASED CLINICAL ALGORITHM:
KETAMINE PROCEDURAL SEDATION & ANALGESIA

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EMERGENCY MEDICINE
طب الطوارئ

Version date: 7 December 2015

Authors: C Richards (EM), K Alyafei (Pediatric EM), N Sutcliffe (Anesthesia), S Thomas (EM)

Evidence basis:

- Bisanzo M *et al*. Nurse-administered ketamine sedation in an ED in rural Uganda. *Ann Emerg Med* 2012; 59: 268.
- Green S. Clinical practice guideline for ED ketamine dissociative sedation in children. *Ann Emerg Med* 2004; 44: 461.
- Auerbach P. Pain management and procedural sedation in children. *Tintinalli's Emergency Medicine*, 7th edition (www.accessem.com)
- Godwin S. ACEP Clinical Policy: Procedural sedation and analgesia in the ED. *Ann Emerg Med* 2005; 45: 177.
- Sener S. Ketamine with and without midazolam for ED sedation in adults: A randomized controlled trial. *Ann Emerg Med* 2011; 57: 109.

This EBCA:
- has been endorsed by HMC EM and other consultants for education and assistance with clinical practice in HMC's EDs.
- is intended to complement any related multispecialty Clinical Practice Guideline prepared as per HMC policy.
- is not presented as the binding "standard of care" but is rather a reference tool to inform clinical judgment.

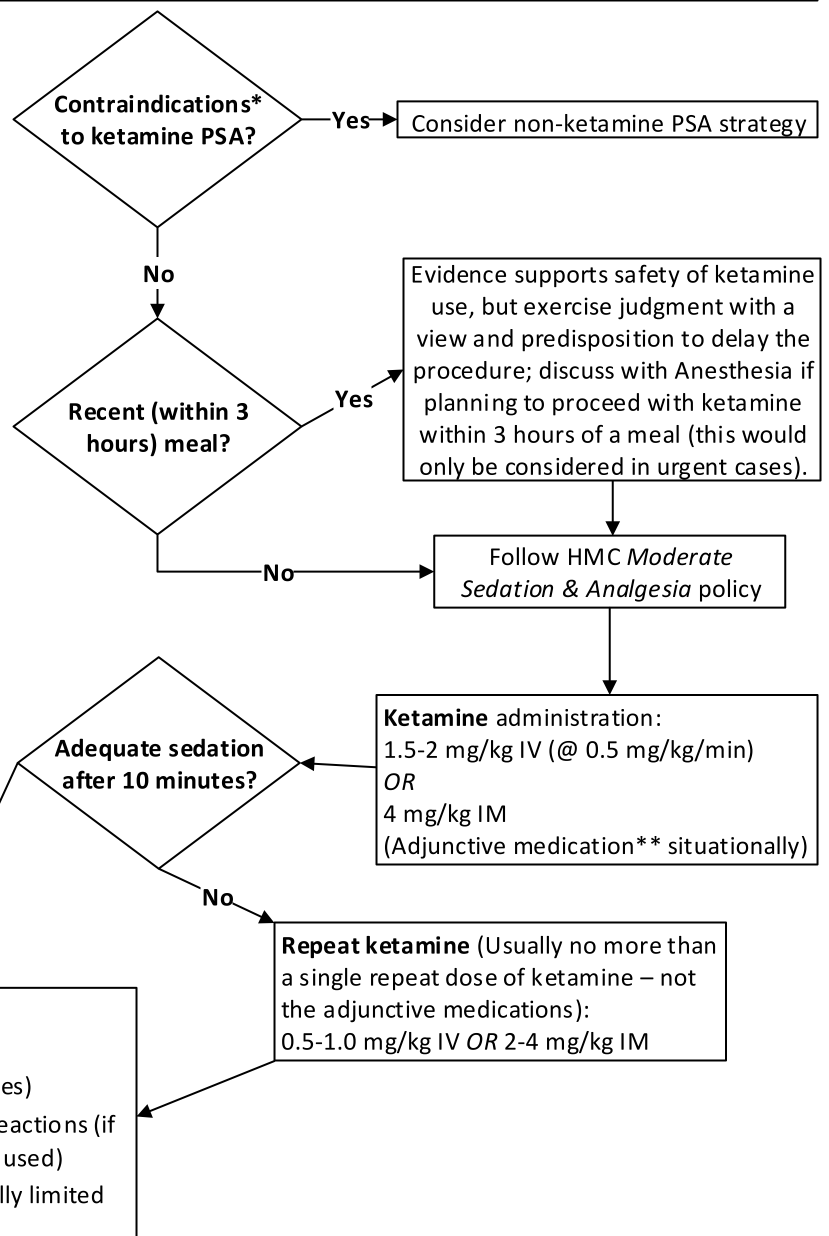
Algorithm aim & applicability:
This algorithm applies to adult and pediatric ED patients in whom ketamine procedural sedation and analgesia (PSA) is being considered. The aim is not to dictate all aspects of ketamine PSA but rather to guide use of ketamine where appropriate. This EBCA is intended to complement – *and in any disagreement, yield to* – applicable HMC Policy (*e.g., Moderate Sedation & Analgesia by Non-Anesthesiologists*).

***Ketamine contraindications (*Note*: Evidence for both strong and relative contraindications is non-definitive):**

Strong: Age < 3 months or active psychosis

Relative:
- Age 3 to 12 months or over 40 years
- Hx of airway instability or tracheal surgery/stenosis
- Procedures involving posterior pharyngeal stimulation
- Active pulmonary or upper airway infection or disease
- Ischemic cardiac disease or CHF
- ICP issues: Head injury, CNS mass, hydrocephalus
- Glaucoma or acute globe injury
- PMH: seizures, psychosis, porphyria, thyroid disease

****Adjuncts (may be added to ketamine syringe)**
- **Atropine** 0.01 mg/kg IV or IM (max 0.3 mg) *OR* **Glycopyrrolate** 5 mcg/kg IV or IM (max 250 mcg); (either is acceptable as antisialogogue)
- **Midazolam** 0.05 mg/kg IV or IM (2 mg max) reduces emergence reaction in adults; may also reduce post-PSA vomiting



Post procedural recovery
- Follow HMC *Sedation & Analgesia* policy
- Observe until return of pre-treatment status (in most cases)
- Recover in a quiet, dimly lit room to reduce emergence reactions (if there is unpleasant emergence, benzodiazepines may be used)
- At discharge, warn patient/parents of potential for (usually limited and harmless) delayed vomiting up to 12 hours after d/c

HMC EM Evidence-Based Clinical Algorithm:
Pediatric Cranial CT after Trauma

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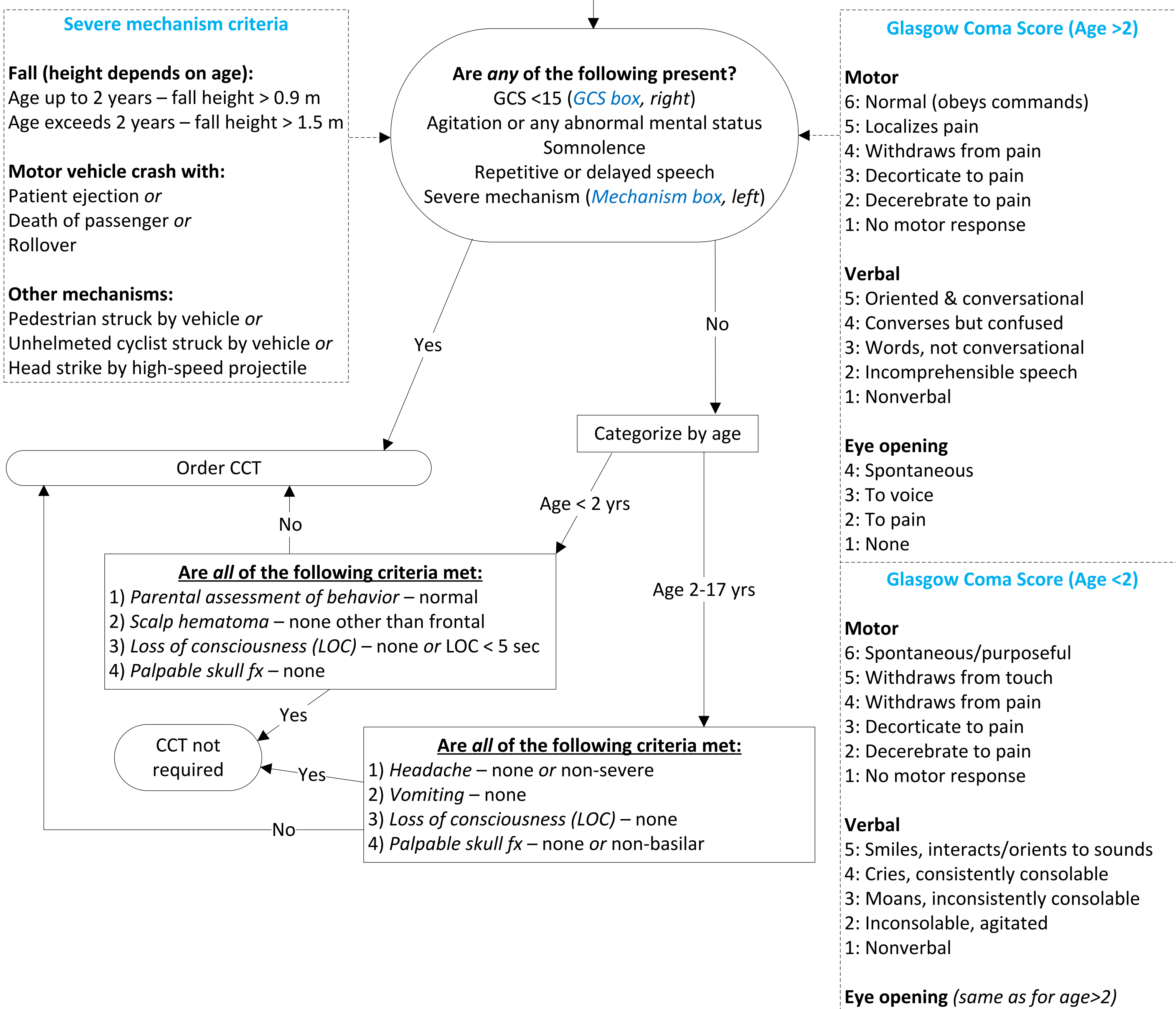
Version date: 25 April 2015
Authors: M Mahmoud (EM), K Ansari (*Pediatrics*), S Al Hilli (*Radiology*), A Quateen (*Neurosurgery*), Y Sharma (*EM*), N Syed (*Radiology*), S Thomas (*EM*)

Evidence basis:

- Pediatric Emergency Care Applied Research Network (PECARN) head injury imaging algorithm (init. pub. *Lancet* 2009; 374:1160)
- Easter JS. Comparison of PECARN, CATCH, and CHALICE rules for children with minor head injury. *Ann Emerg Med* 2014; 64:145.

This EBCA:
- has been endorsed by HMC EM and other consultants for education and assistance with clinical practice in HMC's EDs.
- is intended to complement any related multispecialty Clinical Practice Guideline prepared as per HMC policy.
- is not presented as the binding "standard of care" but is rather a reference tool to inform clinical judgment.

Algorithm aim & applicability:
This algorithm applies to pediatric (age <18) ED patients presenting to ED within 24 hours of head injury, who do *not* have obvious need for cranial computed tomography (CCT) but in whom CCT is considered; the algorithm aim is to inform EM physicians' imaging decision-making.



HMC EM Evidence-Based Clinical Algorithm: Pediatric Seizure

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Version date: 12 October 2015
Authors: M Abbasy (EM), G Melikyan (Neurology), K Zamal (Pediatric Neurology), K Alyafei (Pediatric EM), S Thomas (EM)
Evidence basis:
- Koburov G. Seizures. *Strange & Shafermeyer's Pediatric Emergency Medicine*, 4th edition 2015 (www.accessem.com, accessed 9/2015)
- Stone CK. Status epilepticus. *Current Diagnosis & Treatment: Pediatric EM*, 1st edition 2015 (www.accessem.com, accessed 9/2015)

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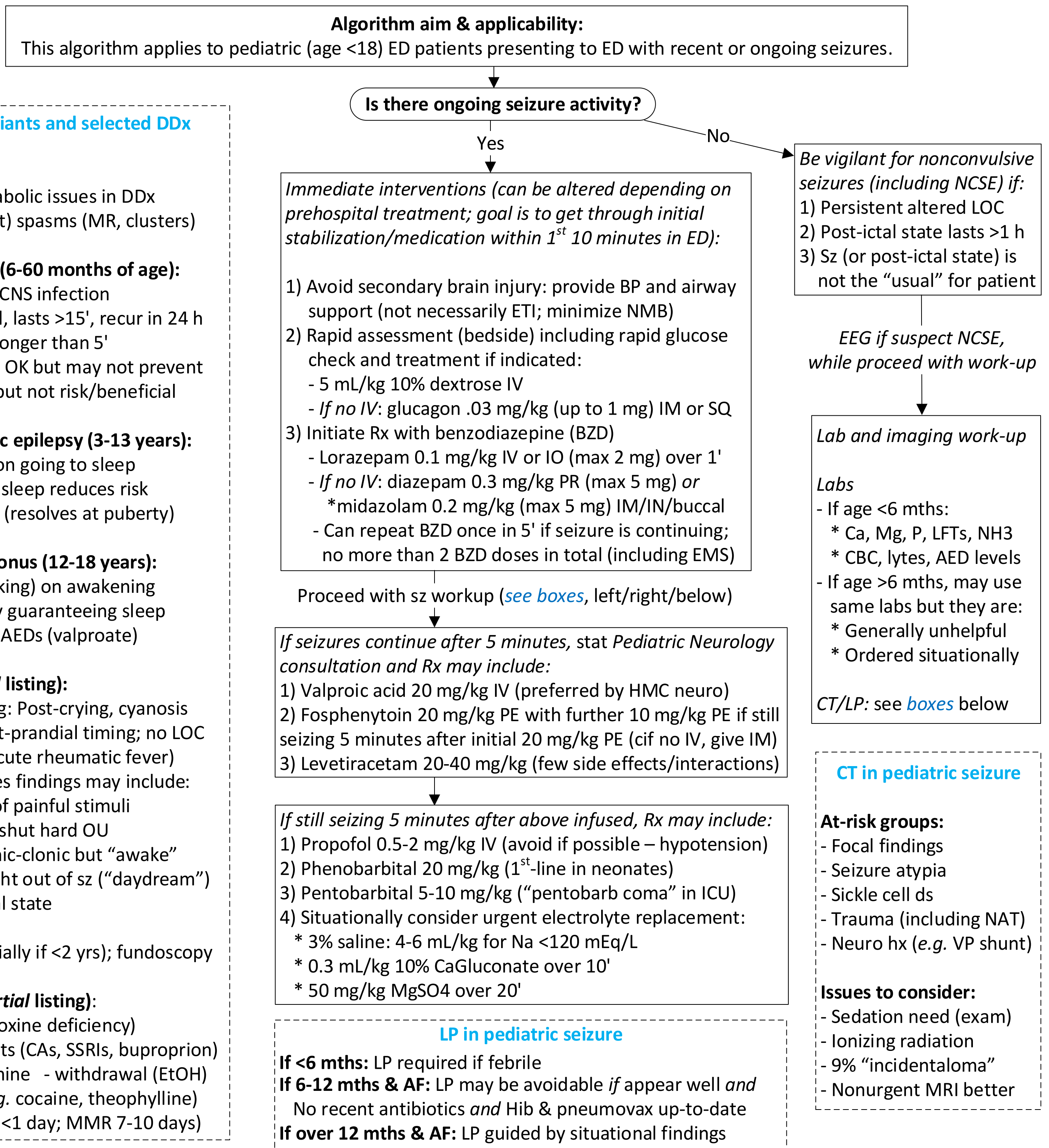
- is not presented as the binding "standard of care" but is rather a reference tool to inform clinical judgment.



Seizure variants and selected DDx

Neonates:
- Complex metabolic issues in DDx
- Infantile (West) spasms (MR, clusters)

Febrile seizure (6-60 months of age):
- >38C without CNS infection
- complex: focal, lasts >15', recur in 24 h
- Tx BZD if last longer than 5'
  * Antipyretics OK but may not prevent
  * AEDs work but not risk/beneficial

Benign Rolandic epilepsy (3-13 years):
- Brief (< 2') sz on going to sleep
- Guaranteeing sleep reduces risk
- Usually: no Rx (resolves at puberty)

Juvenile myoclonus (12-18 years):
- Sz (usually jerking) on awakening
- Reduce risk by guaranteeing sleep
- Often require AEDs (valproate)

Mimics (*partial* listing):
- Breath-holding: Post-crying, cyanosis
- GE reflux: Post-prandial timing; no LOC
- chorea (*e.g.* acute rheumatic fever)
- Pseudoseizures findings may include:
  * Avoidance of painful stimuli
  * Eyes squint shut hard OU
  * Bilateral tonic-clonic but "awake"
  * Easily brought out of sz ("daydream")
  * No post-ictal state
- Syncope
- Abuse: (especially if <2 yrs); fundoscopy

Toxicology (*partial* listing):
- INH (*i.e.* pyridoxine deficiency)
- antidepressants (CAs, SSRIs, buproprion)
- diphenhydramine - withdrawal (EtOH)
- stimulants (*e.g.* cocaine, theophylline)
- vaccines (DPT <1 day; MMR 7-10 days)

HMC EM EVIDENCE-BASED CLINICAL ALGORITHM:
PULMONARY EMBOLISM WORKUP (LOW-PROBABILITY CASES)

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Version date: 15 September 2015
Authors: A Hameed (EM), A Aziz (EM), A Elmoheen (EM), S Al Hilli (Radiology), T Mohd (Pulmonary/Critical Care), S Thomas (EM)

Evidence basis:

- Singh B. Diagnostic accuracy of Pulmonary Embolism Rule-Out Criteria (PERC). *Ann Emerg Med* 2012; 59: 517-520.
- Green SM. Right-sizing testing for pulmonary embolism: Recognizing the risks of detecting any clot. *Ann Emerg Med* 2012; 59: 524-526.
- Righini M. Age-adjusted D-dimer cutoff levels to rule out pulmonary embolism: ADJUST PE Study. *JAMA* 2014; 1117-1124.

This EBCA:
- has been endorsed by HMC EM and other consultants for education and assistance with clinical practice in HMC's EDs.
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- is not presented as the binding "standard of care" but is rather a reference tool to inform clinical judgment.

Algorithm aim & applicability:
This algorithm applies to adult non-obstetric patients (>17) in whom, after initial evaluation, there is low risk (<15% by gestalt *or* Wells) of pulmonary embolism (PE) and question of need to pursue PE work-up/evaluation)

↓

Application of PERC: Are *all* of the following true)?
- Age <50 years
- HR <100
- SpO2 >94%
- Absent unilateral leg swelling
- No hemoptysis
- No surgery or trauma within 4 weeks
- No history of previous DVT or PE
- No oral hormone use

Wells' criteria use in defining low-risk (<15% chance) for PE

Patients can have *neither* of the following characteristics
- Clinical signs/symptoms of DVT
- PE is the #1 diagnosis (including "tie" for #1)

Patients can have *zero or one* of the following characteristics:
- HR >100
- Immobilization at least 3 days or surgery <4 weeks ago
- Previous objectively diagnosed DVT or PE
- Hemoptysis
- Malignancy with Tx (or palliative care) within 6 months

No →

Institute workup for PE diagnosis. PE investigation may include combination of the following (see *boxes* below):
- D-dimer
- ED ultrasound performed by EM
- Radiology-performed ultrasound
- CT scan
- V/Q scan

Yes →

ED PE workup not required. It is likely that the overall harm of a PE work-up outweighs the benefit to the patient.
- Document: *"My clinical judgment for this patient is that the risks of PE workup outweigh the likely benefits."*
- Only for those cases in which there is lingering concern, patients should be recommended for 24-hour recheck. If this option is chosen, document: *"I have asked the patient to be rechecked in 24 hours (or earlier if worse)."*

Notes on D-dimer interpretation

Age
- D-dimer cutoff is 500 mcg/L in patients up to 50 years old
- For patients >50 the cutoff is *10×age* (*e.g.* 550 if 55 years old)

Conditions increasing or decreasing D-dimer (partial listing)
- D-dimer can be elevated by infection, cancer, pregnancy (*PE work-up in pregnant patients is outside this EBCA's scope*), or recent surgery/trauma.
- D-dimer can be falsely negative in patients taking warfarin or in patients with small clots, >5 days of symptoms, calf-only thrombosis, or isolated small pulmonary infarction.

Notes on PE imaging

Ultrasound (US)
- Emergency Radiology resources do not allow performance of large numbers of lower extremity (LE) US studies.
- Patients can often safely be given a dose of anticoagulation (*e.g.* LMWH) and then sent for outpatient-clinic US.
- PE can come from multiple sites (not just proximal LEs).
- EM US *may* be incorporated into decision-making *only* for those whose training/certification specifically includes DVT evaluation.

CT scan
- "Double rule-out" chest CT (*i.e.* to assess for PE and aortic dssxn) requires an additional dose of ionizing radiation (to get venous & arterial phases of contrast). Discuss with Radiology if considering.

V/Q: Rarely indicated in the ED (discuss with Radiology if considering)

HMC EM Evidence-Based Clinical Algorithm: Evaluation for Septic Arthritis

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Version date: 3 October 2015
Authors: S Hlaoui (EM), R Hussein (EM), A Mahdy (EM), H Al Soub (ID), A Al Khal (ID), S Al Emadi (Rheum), O Alnori (Ortho), S Thomas (EM)
Evidence basis:
- Carpenter et al. Evidence-based diagnostics: Adult septic arthritis. Acad Emerg Med 2011; 18: 782.)
- UpToDate (accessed 3 Sept 15)
- Burton JH. Acute disorders of joints and bursae. Tintinalli's Emergency Medicine, 7th edition (www.accessem.com)

This EBCA:
- has been endorsed by HMC EM and other consultants for education and assistance with clinical practice in HMC's EDs.
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- is not presented as the binding "standard of care" but is rather a reference tool to inform clinical judgment.

Algorithm aim & applicability:
This algorithm applies to adult (age >17) ED patients presenting to ED with joint swelling, in whom the diagnosis of septic arthritis is under consideration; the algorithm aim is to inform EM physicians' decision-making regarding workup and diagnostic testing for septic arthritis.

Is the joint appropriate for EM arthrocentesis?
Consider issues & relative contraindications (*see box*, *left*)

EM arthrocentesis: The following inform decisions regarding EM-performed arthrocentesis

Systemic factors:
- Patient tolerance for procedure
- Immunocompromise
- Recent antibiotics
- Anticoagulation/Bleeding diathesis

Joint factors:
- Overlying infection
- Hardware/prosthetics in place (needs early Ortho consultation pre-tap)
- Accessibility: EM will only tap joints for which the physicians have training & experience (non-knee taps may need pre-tap consult with Rheum/Ortho)

Effusion factors:
Post-traumatic hemarthrosis
High clinical certainty of non-septic dx

No →
Time-sensitive call to Rheum/Ortho/ID for:
1) Collaborate on pre-tap labs, cultures, abx
2) Formulation of plan for urgent evaluation

Yes →
Labs and imaging:
1) Situationally appropriate labs plus: CBC, LFTs, Cr, ESR, CRP, blood cultures
2) Consider *Brucella* serology, PPD/quantiferon and CXR for TB evaluation
3) Situationally appropriate imaging (*eg*, X-ray for fx)

EM arthrocentesis:
- *See box*, *right*
- Shake purple tube well after adding synovial fluid, to avoid spuriously low fluid WBC
- Keep ≥1 mL fluid (in capped syringe) for Rheum for crystals assessment, and send to lab: Lactate, WBC/diff, Gram stain & culture

EM arthrocentesis to r/o septic joint

Timing target: within 30' of MD eval
Consent: written and verbal
Imaging: US in nearly all cases
PSA: Local anesthesia at minimum
Technique: *www.accessem.com*

While awaiting synovial fluid analysis, or (for dry tap) while awaiting consultation recommendations, situationally execute the following:
1) Imaging (in nearly all cases, X-ray if not executed pre-tap)
2) Abx (*eg*, if identify purulent aspirate – *see box*, left)
3) Labs (*eg*, hematology if unexpected bloody aspirate)

IV abx in presumed septic arthritis

Situational guidance:
Allergies, past/current medical (*eg*, sickle) & surg/hardware hx, sexual hx, previous septic arthritis infxn

Antibiotics (all IV):
1st-line
Cloxacillin 2g q4-6h *and*
Ceftriaxone 2 g q24h

Alternatives (consult ID):
Ciprofloxacin 400 mg *or*
Vancomycin 15 mg/kg

Synovial fluid WBC ≥50k
- Disposition: Admission (ID consult)
- Ortho consult – joint irrigation (*NPO*)
- Antibiotics (*see box*, left) within 30' after tap, pending synovial fluid cx results, *unless* specialty consultation dictates otherwise (*eg*, crystals seen, and no overarching signs of sepsis)

Synovial fluid WBC <50k
- Disposition: Situational, determined in consultation
- Antibiotics: In absence of strong clinical suspicion, abx may be withheld pending observation (inpatient or outpatient)
- Septic arthritis cannot be definitively ruled out by lab tests
  - Synovial fluid WBC 50k cutoff misses 1/3rd of cases
  - ESR 30 cutoff is highly sensitive (>95%) but nonspecific

HMC EM EVIDENCE-BASED CLINICAL ALGORITHM: ADULT SEIZURE

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EMERGENCY MEDICINE
طب الطوارئ

Version date: 21 November 2015
Authors: S Hlaoui (EM), G Melikyan (Neurology), G Alarcon (Neurology), N Azar (Neurology), J Houssein (EM), J Sirajudeen (EM), L Michael (EM), B Kunhimon (EM), S Thomas (EM)

Evidence basis:
- ACEP Clinical Policy: Critical issues in evaluation and management of adult patients presenting to ED with seizures. *Ann Emerg Med* 2014: 63: 437.
- Stone CK. Status epilepticus. *Current Diagnosis & Treatment: Pediatric EM*, 1st edition 2015 (www.accessem.com, accessed 9/2015)

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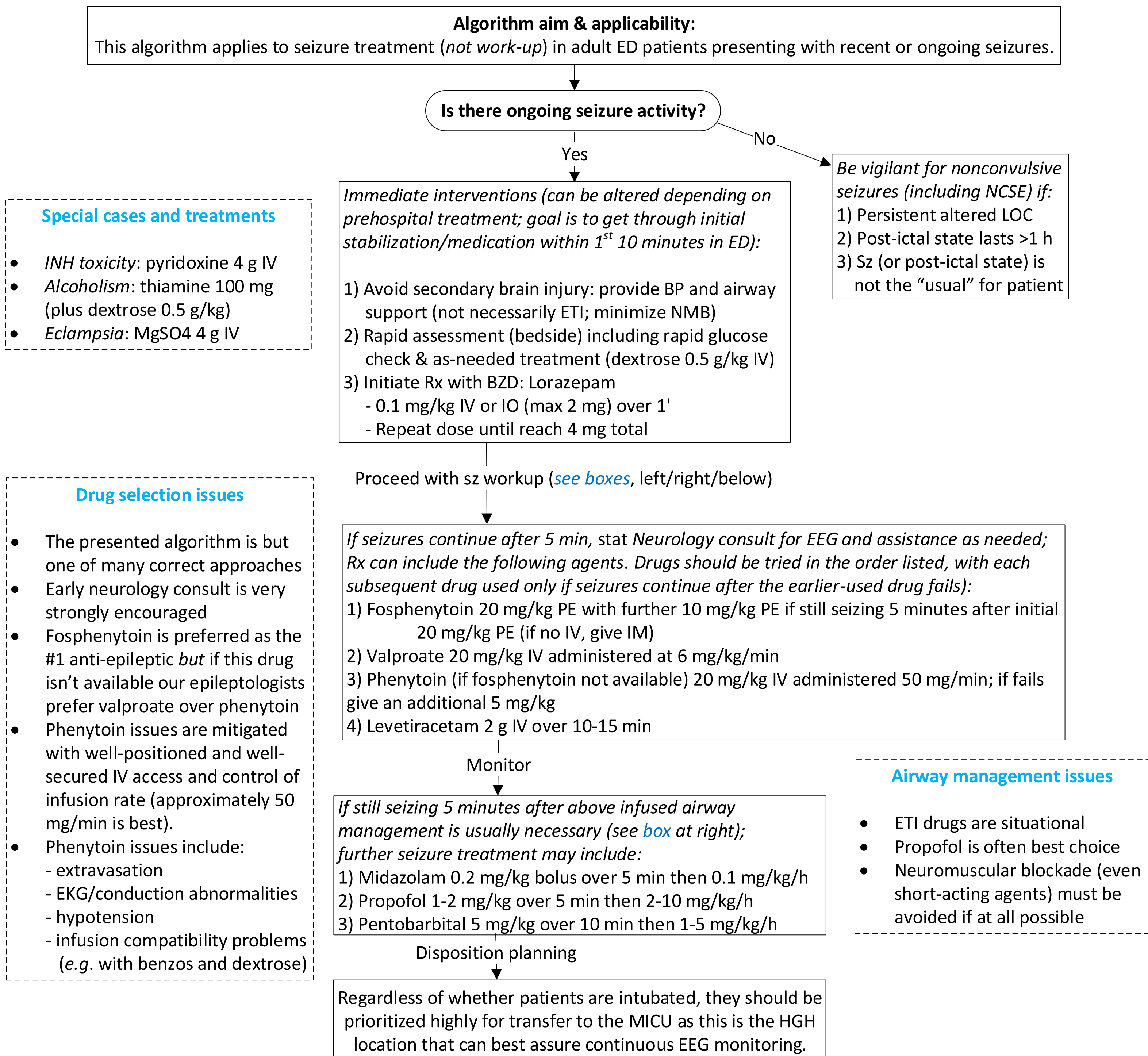

Heat Exhaustion Cooling Kit and Guide

Prepared by: Dr. Muna Al-Musleh, Ms. Alice George, Dr. Navid Iqbal and Ms. Sandra Rull

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1) Get the Heat Exhaustion Kit and open it to check all components (Available in all Male and Female Areas)

---

2) Arrange for ice

Ice machine Locations:

1) Non GCC Male Minors (Plaster Room)
2) GCC Female Minors
3) Trauma/Resus

Get ice from the ice machine. Fill the ice bags or the basins provided in the kit.

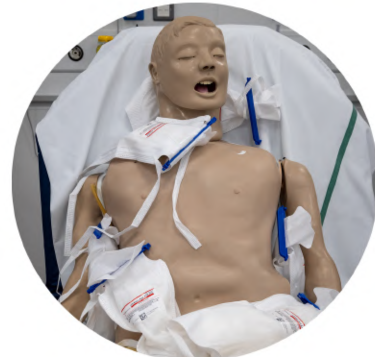
First thing to do

Undress the patient

Encourage oral hydration with water and juice. Also encourage the patient to eat a snack.

Start Cooling the patient

Method 1



Place the ice packs directly on the patient. Suggested areas are: axilla, around the neck and over the groin.

Method 2

a) Distribute ice in all three basins.

b) Add cold water from the sink to the ice in the basin.

c) Submerge the towel in the kit in this ice/water mix untill completely soaked.

d) Prepare all three basins and towels, keep them close to the patient's bedside.

e) Wrap the cold towels around the patient's body as shown above.
After 3-5 minutes place the towels back in the ice/water mix
then reapply to the patient.
Repeat this cycle as necessary.

Other considerations

Fans are not avialable in the ED.

Cold Normal Saline is available in Pyxis' fridge in GCC and non-GCC Male Minors along with Resus Room.

Water can spill so be careful and walk carefully. Also be mindful of electronics near water.

Heat Stroke Cooling Kit and Guide

Prepared by: Dr. Muna Al-Musleh, Ms. Alice George, Dr. Navid Iqbal and Ms. Sandra Rull

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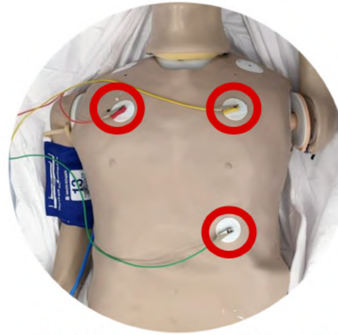
1) Get the Heat Stroke Kit and open it to check all components (Available in all Male and Female Areas)

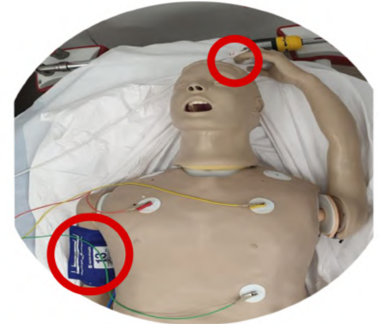
Heat Stroke Kit	QTY.
Basin	4
Body Bag	1
Probe Cover	2
KY gel (sachet)	3
Blue pad	5
Laundry bag	2

2) Meanwhile undress the patient and attach to monitor

a) Undress the patient and remove blanket.



b) Attach all 3 leads to the anterior of the patient's thorax. Avoid lead placement on the patient's side.



c) BP Cuff to be attached every 5-10 minutes to measure BP then remove cuff
Keep the arm with saturation probe away from water.

2) Measure core body temperature with a rectal probe

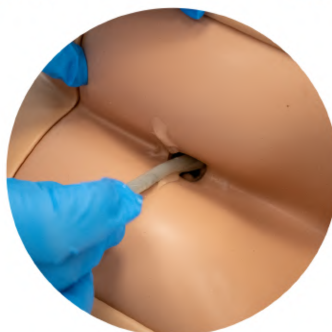
a) Make sure a rectal probe is available and connected to the monitor.

b) Apply KY Gel on the probe.

c) Slide the cover over the probe.

d) Apply KY Gel over the probe.

e) Apply KY Gel to the anus.



f) Insert the rectal probe in the rectum. At least 15cm in.

g) A second method of temperature measurement should be obtained. For intubated patients an esophageal thermometer can be used. For patients breathing spontaneously (or intubated) an oral or aural intermittent temperature measurements can be used (Q10 minutes).

4) Get ice ready

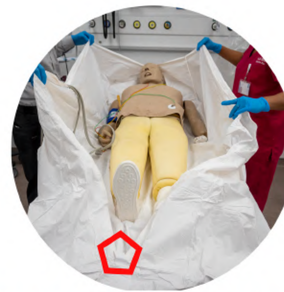
a) Ice is available at the enterance of Trauma Room and Resus, on the Ground Floor in Female GCC Minors and in Non GCC Male Minors (Plaster Room)

b) Put ice in a doubled laundry bag.
Use the basin for scooping ice if necessary.

c) Try to fill at least half of the bag.

5) Help patient get inside the body bag

a) Place a pillow under the head to elevate it. Assign one person to monitor airway while patient is cooled down.



b) Put patient in the body bag.
(Bag's zipper should be at the legs end of the bed.)

6) Start actively cooling the patient

a) Add ice packs to the neck, axilla, chest and abdomen. Avoid covering ECG electrodes.

b) Add ice directly over the other areas of the patient. Once enough ice is added, start pouring cold water (from the sink in the room) over the ice using a basin.
Avoid ice/water coming in contact with ECG electrodes, saturation probe and the BP cuff.

c) Keep the patient semi-submerged in ice and water, hold the body bag up and zip it if necessary to avoid spillage. Add extra ice when moderate melting is noted.

7) Target and goal of cooling

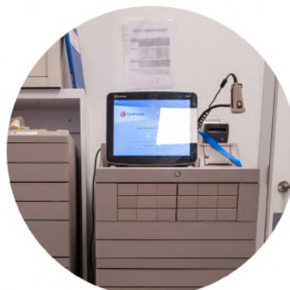
Achieve a core temperature of 38.3°C within 30 minutes

Once goal reached, remove the patient from the body bag, dry the patient, remove all wet bed sheets,cover the patient with a light sheet and continue core body temperature monitoring.

Other considerations

- Gaymar machine takes time to cool. Only use as an adjunct and not a primary cooling modality.

- Fans are not avialable in the ED.



Cold Normal Saline is available in Pyxis' fridge in Resus Room, GCC and Non-GCC Male Minors.

Water can spill so be careful and walk carefully. Also be mindful of electronics near water.

APPENDIX B-1
CLINICAL PRACTICE GUIDELINE

TITLE:	Management of Acutely Disturbed Patients for All Age Groups	ORIGINAL DATE: 4/12/2017
IDENTIFICATION NUMBER:	CG10151	LAST REVISION DATE: July 2019
HOSPITAL: Mental Health Services		NEXT REVIEW DATE: July 2022
		Sheet No. 1 of 13

1.0 PURPOSE (AIM):

This guideline aimed to help in the management of acute behavioural disturbance (including violence and aggression) in patients presented to hospital services, in line with evidence based practice. This includes prescribing advice, physical health monitoring and management of acutely disturbed patients.

This guideline is for short term management of acute behavioural disturbance and is divided into management of patients in all age groups; i) adults and older adults (above 18 years old) and ii) for children and adolescents below 18 years old.

2.0 DEFINITIONS:

Violence and aggression: This is a range of behaviour or actions that can result in harm, hurt or injury to another person. It can be in physical or verbal form.

Rapid Tranquillisation: This is the use of rapid-onset, short acting, parenteral or oral medication to alleviate acutely disturbed behaviour which cannot be achieved by less restrictive measures. The aim of rapid tranquillisation is to achieve a state of calm sufficient to minimise the risk posed to the patients or to others and not to induce sleep or unconsciousness.

3.0 APPLIES TO: All doctors and nurses working in mental health service, pharmacists and any health care practitioners who are involved in patients' care in acute and community settings.

4.0 PATIENT GROUP: Acute behaviourally disturbed (including violent and aggressive) patients who pose risk on themselves and others.

5.0 EXCEPTIONS: Pregnant women.

6.0 TARGET AREAS:

Mental Health Hospital inpatient wards.
Mental Health Hospital outpatient clinics.
Mental Health Hospital community services including the Child and Adolescents Mental Health Service and the Muaither compound.

7.0 GUIDELINE:

This guideline helps to guide practitioners in managing patients with acute behavioural disturbance. Any variation of this guideline will be based on clinical and nursing assessments and clinical judgment.

7.1 **Overall principles**

A quick but comprehensive assessment of the patient is required for all patients who are behaviourally disturbed. This includes understanding the cause for the disturbance for example, due to psychotic symptoms, other psychiatric illness, physical illness, substance abuse, personality disorder, behaviour problems or for secondary gain. The assessment should include the risk of continuing disturbed behaviour on the patients themselves, on other patients, on the staffs and the risk of possible medication related effects. Check on the past and current medical histories as well as any medication given within the 24 hours.

Behaviour and verbal de-escalation must be tried first before considering physical or chemical restraint.

Choosing the appropriate medications for the rapid tranquillisation and continuing monitoring after medication administration are crucial.

Documentation should be done as soon as possible. OVA reporting should be completed if the patient is aggressive and needs rapid tranquillisation.

Post incident actions include holding de-briefing session for patients and staffs about the incident.

7.2 **Verbal and Behavioural De-escalation**

Verbal and behavioural de-escalation should be first line approach in managing acutely disturbed patients of all ages. This is particularly important for children under 12 years of age.

De-escalation techniques include:

- Talking down, use non-threatening non-verbal communication.
- Using distraction technique.
- Put the patient in safe place or change of environment (provide high support, low stimulation environment).
- Try to develop and maintain therapeutic relationship throughout the process with the patient or the child and his/her carer by giving them reassurance and explanation.
- Assess patient's capacity and obtain their consent if possible.
  Please also refer to Restraining Policy CL6025 and management of violent patient CL7149.

7.3. Rapid Tranquillisation

7.3.1 General Principles

Rapid tranquillisation is a clinical management strategy that is used as an emergency action once all other strategies such as de-escalation are unsuccessful in calming the patient. This will include situations where the patient is acutely disturbed and presenting a significant immediate risk to themselves and/or others. Rapid tranquillisation should be viewed as the last option in maintaining the safety of the patient and others in the care environment.

The aim of rapid tranquillisation is to achieve a state of calm sufficient to minimise the risk posed to the service user or to others and not to induce sleep or unconsciousness.

The main principles in rapid tranquillisation include:

- Oral medication is preferred to parenteral medicine whenever possible.
- Start at low dose, wait for effect and re-assess.
- Don't be tempted in over-medicating the patients.
- Be mindful of off-license prescribing. If this is necessary, clinical rationale and if possible consent should be documented.

7.3.2 Rapid tranquillisation algorithms

7.3.2.1. Adults (18-65 years old) and older adults (above 65 years old) – please see Appendix 1

7.3.2.2 Children and young persons under 18 years old – please see Appendix 2

In those under 18 years old, verbal and behavioural de-escalation must be tried first before any consideration for medication.

The child/adolescent should be sedated but still able to participate in further assessment and treatment, however there may be occasions when sedation is an appropriate goal.

7.3.3 Oral medications

If medication is necessary, oral medications should be offered as first line for all patients.

7.3.3.1 Older adults above 65 years old

Patients with dementia should not be prescribed intramuscular or intravenous medications unless the risks to themselves or others deemed greater than the risk of side effects or adverse events. Antipsychotic generally should be avoided in patients with dementia as this might increase their morbidity and mortality. Please refer to the old age psychiatrists for advice in management of behavioural and psychological symptoms in dementia.

Older adults require half of adults' dose of medication and their maximum daily limit is also half of the adults' daily maximum dose.

7.3.3.2 Young persons under 18 years old

Any medications for young person should only be considered as last resort, only after behavioural management has failed.

If medication is really necessary for children under 12 years old, only lorazepam should be used. All other medications such as antipsychotics should be avoided. However, avoid benzodiazepines in adolescents who are physically unwell, delirious or who have significant respiratory impairment e.g. asthma.
Use atypical antipsychotic for first episode psychosis.

The doses for young persons are based on their weight.

If the young person requires more than one (dose) administration of any rapid tranquillisation medication, please consult with the on call psychiatrist before giving further doses.

7.3.4 Parenteral medications

In cases where patient refuses oral medication or if patient has a known history of poor response to oral medications, parenteral administration of medication should be considered. In general, intramuscular route is easier and safer than the intravenous route, particularly in the ward and clinic settings.

7.3.4.1. Young persons under 18 years old

Use atypical antipsychotic for first episode psychosis.

Consider procyclidine with atypical antipsychotics as (extra pyramidal side effects) EPSEs with antipsychotics are more common in adolescents even with atypicals.

7.3.5 Zuclopenthixol acetate

In acutely psychotic patients who are not neuroleptic naïve and who remained disturbed despite repeated injections of rapid tranquillisation medications (such as lorazepam and haloperidol) zuclopenthixol acetate is an option in the management of agitated and disturbed patients.

Its effect is not immediate and it should not be used as part of rapid tranquillisation. However, evidence suggests that patients who received zuclopenthixol acetate have fewer subsequent injections in the medium term.

Zuclopenthixol acetate prescribing should be restricted to:

- psychiatric inpatients only and
- only specialists, consultants and senior consultants can prescribe it.

Please refer to Appendix 3 for further prescribing information.

7.3.6 Medications for side-effects

7.3.6.1 Anticholinergic

Acute dystonia reaction is involuntary muscle spasm that can present as oculogyric crisis (eyes rolling upwards), torticollis (neck and head bend to the side), not able to swallow or speak clearly, tongue protrusion and opisthonous (back arch backward). It can occur within hours of administering haloperidol (or other highly potent antipsychotic medications). Young male patients and those who had no prior exposure to antipsychotics are more susceptible to get acute dystonia. Acute dystonia can be painful and frightening for the patient.

The main treatment is anticholinergic medication such as procyclidine, benztropine or benzhexol. Patient may not be able to swallow, and thus intramuscular preparation is preferred. Procyclidine 5-10mg i.m. can be given. Alternatively, 2 separate intramuscular injections of 50mg of diphenhydramine together with 2mg of lorazepam can be given, but this is less ideal.

Prophylactic treatment with an anticholinergic agent or adding 50mg of promethazine to 5mg of haloperidol can be considered to improve tolerability in patients who are given haloperidol.
In adolescents, consider giving procyclidine with atypical antipsychotics as EPSEs with antipsychotics are more common in adolescents even with atypicals.

7.3.6.2 Flumazenil

In cases of suspected benzodiazepine toxicity or overdose, flumazenil can be given to reverse the effect of benzodiazepine.
Flumazenil must be administered intravenously by a doctor.

Initial dose: 0.2 mg over 30 seconds; if the desired level of consciousness is not obtained 30 seconds after the dose, 0.3 mg can be given over 30 seconds.

Repeated doses: 0.5 mg over 30 seconds repeated at 1-minute intervals

Maximum total cumulative dose: 3 mg (usual total dose: 1-3 mg). Patients with a partial response at 3 mg may require (rare) additional titration up to a total dose of 5 mg (although doses >3 mg do not reliably produce additional effects). If a patient has not responded 5 minutes after cumulative dose of 5 mg, the major cause of sedation is unlikely due to benzodiazepines.

In the event of re-sedation, repeated doses may be given at 20-minute intervals if needed, at 0.5 mg per minute to a maximum of 1 mg total dose and 3 mg in 1 hour.

7.4 Additional information

7.4.1 Old age

The pharmacokinetics and pharmacodynamics of most drugs are altered to an important extent in the elderly. These changes in drug handling and action must be taken into account if treatment is to be effective and adverse effects minimized.

In the elderly;

- Their receptors may become more sensitive resulting in an increased incidence and severity of side-effects.
- Their gut motility and secretion of gastric acid decreases with age, which leads to drugs being absorbed more slowly, resulting in slower drugs onset of action.
- They have more body fat, less body water and less albumin than younger adults which leads to increased volume of distribution and longer duration of action for some fat-soluble drugs, higher concentrations of some drugs at the site of action and reduction in the amount of drug bound to albumin.
- The magnitude of pharmacokinetic interaction is unlikely to be altered but the pharmacodynamic consequences of these interactions may be amplified.
- The renal function declines with age, 35% of function is lost by age of 65 and 50% by age of 80. Thus drugs that are primarily excreted by kidneys will accumulate in the elderly, leading to toxicity and side–effects.

To reduce drug-related risk in the elderly:

- Use drugs only when absolutely necessary
- Avoid, if possible, drugs that block alpha1 adrenoceptors due to its sedative effect and its inhibiting effect on the liver enzymes.
- Start with a low dose and increase slowly but do not undertreat.
- Try not to treat the side effects of one drug with another drug
- Keep therapy simple and avoid polypharmacy.

Delirium (acute confusional state) is more common in old age due to co-morbid physical illnesses.

Medicine should be administered covertly only if the clear and express purpose is to reduce suffering for the patient.

7.5 Monitoring

Baseline observations are required on admission. Please refer to the most recent observations taken before administering rapid tanquillisation medication.

Once the rapid tanquillisation medications are given, the vital signs (BP, pulse, temperature, respiratory rate, O_2 saturation, close visual observation of respiratory rate/skin colour) should be monitored every 30 minutes until patient is verbally responsive. For under 18 years old, the vital signs are monitored every 15 minutes for the first hour then hourly for the next 4 hours, and then depending on the clinical status, 4 hourly for the next 12 hours. If it is not possible to take

patient's vital signs, it is imperative to continue to keep patient under close visual observation and document reason why this was not possible.

Please also refer to restraint policy CL6025.

Use fluid monitoring sheet to ensure adequate hydration and do Urea and Electrolytes if clinically appropriate. Avoid fluid overload in anorexic patients.

Monitoring and assessment for signs of extrapyramidal side effects including acute dystonic reaction with the use of haloperidol should continue even the vital signs monitoring stops.

7.6 Documentation

7.6.1 Minimum standard

Clear description of the incident that necessating tranquillisation should be contemporaneously documented by those who witnessed the incident. The de-escalation techniques applied, the restraint and rapid tranquillisation process with the recommended monitoring should all be documented.

7.6.2 Initiating OVA

OVA should be initiated in all cases where patients are aggressive and require rapid tranquillisation, particularly in cases where the potential risks for not controlling the behaviour are significant and clear injury sustained. OVA is often completed by the primary health care professional involved in the incident.

7.7 Debrief

7.7.1 Patient

It is important to involve patients in their care as much as possible. However, patients who required rapid tranquillisation are often too disturbed to give informed consent or be involved in their care at the time. Despite this, it is still important to explain to patient of what is being done to them. The primary nurse or doctor involved in that patient's care should consider offering a de-briefing session to the patient as soon as it is feasible to do so.

7.7.2 Team

A debriefing session with the team involved in the de-escalation and rapid tranquillisation should be held as soon as feasible. Often lead by the most senior nurse in charge, team de-briefing not only offer an avenue for support to staffs involved in the rapid

tranquillisation process but it can also be used as a forum to review and learn from the incident.

8.0 AUDIT DELIVERABLES

Below are auditable areas:

- Evidence of stepwise approach in managing disturbed patients by using verbal de-escalation first, then offering oral medication first before giving parenteral medication (in this order).
- The medications used in rapid tranquilisation.
- The use of zuclopenthixol acetate is not for the purpose of rapid tranquilisation.
- Evidence of ongoing education and training to doctors and nurses in managing patients who are acutely disturbed.

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Approved by: Prof Peter Woodruff, chairman of the Mental Health Service

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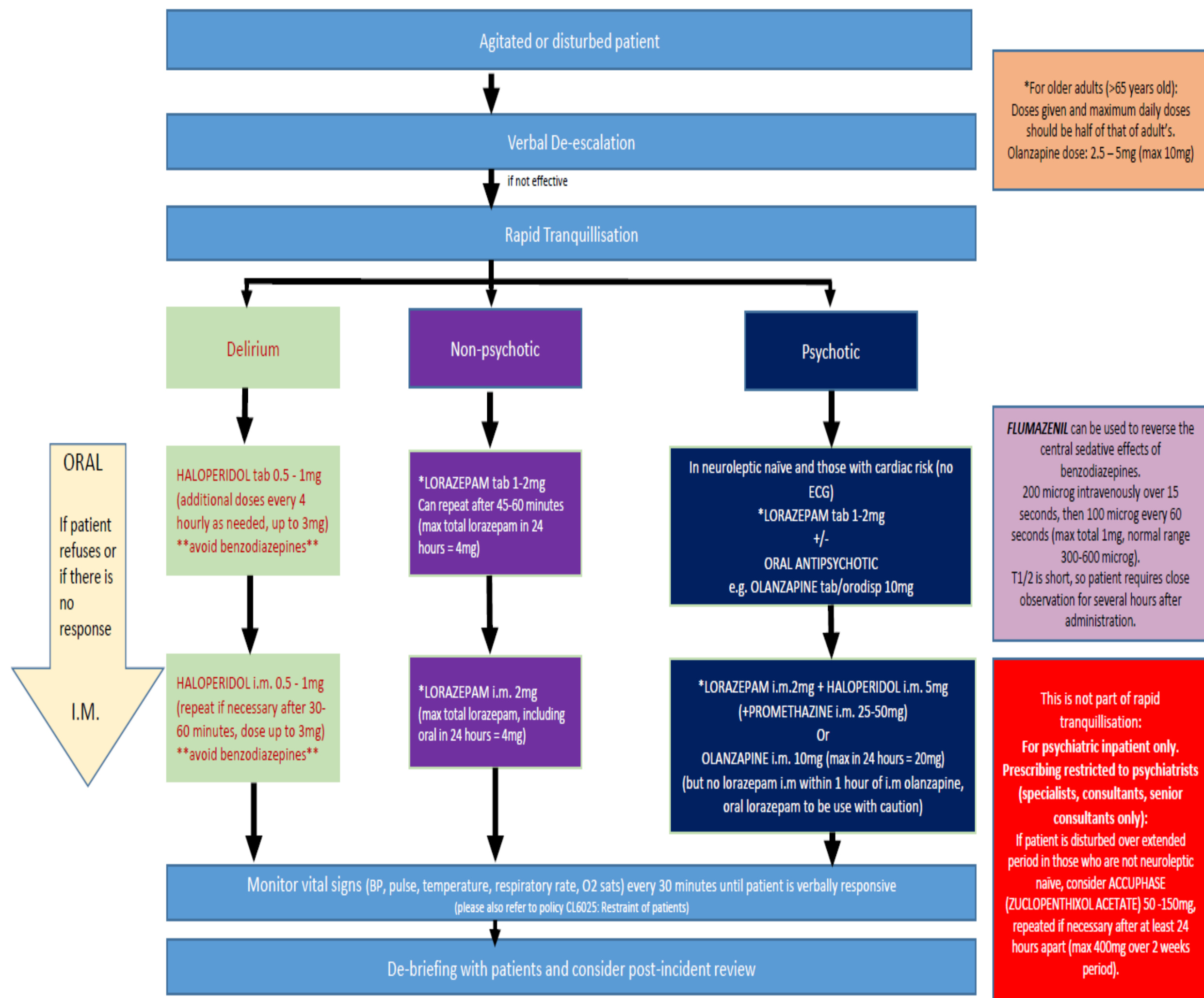
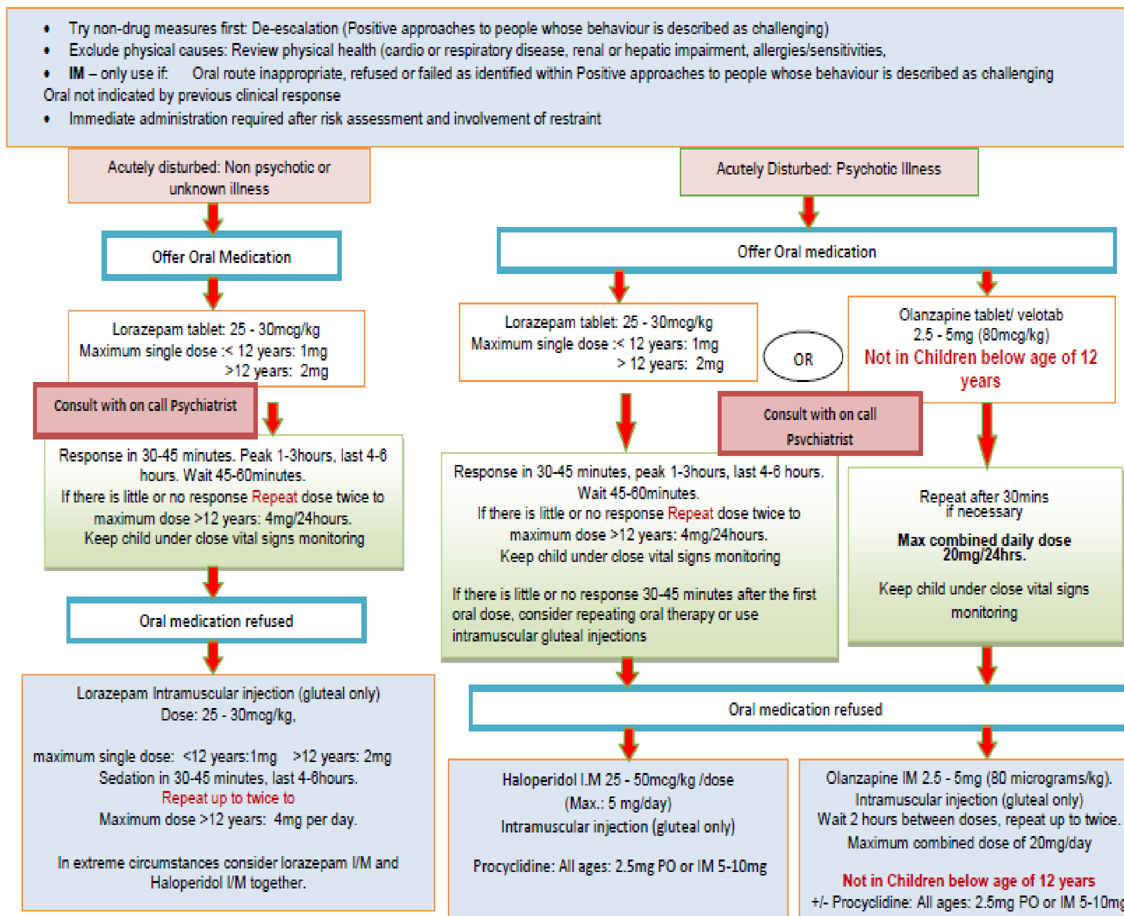
HOSPITAL: Mental Health Services		NEXT REVIEW DATE: July 2022
		Sheet No. 11 of 13

Appendix 1: Rapid Tranquillisation for adults (>18 years) and older adults (>65 years)



Appendix 2: Rapid Tranquillisation for under 18s



Appendix 3: Zuclopenthixol acetate prescribing information

Do not give Zuclopenthixol acetate within 60 minutes of other intramuscular medication injections.

A dose of 50 – 150mg of zuclopenthixol acetate can be given in those who are not neuroleptic naïve and to those who had previous good response to zuclopenthixol acetate. For older adults, the maximum dose per injection is 100mg.

Zuclopenthixol acetate should not be confused with zuclopenthixol decanoate. Zuclopenthixol acetate should not be used as a test dose for zuclopenthixol decanoate depot.

The injection may be repeated after at least 24 hours if necessary, but patient must be assessed before each injection. Although the recommended maximum accumulated dose of zuclopenthixol acetate is 400mg over 2 weeks period, the total number of injections should not exceed four. Patients who were given zuclopenthixol acetate should also have a clear management plan in place.

Zuclopenthixol acetate is not for:

- Rapid tranquillisation
- Patients who are sensitive to extrapyramidal side-effects such as those who have pre-existing organic brain problems and mental retardation.
- Patients who accept oral medications.
- Patients with co-morbid physical problems such as renal and liver impairment, cardiac disease, severe respiratory disease.
- Patients who are pregnant.

HMC EM EVIDENCE-BASED CLINICAL ALGORITHM

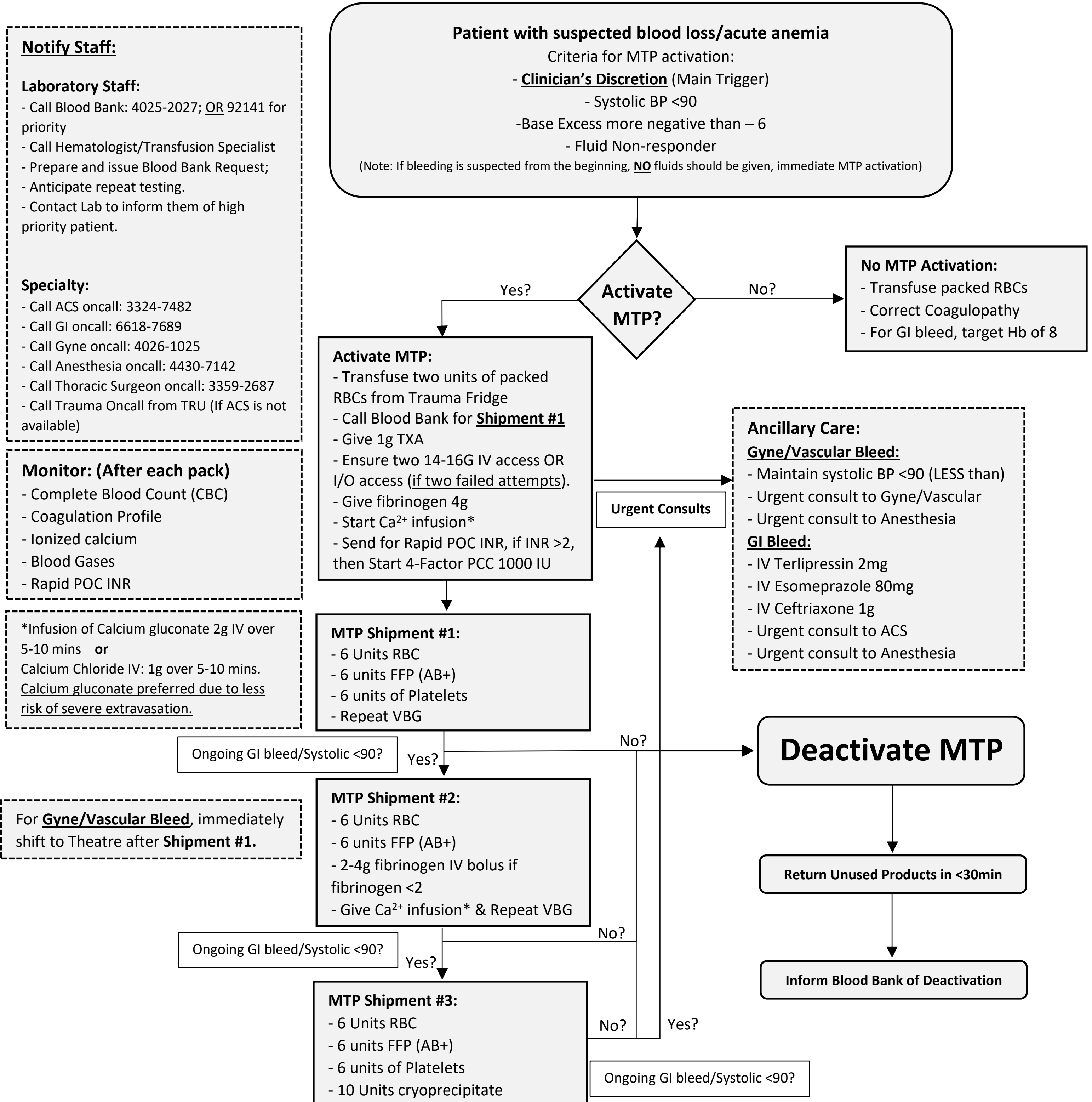
Activation of Massive Transfusion Protocol in NonTraumatic ED setting

مؤسسة حمد الطبية Hamad Medical Corporation
HEALTH • EDUCATION • RESEARCH صحة • تعليم • بحوث
EMERGENCY MEDICINE طب الطوارئ

Version: June 2022

Authors: Mohamed Elgassim (EM), Syeda Mishkaat Noor (EM), Shumaila Hanif (EM), Ashraf Mustafa El Malik (Pharmacist), Prof Ruben Peralta Rosario (Trauma), Prof Tim Harris (EM), EBCA Committee.

This EBCA:
- Has been endorsed by HMC EM and other consultants for education and assistance with clinical practice in HMC's Eds;
- Is intended to complement any related multispecialty Clinical Practice Guideline prepared as per HMC policy;
- Is not presented as the binding "standard of care" but is rather a reference tool to inform clinical judgment.



Approved
Saad
21.10.2021

Acute Corrosive Ingestion
(Acid or alkali)

Symptoms include one or all:
- Drooling
- Stridor
- Vomiting
- Inability to take food orally
- Throat pain or symptoms
- Retrosternal pain

History & physical exam
- Manage airway as needed
- Manage circulation as needed
- Consult ENT if indicated (Stridor, throat symptoms or edema)

Symptomatic and/or large amount of ingestion especially alkali → **CT scan chest & abdomen**

Asymptomatic and confirmed small amount of ingestion → **Chest X-ray**

Negative → Consult GI for EGD

Positive → Perforation, mediastinitis, peritonitis → Surgery, IV Antibiotics

Consult GI for EGD within 24-48 hrs
(Grading and prognosis)
*Very asymptomatic patients with very minimal ingestion can be discharged without EGD (to be decided by GI team)

Grade → Observe for 4-6 hours; Discharge Patient if stable

Grade I-IIa → No Rx needed (Observe); Trial of liquid diet for 12-24 hrs; Oral diet and discharge if tolerating well

Grade IIb-III →
- Admit (consider HDU/ICU if indicated)
- NPO, IV Abx, PPI
- Upper GI Surgery Consultation
- Consider NJ feeding **(by endoscopy)**
- Methylprednisone 1 gram/day for 3 days **(esp. if alkaline)**
- Try liquid diet after 48 hrs if no odynophagia
- EGD after 2-4 weeks (dilate if stricture/stent if indicated)

If any deterioratio → Surgery, IV Antibiotics

Grade IV → **Surgery, IV Antibiotics**

EGD grading system (Zargar classification)

- Grade 0 - Normal
- Grade I - Hyperemia and edema of the mucosa
- Grade II - Ulceration
  - IIa- friability, bleeding, erosions, blisters whitish membranes, exudates and **superficial ulcers**
  - IIb- as IIa with **deep ulcers (discrete or circumferential)**
- Grade III – Necrosis
  - IIIa- multiple ulcerations and small scattered areas of **necrosis**
  - III-b- multiple ulcerations and extensive **necrosis**
- Grade IV – Perforation

HMC EM Evidence-Based Clinical Algorithm:
HINTS assessment in acute vestibular syndromes

Hamad Medical Corporation — Health · Education · Research
مؤسسة حمد الطبية
EMERGENCY MEDICINE
طب الطوارئ

Version date: 1 July 2019
Authors: S Thomas (EM), Akhtar N (Stroke Service)
Evidence basis: Newman-Toker D. Avoiding "HINTS Positive/Negative" to minimize diagnostic confusion in acute vertigo. *JACPT* 2016.

This EBCA has been endorsed by HMC EM and other consultants for education and assistance with clinical practice in HMC's EDs, and it:
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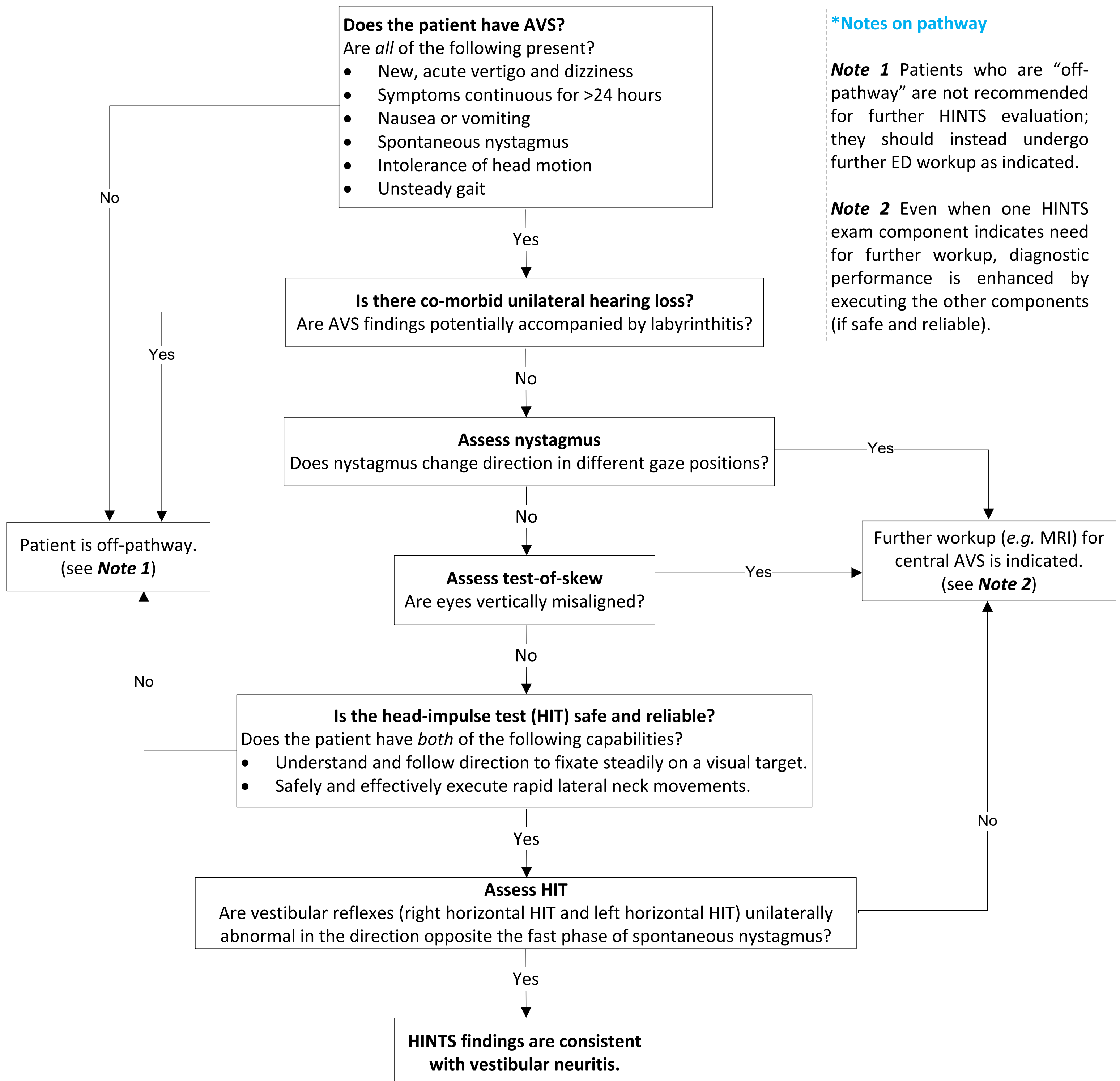
- is not presented as the binding "standard of care" but is rather a reference tool to inform clinical judgment.



HMC EM Evidence-Based Clinical Algorithm:

Anaphylaxis

Hamad Medical Corporation — EMERGENCY MEDICINE

Version date: 5 Jun 2017

Authors: R Hussein (EM), M Ershad (EM), S Syed (EM), N Puthiyottil (EM)

Evidence basis:

-UpToDate (accessed May 2017)-Cole *et al*. IN fentanyl in 1-3 years old. *Emergency Medicine Australasia* 2009; 21: 395-400.
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-Rowe BH, *et al*. Ch. 14: Anaphylaxis, allergies, and angioedema. *Tintinalli's Emergency Medicine* 8th ed 2017; accessem.com

This EBCA:
- has been endorsed by HMC EM and other consultants for education and assistance with clinical practice in HMC's EDs.
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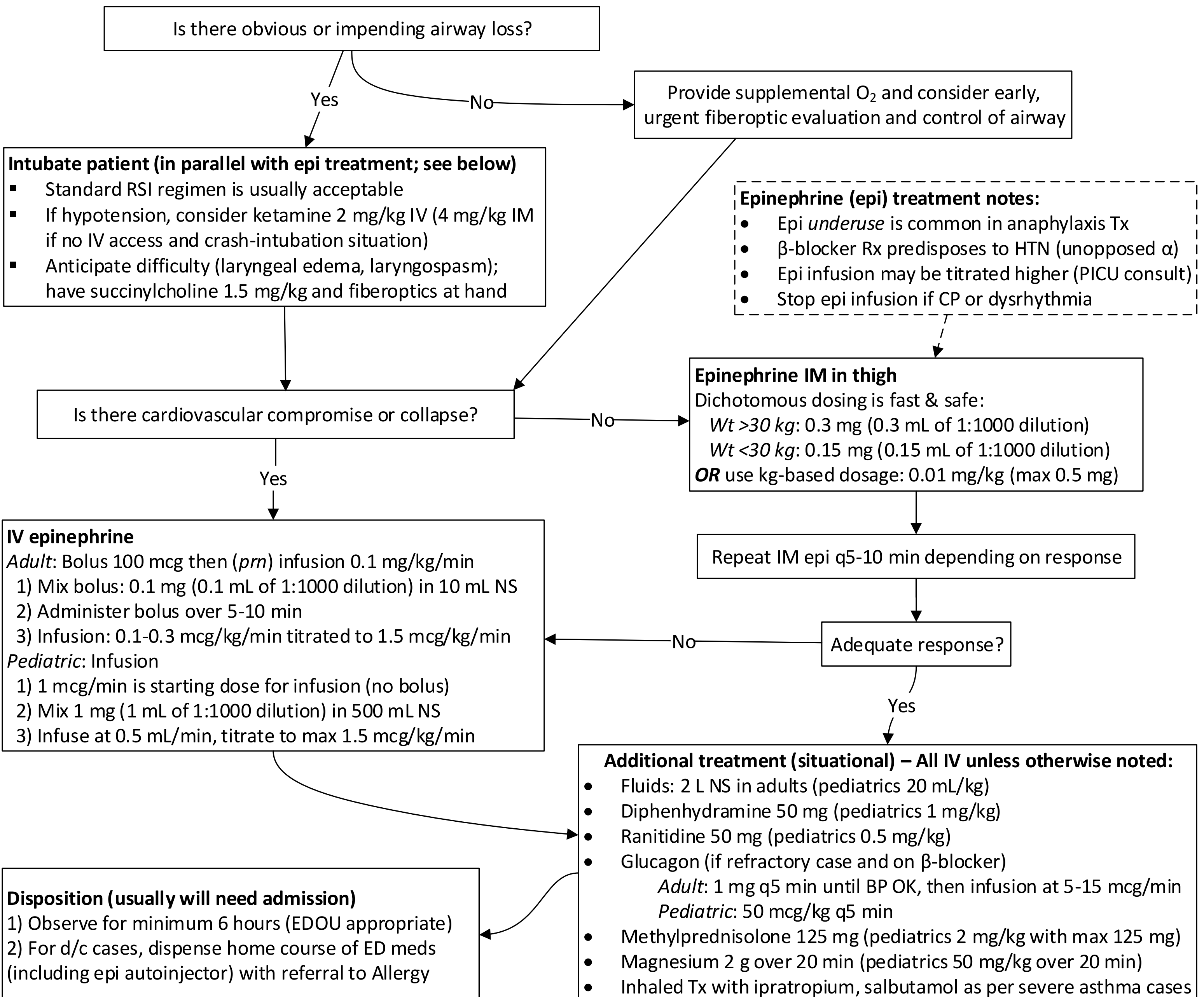

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Antimicrobial Guidebook for Adults in Emergency Department

2019

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Introduction

It is with both pleasure and privilege that I introduce readers to this handbook. It is a detailed yet lucid outline for practical decision-making regarding antibiotics usage in the Emergency Department setting.

The ED physician is faced with no shortage of potentially useful texts and information resources, but this guide is a useful complement to any HMC Emergency Medicine prescriber. The well-organized, easily followed presentation of material does an outstanding job of getting the busy physician vital information both quickly and accurately.

The guidebook's utility lies in its blending of international authoritative recommendations with HMC-level experience on antimicrobial sensitivities and local Infectious Disease specialists' recommendations.

In an age in which antimicrobial stewardship must be balanced with assuring adequate initial ED coverage, information such as that contained within this book is timely and sincerely appreciated.

The cooperative efforts of clinical pharmacists and EM physicians is applauded, and I salute the work that resulted from this collaboration.

Professor. Stephen Hodges Thomas
Chairman, Emergency Medicine

Table 1: Typical Gram Stain Morphology of Selected Organisms[1]

Gram-Positive Cocci (GPC)

Clusters:
- Staphylococcus sp

Pairs & Chains:
- Streptococcus sp
- Enterococcus sp
- Peptostreptococcus sp (anaerobe)

Gram-Positive Bacilli (GPB)

Irregular:
- Diphtheroid:
  - › Corynebacterium sp
  - › Propionibacterium sp (anaerobe)

Large, with spores:
- Clostridium sp (anaerobe)
- Bacillus sp

Branching, beaded, rods:
- Nocardia sp
- Actinomyces sp (anaerobe)

Others:
- Listeria sp
- Lactobacillus sp

Fungi
Yeast
- Candida albicans
- C glabrata, C tropicalis, C parapsilosis

Molds:
- Zygomycetes (ex. Rhizopussp, Mucor)
- Aspergillus sp
- Fusarium sp

Gram-Negative Cocci (GNC)

Diplococci
- Pairs:
  - › Neisseria meningitidis
  - › Neisseria gonorrhoeae
  - › Moraxella catarrhalis

Gram-Negative Bacilli (GNB):

Enterobacteriaceae:
- Escherichia coli
- Serratia sp
- Klebsiella sp
- Enterobacter sp
- Citrobacter sp

Nonfermentative:
- Pseudomonas aeruginosa
- Stenotrophomonas maltophilia
- Many others

Haemophilus influenzae (coccobacilli)
Acinetobacter sp (coccobacilli)
Bacteroides fragilis group (anaerobe)
Fusiform (long, pointed):
- Fusobacterium sp (anaerobe)
- Capnocytophaga sp

[1] These organisms represent a subset of possible identifications correlating with gram stain morphology observed on direct specimen preparations. Correlation with culture, specimen quality, and clinical findings is required.

Table 2: Mechanism of Action of Common Antibacterial Agents

Aminoglycosides: Interfere with bacterial protein synthesis by binding to 30S ribosomal subunits.

Beta-Lactams: Inhibit bacterial cell-wall synthesis by binding to one or more penicillin-binding proteins which in turn inhibit the final transpeptidation step of peptidoglycan synthesis in bacterial cell walls. Bacteria eventually lyse due to ongoing activity of organism autolytic enzymes (autolysins and murein hydrolases) while cell-wall assembly is arrested.

Fluoroquinolones inhibit DNA-gyrase and topoisomerase IV which does not allow the uncoiling of supercoiled DNA and promotes breakdown of double-strand DNA.

Clindamycin binds to the 50S ribosomal subunit (reversibly), preventing peptide-bond formation and inhibiting protein synthesis.

Daptomycin inserts into the cell membrane leading to leakage of intracellular cations responsible for membrane polarization causing depolarization and cell death.

Linezolid binds to a site on the 23S ribosomal RNA of the 50S subunit, blocking formation of the 70S initiation complex thus inhibiting translation.

Macrolides inhibit protein synthesis at the chain elongation step and binds to the 50S ribosomal subunit.

Metronidazole interacts with DNA causing a loss of helical DNA structure and strand breakage, resulting in inhibition of protein synthesis.

Tetracyclines inhibit protein synthesis by binding to the 30S and possibly the 50S ribosomal subunits.

Tigecycline binds to the 30S ribosomal subunit of susceptible bacteria, thereby, inhibiting protein synthesis. It binds 5-fold more tightly than tetracycline and also able to overcome the ribosomal protection mechanism of tetracycline resistance.

Trimethoprim/sulfamethoxazole: Trimethoprim inhibits dihydrofolic acid reduction to tetrahydrofolate, resulting in sequential inhibition of the folic acid pathway. Sulfamethoxazole interferes with bacterial folic acid synthesis and growth via inhibition of dihydrofolic acid formation from PABA.

Vancomycin inhibits bacterial cell wall synthesis by blocking glycopeptide polymerization through binding to the D-alanyl-D-alanine portion of the cell wall precursor

Table 3: Common Infections in ED

Table 3.1: Guidelines for Treatment of Pneumonia in Adults

ClinicalSetting	Likely pathogens	Empiric therapy	Usual alternatives	Comment
Community Acquired Pneumonia	S-pneumoniae H-influenzae M-catarrhalis M-pneumonia C-pneumonia Respiratory viruses	**Mild (No comorbidities):** Azithromycin 500mg PO daily for 5-3 days **Mild(w/comorbidities):** Co-Amoxiclav 625 mg PO TID + Azithromycin 500 mg PO q24h for 10 -7 days **Hospitalized –non ICU:** Ceftriaxone 2-1 gm IV q24h +Azithromycin 500 mg IV/PO q24h **Hospitalized – ICU:** Pipracillin/tazobactam 4.5 gm IV q6h + Moxifloxacin 400 mg IV q24h.	Moxifloxacin 400 mg PO q24 for 7-5 days Moxifloxacin 400 mg IV/PO q24h 7-5 days Meropenem 1 gm q8h + Azithromycin 500 mg IV q24h.	Co-morbidity: • COPD • Post CVA aspiration • Post-obstruction of bronchi • Post-influenza • Alcoholism
Aspiration Pneumonia	Gram –negative enteric pathogens. Oral anaerobes	**Community acquired:** Clindamycin 600 mg IV q8h **Hospital acquired:** Pipracillin/tazobactam 4.5 gm IV q8-6h	Co-Amoxiclave 1.2 gm IV q8h Cefepime 2 gm IV q8h	
HAP/VAP	S.aureus P.aeruginosa Other Gram negatives bacilli	**Early hospital acquired(<5days):** Ceftriaxone 2 gm IV q24h **Late hospital acquired(>5 days):** Pipracillin/tazobactam 4.5 gm IVq6h + *Colistin	Moxifloxacin 400 mg IV q24h Or Ampicillin/sulbactam 3-1.5 g IV q6h Meropenem 1 gm q 8h + *Colistin	*Add Colistin to empirical regimen for patients with suspected carbapenem-resistant Gram-negative.

Table 3.2: Sepsis of Unknown Origin

Clinical setting	Likely pathogens	Empiric Therapy	Alternatives	Comments
Community Acquired	Enterobacteriaceae including: Salmonella S.pneumoniae S.aureus Ceftriaxone 2 gm IV q24h + Amikacin (15mg/kg q 24h)	Ceftriaxone 2 gm IV q24h + Amikacin (15mg/kg q 24h)	Ampicillin\Sulbactam 3 g IV q6h + Gentamicin (7-5 mg/kg IV q24h)	PCN ALLERGY: Aztreonam 2 gm IV q8h+Amikacin (15 mg/kg iv q24h) Collect 2 sets blood culture before starting antimicrobial therapy. Consider source of sepsis when choosing antimicrobial therapy.
Nosocomial	Enterobacteriaceae S-aureus P-aeruginosa Coag.negative staph	Piperacillin/Tazobactam 4.5 g IV q8h + Amikacin (15 mg/kg q24h)+/- vancomycin for MRSA	Cefepime 2 gm IV q8h + Colistin Aztreonam 2 gm IV q8h + Amikacin (15 mg/kg iv q24h)*) +/- Vancomycin 1 gm IV q12h	Renal impairment: Ciprofloxacin can be used instead of Aminoglycosid Also Consider Antifungal use in Patients receiving parenteral nutrition.

[2] **Refer to HMC sepsis policy for detailed management of sepsis**

Table 3.3: Urinary Tract Infection& STDs:

Infection	Likely pathogens	Empiric Therapy	Alternative	Comments
Uncomplicated Cystitis	Enterobacteriaceae Strep.Group.B Enterococci	*Nitrofurantoin(Macrobid) 100 mg PO q12h for 7-5 days	Co-trimoxazole D.S 960 mg BID for 7-3 days	*Frequency Based on nitrofurantoin dosage form available
Pyelonephritis	Enterobacteriaceae Enterococci Pseudomonas aeruginosa	**Acute: (systemically well (low risk for resistant bacteria)** Cefixime 400 mg PO q24h for 14-10 days or Cefditoren 400 mg po bid for 14-10 days **Systemically unwell high risk of resistance** Ceftriaxone 2 gm IV q24h	Ciprofloxacin 500 mg PO BID for 7-5 days **OR** Ertapenem 1gm IV q24h Ertapenem 1 gm IV q24h **OR** Pipracillin/tazobactam 4.5 gm IV q8h	
Complicated UTI (Catheter-related infections, Obstruction)	Enterobacteriaceae Enterococci Pseudomonas	Pipracillin/tazobactam 4.5 gm IVq8h	Cefepime 2 gm IV q8h	**PCN ALLERGY:** Ciprofloxacin 400 mg IV q12h **OR** Aztreonam 1 gm IV q8h
Prostatitis	N.gonorrhoeae C.trachomatis Enterobacteriaceae Enterobacteriaceae P.aeruginosa	**Acute**: Ciprofloxacin 500 mg PO BID for 14 days **If risk of STD Give :** Ceftriaxone 250 mg IM one dose + Doxycycline 100 mg PO BID for 10 days **Chronic**: Co-trimoxazole D.S 960 mg tab PO BID for 3-1 months	Co-trimoxazole D.S 960mg PO BID for 10 days Ciprofloxacin 500 mg PO BID for 4 weeks Or levofloxacin 750 mg PO once daily for 4 weeks	
Gonorrhea	Neisseria gonorrhoeae Chlamydia trachomatis	**Uncomplicated** : Ceftriaxone 250 mg IM one dose + Azithromycin 1 gm PO for 1 dose **Disseminated:** Ceftriaxone 2 gm IV q24h at least for 7 days + Azithromycin 1gm single dose.	**Salvage therapy for patients allergic to PNC:** Gentamicin 240mg IM (5MG/KG if<45kg)+ Azithromycin 2gm Po for 1 dose.	Screen all patients with gonococcal infections for syphilis and HIV
Epididymitis-Orchitis	N. gonorrhoeae C. trachomatis Enterobacteriaceae	**Age<35:** Ceftriaxone 250 mg IM one dose + Doxycycline 100 mg PO BID for 10 days **Age>35** Levofloxacin 750mg PO for -10 14 days	Ceftriaxone 2 gm IV q24h	

Table 3.4: Meningitis

Clinical settings	Likely Pathogens	Empiric Therapy	Alternatives	Comments
Young adults < 50 years	Strep. pneumoniae Meningococci H. influenzae (rare) Listeria monocytogenes (immunosuppressed or immunocompromised patient, pregnancy)	Ceftriaxone 2 gm IV q12h + Vancomycin (60-45 mg/kg/day) IV, divided into q8-6h doses + Dexamethasone (0.15 mg/kg) IV q6h x 4–2 days administered with or just before 1st dose of antibiotic for 4-2 days	Meropenem 2 gm IV q8h + Vancomycin 500 mg IV q6h + Dexamethasone (0.15 mg/kg) IV q6h x 4–2 days administered with or just before 1st dose of antibiotic for 4-2 days	
Adults > 50 years	Neisseria meningitidis Strep. pneumoniae Listeria monocytogene	Ampicillin 2 gm IV q4h+ Ceftriaxone 2 gm IV q12h + Vancomycin 20-15 mg/kg IV q12-8h + Dexamethasone 0.15 mg/kg IV q6h x 4–2 days prior to or concomitant with 1st dose of antibiotic)	PNC allergy: Vancomycin 20-15 mg/kg IV q12-8h + Moxifloxacin 400 mg IV q24h + TMP-SMX 5 mg/kg q8–6h.	
Viral encephalitis/ encephalomyelitis	Herpes simplex Varicella zoster. Other viruses	Acyclovir 10 mg /kg IV q8h	Valacyclovir 500 mg po bid for 7 days	

Table 3.5: BONE AND SOFT TISSUE INFECTIONS

Clinical settings	Likely Pathogens	Empiric Therapy	Alternatives	Comments
Osteomyelitis	Staphylococcus Streptococcus Enterobacteriaceae	Cefazolin 2 gm IV q8h **OR** Cloxacillin 2 gm IV q6-4h	Clindamycin 900-600 mg IV q8hr	Use Vancomycin If MRSA suspected
Septic arthritis	Staphylococcus Streptococcus Enterobacteriaceae N-gonorrhoeae	Cloxacillin 2 gm IV q6-4h+ Ceftriaxone 2 gm IV q24h	Clindamycin 900-600 mg IV q8h + Ciprofloxacin 400 mg IV q12h	Treatment guided by gram stain, cultures& risk of STD
Soft Tissue Infection (Cellulitis &erysipelas	Streptococcus pyogenes (Groups A, B, C, G) Staphylococcus(rare)	Cefazolin 1 gm IV q8h **OR** Ceftriaxone 2 gm IV q24h	Clindamycin 900 -450 mg IV/PO q8h for 10-5 days	
Soft tissue infection(orbital cellulitis,facial erysipelas	Strep. pneumoniae H. influenzae M. catarrhalis Staph. aureus	Vancomycin 30-15 mg/kg IV q12-8h (target trough serum concentrations of 20-15 µg/mL)+ Ampicillin/sulbactam 3 gm q6h IV	Vancomycin 30-15 mg/kg IV q12-8h (target trough serum concentrations of 20-15 µg/mL)+ Moxifloxacin 400 mg IV q24h	
Diabetic Foot Infection	S.aureus . Betahemolytic streptococcus . Coliforms Anaerobes Pseudomonas	**Ulcer with superficial inflammation <2 cm:** Cefuroxime 500 mg PO q12h **Ulcer with inflammation > 2 cm with extension into fascia:** Augmentin 625mg PO q8h OR Ampicillin/sulbactam 3 – 1.5 gm IV q6h **Extensive inflammation / systemic toxicity:** Pipracillin/tazobactam 4.5 gm IVq6h +/-Vancomycin (if MRSA suspected)	Cloxacillin 1 gm PO Q6h OR Moxifloxacin 400 mg PO q24h Moxifloxacin 400 mg IV q24h OR Ertapenem 1 g IV q24h Cefepime 2gm IV q8h + Clindamycin 600 mg IV q8h +/-Vancomycin (if MRSA suspected)	**PCN Allergy :** Ciprofloxacin 400 mg IV q12h + Clindamycin -600 900 mg IV q8h
Mastitis	Staphylococcus aureus Bacteroides sp(less often)	**Postpartum/Non-lactating:** Co-amoxiclave 625 mg PO q8h for 10-7 days	**PNC allergy:** Clindamycin 450-300 mg PO q8h for 10-7 days	

Table 3.6: Intra-Abdominal Infections:

Clinical settings	Likely Pathogens	Empiric Therapy	Alternatives	Comments
Primary Spontaneous Peritonitis	Enterobacteriaceae S.pneumoniae	Ceftriaxone 2 gm IV q24h for 5 days	Ertapenem 1 gm IV q24h for 5 days	PNC allergy Ciprofloxacin 400mg IV q12h for 5 days
Secondary Peritonitis	Enterobacteriaceae Enterococcus Anaerobes P-aeruginosa	Community acquired: Ceftriaxone 2 g IV q24h +Metronidazole 500 mg IV q8h Hospital Acquired: Pipracillin/tazobactam 4.5 g IV q8h	Ertapenem 1 gm IV q24h Meropenem 1 gm IV q8h	
Cholecystitis & Cholangitis	Enterobacteriaceae Enterococci Bacteroides sp	Pipracillin/tazobactam 4.5 gm IV q8h	Ceftriaxone 2 gm IV q24h+Metronidazole 500 mg IV q8h for 7-4 days	
Pancreatitis (Abscess, Pseudocyst, Post-Necrotizing)	Enterobacteriaceae Enterococcus sp. S. aureus S. epidermidis Anaerobes Candida sp	Pipracillin/tazobactam 4.5 gm IV q8h	Meropenem 1gm IV q8h	
Enteric Fever	Salmonella enterica Typhi or Paratyphi (formerly Salmonella typhi S.paratyphi)	Ceftriaxone 2 g IV q24h for -10 14 days	Azithromycin 1 gm IV/ PO for one day followed by 500 mg IV/PO for 7-5 days	Choice of regimen dictated by geographic region
Clostridium Difficile Associated Diarrhea(CDAD	C.Difficile toxin producer	**Mild to moderate(intial episode):** Vancomycin 125mg PO qid for 10 days. **Severe complicated:** Metronidazole 500 mg IV q8h + Vancomycin 500 mg PO q6h		
Amebic colitis	E.histoltica	**Diarrhea/mild dysentery:** Metronidazole 500 PO q8h for 10-7 days followed by Paromomycin (35-25 mg/kg/day) divided in 3 doses for 7 days		**Asymptomatic cyst passer:** Paromomycin (-25 35 mg/kg/day) divided in 3 doses for 7 days

Table 3.7: Miscellaneous Infections:

Clinical settings	Likely Pathogens	Empiric Therapy	Alternatives	Comments
Neurocysticercosis	Tinea solium	**Parenchymal neurocysticercosis: (2–1 viable parenchymal cysticerci):** Albendazole monotherapy (15 mg/kg/day)divided into 2 daily doses for 14–10 days (max .1200 mg/day) **>2 viable and/or degenerating cysts):** Albendazole 15 mg/kg per day (max. 800 mg/day) + Praziquantel 50 mg/kg per day + Dexamethasone 0.1 mg/kg/day beginning prior to anti parasitic drugs for 14-10 days ± Anti-seizure medication x 2 year minimum if needed **Dead, calcified cysts:** No antiparasitic treatment ± Anti-seizure medication x 1 year minimum if needed		
Varicella-Zoster (Chicken pox)	Varicella zoster virus	**Immunocompetent :** Valacyclovir 1 gm PO q8h for 5 days **Immunocompromised(severe):** Acyclovir 12-10 mg/kg IV q8h for 7 days	Acyclovir 800 mg PO 5 times Daily for 5 days	
Herpes Zoster (Shingles)	Varicella zoster virus	**Immunocompetent:** Valacyclovir 1 gm PO q8h for 7 days **Immunocompromised** (not severe): Valacyclovir 1 gm PO q8h for 7 days **Immunocompromised (severe>1 dermatome, trigeminal nerve or disseminated):** Acyclovir 10 mg /kg IV q 8h for 14-7 days	Acyclovir 800 mg PO 5 times daily for 10-7 days Acyclovir 800 mg PO 5 times daily for 10-7 days Foscarnet 40 mg/kg q8h for 26-14 days	

Candida infections	Candida spp.	<u>**superficial candidiasis (oral thrush):**</u> Nystatin suspension 100,000 units PO q6h <u>**Vulvo vaginitis:**</u> Clotrimazole 500 mg vaginal tablet one dose.	Miconazole oral gel 2.5 ml of gel applied 4 times daily Fluconazole 800 mg loading dose then 400 mg IV once daily Fluconazole 150 mg PO one Dose	For candidemia and and othor candidas infection please refere to the HMC antimicrobial policy and consult ID team
H. Influenza (A&B)	influenza virus	Oseltamivir 75 mg PO bid for 5 day		
Pharyngitis, Tonsillitis	Streptococcus sp.(Group A, C, G) Viral	Co-Amoxiclav 625 mg PO q8h for 10 days **OR** Cefuroxime 500-250 mg PO q12hr for 10 days **OR** Azithromycin 500-250 mg daily for 5 days		<u>PCN allergy:</u> Clindamycin -300 450 mg IV/PO q8h for 10 days **OR** Azithromycin 500 mg IV/PO daily for 5 days.
Brucellosis	Brucella melitensis—goats, camel (Middle East) Brucella abortus —cattle	<u>**Non –localizing:**</u> Gentamicin 5 mg/kg IV once daily for 7 days + Doxycycline 100 mg PO bid for 6 weeks <u>**Neurobrucellosis:**</u> Doxycycline 100 mg PO Bid +Rifampin 900-600 mg PO once daily + Ceftriaxone 2 gm IV q12h. *Continue until CSF is normal	Rifampin 900 - 600 mg PO daily for 6 weeks + Doxycycline 100 mg PO bid for 6 weeks	

Malaria	P.vivax P.ovale P.falciparum	**Uncomplicated (Chloroquine sensitive):** 1 gm (600 mg base) PO, then 0.5 gm in 6 hrs, then 0.5 gm daily x 2 days. Total: 2500 mg **Uncomplicated (Chloroquine-resistant/ resistance unknown)** Artemther- lumefantrine (Coartem) 4 tablets (20 mg/120 mg tabs) as a single dose, then 4 tablets again after 8 hours, then 4 tablets every 12 hours for 2 days. Total: 6 doses. **Severe malaria:** Artesunate 2.4 mg/kg IV at 0,12,24,48hrs. Follow parenteral therapy with a complete oral course of Artemther-lumefantrine (coartem) for 3 days. (Start coartem after at least 8-6hr from last artusenate IV dose)	Artemther-lumefantrine (Coartem) 4 tablets (20 mg/120 mg tabs) as a single dose, then 4 tablets again after 8 hours, then 4 tablets every 12 hours for 2 days (take with food). Quinine 20 mg salt/kg body weight on admission then 10 mg/kg q8h (infusion rate should not exceed 5 mg salt/kg/hr) for 7-3 days + Clindamycin 10 mg /kg IV loading dose then 5 mg /kg IV/PO q8h for 7 days	Primaquine is Drug of choice for Eradication of the hepatic stage of malaria parasites. Screen for G6PD deficiency prior to primaquine therapy **To prevent relapse of P. vivax and P. ovale malaria:** 30 mg base (2 tablets) PO once daily x 14 days. If documented mild (type 3) G6PD deficiency, 45 mg base po once weekly x 8 weeks
Endocarditis	Strep virdans. Staph aureus . Enterococi. HACEK group Strep Galolytica (bovis) Coagulase negative staph. Staph aureus.	**Native valve:** Vancomycin 20-15 mg/kg q12-8 h + Ceftriaxone 2 gm q24 h **Prosthetic valve:** Vancomycin 20-15 mg/kg IV q 12-8 h+Gentamcin 1 mg/kg q8 hr +Rifampin 300 mg PO/ IV tid	Daptomycin 10-8 mg/kg per day +Ceftriaxone 2 gm q24h Daptomycin 10-8 mg /kg IV once daily +Gentamcin 1 mg/kg q8hr +Rifampin 300 mg po/ IV tid	

Table 4: Guidelines for Beta-lactam Allergy Assessment

Facts about Penicillin Allergy:

Self-reported in 5% to 10% of patients

Incidence of true IgE-mediated penicillin allergy estimated at <1% of the population:

- Symptoms of IgE-mediated penicillin allergy include anaphylaxis, angioedema, hives, hypten sion, shortness of breath and respiratory distress usually occurring within 1 hour of medication administration

Approximately 80% of patients with IgE-mediated penicillin allergy lose their sensitivity after 10 years

Children receiving amoxicillin or ampicillin and have a viral may develop a non-allergic, non-pruritic rash that can appear similar to an IgE-mediated reaction

Why Beta-lactam Allergy Assessment Is Important

- Broad-spectrum antibiotics are often used as an alternative to penicillins in “penicillin allergic” patients which can lead to increased healthcare costs, increased risk of antibiotic resistance, and potentially sub-optimal antibiotic therapy

Management Considerations for Patients With Beta-lactam Allergy

- Clarify nature of reaction (i.e. IgE-mediated reaction vs adverse effect) and how the reaction was managed
- Evaluate for past beta-lactam tolerability
- DO update allergy patient’s profile with specific medications, reactions, and tolerances (i.e. “tolerates ceftriaxone”)

Cross-Reactivity Between Penicillin and Other Beta-lactams

- Cross-reactivity between penicillins and cephalosporins or carbapenems is not a class effect but an allergic reaction to antibiotics with similar side chains
- Cephalosporins: estimated ~0.1-2% cross-reactivity:
    - Many cephalosporins, particularly later generation agents, can be safely tolerated despite penicillin allergy
- Carbapenems: estimated ~1% cross-reactivity
- Aztreonam: does not cross-react with other beta-lactams except ceftazidime

Classification of Hypersensitivity Reactions

Coombs and Gell Classification of Hypersensitivity Reactions				
Type	**Mediator**	**Onset**	**Clinical reactions**	**Comments**
I	IgE	<1hour(rarely up to 72 hours)	Anaphylaxis, angioedema, hypotension, laryngeal edema, urticarial, wheezing	
II	IgG,complement	>72 hours	Hemolytic anemia, neutropenia, thrombocytopenia	Drug specific; cross-reactivity does not appear to occur
III	IgG,IgM,immune complex	>72 hours	Drug fever, glomerulonephritis, serum sickness, small vessel vasculitis	Drug specific; cross-reactivity does not appear to occur
IV	T cell	>72 hours	Contact dermatitis, pustulosis	
Others				
Idiopathic	Unknown	>72 hours	Non-pruritic maculopapular or morbilliform rash Stevens-Johnson Syndrome (SJS), Toxic Epidermal Necrolysis (TEN), Drug Reaction with Eosinophilia and Systemic Symptoms (DRESS), erythema multiforme	Not a contraindication to beta-lactam therapy Beta-lactams should be avoided

Table 5 : IV to Oral Switch :Equivalent Dose and Ratio:

Medication	IV	PO
AZITHROMYCIN	1:1	1:1
Cefazolin	1 gm q8hr	Cephalexin 250-500 mg q6h
Cefuroxime	750 -1.5 gm q8h	Cefuroxime 250-500 mg q12
Ceftriaxone	1-2gm q24hr	Cefixime 400 mg q24h Cefditoren 200-400 mg q12h
CIPROFLOXACIN	200 mg q12h	250 mg q12h
	400 mg q24h	500 mg q12h
	400 mg q8h	750 mg q12h
CLINDAMYCIN	300 mg q8h	150 mg q8h
	600 mg q8h	300 mg q8h
	900 mg q8h	450 mg q8h
CO-Trimoxazole	CO-Trimoxazole(16/80)mg/ml (20-10) ml IV q6h	CO-Trimoxazole DS (2-1 (160/800 tablets q12h
FLUCONAZOLE	1:1	1:1
LEVOFLOXACIN	1:1	1:1
METRONIDAZOLE	1:1	1:1
MOXIFLOXACIN	1:1	1:1

Table 6: Antimicrobial Agents Dosing Guide:

Drug	CrCl(mL/min)	Suggested Dosage Regimen	Comments
Acyclovir IV	> 50 50-25 25-10 <10	10-5 mg/kg q8h 10-5 mg/kg q12h 10-5 mg/kg q24h 5-2.5 mg/kg q24h	Dose using IBW
Azithromycin PO/IV	No renal adjustment	500-250 mg q24h	
Azetronam IV	>30 30-10 <10	2-1 gm q8h 2-1 gm q12h 2-1 gm q24h	
Ampicillin/sulbactam IV	>30 30-15 <15	3-1.5 gm q6h 3-1.5 gm q8h 3-1.5 gm q12h	
Cefazolin IV	>30 30-10 <10	2-1 gm q8h 2-1 gm q12h 2-1 gm q24h	
Cefepime IV	>60 60-30 29-11 <11	2-1 gm q12-8h 2-1 gm q24-12h 2-0.5 gm q24h 1-0.5 gm q24h	
Ceftriaxone	No renal adjustment	2-1 gm q24h	2 gm q12h in meningitis
Cefuroxime IV	>20 20-10 <10	1.5-0.75 gm q8h 1.5-0.75 gm 12h 1.5-0.75 gm q24h	
Ciprofloxacin IV	>30 <30	400 mg q12-8h or 200 mg q12h 400 mg q24h or 200 mg q24h	
Clindamycin IV	No renal adjustment	900-600 mg q8h	
Ertapenem IV	>30 <30	1 gm q24h 0.5 gm 24h	
Fluconazole IV	> 50 50-10	400-200 mg q24h %50 of recommended dose	
Linezolid IV	No renal adjustment	600 mg every 12h	
Meropenem IV	>50 59-26 25-10 <10	500mg q6h or1gm q8h 500 mg q6h or 1gm q12h 500 mg q12h 500 mg q24h	
Metronidazole IV	No renal adjustment	500-250 mg every 6h to 8h	
Piperacillin/Tazobactam IV	>40 40-20 <20	4.5gm q8-6h 3.375-2.25 gm q8h 2.25gm q12h	
Trimethoprim/ sulfamethoxazole IV	>30 30-15 <10	5 mg/kg q8-6h 5-2.5 mg/kg q12h 5-2.5 mg/kg q24h	Dose based on Trimethoprim

Table 7: Antimicrobials In Pregnancy:

AGENT	PREGNANCY CATEGORY	AGENT	PREGNANCY CATEGORY	AGENT	PREGNANCY CATEGORY	AGENT	PREGNANCY CATEGORY
Acyclovir	B	Cefazolin	B	Doxycycline	D	[1]Metronidazole	B
Amikacin	D	Cefepime	B	Ethambutol	C	Moxifloxacin	
Amoxicillin	B	Cefixime	B	Fluconazole	C/D	Nitrofurantoin	B
Amphotericin B	B	Ceftriaxone	B	Fosfomycin	B	Oseltamivir	C
Ampicillin/ sulbactam	B	Cefuroxime	B	Ganciclovir	C	Piperacillin/ tazobactam	B
Atovaquone	C	Cephalexin	B	Isoniazid	C	Ribavirin	X
Atovaquone/ proguanil	C	Ciprofloxacin	C	Levofloxacin	C	Rifampin	C
Azithromycin	B	Clarithromycin	C	Linezolid	C	TMP/SMX	D
Aztreonam	B	Clindamycin	B	Meropenem	B	Vancomycin	D

[1]Metronidazole is contraindicated in the first trimester.

Pregnancy Categories and definitions

Category A: Controlled studies in women fail to demonstrate a risk to the fetus in the first trimester, and there is no evidence of a risk in later trimesters. The possibility of fetal harm appears remote.

Category B: Either animal-reproduction studies have not demonstrated a fetal risk, but there are no controlled studies in pregnant women; or animal-reproduction studies have shown an adverse effect (other than a decrease in fertility) that was not confirmed in controlled studies in women in the first trimester (and there is no evidence of a risk in later trimesters).

Category C: Either studies in animals have revealed adverse effects on the fetus (embryogenic, teratogenic, or other), and there are no controlled studies in women; or studies in women and animals are not available. Drugs should be given only if the potential benefit justifies the potential risk to the fetus.

Category D: There is positive evidence of human fetal risk, but the benefits from use in pregnant women may be acceptable despite the risk (eg, the drug is needed in a life-threatening situation or for a serious disease for which safer drugs cannot be used or are ineffective).

Category X: Studies in animals or human beings have demonstrated fetal abnormalities and the risk clearly outweighs any possible benefit. The drug is contraindicated in women who are or may become pregnant.

The US Food and Drug Administration recently changed drug labeling requirements to assist in assessing benefit vs risk for pregnant women. The pregnancy categories will be phased out and replaced by the following sections: Pregnancy, Lactation, and Females and Males of Reproductive Potential.

Table 8: Antimicrobial in Lactation[3]

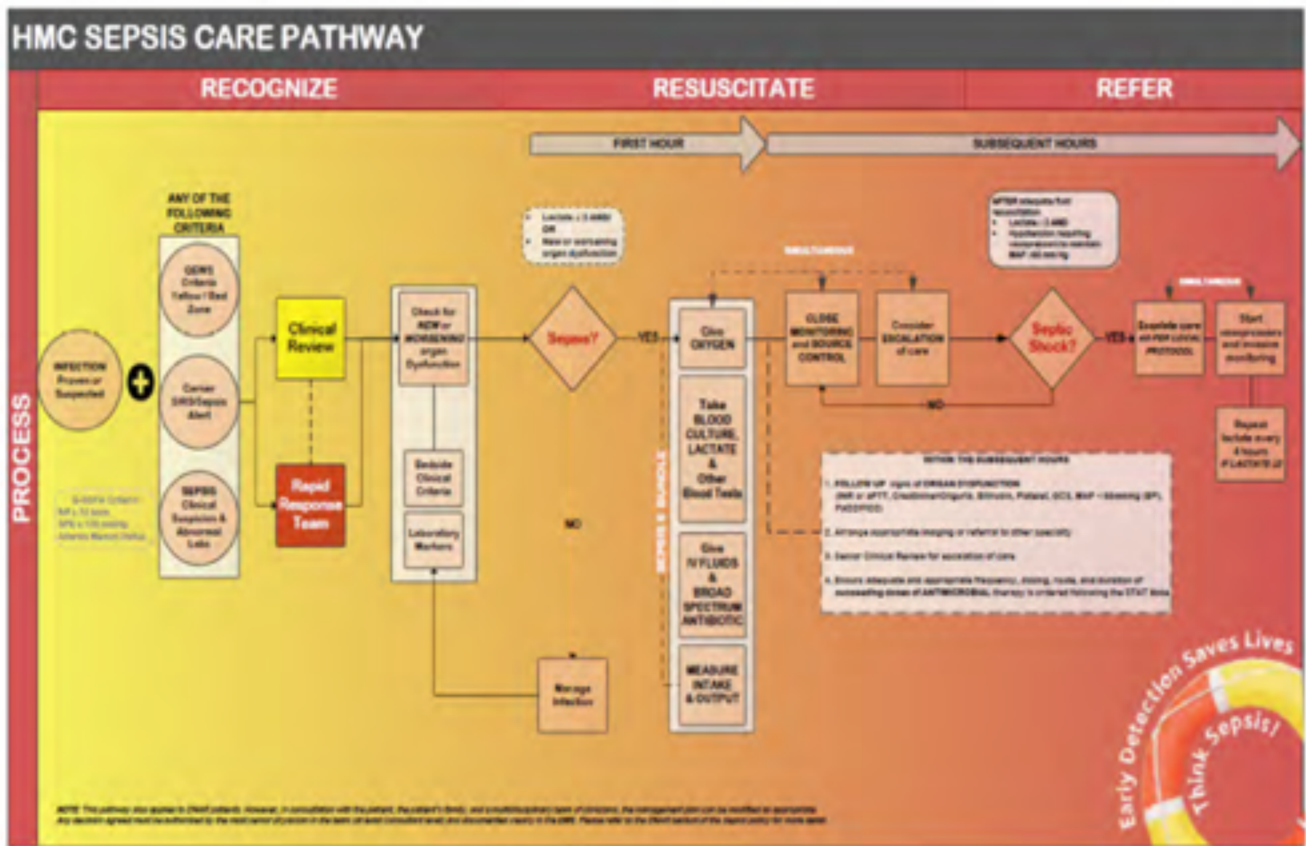
Most antimicrobials are compatible with lactation and are safe to the nursing infant with a few **exceptions** that are listed in the following table. It is, however, prudent to minimize maternal exposure to all medications. In general, antimicrobials that are present in breast milk may cause non–dose-related modification of bowel flora. Monitor infants for GI disturbances, such as oral thrush and diarrhea.

Antimicrobial Name (Generic)	Note
Chloramphenicol	Potential for idiosyncratic bone marrow suppression
Clofazimine	Clofazimine is excreted into breast milk and may result in skin pigmentation of the nursing infant
Metronidazole	Risk of mutagenicity and carcinogenicity. American Academy of Pediatrics recommends discontinuing breast feeding for 12 to 24 hours to allow drug excretion
Quinolones	Due to the potential for cartilage lesions and arthropathies observed in immature animals, quinolones should be avoided in nursing women if alternative agents are available
Sulfamethoxazole	Risk of bilirubin displacement resulting in kernicterus and hemolytic anemia. Avoid use in women breast feeding an infant with known G6PD or jaundice/ Hyperbilirubinemia
Tetracyclines	Risk of tooth discoloration and inhibition of bone growth. Long-term use of tetracyclines (eg, for the treatment of acne) should be avoided
Vaccines	Vaccines are compatible with lactation, including live vaccines such as measles-mumps-rubella (MMR) and oral polio vaccine (OPV). There has been transfer of live vaccines to nursing infants with no ill effects noted

[3] **For detailed information, please refer to the package insert for a narrative summary of the risks of antimicrobial exposure during lactation.**

Table 9 : EBCA & Pathways:

Sepsis Pathway:



Antibiotic during sepsis (Golden hour) Kit:

Drug name	Dose
Meropenem	2 gm
Piperacillin/tazobactam(Tazocin)	4.5 gm
Ceftriaxone	2 gm
Vancomycin	1.5 gm
Ciprofloxacin	400 mg
Metronidazole	500 mg
Clindamycin	900 mg
Eratpenem	1 gm
Amikacin	1000 mg
Aztreonam	2 gm

HMC EM Evidence-Based Clinical Algorithm:

Evaluation for Septic Arthritis

Hamad Medical Corporation
EMERGENCY MEDICINE
طب الطوارئ

Version date: 3 October 2015

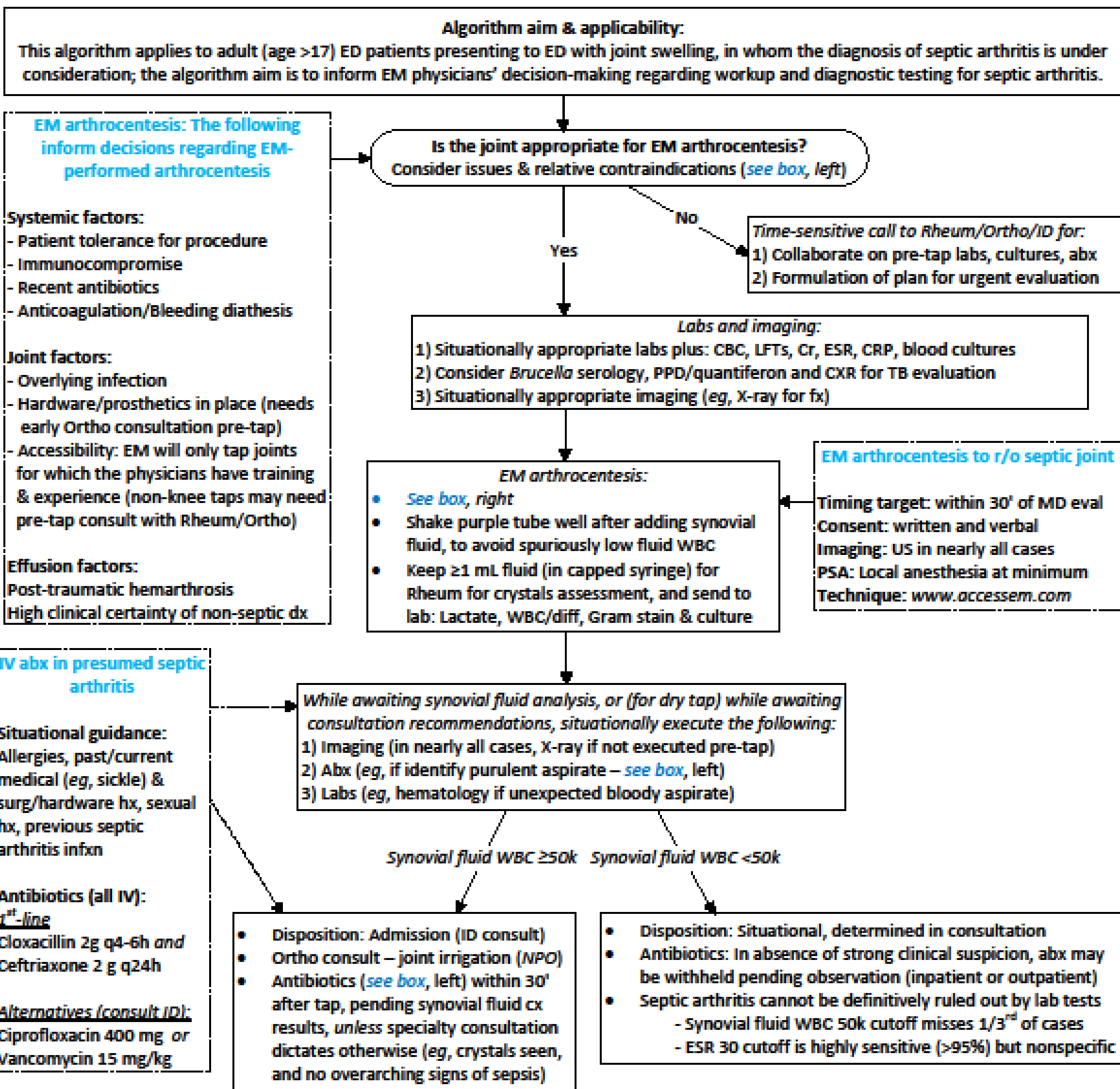
Authors: S Hlaoui (EM), R Hussein (EM), A Mahdy (EM), H Al Soub (ID), A Al Khal (ID), S Al Emadi (Rheum), O Alnori (Ortho), S Thomas (EM)

Evidence basis:

- Carpenter et al. Evidence-based diagnostics: Adult septic arthritis. Acad Emerg Med 2011; 18: 782.)
- UpToDate (accessed 3 Sept 15)
- Burton JH. Acute disorders of joints and bursae. Tintinalli's Emergency Medicine, 7th edition (www.accessem.com)

This EBCA:

- has been endorsed by HMC EM and other consultants for education and assistance with clinical practice in HMC's EDs.
- is intended to complement any related multispecialty Clinical Practice Guideline prepared as per HMC policy.
- is not presented as the binding "standard of care" but is rather a reference tool to inform clinical judgment.



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Disclaimer:

The guidebook is in congruence with HMC Antimicrobial Prescribing Policy. However, users are encouraged to refer to specific corporate polices for further details .The protocols described herein are general and may not apply to patient specific. Exercising prudent clinical judgement would be required.

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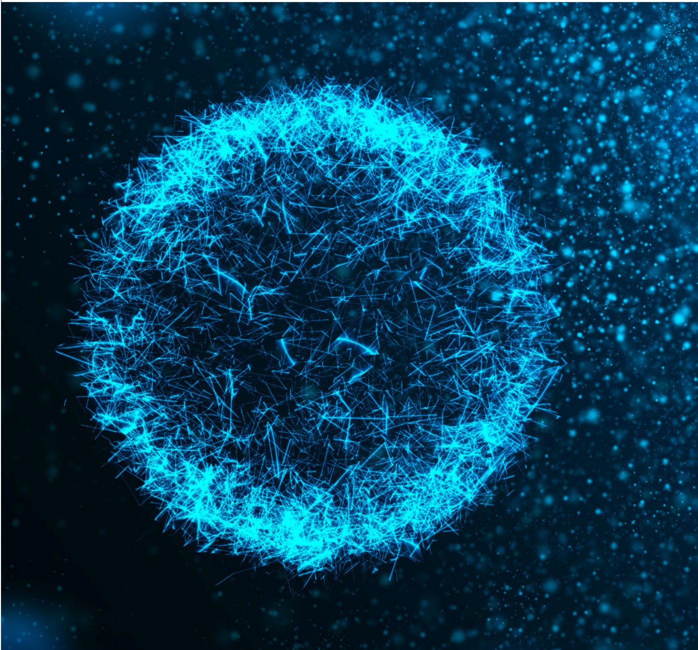
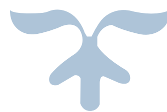
2019





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