Sherwood Forest Hospitals
NHS Foundation Trust

TITLE: Adult Chest Trauma Risk Stratification and Analgesia Guideline

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	Name the documents here or record not applicable
Associated Policy	Not applicable
Associated Procedure(s)	Not applicable
Associated Pathway(s)	• Acute Adult Chest Injury Admissions Pathway (flowchart)
Associated Standard Operating Procedure(s)	Not applicable
Other associated documents e.g. documentation/ forms	• Acute Chest Trauma Pathway Admissions Booklet (documentation/ form) ***(accessed to print/ to refer to/ for use in practice via the Pain Management Services intranet site)***

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Template control:	v1.4 November 2019

Amendments from previous version(s)

Version	Issue Date	Section(s) involved (author to record section number/ page)	Amendment (author to summarise)
1.1	Dec 2023	Page 6 'start analgesia' table	• Information updated for correct dosing for ≥70 years • eGFR ranges updated
			•

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1 INTRODUCTION

This document aims to guide clinicians in risk stratification of patients presenting to King's Mill Hospital with chest trauma and give advice on initial analgesia management. All patients should have careful and thorough assessment and there may be situations where clinical judgement dictates that clinical practice should differ from the following guideline.

2 SCOPE OF DOCUMENT

This clinical document applies to:

Staff groups
All doctors, nurses, and other members of the MDT treating adult patients with chest trauma

Clinical areas
All adult inpatient surgical and medical wards, assessment areas, Emergency Department, Intensive Care Unit

Patient Groups
Adult patients, ≥16 years, with chest trauma

Exceptions
Paediatric patients

3 DEFINITIONS AND ABBREVIATIONS

CCOT	Critical care outreach team
CT scan	Computerized tomography scan
CXR	Chest x-ray
EAU	Emergency assessment unit
ED	Emergency department
e-FAST	Extended focused assessment with sonography in trauma
HDU	High dependency unit
ICU	Intensive care unit
IV	Intravenous
LMWH	Low molecular weight heparin
MDT	Multi-disciplinary team
MTC	Major trauma centre
NSAIDs	Non-steroidal anti-inflammatory drugs
PO	"per os" – oral administration
PRN	"pro re nata" – as required
SAU	Surgical assessment unit
TTO	To take out

4 ROLES AND RESPONSIBILITIES

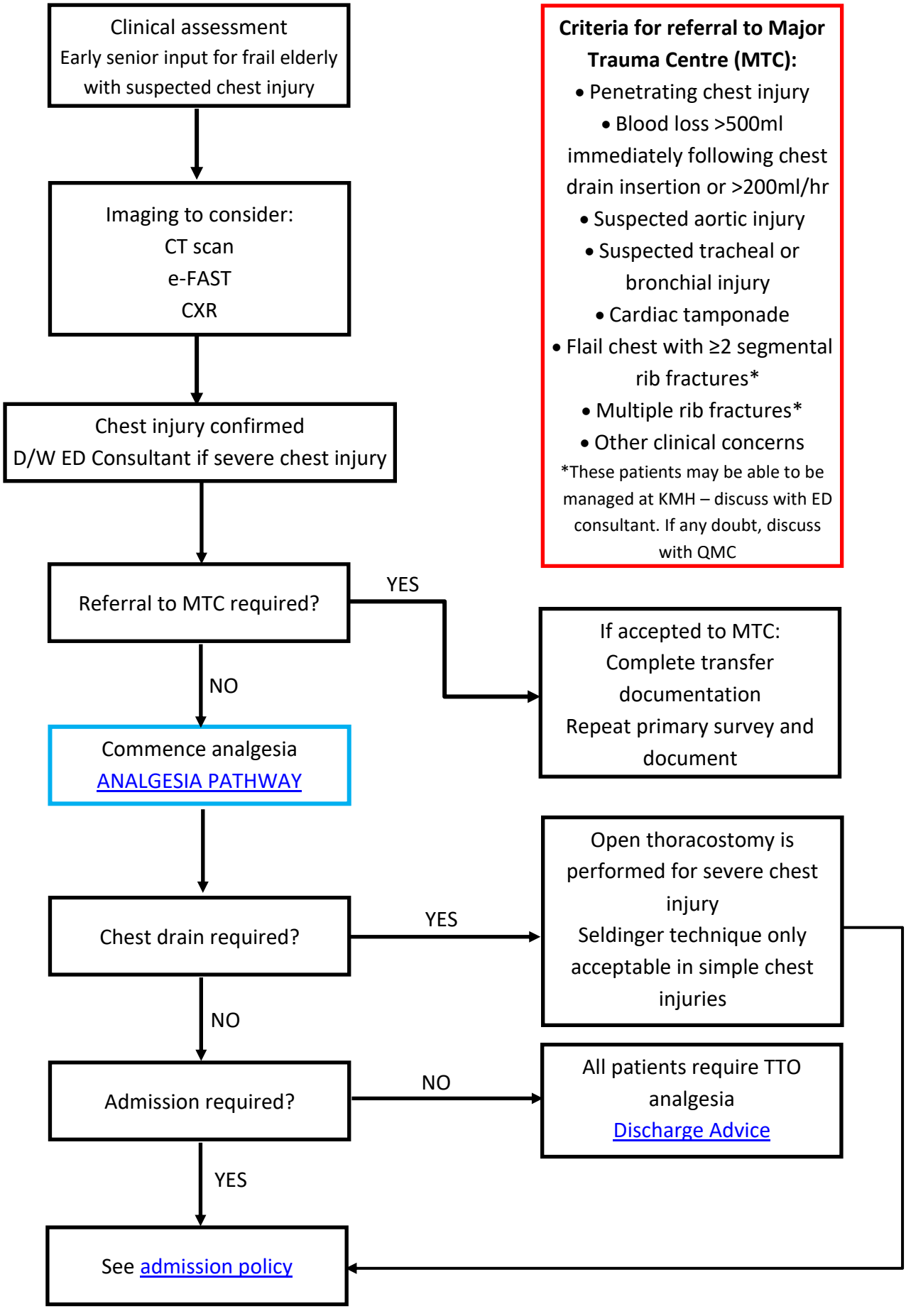
All clinicians caring for adults with chest trauma are expected to be familiar with and implement this guideline. If in doubt about how best to follow this guidance, please seek senior help. Guidelines are not a substitute for clinical experience.
We anticipate that the majority of patients receiving a diagnosis of rib fractures will present via the Emergency Department, however it is important that all clinicians caring for adults are familiar with the contents of this guideline as delayed diagnosis or development following a fall in hospital are possible.

5 AUDIT STANDARDS

The following will be used to monitor implementation of this guideline

- Patient pain score 1/3 AND able to deep breath and cough with minimal discomfort by 12 hours following admission
- Patient pain score at rest, on deep breathing, and on coughing will be documented in the medical notes at least once every 24 hours during acute admission
- All patients admitted with chest trauma will be referred to CCOT, pain team, and physiotherapy services
- Time from anaesthetic referral to review is ≤6 hours and time from referral to management is ≤12 hours

6 ED MANAGEMENT FLOWCHART



7 ANALGESIA PATHWAY

Chest trauma confirmed on CXR/CT

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Consider stat dose IV morphine/IV oxycodone titrated to pain

↓

Start Analgesia

Adult Patients	Patients ≥70 years	Patients with renal impairment	
		eGFR 40-50	eGFR <40
Paracetamol 1g PO/IV QDS **regular** (If weight <50kg dose at 15mg/kg)	Paracetamol 1g PO/IV QDS **regular** (If weight <50kg dose at 15mg/kg)	Paracetamol 1g PO/IV QDS **regular** (If weight <50kg dose at 15mg/kg)	Paracetamol 1g PO/IV QDS **regular** (If weight <50kg dose at 15mg/kg)
Ibuprofen 400mg PO TDS **regular**	NSAIDs with caution	Avoid NSAIDs	Avoid NSAIDs
Zomorph 10mg PO BD **regular**	Longtec 5-10mg PO BD **regular**	Longtec 5mg PO BD **regular**	Shortec 2.5mg PO QDS **regular**
Oramorph 10-20mg PO 2 hourly **PRN**	Shortec 5-10mg PO 2 hourly **PRN**	Shortec 2.5mg PO 1 hourly **PRN**	Shortec 2.5mg PO 2 hourly **PRN**
Laxatives: Sodium Docusate 100-200mg PO BD **regular** and Senna 15mg PO ON **regular**			
Anti-emetics: Ondansetron 4mg PO/IV 4hourly (16mg/24h) **PRN** and Cyclizine 50mg PO 8hourly **PRN**			

Aim of analgesia is: 1) pain score ≤1/3 and 2) to allow patient to deep breathe AND cough

↓

Calculate STUMBL Score

		Score
Age	**+1** per 10 years over 10	
SpO2	**+2** per 5% drop below 95% on air	
Number of rib fractures	**+3** per rib fractured	
On anticoagulant/antiplatelet	**+4**	
Chronic lung disease	**+5**	

↓

Assess Pain

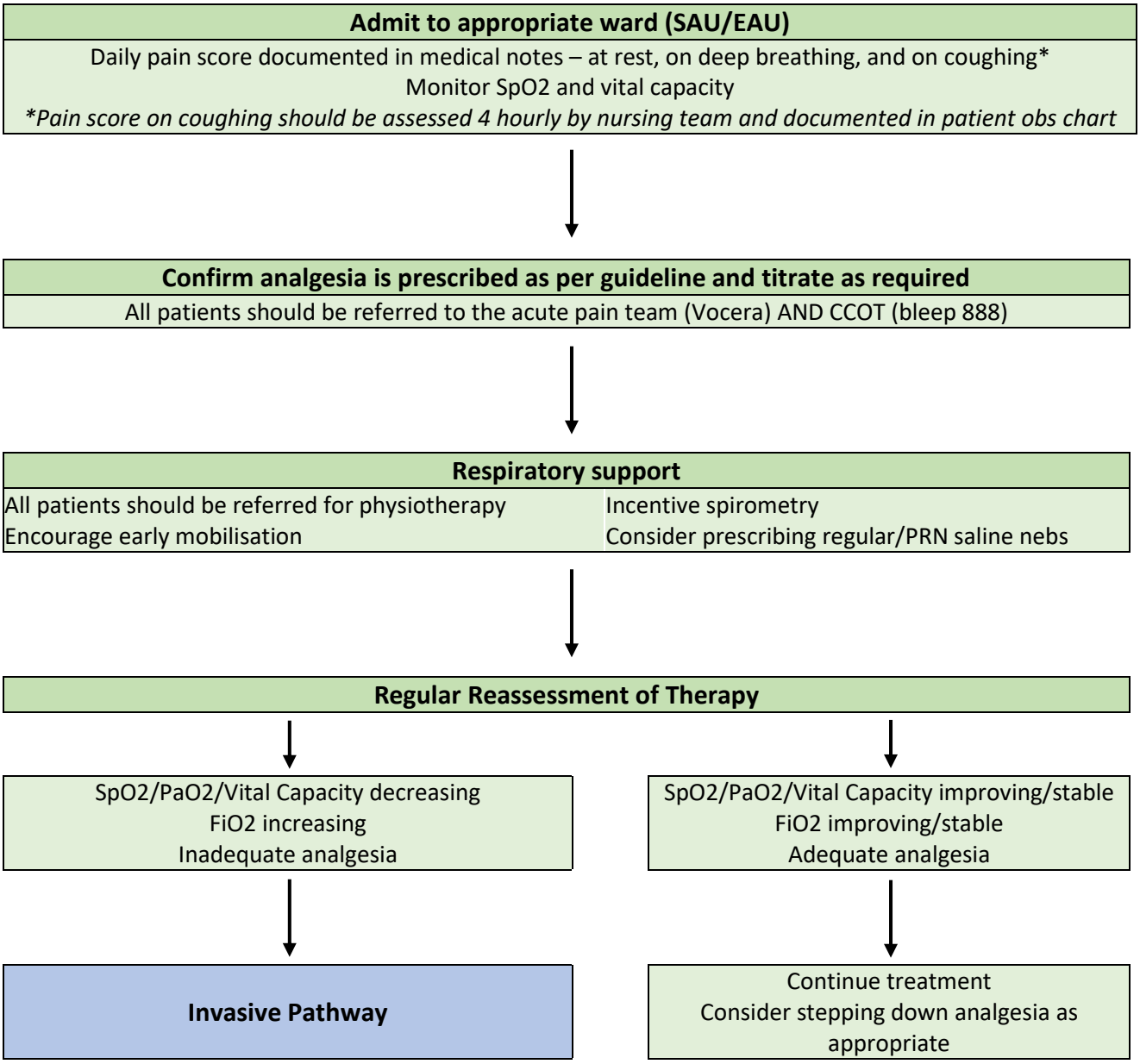
	At rest	On deep breathing	On coughing
Pain Score (0-3)			
(0 – no pain; 1 – mild pain; 2 – moderate pain; 3 – severe pain)			

↓

Start on Appropriate Pathway

STUMBL ≤15	STUMBL ≥16
Non-Invasive Pathway If score <10 consider discharge with TTO analgesia	Invasive Pathway If score >25 consider critical care referral

7.1 Non-Invasive Pathway



7.2 Discharge Advice

Consider discharge from ED for following patients:

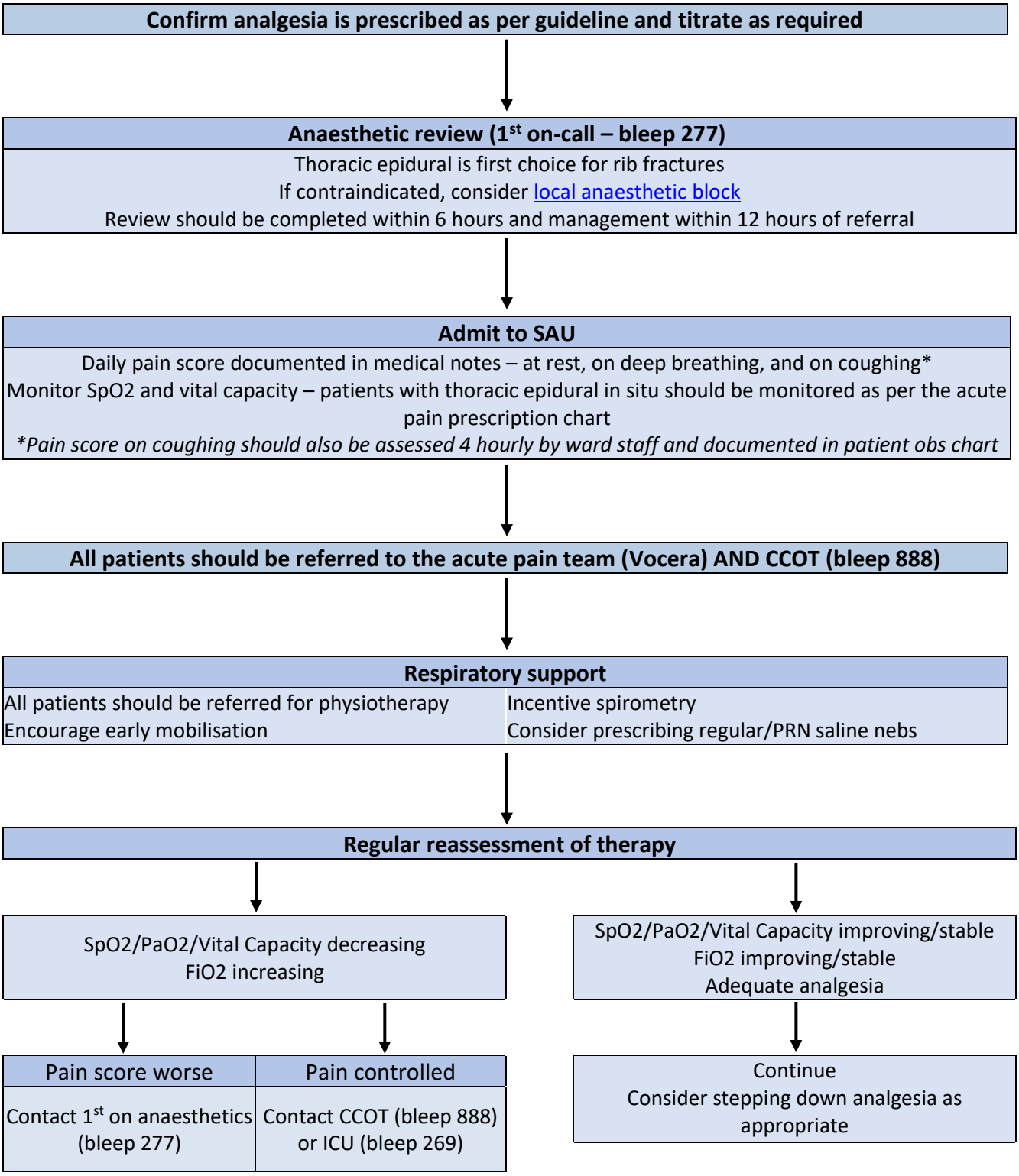
- **Able to deep breathe AND cough with oral analgesia**
- **Pain score ≤1/3 with oral analgesia**
- STUMBL score <10

All patients should be discharged with 1 weeks supply of oral analgesia and advised to contact their GP for follow up (to continue, reduce, and stop opioids). Advise simple analgesia (paracetamol ± NSAIDs) and consider:

- Tramadol 50-100mg QDS/Codeine 30-60mg QDS
- PRN Oramorph/Shortec

All patients discharged with TTO opioids should be given leaflet "Opioids for Acute Pain"

7.3 Invasive Pathway



8 EVIDENCE FOR USE OF STUMBL SCORE

Blunt chest wall trauma patients commonly present to the ED with no respiratory difficulties but can develop respiratory complications approximately 48-72 hours later. A clinical score has been developed to help early identification of patients at the highest risk of developing complications, therefore allowing prompt intervention for these patients. The complications used in development of this score were in-hospital mortality, morbidity including all pulmonary complications (chest infection, pneumonia, haemothorax, pneumothorax, pleural effusion, or empyema), ICU admission, or prolonged hospital stay (7 days or greater). The risk score and associated probability of developing complications are outlined below.

STUMBL Score	Probability mean ± SD
0 to 10	13% ± 6
11 to 15	26% ± 8
16 to 20	52% ± 8
21 to 25	70% ± 6
26 to 30	80% ± 6
31+	88% ± 6

The full article can be reviewed here.

9 ANTICOAGULANTS AND EPIDURALS

An epidural haematoma is a rare but serious risk of thoracic epidural analgesia. The full guideline for identification and management of complications of neuraxial blockade can be found here.

Reversal of anticoagulation is recommended in severe trauma with ongoing bleeding but should also be considered in particularly high-risk cases for rib fracture associated mortality. This should be a consultant-led decision with input from haematology and the parent team. Acceptable timeframes for performing epidural analgesia following anticoagulant administration are outlined below.

Drug	Time after administration for epidural insertion/removal	Administration of drug whilst epidural in situ	Time after epidural catheter removal for next dose
Aspirin/NSAIDs	No precautions	Acceptable	No precautions
LMWH (prophylactic)	12 hours	With caution	4 hours
LMWH (treatment)	24 hours	Not recommended	4 hours
Unfractionated heparin infusion	4 hours (or normal APTT)	With caution	4 hours
Clopidogrel/Prasugrel	7 days	Not recommended	6 hours
Ticagrelor	5 days	Not recommended	6 hours
Tirofiban	8 hours	Not recommended	6 hours
Abciximab	48 hours	Not recommended	6 hours
Warfarin	INR ≤1.4	Not recommended	After removal
DOACs (eg. Rivaroxaban)	eGFR dependent See appendix 1	Not recommended	6 hours
Thrombolytic drugs	10 days	Not recommended	10 days

10 COMPARISON OF ANALGESIA TECHNIQUES FOR RIB FRACTURE MANAGEMENT

Type of analgesia	Features	Evidence
Epidural (Epi)	• Unilateral or bilateral fractures • Contraindicated in coagulopathy and systemic infection • Complications: reduced MAP, urinary retention, spinal cord trauma/infection/haematoma	• Provides the most effective analgesia in meta-analysis comparing Epi, PVB, ICB, and IV; no mortality benefits; some studies suggest may increase LOS • May be technically difficult; positioning may be problematic
Paravertebral block (PVB)	• Unilateral fractures; bilateral insertion for bilateral analgesia • Less sympathetic block than Epi; no urinary retention • Safer than Epi in the presence of anticoagulants	• As effective as Epi in terms of respiratory complications and duration of artificial ventilation or stay in ICU
Intercostal block (ICB)	• Requires multiple injections of LA at the level of the fracture and one level above and below • Unilateral analgesia • May not be suitable for multiple fractures as volume of LA required may exceed safe dose • Can be performed landmark or using US • Risk of pneumothorax	• Has not traditionally been a popular choice of analgesia for rib fractures • May improve respiratory function compared with no regional technique
Erector spinae plane block (ESP)	• Provides analgesia in unilateral fractures; may be inserted bilaterally • Analgesia to anterior and posterior hemithorax; LA will spread 3 segments above and 4 below site of injection • Can be performed sitting or lateral • Technically easier than PVB, ICB, and Epi; can potentially be inserted in ED • Minimal changes in MAP • Lower risk of complications in the anticoagulated patient	• Some studies have shown improved spirometry values post-block insertion in rib fracture patients • Novel technique; evidence comparing with more traditional regional techniques is currently lacking • Retrospective cohort study showed improved pain scores and spirometry values with reduced opioid consumption associated with ESP catheter insertion • RCT needed
Serratus anterior plane block (SPB)	• Unilateral fractures; provides analgesia to anterior chest wall • Can be inserted bilaterally • Blocks lateral branches of intercostal nerves • May be performed supine in anticoagulant patients • Only effective in fractures of anterior two-thirds of hemithorax • May be useful in patients with multiple anterior fractures	• Efficacy limited to case reports and observational studies • No comparison studies with other techniques at present
IV opioids	• Indicated in severe pain where LA regional technique not possible or contraindicated • Can provide analgesia for multiple injuries • PCA not suitable in unconscious patients or those unable to press button • May cause hypotension and respiratory depression	• Inferior analgesia to Epi, PVB, and ICB in meta-analysis

Table taken from Williams et al, BJA Education 2020

11 EVIDENCE BASE/ REFERENCES

- Battle et al, “Predicting outcomes after blunt chest wall trauma: development and external validation of a new prognostic model”. *Critical Care 18(3):R98*. Published 14 May 2014. doi: 10.1186/cc13873
- Williams et al, “Anaesthetic and surgical management of rib fractures”. *BJA Education 20(10):332-340*. Published 23 July 2020. doi: 10:1016/j.bjae.2020.06.001
- Jarvis et al, “Comparison of epidural versus parenteral analgesia for traumatic rib fractures: A meta-analysis". *OPUS 12 Scientist 2009; 3(3):50-57*
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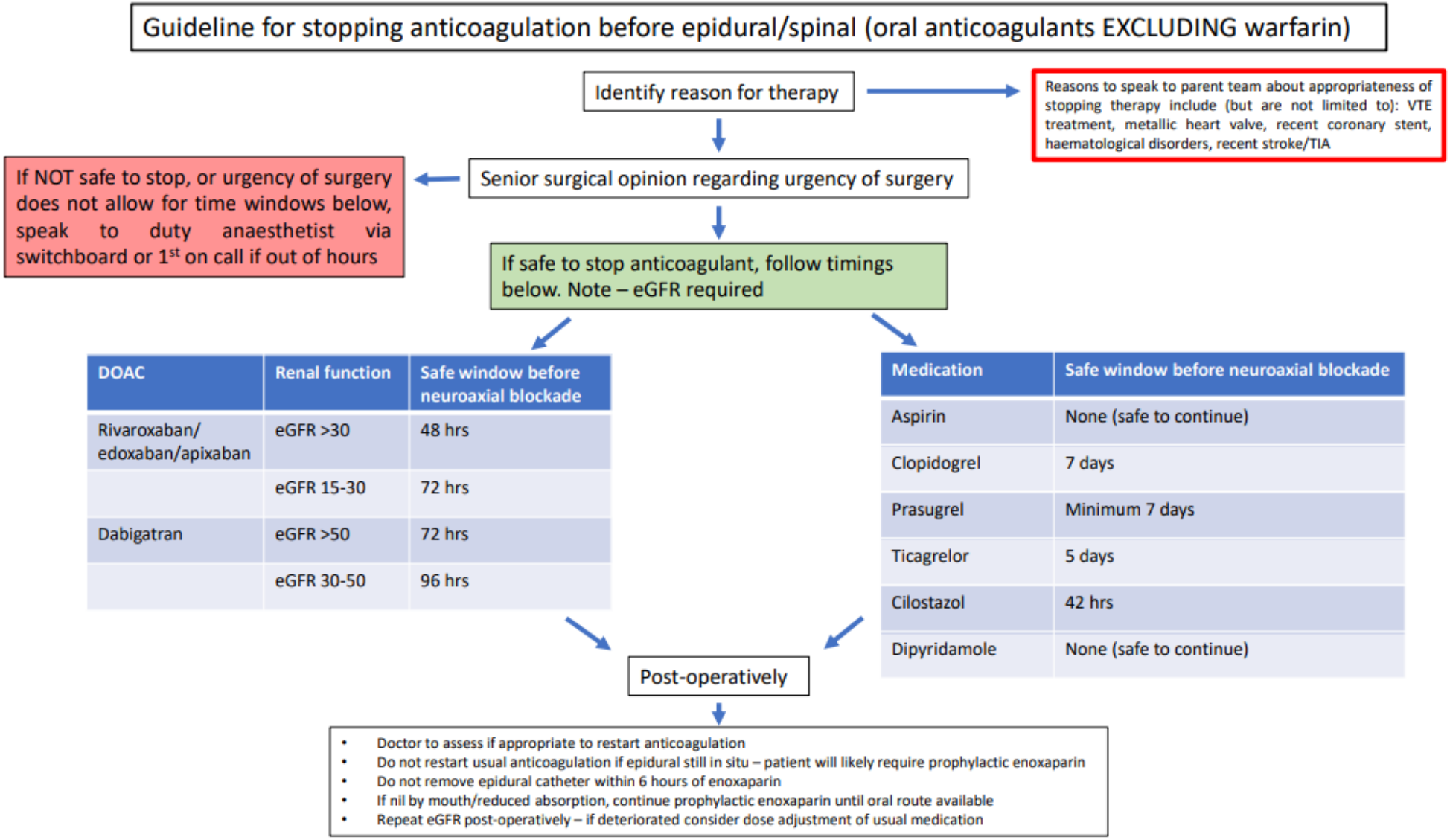
- Kumar et al, “Erector spinae plane block for multiple rib fracture done by an Emergency Physician: A case series”. *Australas J Ultrasound Med 2020; 24(1):58-62.* Published 30 August 2020. doi: 10.1002/ajum.12225

12 APPENDICES

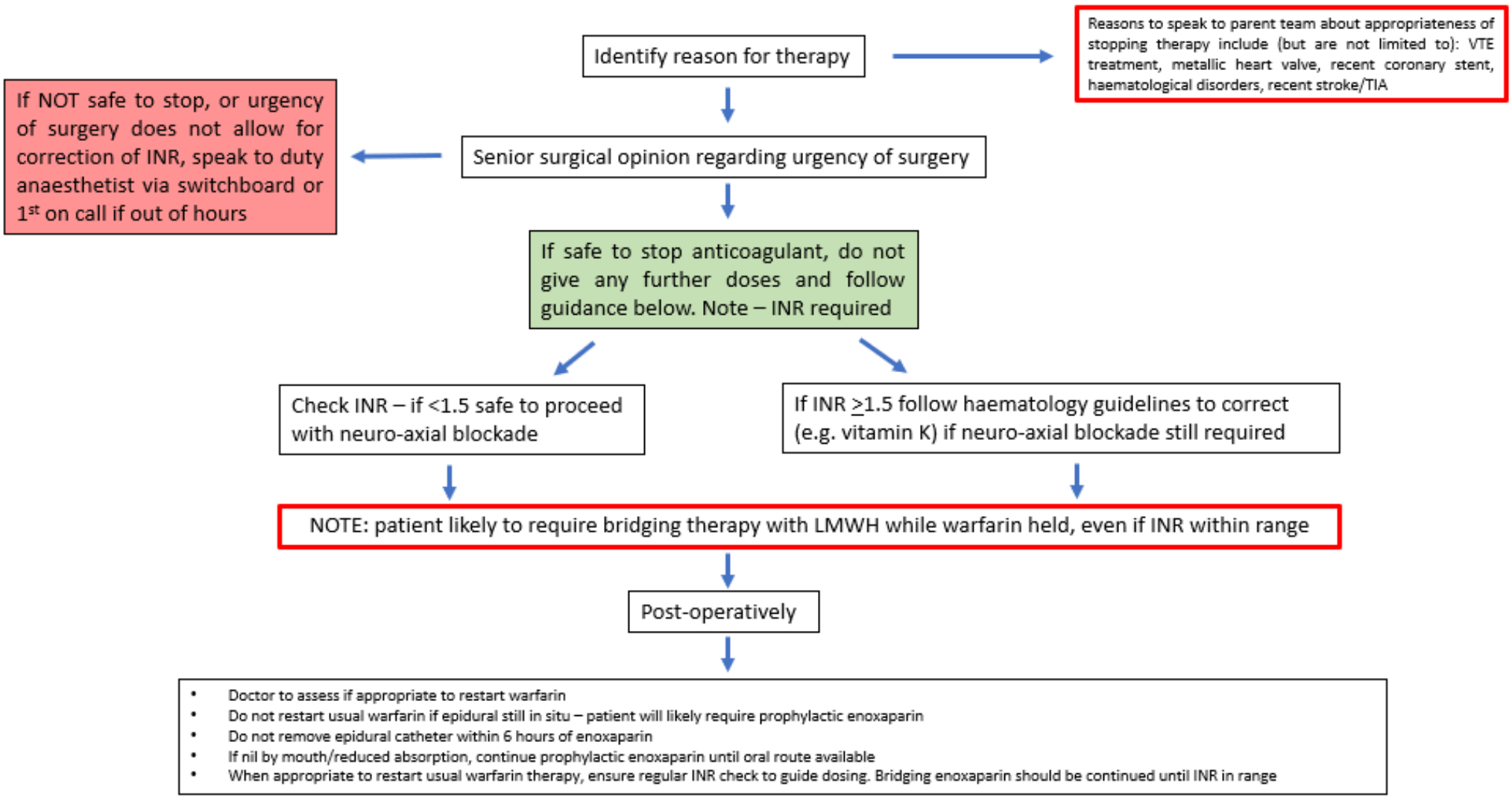
Appendix 1 Anticoagulants and Epidurals



DOAC	Renal function	Safe window before neuroaxial blockade
Rivaroxaban/ edoxaban/apixaban	eGFR >30	48 hrs
	eGFR 15-30	72 hrs
Dabigatran	eGFR >50	72 hrs
	eGFR 30-50	96 hrs

Medication	Safe window before neuroaxial blockade
Aspirin	None (safe to continue)
Clopidogrel	7 days
Prasugrel	Minimum 7 days
Ticagrelor	5 days
Cilostazol	42 hrs
Dipyridamole	None (safe to continue)

Guideline for stopping warfarin before epidural/spinal



Appendix 2 | Admissions Policy

Chest injury with acute medical problems
Initial management in resus with surgical, critical care, and medical review in department. If patient needs an epidural, then HDU or SAU admission. These patients will likely need consultant discussion.

Isolated chest injury – admission reason is the chest injury or pain control
Chest drain (if indicated) is inserted in resus. Admit to surgery via SAU. Ongoing management of surgical chest drains by surgical team.

Chest injury plus injury needing <u>non-surgical</u> orthopaedic management
Patients are admitted under general surgery on SAU. If chest drain is indicated, to be inserted in ED. It is mandatory that the orthopaedic consultant reviews the patient on ward rounds, confirms management, and a plan is documented in the notes regarding orthopaedic injury.

Chest injury plus injury needing <u>surgical</u> orthopaedic intervention
Patient admitted under orthopaedics. Chest injury to be managed by general surgeons. Both teams would liaise with each other at at least registrar level on appropriate timing of orthopaedic surgery in relation to patient condition.

Any associated non-operative head injury
All non-operative head injury associated with chest injury, with no operable orthopaedic injury, and is not a social admission, to be admitted to SAU under general surgery. ED team to continue to input on head injury management for 48 hours, then the patient can be placed on the head injury rehab pathway.

Chest injury with chronic medical problem (eg. frailty)
An unremarkable CT chest (ie. no chest pain or epidural needed) and no pain control issues needing intervention, but admission is felt appropriate due to ongoing medical problems – admit to EAU under medicine.

12 EQUALITY IMPACT ASSESSMENT

Name of service/policy/procedure being reviewed: Adult Chest Trauma Risk Stratification and Analgesia Guideline			
New or existing service/policy/procedure: New			
Date of Assessment: 09/07/2022			
For the service/policy/procedure and its implementation answer the questions a – c below against each characteristic (if relevant consider breaking the policy or implementation down into areas)			
Protected Characteristic	a) Using data and supporting information, what issues, needs or barriers could the protected characteristic groups' experience? For example, are there any known health inequality or access issues to consider?	b) What is already in place in the policy or its implementation to address any inequalities or barriers to access including under representation at clinics, screening?	c) Please state any barriers that still need to be addressed and any proposed actions to eliminate inequality
The area of policy or its implementation being assessed:			
Race and Ethnicity:	Persons for whom English is a second language may struggle to understand all analgesic options offered to them	Telephone interpretation services are easily available throughout the trust	N/A
Gender:	N/A	N/A	N/A
Age:	Chest trauma and rib fractures are more common in the elderly population and these patients are at higher risk of developing complications	The scoring system introduced in this guideline uses age to determine risk	N/A
Religion:	N/A	N/A	N/A
Disability:	N/A	N/A	N/A
Sexuality:	N/A	N/A	N/A
Pregnancy and Maternity:	Pregnant women presenting with chest trauma will be discussed with the obstetric team	Pregnant women presenting with chest trauma will be discussed with the obstetric team	N/A
Gender Reassignment:	N/A	N/A	N/A
Marriage and Civil Partnership:	N/A	N/A	N/A
Socio-Economic Factors (i.e. living in a poorer neighbourhood / social deprivation):	N/A	N/A	N/A

What consultation with protected characteristic groups including patient groups have you carried out? • None
What data or information did you use in support of this EqIA? • None
As far as you are aware are there any Human Rights issues be taken into account such as arising from surveys, questionnaires, comments, concerns, complaints or compliments? • None

Level of impact

From the information provided above and following EqIA guidance document please indicate the perceived level of impact:

Low Level of Impact

For high or medium levels of impact, please forward a copy of this form to the HR Secretaries for inclusion at the next Diversity and Inclusivity meeting.

Name of Responsible Person undertaking this assessment:
Signature: Dr Harriet Davis
Date: 09/07/2022