
Standard Operating Procedure

Stoke-on-Trent Thoracic Assessment Referral and Transfer Pathway Trauma Unit & LEH (Concise Version)

Background:

Patients with blunt thoracic injuries within the NWMNW Network need a comprehensive management plan, with appropriate transfer and repatriation to and from the Royal Stoke University Hospital for supportive non-operative management and chest wall reconstruction if required.

The S.T.A.R.T. pathway outlines how the blunt chest wall trauma patient can be risk stratified in the initial Emergency Department presentation using the STUMBL rib assessment score to predict complications in the next 48-72 hours. Individualised supportive care packages (analgesia, physiotherapy, monitoring) can be targeted, guided by this risk score.

For patients with higher risk injuries presenting within Trauma Units who have not triggered a 'call and send' hyper-acute or emergency TU to MTC transfer, it describes the referral pathway for isolated thoracic MTC assessment referral and transfer. It is intended for use by TTLs and the wider Trauma Team and remains consistent with the Tri-Network Guidance on this subject⁽¹⁾.

Introduction:

Rib fractures are common injuries,⁽²⁻⁵⁾ frequently caused by high-energy Road Traffic Collisions (RTCs) in younger adults, and in the elderly as a result of low energy trauma such as falls or low speed RTCs^(6,7). They can be associated with underlying pulmonary contusions and respiratory compromise which may not develop until 48-72 hours after injury. The risk of complications increases with age, number of ribs fractured, presence of pre-existing chronic lung disease, and anticoagulation use. Five or more fractured ribs should be regarded as a high risk injury with a mortality of approximately 10%⁽⁴⁾. Isolated rib fractures can be associated with high levels of chronic pain and difficulty in returning to pre-injury functional state⁽¹⁰⁾.

The impact of associated fractures to the clavicle, scapula, sternum and thoracic spine should not be underestimated as these can produce a 'functional flail' in association with a relatively small number of rib fractures, causing a greater degree of morbidity than might otherwise be anticipated (see UHNM Flail Classification Appendix 2).

STEP 1: Assessment with initial STUMBL Scoring

- On presentation to the Emergency Department, following appropriate initial patient assessment management and imaging, the STUMBL score, developed by Battle et al can be completed ⁽⁸⁾ **see Appendix 1 for STUMBL score card.**
- This prognostic risk prediction score allows patients to be stratified into three groups, supporting the ED clinician in deciding whether to discharge, admit to a ward or refer to critical care. It has been subject to a multi-centre prospective validation⁽⁹⁾ and has been adopted by the Midlands Critical Care and Trauma Network guidelines on this subject⁽¹⁾ It is subject to further investigation in the STUMBL-2 trial with the Centre for Trauma Sciences⁽¹¹⁾.
- The STUMBL score should be used to guide clinical judgment with respect to initial admission, analgesia and referral decisions, not replace it.**
- Patients being admitted should receive S.N.O.M. (see Isolated Thoracic Trauma Management Pathway page 5).

STEP 2: Initial Care Bundle in Emergency Department

STUMBL score	0-10	11-15	16-20	20-25	26 or greater
Consider where?	Home	Ward Level 0	Ward Level1		ITU assessment Level2/3
Oxygen therapy?		Titrate Oxygen to SpO2 Humidify if high flow rate			Consider nasal high flow and need for invasive ventilation
Referrals?	Discharge/GP Letter (recommended to be seen in GP surgery in 4 weeks)	Acute Pain Team, Chest Physiotherapy			
		Critical Care Outreach and escalate as appropriate (>15 ensure TU TTL aware, consider MTC referral)			Isolated thoracic injury: CTS via 'Refer-a-patient' & call to confirm receipt. If polytrauma: MTC-TTL TU Anaesthetist for regional blocks /epidural
Analgesic ladder Step i)	Paracetamol 1g qds oral Oral Codeine 30-60mg qds or Tramadol 50/100mg PO qds (caution in elderly)	IV Paracetamol 1g qds if >50kg			
Step ii)	PO Ibuprofen 400mg 6-8 hourly (Caution in asthmatics, gastric irritation, elderly and renal disease) Or: IV Diclofenac 75mg bd max, max 2 days (care in asthmatics, gastric irritation, elderly and renal disease)				

Step iii)	Requires Oral morphine 1020mg PRN for breakthrough pain Consider overnight I/P observation	Consider opiate based analgesia according to local protocols e.g. PCA Morphine/ oxycodone
Step iv)		Discuss regional local anaesthesia catheter e.g SAPB, epidural technique with Anaesthetist/Pain Team if available
MTC Referral needed?	N/A	STUMBL score >10, ≤ 25 Consider MTC referral for Thoracic injury input

- The goal of the analgesic ladder is **to enable the patient to deep breath and cough in order to clear secretions as well as for its humanitarian benefit.**
- Patients discharged from the ED or after admission with chest wall injury treated operatively or non-operatively will be given a **Patient Information Leaflet on thoracic injuries (see Appendix 4).**
- Patients being admitted should receive S.N.O.M. (see: Isolated Thoracic Trauma Management Pathway page 6).

STEP 3: Referral to Thoracic Surgeons at Royal Stoke University Hospital MTC

For patients with **isolated thoracic trauma referral must be made online via the “Refer-a-patient” portal**, then telephone call to on-call Cardiothoracic registrar to inform them of referral. This is to ensure for Information Governance that the referral details and any advice given can be reviewed by a MTC or Thoracic Consultant (on next working day), especially if patient condition should deteriorate and second referral opinion is requested.

Referral Checklist	Comments:
Referring Consultant and contact number	
Patient location and ward contact number	
Name / DOB / NHS no	
Date / Time / mechanism of injury	
STUMBL Score (see appendix1)	
Other injuries or fractures (e.g. scapula, clavicle, sternum or spine) and other systems	Isolated chest trauma excludes thoracic vertebral trauma which should be referred via severe polytrauma pathway
Age If > 65 calculate Clinical Frailty Score (see appendix 3)	Very elderly ≥80 & high frailty score ≥ 7 discuss with MTC

3

GCS >13, ≤ 13	(If ≤ 13 , Refer to MTC-TTL not CTS)		
Type of Flail Chest Establish from 3D Recon of CT thorax	A / B / C / D <i>(UHNM Classification see Appendix 2)</i>		
Number of rib fractures left /right Specify presence, side and size of pleural complications	No of ribs #	Right	Left
	Haemothorax		
	Pneumothorax		
	Tension Pneumothorax		
	Chest drain inserted		
PaO2 and FiO2? Intubated? CPAP?			
NEWS2 score GCS	At presentation	Current after pain relief	
Co-morbid disease e.g. COPD/ILD/CF/BMI >30 /OSA Cardiac /Renal/ Neurological conditions / liver injury/ dysfunction / Pre-injury anticoagulation			
Covid-19 swab			

If the patient is accepted for MTC / CTS transfer proceed to STEP 4: Transfer.

STEP 4: Transfer

MTC transfers are either hyper-acute, emergency, or isolated single system.

- A. Hyper-acute patients** with immediately life threatening severe multisystem poly-trauma presenting to the TU should be resuscitated and stabilised according to damage control resuscitation principles. They should be transferred on a “call and send” basis TTL to TTL as per Tri-Network guidance. From Welsh TUs to RSUH contact the Wales Air Support Desk 0300 123 2301 (24 hours) to discuss with the duty EMRTS Top Cover Consultant for potential Wales Air Ambulance transfer.

From English TU/LEHs [English hospitals](#) use the [MERIT Enhanced Care Team](#) if available to RSUH. Contact via West Midlands Ambulance Service Trauma Desk 01384 215696 (24 hours) for Hyper acute transfer only.

- B. Emergency severe multi-system poly-trauma** patients should be discussed by TU TTL direct to MTC TTL via the Royal Stoke University Hospital Switchboard on 01782 715444. (This type of referral does not need to go on Refer A Patient).

The patient should be optimised and imaging shared immediately with the MTC. We require CT scans to be reconstructed on 3D format to show bony structures. Immediate advice should be given TTL to TTL, the patient optimised for transfer, and if possible a transfer decision made immediately.

If a transfer decision is not possible immediately, and thoracic injury is the primary injury burden, imaging will require review (include 3D reconstruction) and/or a discussion with a Cardiothoracic Consultant. If this decision is pending at 4-6 hours after referral, TU/LEH - TTL to inform the MTC TTLs. Subsequent transfer decision making, once imaging is available to the MTC TTL will be expedited.

If decision is made to transfer, TU/LEH- TTL to respond to advice given emergently and expedite transfer promptly within 60 minutes using local ambulance service to provide transport. Within Wales, the EMRTS may be able to assist with Emergency patient transfer to the MTC. Tel 0300 123 2301.

C. Isolated single system thoracic trauma patients who are being referred Consultant (TU/LEH) to Consultant (CT surgery) and accepted via **Refer A Patient** will normally be assessed as **requiring standard transfer pathway within 24 hours** (please refer to UHNM transfer SOP). This must be organised by the sending hospital after liaising with the RSUH Bed Manager.

If Thoracic Surgery has accepted an isolated thoracic trauma transfer, the patient should be transferred within **48 hours** of acceptance. For clinical and non-clinical reasons, once accepted RSUH will endeavour to locate a specialty bed on wards or critical care if required.

If after 24 hours (passing of 1 midnight) of acceptance no bed has been made available under Thoracic Surgery to receive the patient, the TU Consultant should contact the TTL who will accept the patient for transfer from the TU direct to the MTC Emergency Department rather than a Specialty ward bed.

Repatriation will occur on a reciprocal basis using the same time standard once the patient is assessed as ready for discharge back to the TU/ LEH.

Ambulance Transfers should be risk assessed and undertaken according to the relevant transfer guidelines which can be accessed in the Midlands Critical Care & Trauma Network site www.mcctn.org.uk/ click following hyperlink for [English hospitals](#) and for [Welsh hospitals](#).

North Wales WAST CCC (To discuss routine WAST Ambulance Transfer) Tel: 0300 123 9235

Wales Air Support Desk (To discuss scheduled Helimed 67 transfer) Tel: 0300 123 2301

Isolated Thoracic Trauma Management (TTM) pathway

All thoracic trauma patients will be instituted on supportive non-operative management care immediately at the **first point of contact when being admitted to the LEH, TU or directly at MTC.**

A. Supportive non operative management (SNOM) consists of (as needed)

- High Flow humidified Nasal Oxygen therapy (opti-flow)
- Arterial line with ABGs in an appropriate setting
- Pain management with Acute Pain Team input
- Mucolytics, nebulisers, antibiotics, +/- steroids
- Respiratory Physiotherapy and mobilization
- NEWS2 and Pain Scoring at 4 hourly intervals or more frequently
- VTE(venous thromboprophylaxis) as per local policy

With a rise in the elderly patients presenting with thoracic trauma, patients may need cardiac monitoring and a higher index of suspicion for diagnosis of cardiac complications. If the patient is frail or > 65 consider high energy drinks.

Patients with higher STUMBL score are at higher risk of developing chest complications and should be considered for multiple interventions and regular review with a view to graded escalation of physiotherapy input after pain control. Early intervention for clearance of secretions especially in patients with COPD and productive chest diseases to prevent intubation is advised.

Respiratory distress and inability to cough will be considered an early indication of potential deterioration. Decline in responsiveness associated with other physiological derangement is usually a late presentation of associated with hypoxia/ hypercarbia and/or increased opiate usage.

If the patient has a high Rockwood Clinical Frailty Score (Appendix 3), consider filling in the ReSPECT form to comply with the patients' wishes and preferences.

In the very elderly patients ≥ 80 requiring SNOM only, the Elderly Care trauma consultant should be involved at the outset. The frail very elderly patient with isolated chest trauma not needing surgical intervention may not be best cared for in the cardiothoracic ward 223 and should be considered to be placed in the Medical or the Frail Elderly Wards. The care of the Frail and the Elderly is currently under review in the UHNM.

B. Chest Wall Reconstruction (CWR)

Decision making on which patients with thoracic injuries will benefit or require Chest Wall Reconstruction (CWR) is beyond the scope of this SOP. Surgical management namely patient selection and planning is the specialist domain of Thoracic Surgical Team.

Of note, in the current literature there is no age limit or specific number of rib fractures that dictate the practice.

Conclusion

Chest wall trauma accounts for between 10-40% of cases of mortality in trauma. Chest wall stabilization, undertaken in a multi-disciplinary manner reduces mortality, speeds clinical recovery and has a potential to improve quality of life and reduce long term impact of chest wall injury. A stratified service to deliver this care is proposed in this document.

Appendix 1: STUMBL Scorecard

Swansea Blunt Chest Wall Trauma Score


NB: Circle the score for each risk factor in the table and total all scores

	Patient data	Corresponding risk score																
Age	10-19	1	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: auto;"> Total Score _____ </div>															
	20-29	2																
	30-39	3																
	40-49	4																
	50-59	5																
	60-69	6																
	70-79	7																
	80-89	8																
	90-99	9																
	100-109	10																
Number of rib fractures	0	0	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Risk score</th> <th>Probability of complications</th> </tr> </thead> <tbody> <tr><td>0-10</td><td>13%</td></tr> <tr><td>11-15</td><td>29%</td></tr> <tr><td>16-20</td><td>52%</td></tr> <tr><td>21-25</td><td>70%</td></tr> <tr><td>26-30</td><td>80%</td></tr> <tr><td>31+</td><td>88%</td></tr> </tbody> </table>		Risk score	Probability of complications	0-10	13%	11-15	29%	16-20	52%	21-25	70%	26-30	80%	31+	88%
	Risk score	Probability of complications																
	0-10	13%																
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	1	3																
	2	6																
	3	9																
4	12																	
5	15																	
6	18																	
7	21																	
8	24																	
9	27																	
10	30																	
Pre-injury anticoagulants	No	0																
	Yes	4																
Chronic lung disease	No	0																
	Yes	5																
Oxygen saturation levels	100-95%	0																
	90-94%	2																
	85-89%	4																
	80-84%	6																
	75-79%	8																
	70-74%	10																

Total Score 0-11: Consider discharge home with advice leaflet and analgesia
Total Score 12-26: Consider admission to a ward for observation, analgesia and physiotherapy
Total Score ≥27: Consider ICU management


Actual management decision: (PLEASE CIRCLE): **HOME** **WARD** **HDU / ICU**

Attach Patient Sticker Here

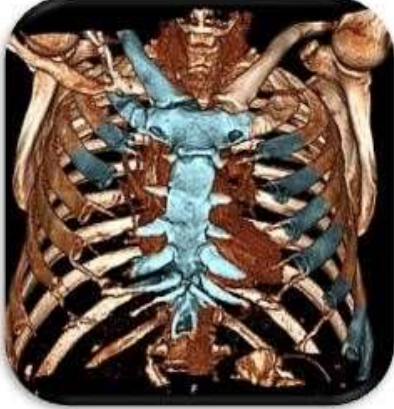


major
traumacentre
University Hospitals of North Midlands
Royal Stoke University Hospital

UHNM Flail Chest Classification




NHS
70
YEARS
OF THE NHS
1948-2018
University Hospitals
of North Midlands
NHS Trust




Type A:

Sequential fracture of ribs and cartilages, often bilateral and asymmetrical, including the sternum and clavicles. May include ribs 1 – 9. *(Frequently caused by seat belt injuries).*




Type B:

Sequential pairs of fractures situated on the lateral border of the rib cage. May include ribs 2 – 9. *(Commonly caused by falls).*



Type C:

Sequential postero-lateral fractures, often seated under the scapular. The most medial point of fractures are immediately lateral to transverse processes of vertebra. *(Often caused by falls or RTC).*



Type D:

Fracture of sequential ribs situated either side of the vertebra and including anatomically associated vertebral bodies. *(Often caused by industrial compression accidents).*

R. Chubsey et al. 2019

Appendix 3: Rockwood Clinical Frailty Score from NHS England website

Clinical Frailty Scale*



1 Very Fit – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.



2 Well – People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g. seasonally.



3 Managing Well – People whose **medical problems are well controlled**, but are **not regularly active** beyond routine walking.



4 Vulnerable – While **not dependent** on others for daily help, often **symptoms limit activities**. A common complaint is being “slowed up”, and/or being tired during the day.



5 Mildly Frail – These people often have **more evident slowing**, and need help in **high order IADLs** (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.



6 Moderately Frail – People need help with **all outside activities** and with **keeping house**. Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.



7 Severely Frail – **Completely dependent for personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).



8 Very Severely Frail – **Completely dependent**, approaching the end of life. Typically, they could not recover even from a minor illness.



9 Terminally Ill – Approaching the end of life. This category applies to people with a **life expectancy <6 months**, who are **not otherwise evidently frail**.

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderata dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

* 1. Canadian Study on Health & Aging, Revised 2001
2. K. Rockwood et al. A global clinical measure of fitness and frailty in elderly people. *CPMJ* 2005; 173:489-495.

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Appendix 4: Chest Wall Injuries Patient information Leaflet

When to seek medical advice

Injuries vary from patient to patient but it is important to contact the relevant personnel if your symptoms are not being controlled.

Contact your GP if any of the following arise:

- Development of a new fever
- Development of a productive cough that gives rise to discoloured sputum
- Coughing up of any blood
- Any discharge from the wound (post-op)

Urgently call 999 if any of the following arise:

- A new type of pain that has developed in the chest
- Chest pain worsening despite pain relief
- Difficulty in breathing

Chest Wall Injuries

Patient information Leaflet

What is a Chest Wall Injury?

A chest wall injury is an injury to the upper half of the torso involving the ribs, sternum and/or the lungs. In major injuries the spine may be involved.

It can occur after a traumatic event to the chest such as a road traffic accident, as a result of a sporting activity or even falling from a height.

Chest wall injuries can be painful and can take several weeks to heal usually 4-6 weeks. There are some instances when surgery is necessary to fix the ribs but largely there is no specific treatment for such injuries.

The mainstay management is pain relief.

The main injuries may be:

- Fractured ribs
- Fractured sternum
- Chest wall bruising
-

There may be other associated injuries to the spine, clavicle and scapula which is dealt with by the orthopaedic team.

Complications

Depending on the mechanism of action, there can be complications of varying severity.

Most Common

Chest infections

With a chest wall injury, it becomes painful to cough. Without coughing, the airways are not able to remove the excess phlegm produced. With this collection, an infection can arise leading to pneumonia.

Less Common

Pneumothorax

A pneumothorax is where there is an accumulation of air in the lining of the lungs thus, reducing the lung volume within the chest cavity. This can cause shortness of breath and pain upon breathing.

Haemothorax

Similar to a pneumothorax, a haemothorax is where there is a collection of blood within the lining of the lung (pleura). This too can cause shortness of breath and pain upon breathing.

Post-operative

Wound Infection

Please follow the instructions given by the nurse at discharge and contact GP at the earliest.

After being discharged

The treatment for any chest wall injury is controlling the pain. However, it is important to be aware of the complications and minimise the risk of them occurring.

Do's

Ensure you are taking enough pain relief

- This can be the medications your doctor discharged you with or over the counter medications such as paracetamol, ibuprofen and codein as advised.
- Do not take ibuprofen if you are taking another blood thinning medication.

Cough if you need to

- This will help clear the excess phlegm built up in your chest

Keep walking around and being active

Keep taking regular deep breaths as tolerated

You may find sitting upright more comfortable than lying down

Don'ts

Do not suppress your urge to cough

Avoid the use of cough medicine unless prescribed.

Do not stay physically inactive for prolonged periods of time in the day.

Do not engage in strenuous activities which may trigger pain

References:

1. [Blunt Chest Trauma \(Rib Fracture\) Management Guideline](#)
2. [Cameron P, Dziukas L, Hadj A, Clark P, Hooper S. Rib fractures in major trauma. Aust N Z J Surg. 1996;66\(8\):530–4.](#)
3. [Ziegler DW, Agarwal NN. The morbidity and mortality of rib fractures. J Trauma. 1994;37\(6\):975–9.](#)
4. [Flagel BT, Luchette FA, Reed RL, Esposito TJ, Davis KA, Santaniello JM, et al. Half-a-dozen ribs: the breakpoint for mortality. Surgery. 2005;138\(4\):717–723](#)
5. [Lafferty PM, Anavian J, Will RE, Cole PA. Operative treatment of chest wall injuries: indications, technique, and outcomes. J Bone Joint Surg Am. 2011;93\(1\):97–110.](#)
6. [Bergeron E, Lavoie A, Clas D, Moore L, Ratte S, Tetreault S, et al. Elderly trauma patients with rib fractures are at greater risk of death and pneumonia. J Trauma. 2003;54\(3\):478–85.](#)
7. [Wijffels et al. Early fixation versus conservative therapy of multiple, simple rib fractures \(FixCon\): protocol for a multicenter randomized controlled trial. World Journal of Emergency Surgery \(2019\) 14:38:9-11](#)
8. [Battle C, Hutchings H, Lovett S, et al. Predicting outcomes after blunt chest wall trauma: development and external validation of a new prognostic model. Critical Care. 2014;18\(3\):R98.](#)
9. [Battle C, Hutchings HA, Driscoll T, et al. A multicentre randomised feasibility STUdy evaluating the impact of a prognostic model for Management of BLunt chest wall trauma patients: STUMBL Trial BMJ Open 2019;9:e029187.](#)
10. [Van Vledder MG, Kwakernaak V, Hagens T, Van Lieshout EMM, Verhofstad MHJ. Patterns of injury and outcomes in the elderly patient with rib fractures: a multicenter observational study. Eur J Trauma Emerg Surg. 2018;](#)
11. [Centre for Trauma Sciences website accessed 17/11/2019](#)
12. [Juma, Salina et al. “Clinical Frailty Scale in an Acute Medicine Unit: a Simple Tool That Predicts Length of Stay.” Canadian geriatrics journal : CGJ vol. 19,2 34-9. 29 Jun. 2016.](#)
13. <https://www.england.nhs.uk/ourwork/clinical-policy/older-people/frailty/frailty-risk-identification/> website accessed on 21/01/2020.

Useful website:

[Midlands Critical Care Trauma Network Site](#)

11 Authored:
Date for Review:

Abbreviations:

ARTU	Acute Rehabilitation and Trauma Unit
CTS	Cardiothoracic Surgery
CWR	Chest Wall Reconstruction
EMRTS	Emergency Medical Retrieval and Transfer Service
LEH	Local Emergency Hospital
MERIT	Medical Emergency Response and Incident Team
MTC	Major Trauma Centre
NWMNWN	North West Midlands and North Wales Network
ReSPECT	Recommended Summary Plan for Emergency Care and Treatment
SOP	Standard Operating Procedure
TRA	Trauma Resuscitation Anaesthetist
TTL	Trauma Team Leader
TTM	Thoracic Trauma management
TU	Trauma Unit
ED	Emergency Department
WAST- CCC	Welsh Ambulance Services NHS Trust- Clinical Contact Centre

17 Authored:
Date for Review: