



Trauma Triage

Decision Making in an Information Vacuum

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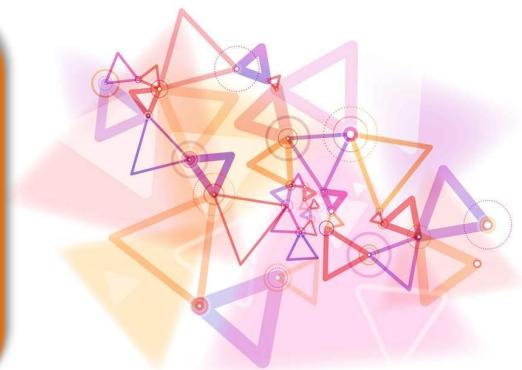
MTC: 40 minutes



Trauma Unit: 4 minutes



Critical Care team: 50 minutes





Stacey
21F

Closed Head Injury
GCS 13
HR 80, RR 14
BP 121/85



Steve
49M

Left PTX, Liver Lac,
Closed #L Femur
GCS 15
HR 98, RR 16, SpO₂ 95%
BP 114/73



James
29M

Massive facial
haemorrhage, airway
compromise
GCS 7
HR 130, RR 28, SpO₂ 84%
BP 72/50

NICE Guidance Trauma Service Delivery

- Provide a major trauma triage tool to differentiate patients who should be taken to a TU vs MTC
- Assessment of physiology & anatomical injury
- Takes into account needs of older patients, children & other high risk populations
- Support pre-hospital providers to use the tool with immediate advice from control centre
- Train pre-hospital providers to use the tool
- Monitor and audit use of tool

“The optimal destination for patients with major trauma is usually a major trauma centre”

News

More than 1,600 extra trauma victims alive today says major new study

 20 August 2018

Urgent and emergency care

The NHS in England has saved an additional 1,600 patients with severe injuries since major trauma centres were established in 2012.

New findings show the creation of major traumas centres has led to the survival of more than 1,600 patients who have suffered some of the most severe and complicated injuries thanks to top teams of surgeons, doctors and clinical staff. Patients also spent fewer days in hospital and had improved quality of life after receiving critical care.

Major trauma centres have played a vital role in saving the lives of many victims of knife, gun and acid attack crimes that have seen a sharp increase in London and other inner city areas in recent months.

Research into the outcomes of more than 110,000 patients admitted to 35 hospitals between 2008 and 2017 represents an increase of nearly a fifth in the odds of survival from severe injury in the five years from 2012.

Injury Severity Score

Region	Injury Description	AIS	Square Top 3
Head & Neck	Cerebral Contusion	3	9
Face	No injury	0	
Chest	Flail Chest	4	16
Abdomen	Minor contusion of liver	2	
	Complex Ruptured Spleen	5	25
Extremity	Fractured Femur	3	(9)
External	No injury	0	
Total			50

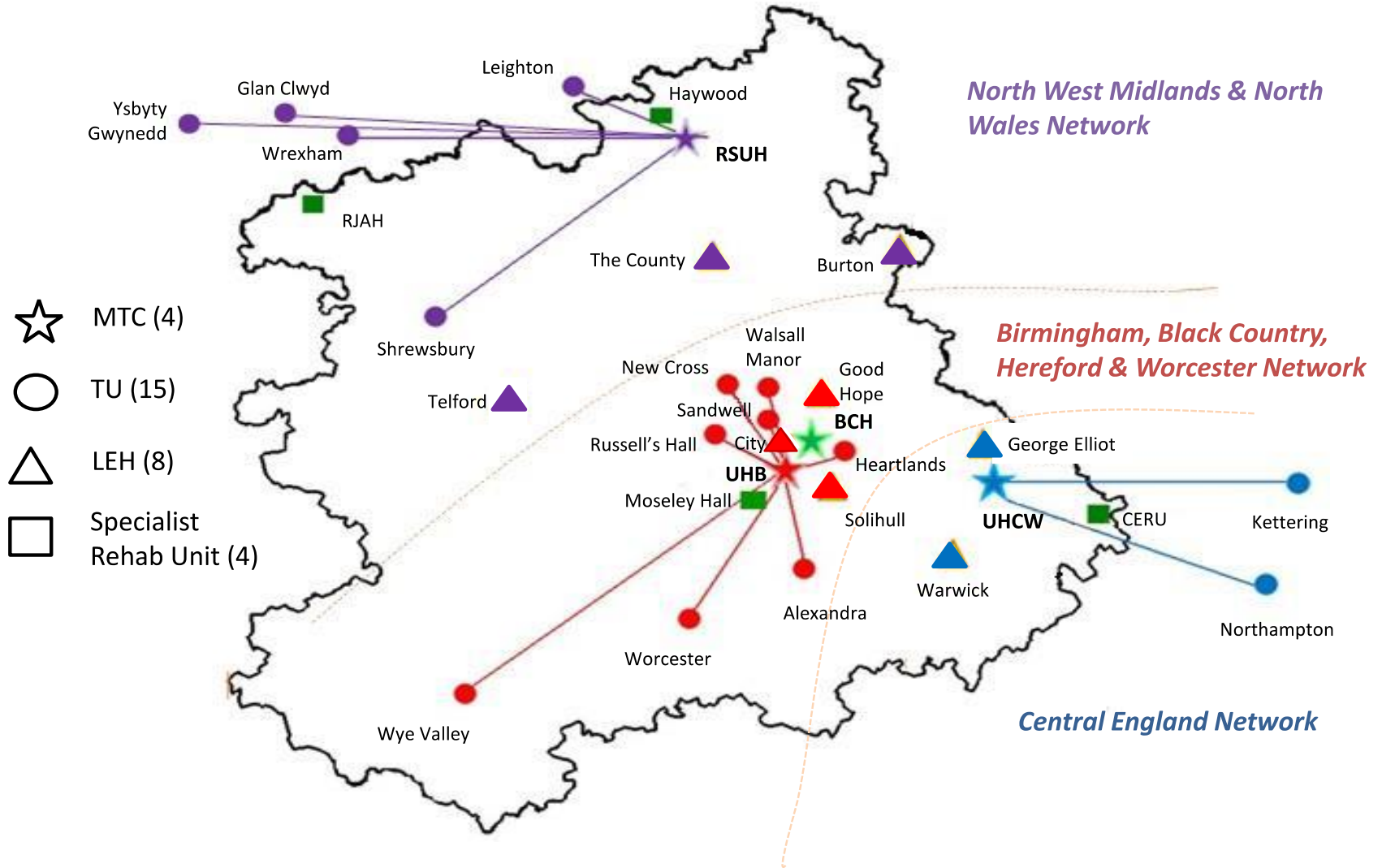
AIS Score

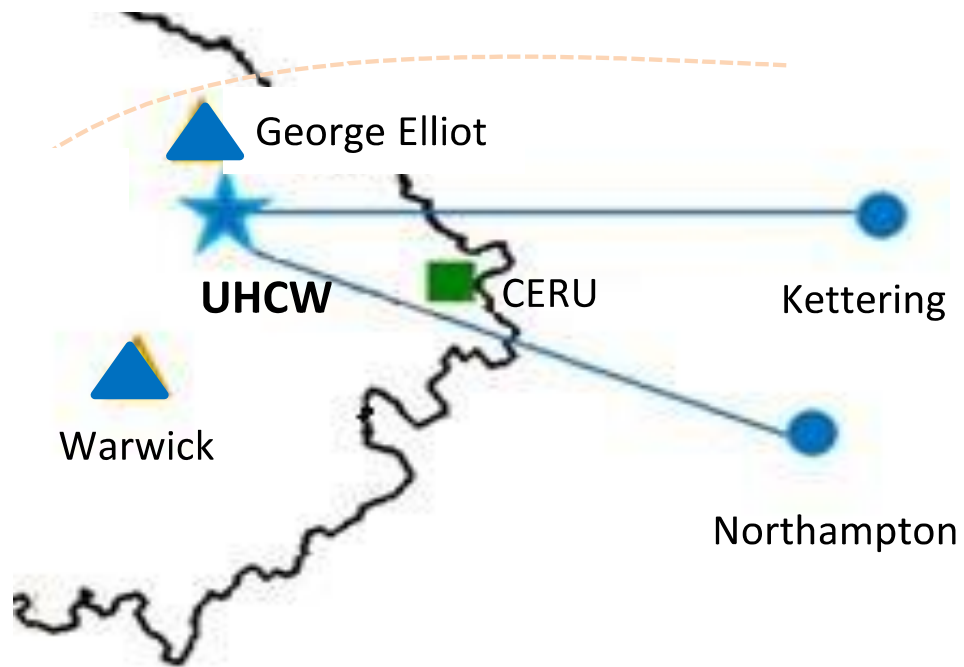
1. Minor
2. Moderate
3. Serious
4. Severe
5. Critical
6. Survivable

ISS

- | | |
|-------|----------|
| 1-8 | Minor |
| 9-15 | Moderate |
| 16-24 | Serious |
| 25-49 | Severe |
| 50-74 | Critical |
| 75+ | Maximum |

Network Map





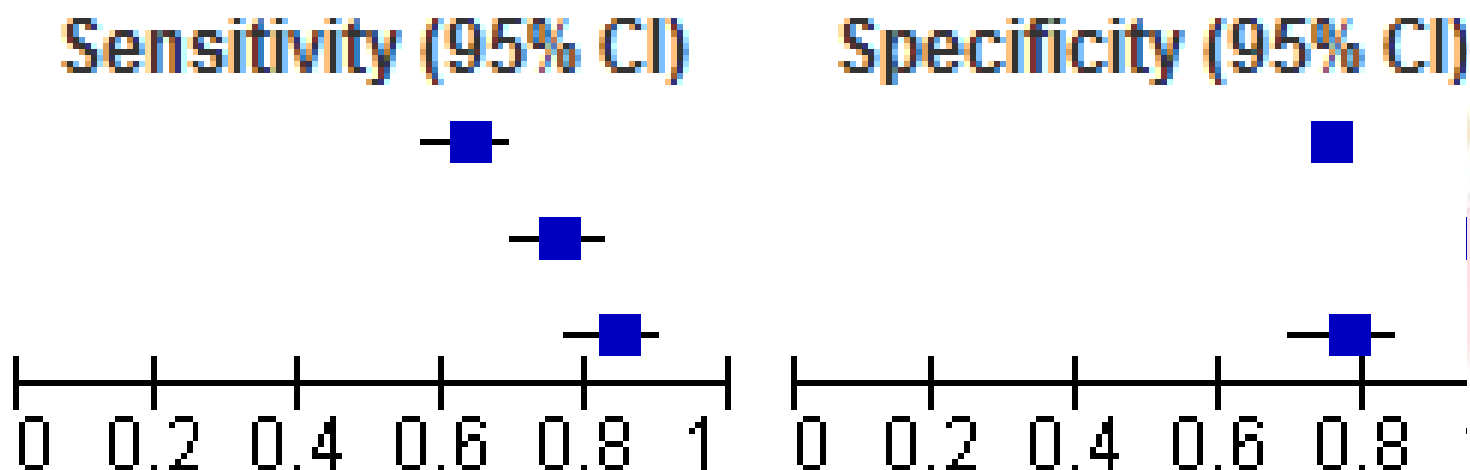
Central England Network

Table 8: Summary of studies included in the review

Study	Population	Index test(s)	Reference test	Comments
Cheung 2013	People under 16 years sustaining injury or trauma and admitted to a receiving unit direct from the scene of the incident.	UK Trauma tools: East Midlands, London, North West, Northern, South West London, Wessex, Paediatric Trauma Score	ISS>15	<ul style="list-style-type: none"> Unclear statement regarding enrolment
Dinh 2012	Patients directly transported by a regional ambulance service due to trauma.	ACS-SCOT	Primary outcome: ISS >15 Secondary outcome: Later clinical findings including: Death, ISS>15, ICU admission with mechanical ventilation for more than 24 hours, urgent surgery	Registry data <ul style="list-style-type: none"> Unclear statement regarding enrolment 232 patients were excluded due to incomplete documentation.
Do 2014	Trauma patients attending a trauma centre and transported by ambulance (also self-attendees).	ACS-SCOT	ISS>15	Registry data <ul style="list-style-type: none"> Study reports paediatric and adult populations separately. Unclear statement regarding enrolment
Ocak 2009	Adult trauma patients transported by ambulance from an accident	ACS-SCOT	ISS >15	<ul style="list-style-type: none"> Patients selected differentially for either arm (consecutive and randomised).

Figure 1: Sensitivity and specificity of index test ACS-SCOT in detecting major trauma

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Dinh 2012	180	587	105	1792	0.63 [0.57, 0.69]	0.75 [0.74, 0.77]
Do 2014	139	45	43	1469	0.76 [0.70, 0.82]	0.97 [0.96, 0.98]
Ocak 2009	127	34	24	117	0.84 [0.77, 0.90]	0.77 [0.70, 0.84]



Major Trauma in Older People (ISS>15)

Process

Emergency care

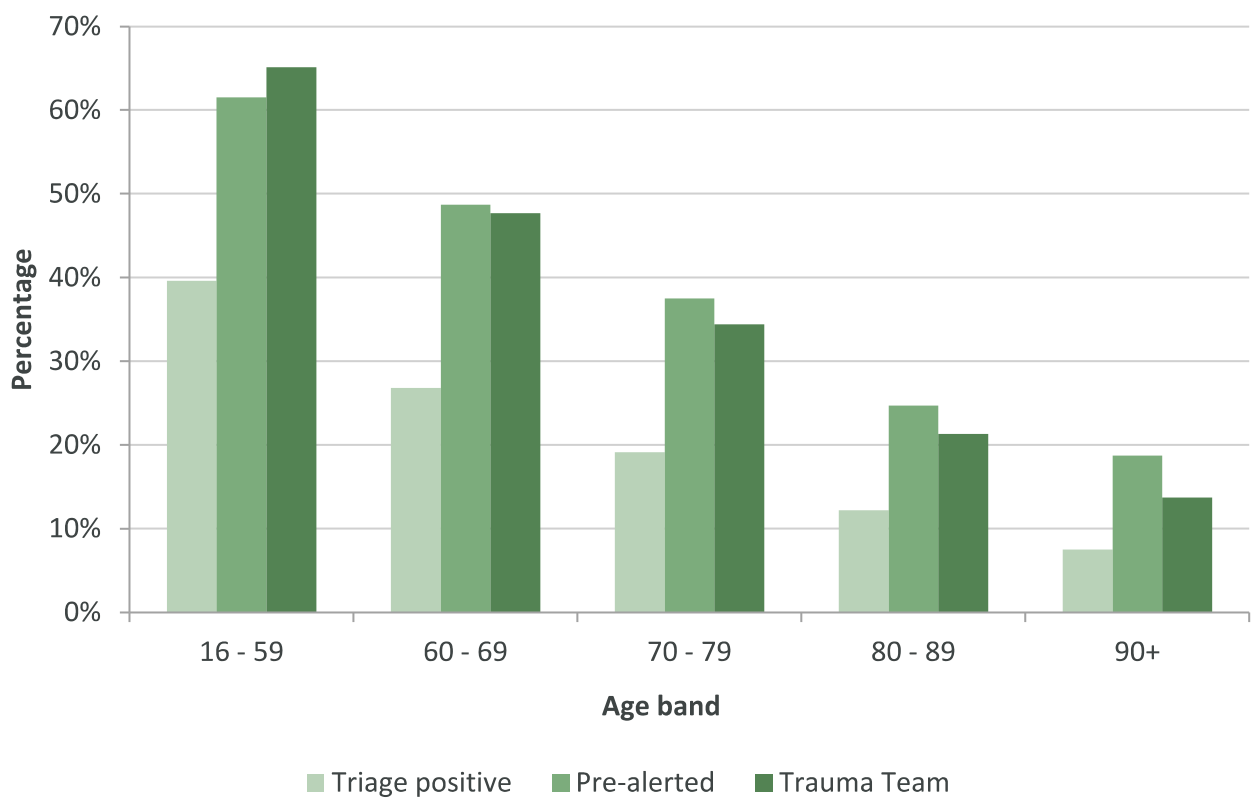
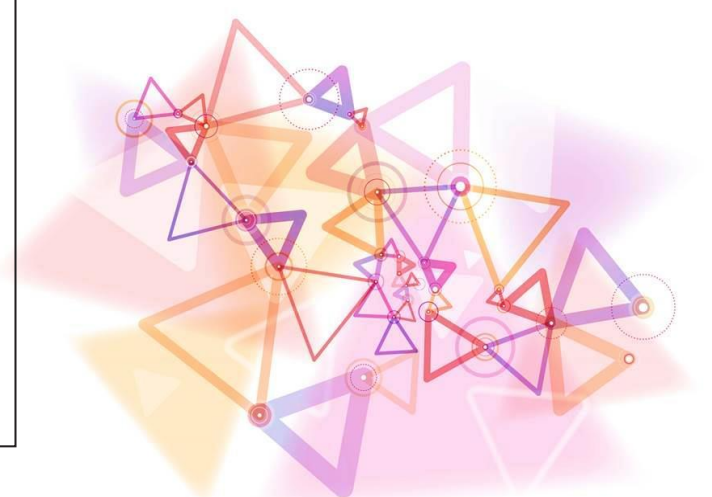
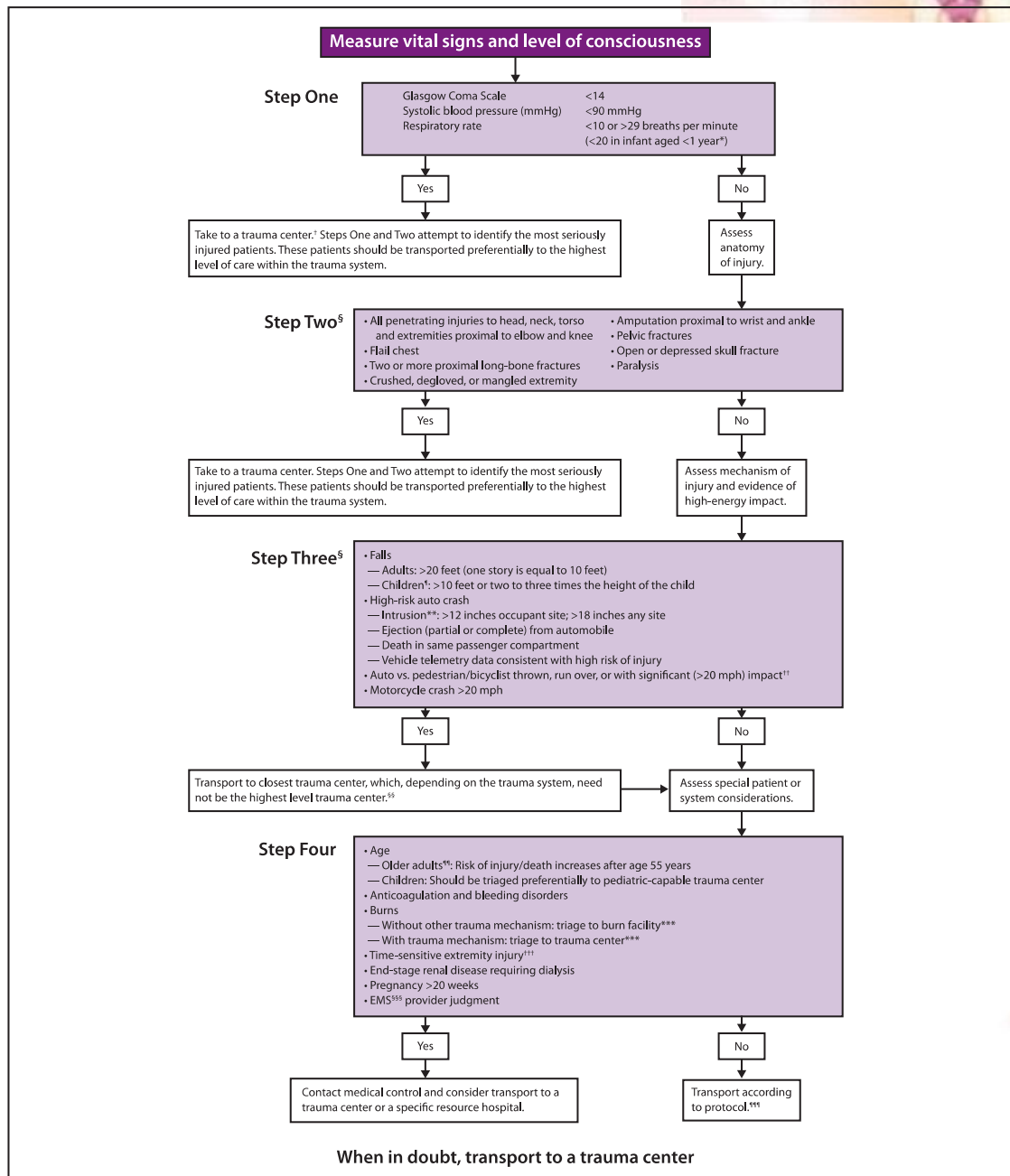


FIGURE 1. Field triage decision scheme — United States, 2006



Measure vital signs and level of consciousness

Step One

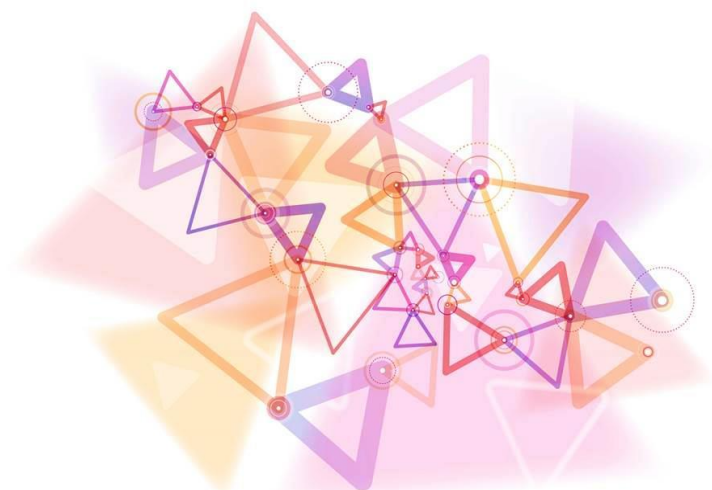
Glasgow Coma Scale	<14
Systolic blood pressure (mmHg)	<90 mmHg
Respiratory rate	<10 or >29 breaths per minute (<20 in infant aged <1 year*)

Yes

No

Take to a trauma center.† Steps One and Two attempt to identify the most seriously injured patients. These patients should be transported preferentially to the highest level of care within the trauma system.

Assess anatomy of injury.



Step Two^s

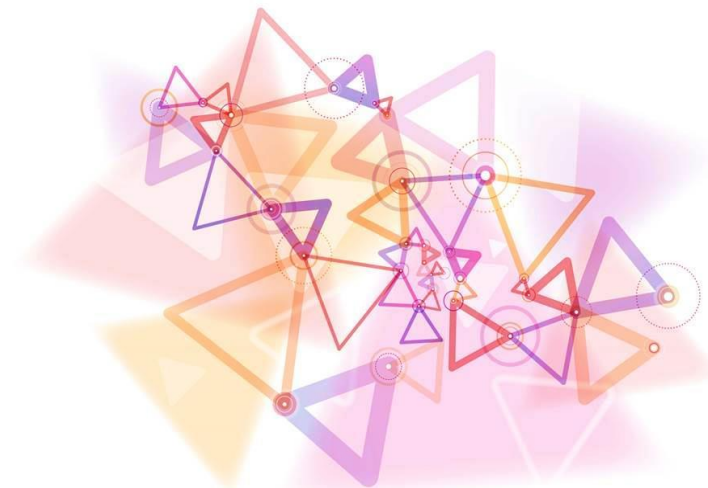
- All penetrating injuries to head, neck, torso and extremities proximal to elbow and knee
- Flail chest
- Two or more proximal long-bone fractures
- Crushed, degloved, or mangled extremity
- Amputation proximal to wrist and ankle
- Pelvic fractures
- Open or depressed skull fracture
- Paralysis

Yes

Take to a trauma center. Steps One and Two attempt to identify the most seriously injured patients. These patients should be transported preferentially to the highest level of care within the trauma system.

No

Assess mechanism of injury and evidence of high-energy impact.



Step Three^s

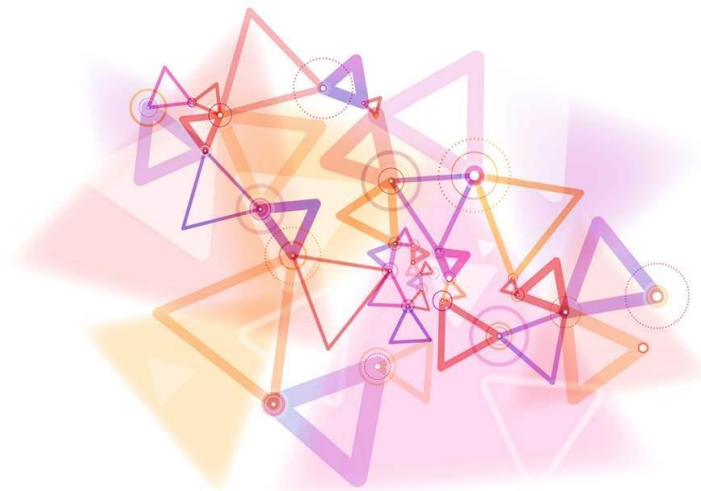
- Falls
 - Adults: >20 feet (one story is equal to 10 feet)
 - Children[¶]: >10 feet or two to three times the height of the child
- High-risk auto crash
 - Intrusion^{**}: >12 inches occupant site; >18 inches any site
 - Ejection (partial or complete) from automobile
 - Death in same passenger compartment
 - Vehicle telemetry data consistent with high risk of injury
- Auto vs. pedestrian/bicyclist thrown, run over, or with significant (>20 mph) impact^{††}
- Motorcycle crash >20 mph

Yes

No

Transport to closest trauma center, which, depending on the trauma system, need not be the highest level trauma center.^{ss}

Assess special patient or system considerations.



Step Four

- Age
 - Older adults^{¶¶}: Risk of injury/death increases after age 55 years
 - Children: Should be triaged preferentially to pediatric-capable trauma center
- Anticoagulation and bleeding disorders
- Burns
 - Without other trauma mechanism: triage to burn facility^{***}
 - With trauma mechanism: triage to trauma center^{***}
- Time-sensitive extremity injury^{†††}
- End-stage renal disease requiring dialysis
- Pregnancy >20 weeks
- EMS^{\$\$\$} provider judgment

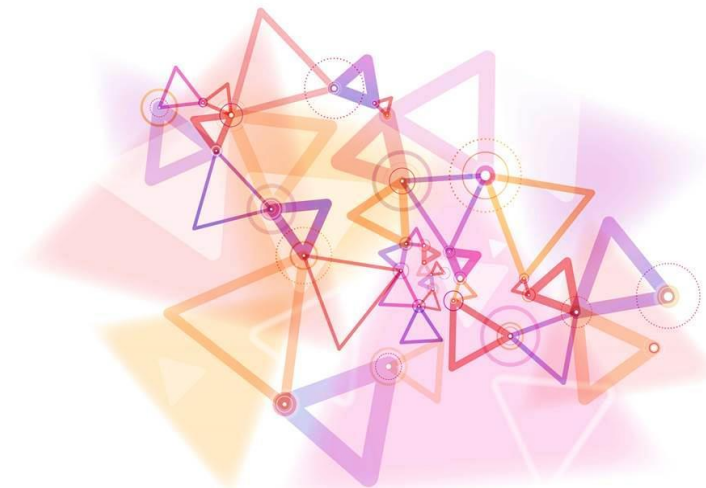
Yes

Contact medical control and consider transport to a trauma center or a specific resource hospital.

No

Transport according to protocol.^{¶¶¶}

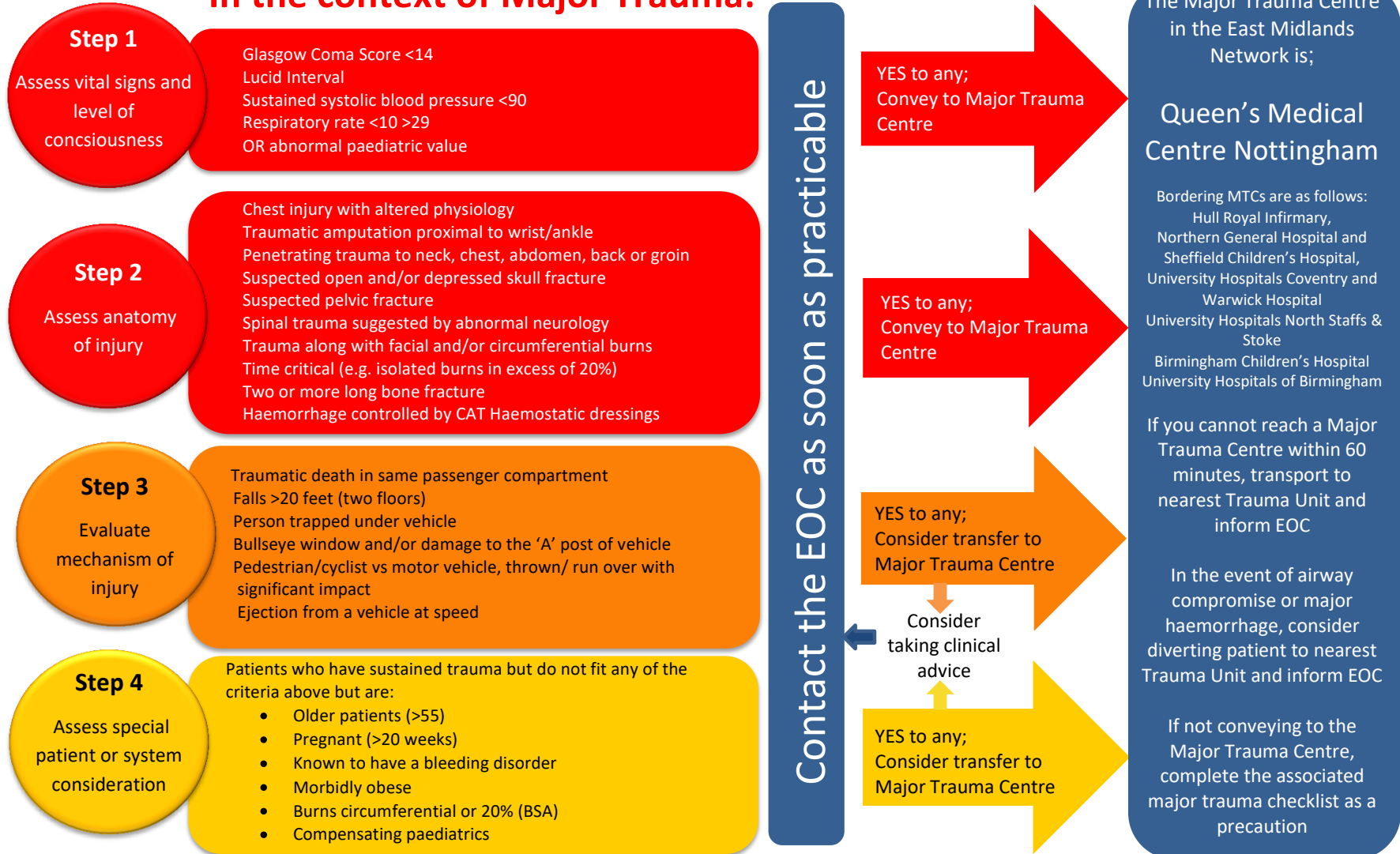
When in doubt, transport to a trauma center





Major Trauma Triage Tool - Primary Patient Transfer

In the context of Major Trauma:





Major Trauma Triage Tool

Entry criteria for this triage is a judgement that the patient may have suffered significant trauma

1. Measure vital signs

- Glasgow Coma Scale ≤ 13
- Systolic Blood pressure (mmHg) < 90 mmHg
- Respiratory Rate < 10 or > 29 breaths per minute (< 20 in infant aged < 1 year), or need for ventilatory support

NO

Yes to any one

If any of the factors are present:-

- Activate a Major Trauma Alert with the EOC Regional Trauma Desk
- Transport to Major Trauma Centre

If all factors are absent, proceed to stage 3.

2. Assess anatomy of injury

- All penetrating injuries to head, neck, torso and extremities proximal to elbow or knee
- Chest wall instability or deformity (e.g., flail chest)
- Two or more proximal long-bone fractures
- Crushed/ de-gloved/ mangled or pulseless extremity
- Amputation proximal to wrist or ankle
- Pelvic fractures
- Open or depressed skull fracture
- Paralysis

NO

Yes to any one

3. Assess mechanism of injury

- **Falls**
 - Adults: > 20 feet (one storey is equal to 10 feet)
 - Children: > 10 feet or two or three times the height of the child
- **High-risk motor vehicle collision**
 - Intrusion including roof: > 12 inches occupant site
 - Ejection (partial or complete) from automobile
 - Death in same passenger compartment
 - Vehicle telemetry data consistent with a high risk of injury
- Motor vehicle vs pedestrian/ bicyclist thrown, run over, or with significant (> 20 mph) impact
- Motorcycle crash > 20 mph

Yes to any one

If any of the factors are present contact:

EOC Regional Trauma Desk for advice

If all factors are absent, proceed to stage 4.

4. Special conditions

- **Older adults**
 - Risk of injury/death increases after age 55 years
 - SBP < 110 might represent shock after age 65 years
 - Low impact mechanisms (e.g. ground level falls) might result in severe injury
- **Children**
 - Should be triaged preferentially to paediatric capable trauma centres
- **Anticoagulants and bleeding disorders**
 - Patients with head injury are at high risk for rapid deterioration
- **Burns**
 - Without other trauma mechanism: consider triage to regional burn centre
 - With trauma mechanism: triage to major trauma centre
- Pregnancy > 20 weeks
- Clinician judgement in liaison with RTD

Yes to any one

If any of the factors are present contact:
EOC Regional Trauma Desk for advice

NO

Transport to nearest Trauma Unit or Local Emergency Hospital

In the context of Major Trauma:

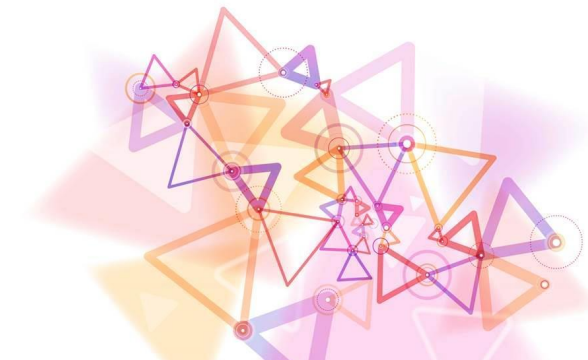
Step 1

Assess vital signs and level of consciousness

Glasgow Coma Score <14
Lucid Interval
Sustained systolic blood pressure <90
Respiratory rate <10 >29
OR abnormal paediatric value

1. Measure vital signs

- Glasgow Coma Scale ≤ 13
- Systolic Blood pressure (mmHg) <90 mmHg
- Respiratory Rate <10 or >29 breaths per minute (<20 in infant aged <1 year), or need for ventilatory support



Step 2Assess anatomy
of injury

Chest injury with altered physiology
Traumatic amputation proximal to wrist/ankle
Penetrating trauma to neck, chest, abdomen, back or groin
Suspected open and/or depressed skull fracture
Suspected pelvic fracture
Spinal trauma suggested by abnormal neurology
Trauma along with facial and/or circumferential burns
Time critical (e.g. isolated burns in excess of 20%)
Two or more long bone fracture
Haemorrhage controlled by CAT Haemostatic dressings

**2. Assess anatomy
of injury**

- All penetrating injuries to head, neck, torso and extremities proximal to elbow or knee
- Chest wall instability or deformity (e.g., flail chest)
- Two or more proximal long-bone fractures
- Crushed/ de-gloved/ mangled or pulseless extremity
- Amputation proximal to wrist or ankle
- Pelvic fractures
- Open or depressed skull fracture
- Paralysis

YES to any;
Convey to Major Trauma
Centre

Step 3

Evaluate
mechanism of
injury

Traumatic death in same passenger compartment
Falls >20 feet (two floors)
Person trapped under vehicle
Bullseye window and/or damage to the 'A' post of vehicle
Pedestrian/cyclist vs motor vehicle, thrown/ run over with significant impact
Ejection from a vehicle at speed

3. Assess mechanism of injury

• Falls

- Adults: >20 feet (one storey is equal to 10 feet)
- Children: > 10 feet or two or three times the height of the child

• High-risk motor vehicle collision

- Intrusion including roof: > 12 inches occupant site
- Ejection (partial or complete) from automobile
- Death in same passenger compartment
- Vehicle telemetry data consistent with a high risk of injury
- Motor vehicle vs pedestrian/ bicyclist thrown, run over, or with significant (> 20 mph) impact
- Motorcycle crash > 20 mph

YES to any;
Consider transfer to
Major Trauma Centre

Consider
taking clinical
advice

Step 4

Assess special patient or system consideration

Patients who have sustained trauma but do not fit any of the criteria above but are:

- Older patients (>55)
- Pregnant (>20 weeks)
- Known to have a bleeding disorder
- Morbidly obese
- Burns circumferential or 20% (BSA)
- Compensating paediatrics

4. Special conditions

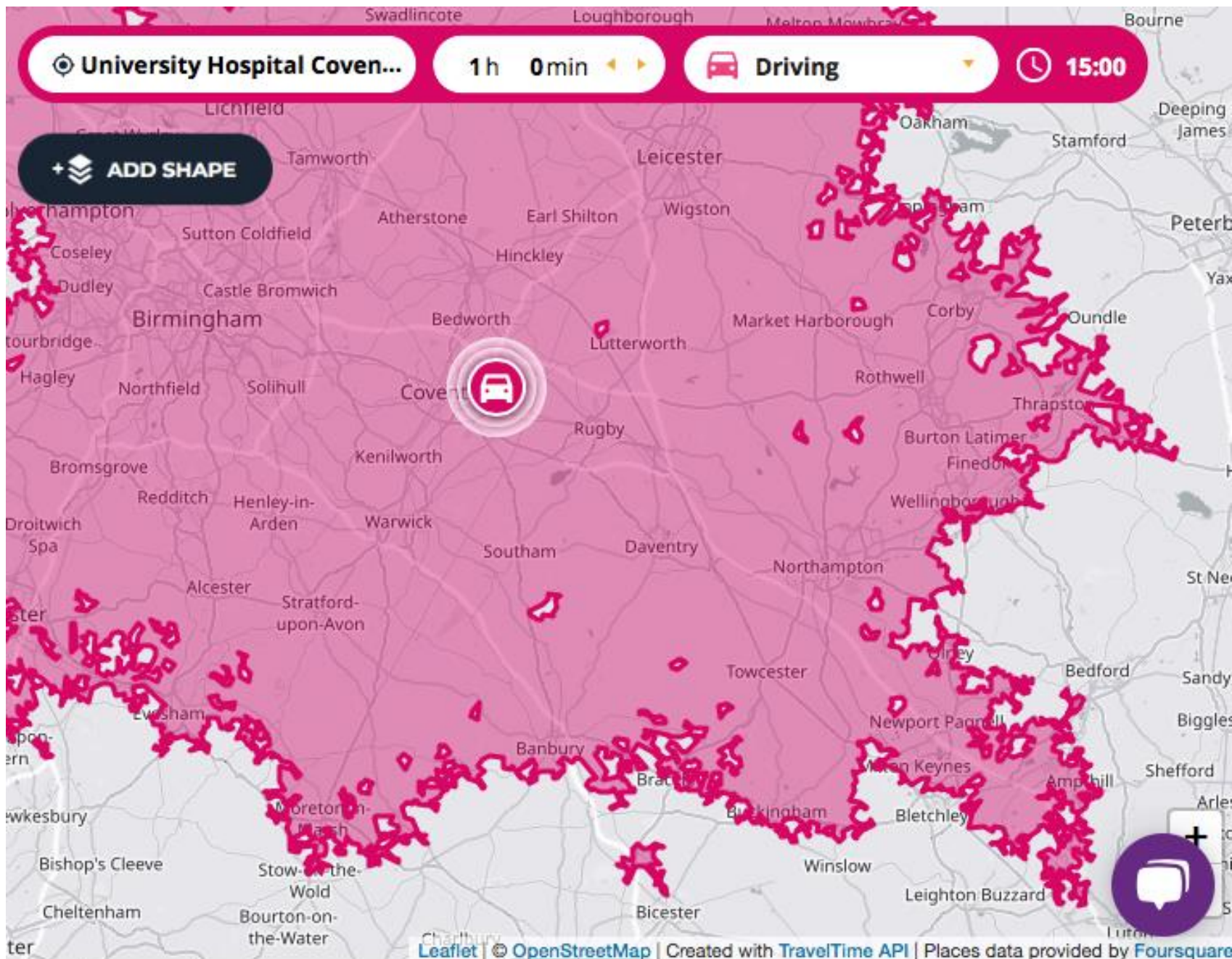
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 - With trauma mechanism: triage to major trauma centre
- Pregnancy > 20 weeks
- Clinician judgement in liaison with RTD

Consider taking clinical advice

YES to any;
Consider transfer to Major Trauma Centre

If you cannot reach a Major Trauma Centre within 60 minutes, transport to nearest Trauma Unit and inform EOC

In the event of airway compromise or major haemorrhage, consider diverting patient to nearest Trauma Unit and inform EOC



Hyperacute/ “Delayed Primary” Transfers

Patients eligible to undergo hyper acute (delayed primary) transfer are those needing immediate life / limb saving intervention at a Major Trauma Centre where it cannot be delivered in a trauma unit (TU) / local emergency hospital (LEH)

Role of the Trauma Unit

- Send & Call/Package & Call
- Minimum imaging
 - CXR
 - Pelvis XR
- Full primary survey
- Lifesaving interventions

Silver Trauma Safety Net Aged 65 years and over?

With any of the following:

PHYSIOLOGY

- Systolic BP <110mmHg following an accident

ANATOMY

- Injury to 2 or more body regions (excluding injuries distal to wrist/ankle joints)
- Suspected shaft of femur fractures
- Open fracture proximal to wrist / ankle

MECHANISM

- Fall downstairs
- From an RTC:
 - Entrapment >30mins
 - Ejection
 - Death in same incident
 - Pedestrian vs Car – direct to MTC
 - Cyclist vs Car – direct to MTC

Discuss the case with the RTD who will then 'SILVER TRAUMA PRE-ALERT' the appropriate Emergency Department

Be aware of patients on anticoagulants as the destination may need upgrading from a TU to an MTC.



Stacey

21F

Closed Head Injury

GCS 13

HR 80, RR 14

BP 121/85

**MTC:
UHCW**



Steve

50M

Left PTX, Liver Lac,

Closed #L Femur

GCS 15

HR 98, RR 16, SpO₂ 95%

BP 114/73

**TU:
NGH**



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