



London Ambulance Service  
NHS Trust



*An evening with us*

**Surviving serious injuries**



# Welcome

5.35pm	Welcome and Introduction	Sandra Adams
5.40pm	Patient Story	Priscila Currie
5.50pm	Developing London's Major Trauma System	Fionna Moore
6.15pm	Our approach to major trauma	Mark Faulkner
6.45pm	Working with London Air Ambulance	Graham Chalk
6.55pm	Questions	
7.30pm	Close	





London Ambulance Service



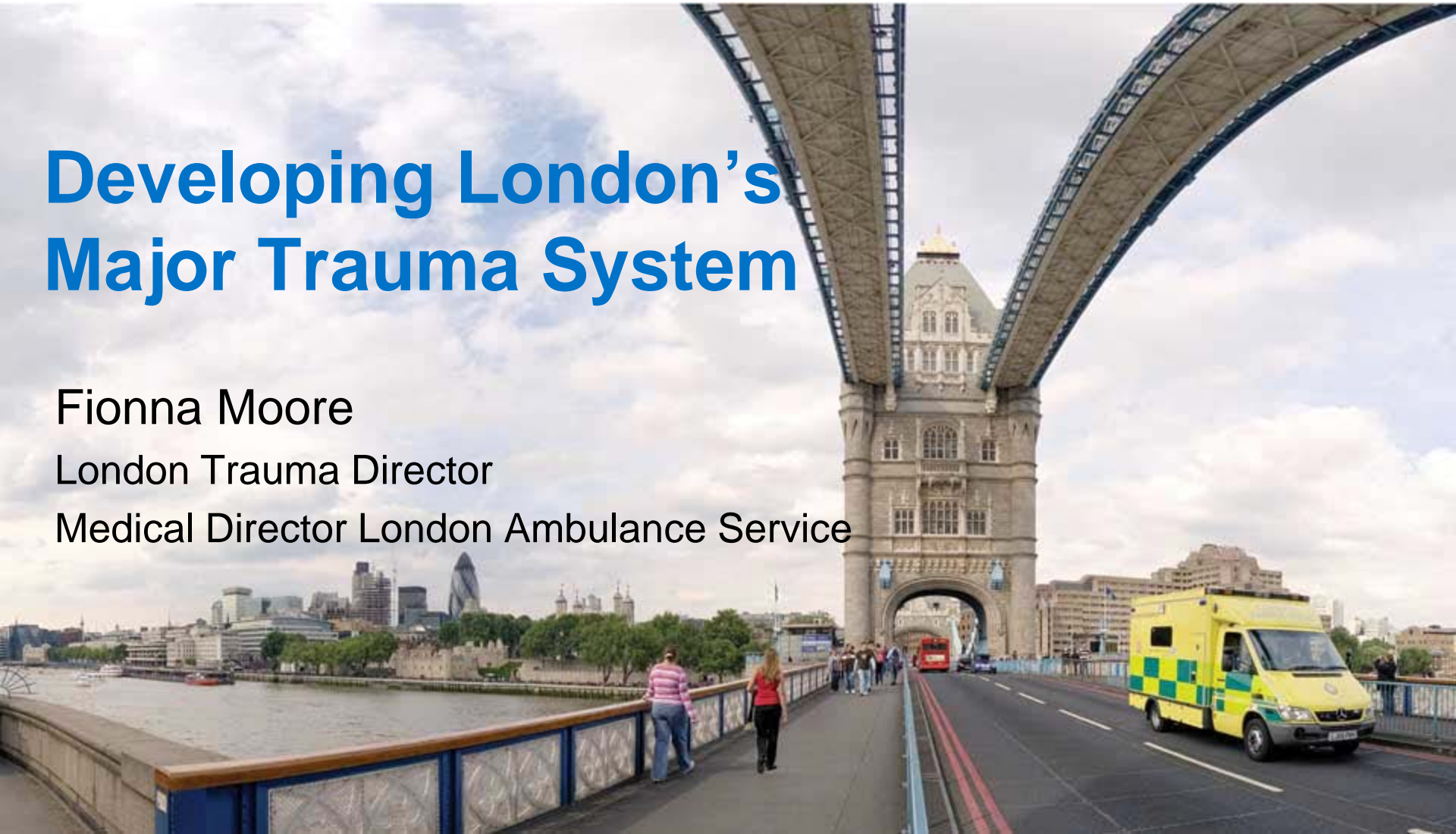
NHS Trust

# Developing London's Major Trauma System

Fionna Moore

London Trauma Director

Medical Director London Ambulance Service



# What is major trauma?

- Catastrophic and serious injuries
- Often multiple injuries affecting multiple body compartments
- ISS >15 (circa 10 per cent mortality)
- Does not include isolated limb fractures





# What is major trauma?

- Road accident (pedestrian, cyclist)
- Fall from height
- Assault/violent



# July 2006

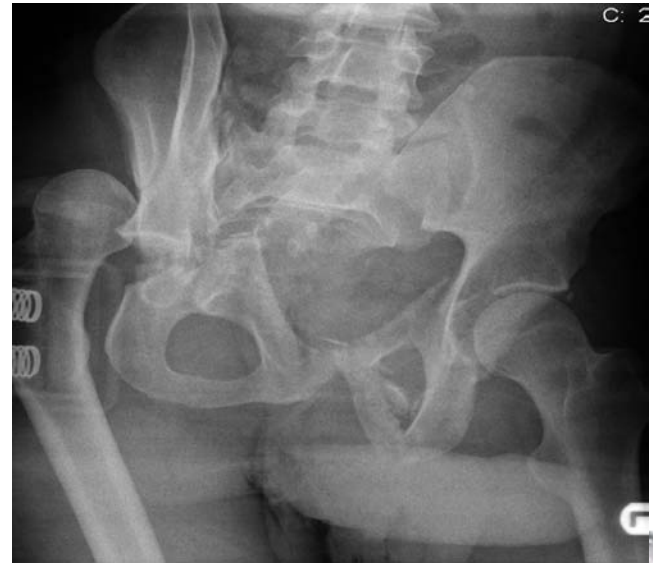
- 0630 hrs
- West London
- 30 year old male leaving for an early meeting
- As he crosses the road is hit by a car travelling at 35mph
- Impact with windscreen thrown 10m down road





# July 2006

- Head injury - agitated
- Abdominal injury
- Pelvic fracture
- Femur fracture
- Chest injury? collapsed lung
- Air ambulance crew not on duty for 30 minutes
- Nearest doctor (volunteer) in Whitechapel



A map of Greater London and surrounding areas, including parts of Hertfordshire, Essex, and Surrey. A red star is placed in the central-western part of London, near the border of the London Boroughs of Ealing and Greenford. Five green callout boxes with black outlines point to specific locations on the map, each containing text about the services of a local emergency department. The map shows major roads (M1, M25, M4, A1, A4, A10, A11, A16, A20, A21, A24, A25, A26, A27, A28, A29, A30, A31, A32, A33, A34, A35, A36, A37, A38, A39, A40, A41, A42, A43, A44, A45, A46, A47, A48, A49, A50, A51, A52, A53, A54, A55, A56, A57, A58, A59, A60, A61, A62, A63, A64, A65, A66, A67, A68, A69, A70, A71, A72, A73, A74, A75, A76, A77, A78, A79, A80, A81, A82, A83, A84, A85, A86, A87, A88, A89, A90, A91, A92, A93, A94, A95, A96, A97, A98, A99, A100) and various towns and villages.

Full Emergency Department  
Orthopaedic Surg  
General Surg  
No Neuro Surg  
No CT Surg

Emergency Department does  
not accept trauma  
CT Surg  
No Orthopaedic Surg  
No General Surg  
No Neuro Surg

Emergency Department  
Orthopaedic Surg  
General Surg  
CT Surg  
No Neuro Surg

Full Emergency Department  
General Surg  
Orthopaedic Surg  
No Neuro Surg  
No CT Surg

Full Emergency Department  
Orthopaedic Surg  
General Surg  
No Neuro Surg  
No CT Surg

Emergency Department  
Orthopaedic Surg  
General Surg  
Neuro Surg  
No CT Surg



# Case for change

NCEPOD (trauma – who cares) 2007

60% of severely injured patients received sub-optimal care.

- Organisational

- Major Trauma is rare (Local Emergency Department may only see one patient per week)

- Clinical

- Lack of seniority of staff especially at night and weekends
- Patient seen by junior doctor /trainee in circa 60 percent of cases

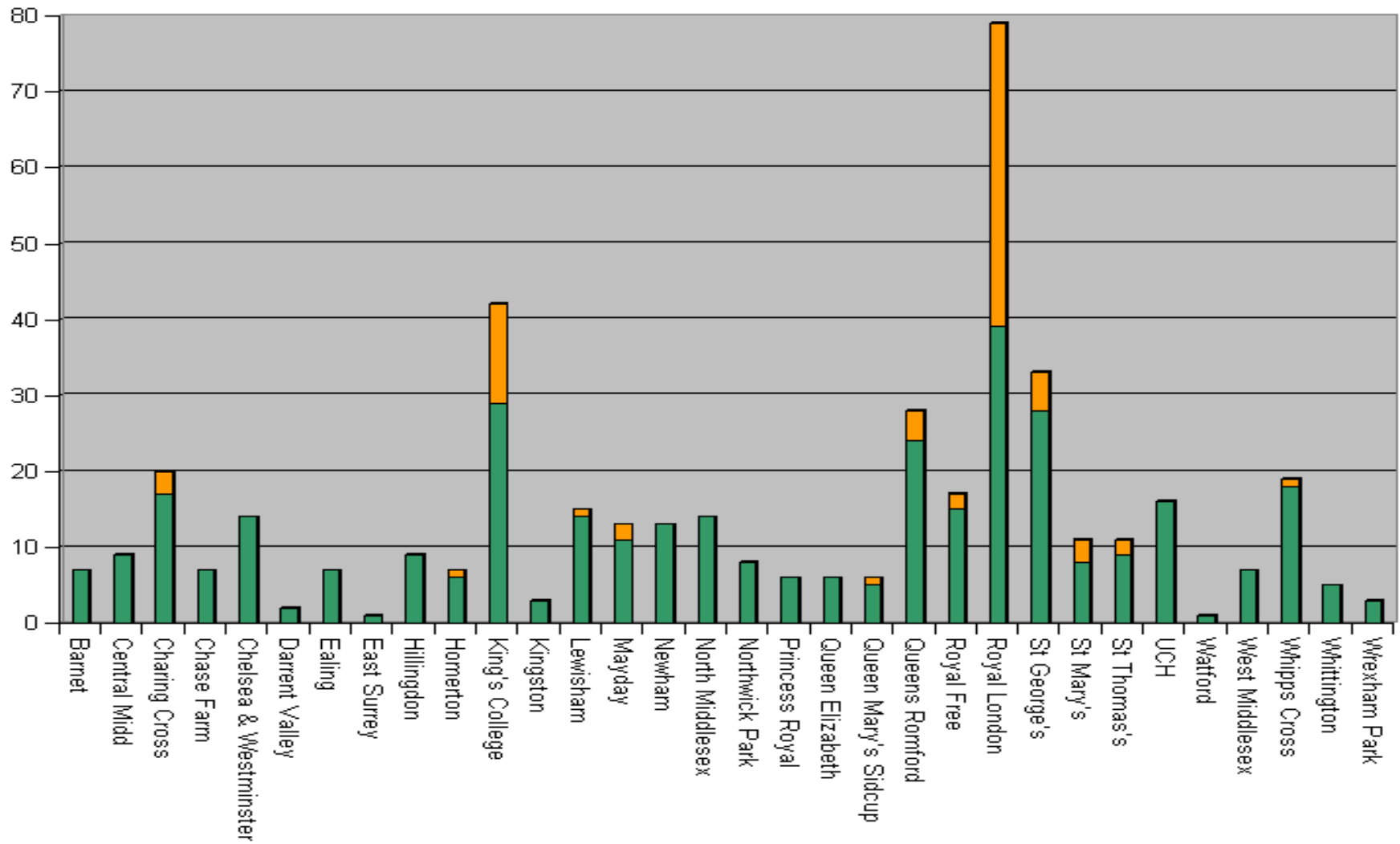


# Case for change

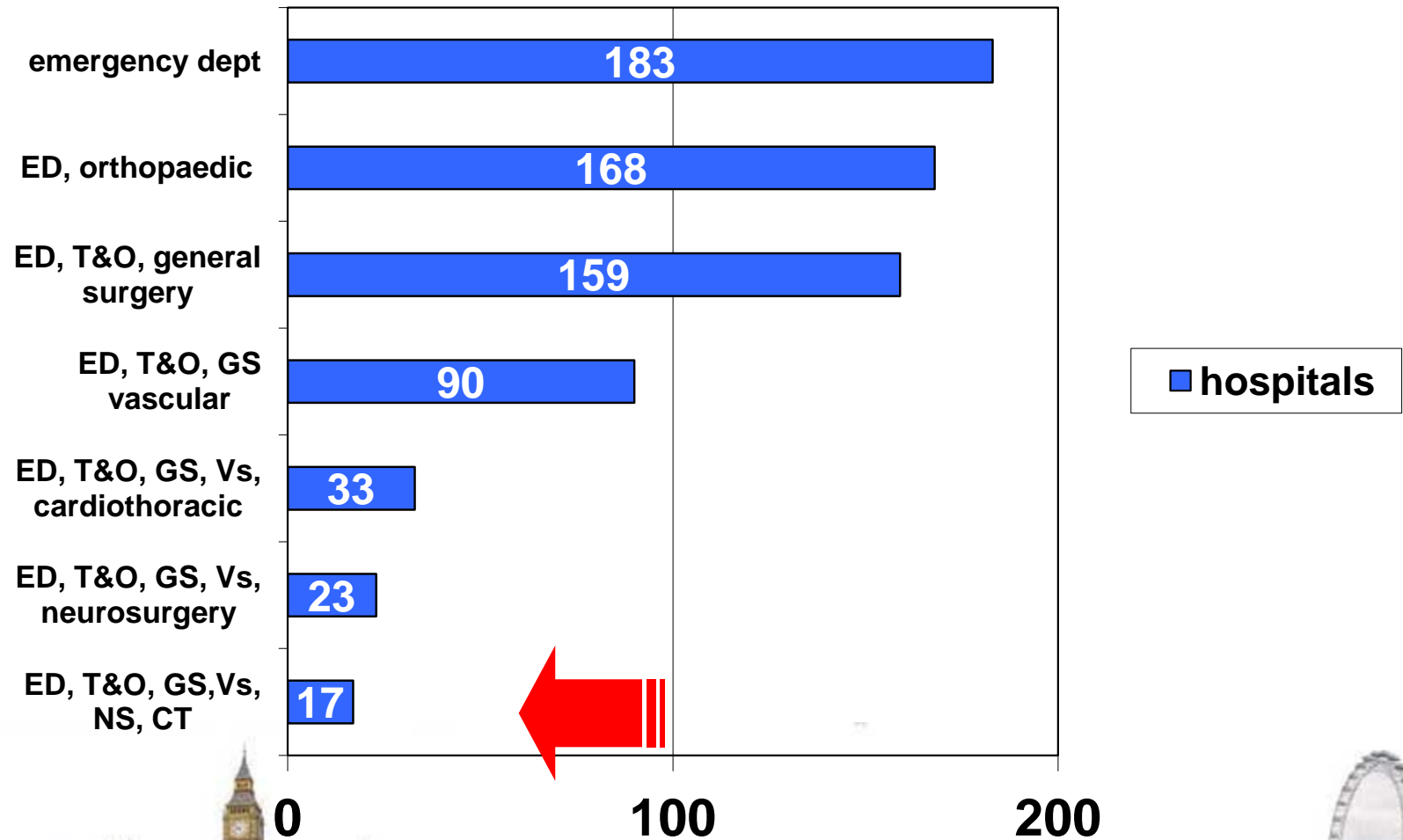




# Trauma workload by London HEMS & LAS into London Emergency Departments between 9<sup>th</sup> – 29<sup>th</sup> March 2009

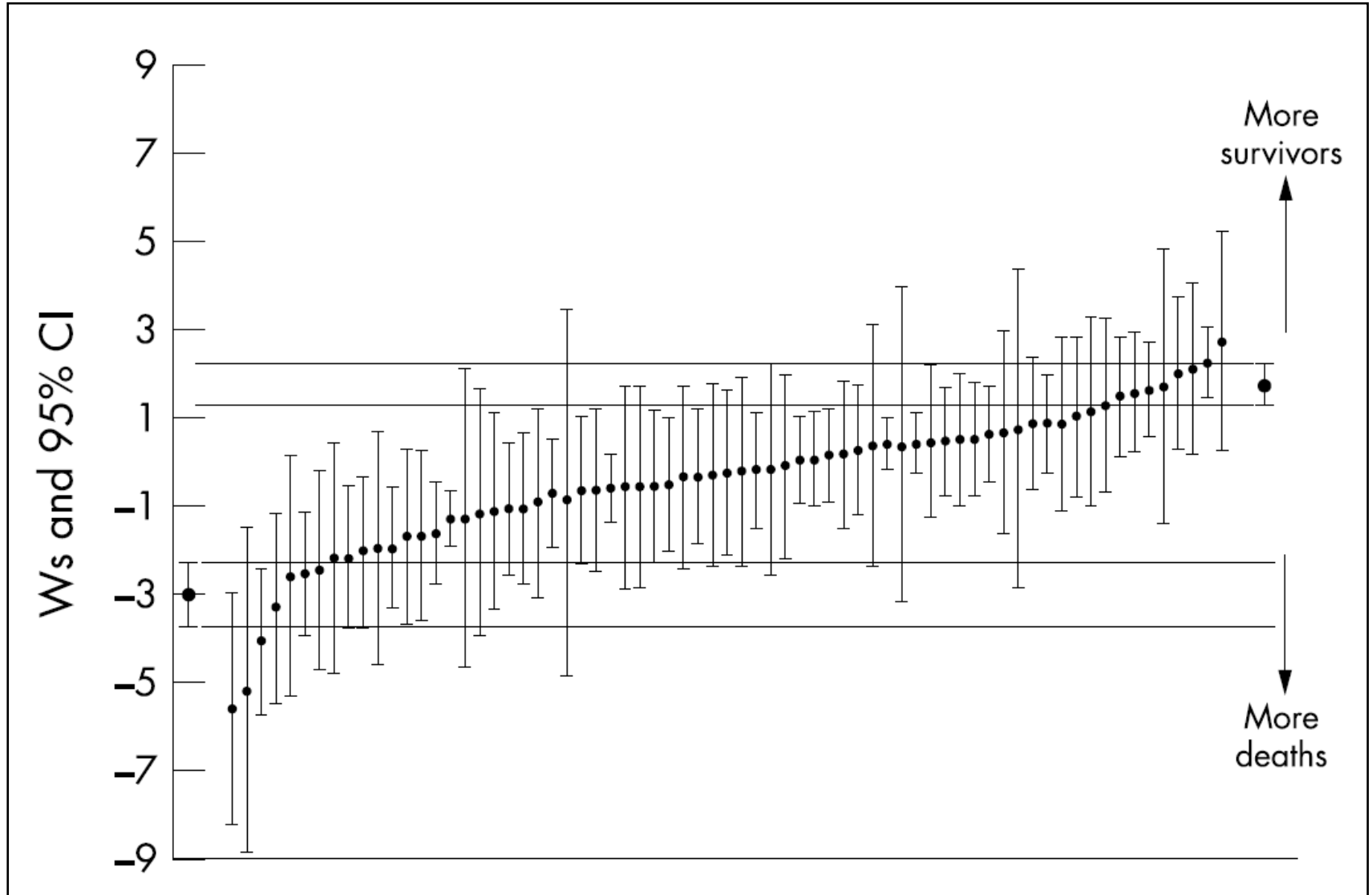


# The mismatch?





# Variance in UK hospital trauma outcomes



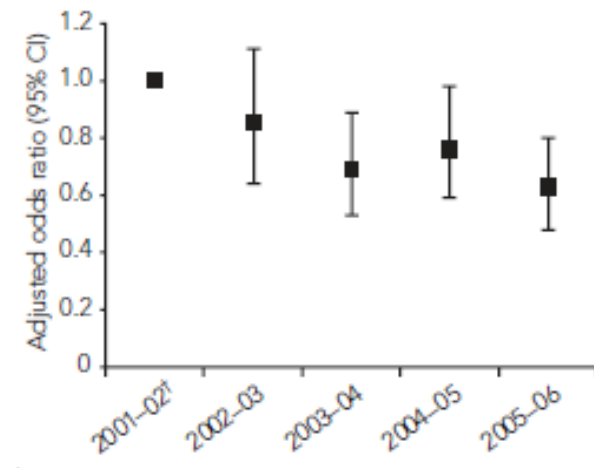
# Case for change

Victoria, Australia:  
established Trauma  
System – 8 years  
of data

- Unadjusted in-hospital death rate fell from 15% 2001-2002 to 11% 2005 - 2006



4 Adjusted odds ratios for death in hospitalised patients admitted with major trauma\* in Victoria, 2001–2006, by year



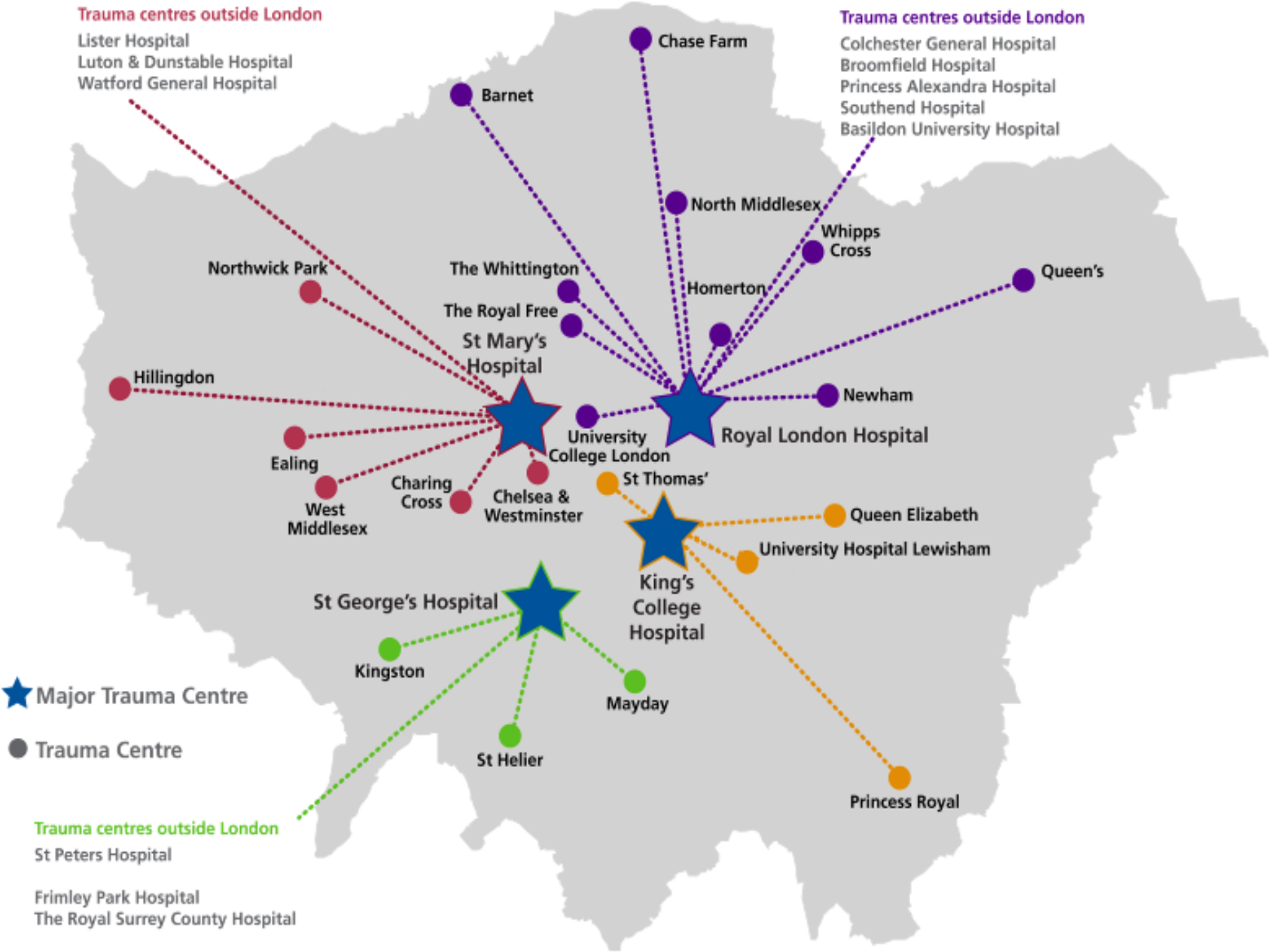
\* Injury Severity Score > 15. † Reference category. ◆





# A London approach





# What is a Major Trauma Centre?

- Organisational commitment to excellent trauma care
- Access to neurosurgery
- Access to general surgery
- Access to orthopaedic surgery
- Access to Cardio-thoracic surgery
- 24/7 Consultant Lead Trauma Team

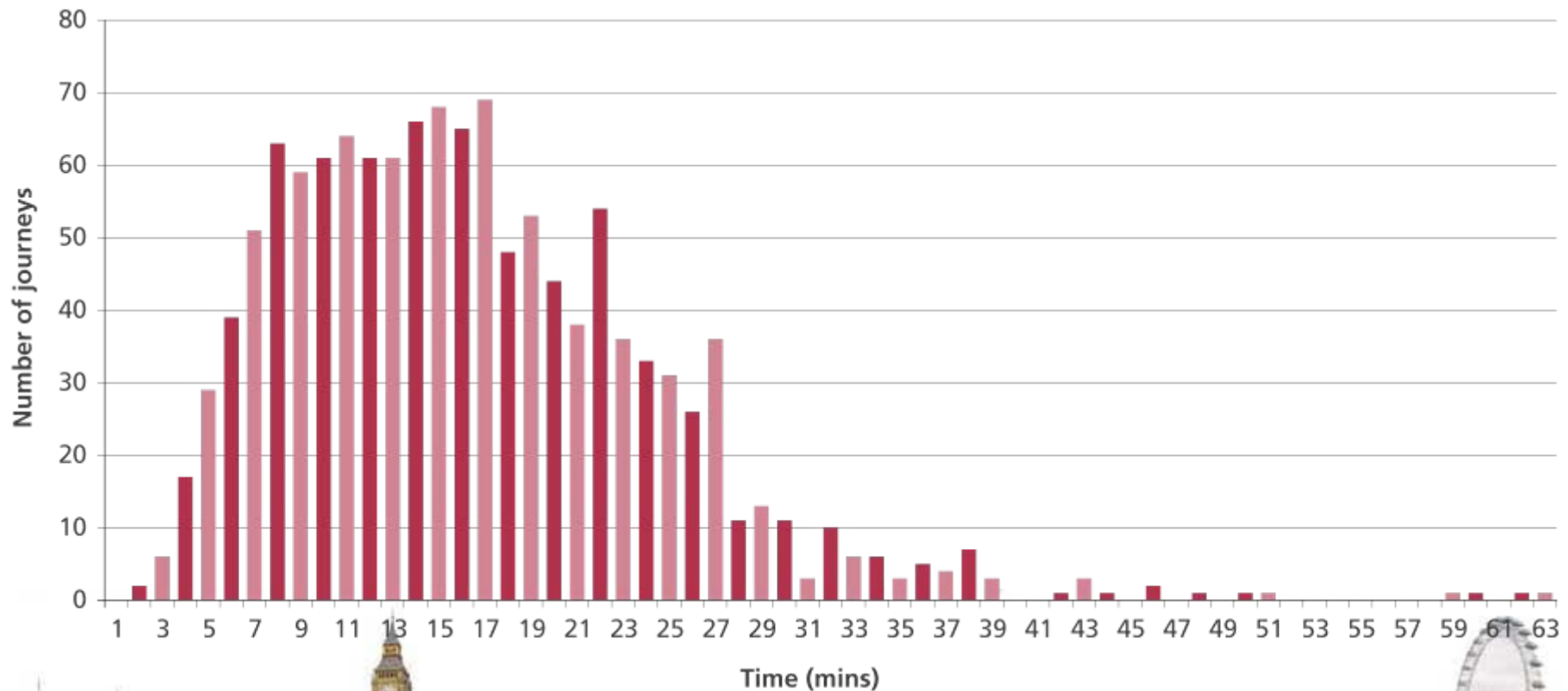
*A specialist hospital not just a hospital of specialties*



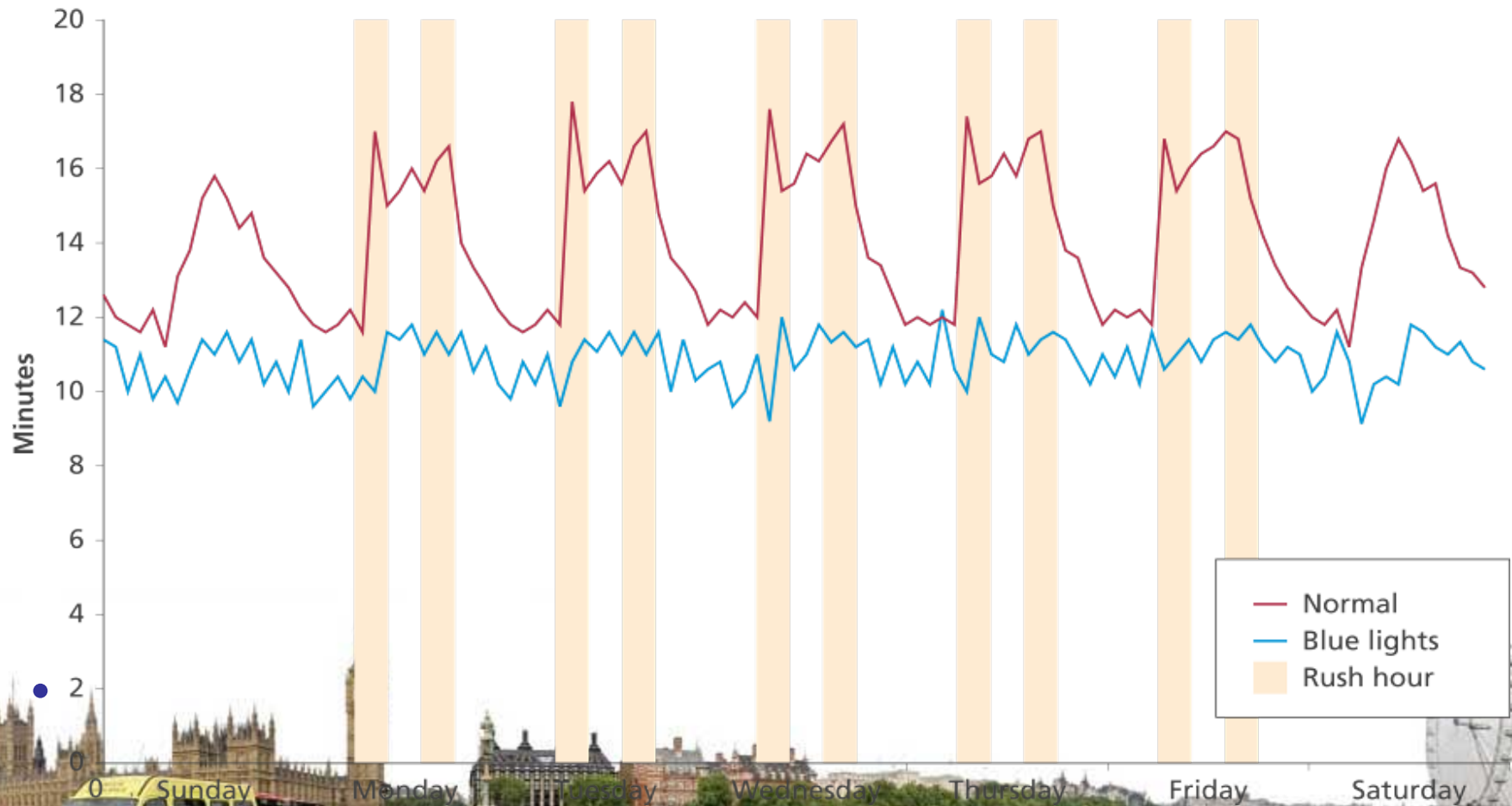


# LAS 'blue light' journey times to heart attack centres 2007- 08

n = 1000

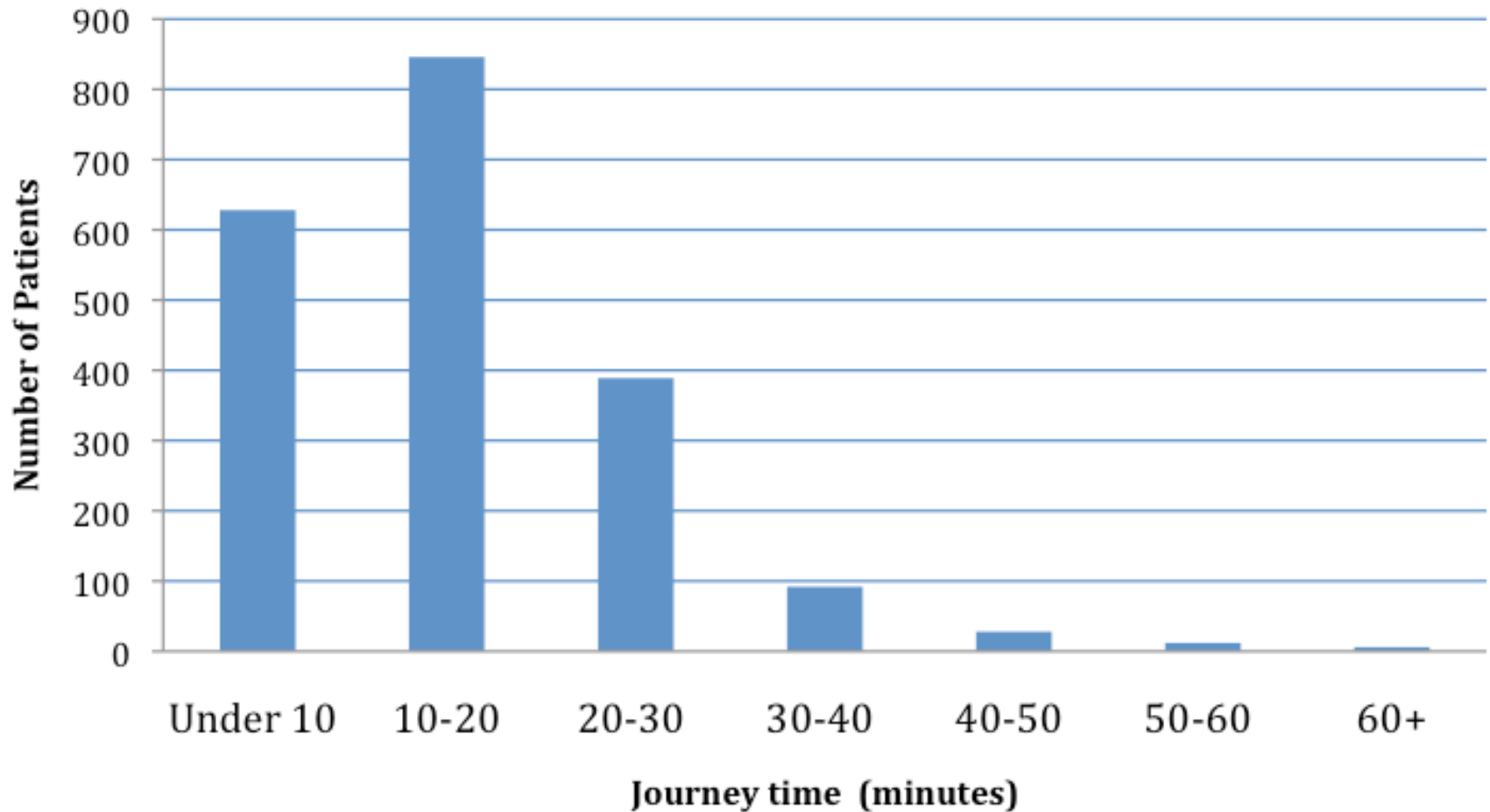


# Average journey times in ambulances 2005 - 08 blue call vs other



# Ambulance journey time from incident

01/05/2010 – 30/11/2010 n = 2001





# Evolution



# Senior leadership

## MOST SENIOR DOCTOR IN THE EMERGENCY DEPARTMENT

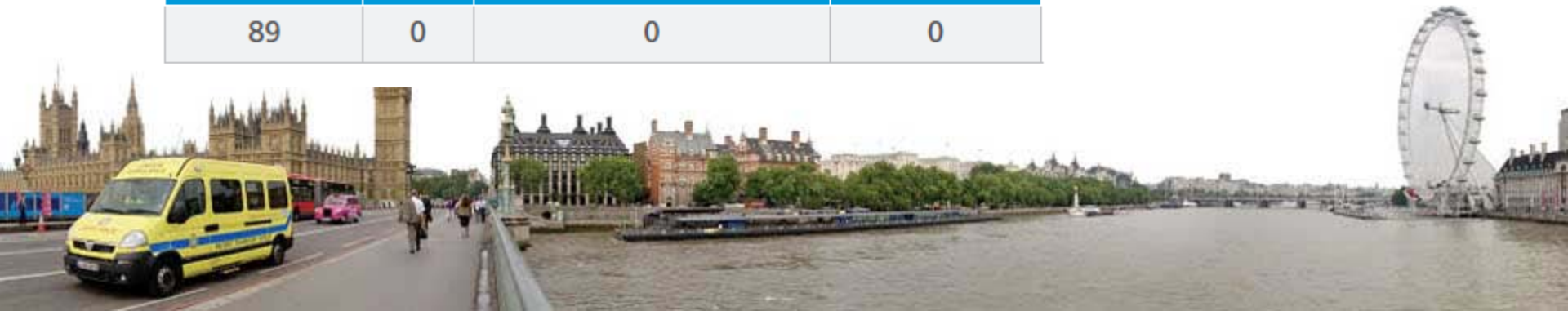
Consultant	STR	Foundation Year/Other	Not recorded
348	3	0	11

## MOST SENIOR DOCTOR IN THE EMERGENCY DEPARTMENT

Consultant	STR	Foundation Year/Other	Not recorded
195	50	3	14

## MOST SENIOR DOCTOR IN THE EMERGENCY DEPARTMENT JANUARY –MARCH 2011

Consultant	STR	Foundation Year/Other	Not recorded
89	0	0	0

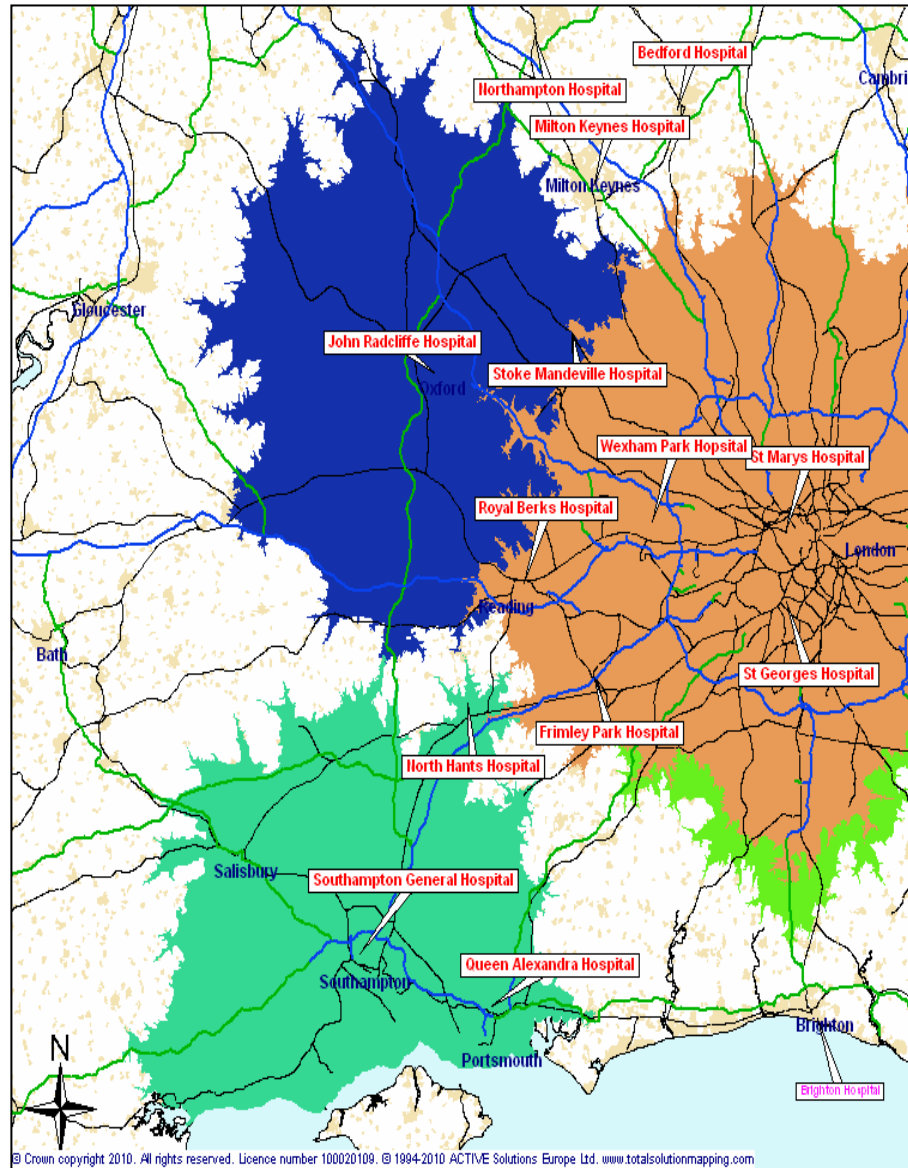


# Major incidents





# The national position



# October 2011

- 1830
- 32 year old male
- Stabbed to left chest and head injuries
- Mugged in basement car park?
- Barely conscious
- Crew on scene for 8 minutes



# October 2011

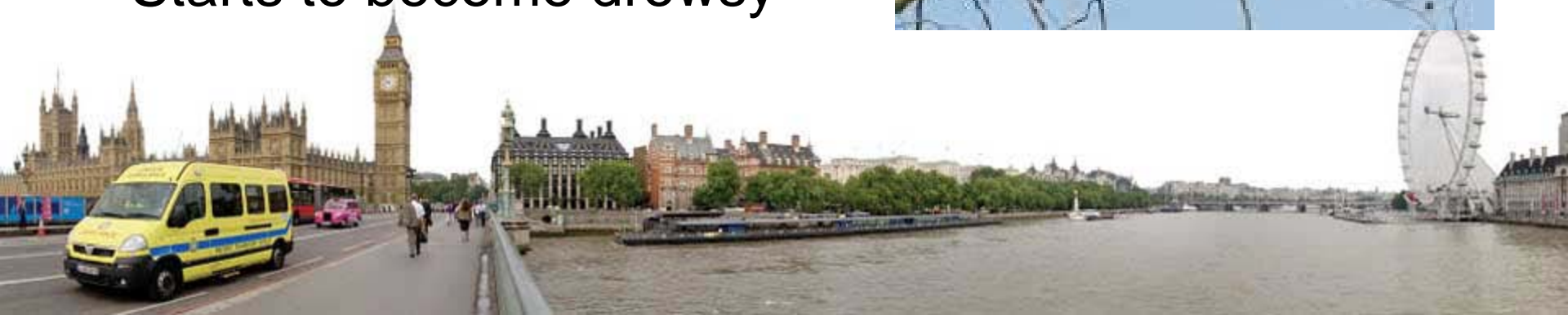
- Conveyed to nearest Major Trauma Centre on blue lights (journey time 12 minutes nearest hospital 6 minutes away)
- Met by consultant led trauma team
- Emergency surgery within 12 minutes of arriving
- Blood waiting for patient
- Intensive care 3/7
- Day 5 complaining about the sandwiches
- Home day 10
- Statistically expected to die





# August 2012

- 34 year old male
- Tree surgeon
- Large branch falls onto head
- Initially alert and chatting to crew
- Crew prepare to convey to nearest
- Starts to become drowsy

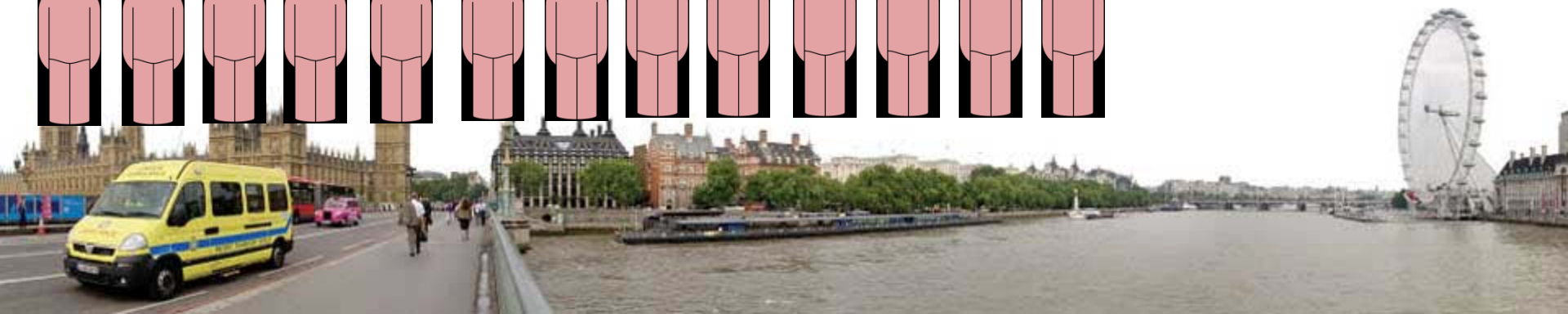


# August 2012

- Crew divert to nearest Major Trauma Centre
- 18 minute journey
- Patient admitted Neuro intensive care
- Then to neuro rehab
- Home



**In the first year since go live, 58 people have survived who were expected to die of their injuries**





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# Our approach to Major Trauma

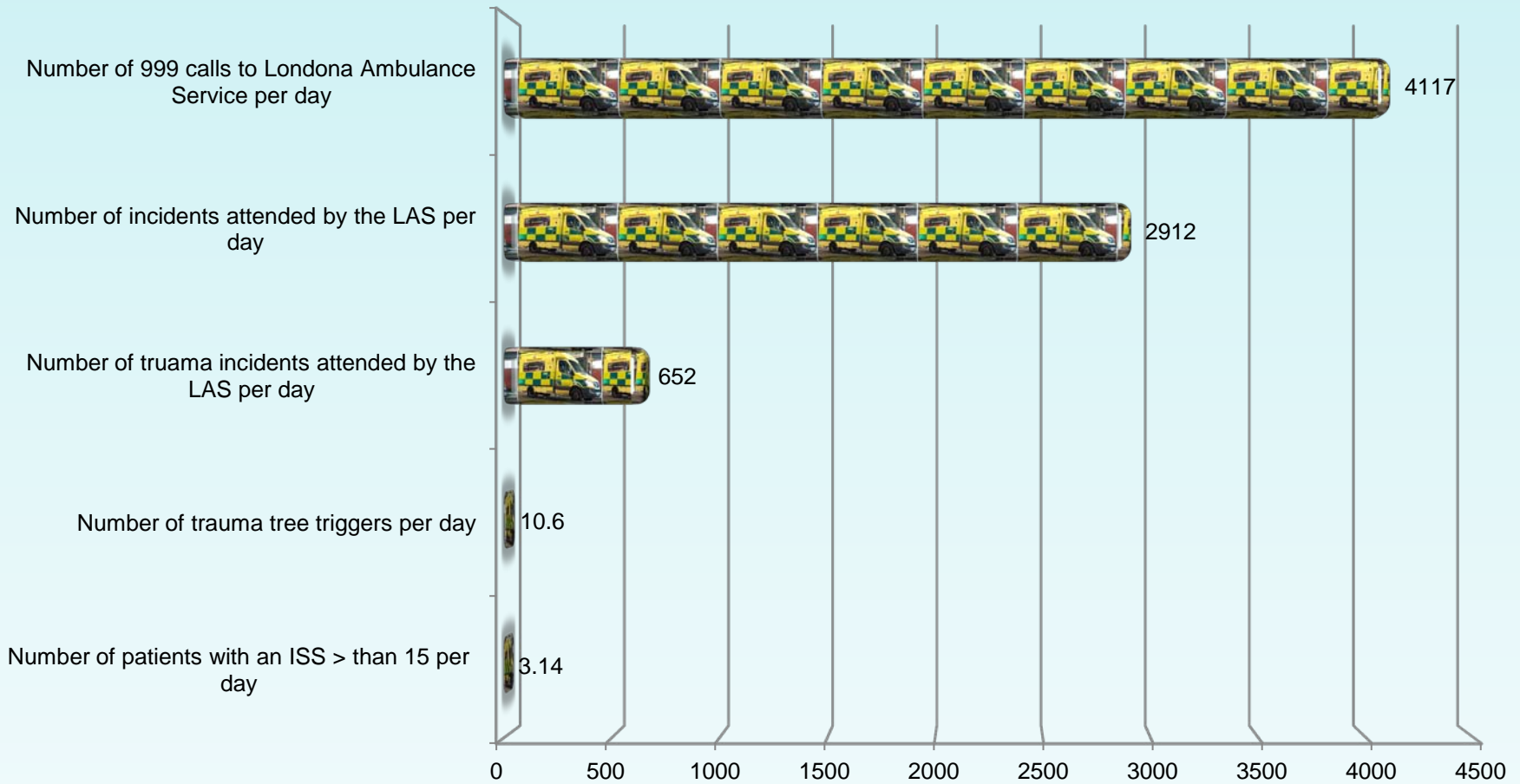
Mark Faulkner

Paramedic Advisor London Trauma Office /  
London Ambulance Service





# Major trauma is a rare event



Sources: LAS management information, Clinical Audit Research Unit, Major Trauma Centres and TARN

# Diagnosing major trauma is difficult

- No access to imaging (X-Ray, CT, USS)
- Patients compensate for injury (often normal blood pressure)
- Initial signs can be subtle (bruising takes time to develop)
- Injuries are common, trauma is rare
- Need for consistent approach



# The risk of getting it wrong

## Under triage

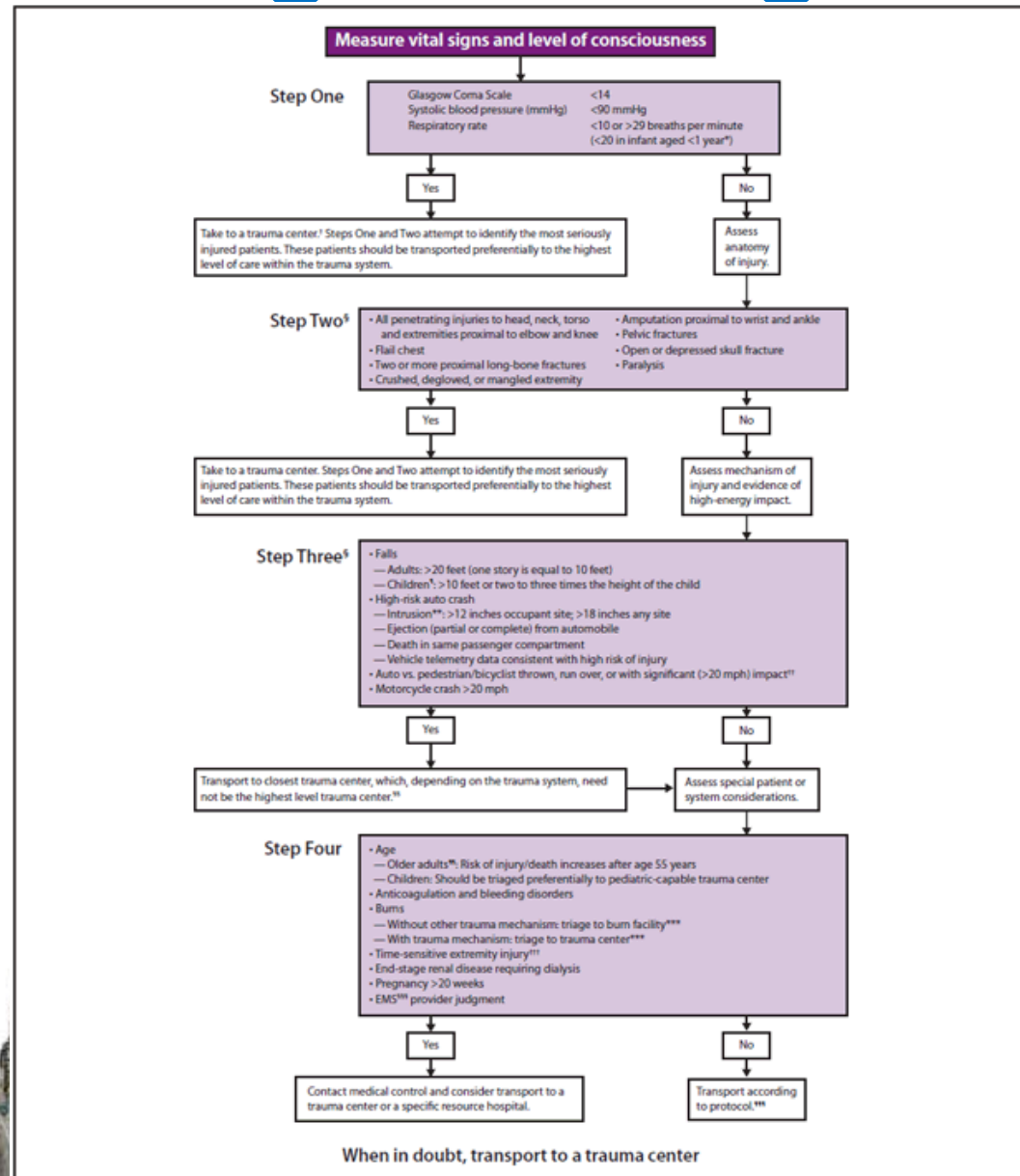
- Patient with major trauma gets conveyed to non major trauma centre
- Centre does not have skill set to offer optimum care
- Delay in transferring the patient
- Poor patient care

## Over triage

- Patient with no major injuries gets taken to major trauma centre
- Centre has limited capacity may effect ability to treat next major trauma patient
- Delays in patient care of non acute patient
- Poor patient care
- *A level of over triage is safe*

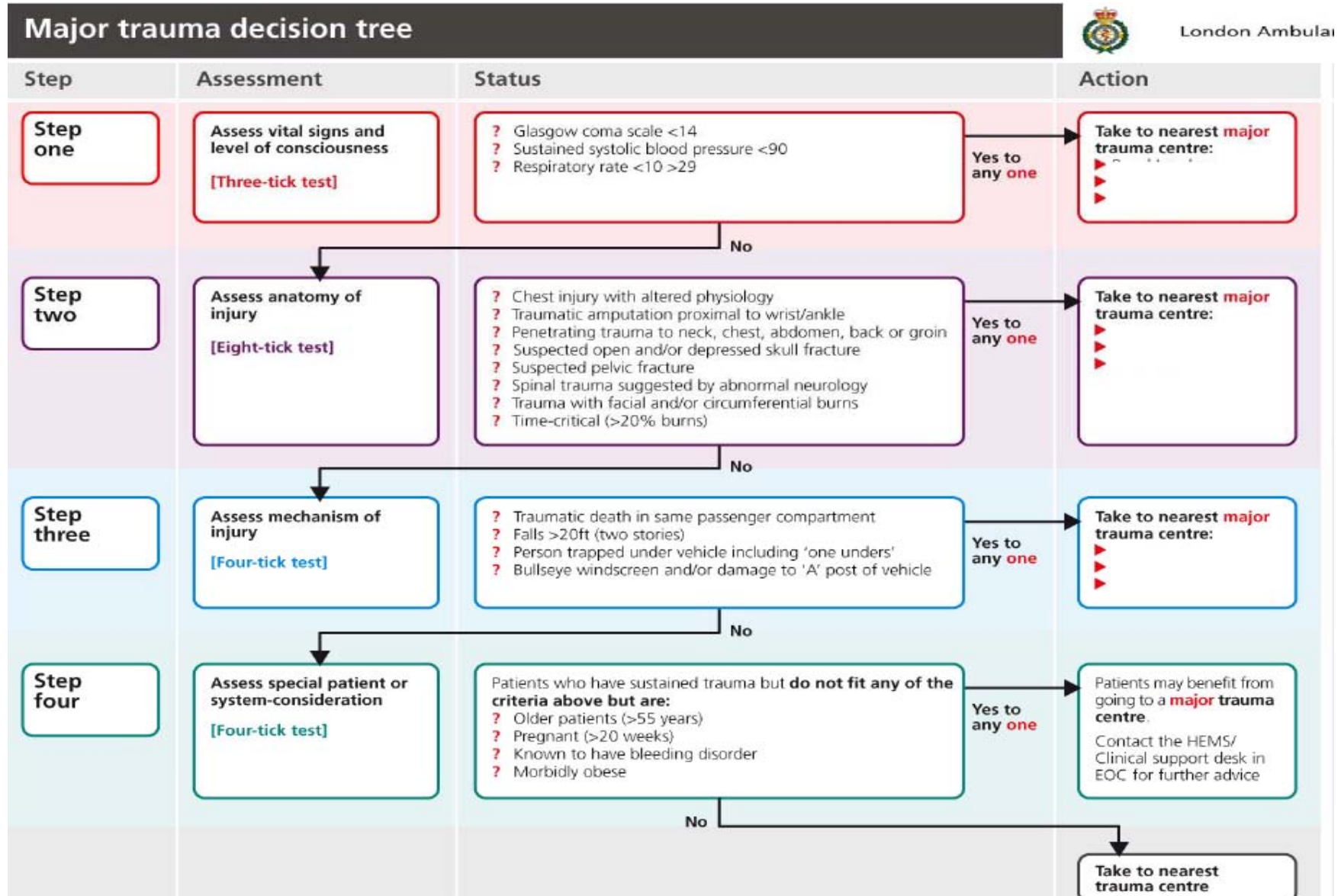


# American College of Surgeons





# Pre-Hospital triage protocol



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# Clinical Coordination Desk



# Trauma tool triggers

Total Triage Tool  
triggers,  
n=809

Assessment of Vital Signs & Level of Consciousness  
(n=216, 27%)

Assess Anatomy of Injury  
(n=373, 46%)

Assess Mechanism of Injury (n=79, 10%)

Assess Special Patient or System Consideration (n=20, 2%)

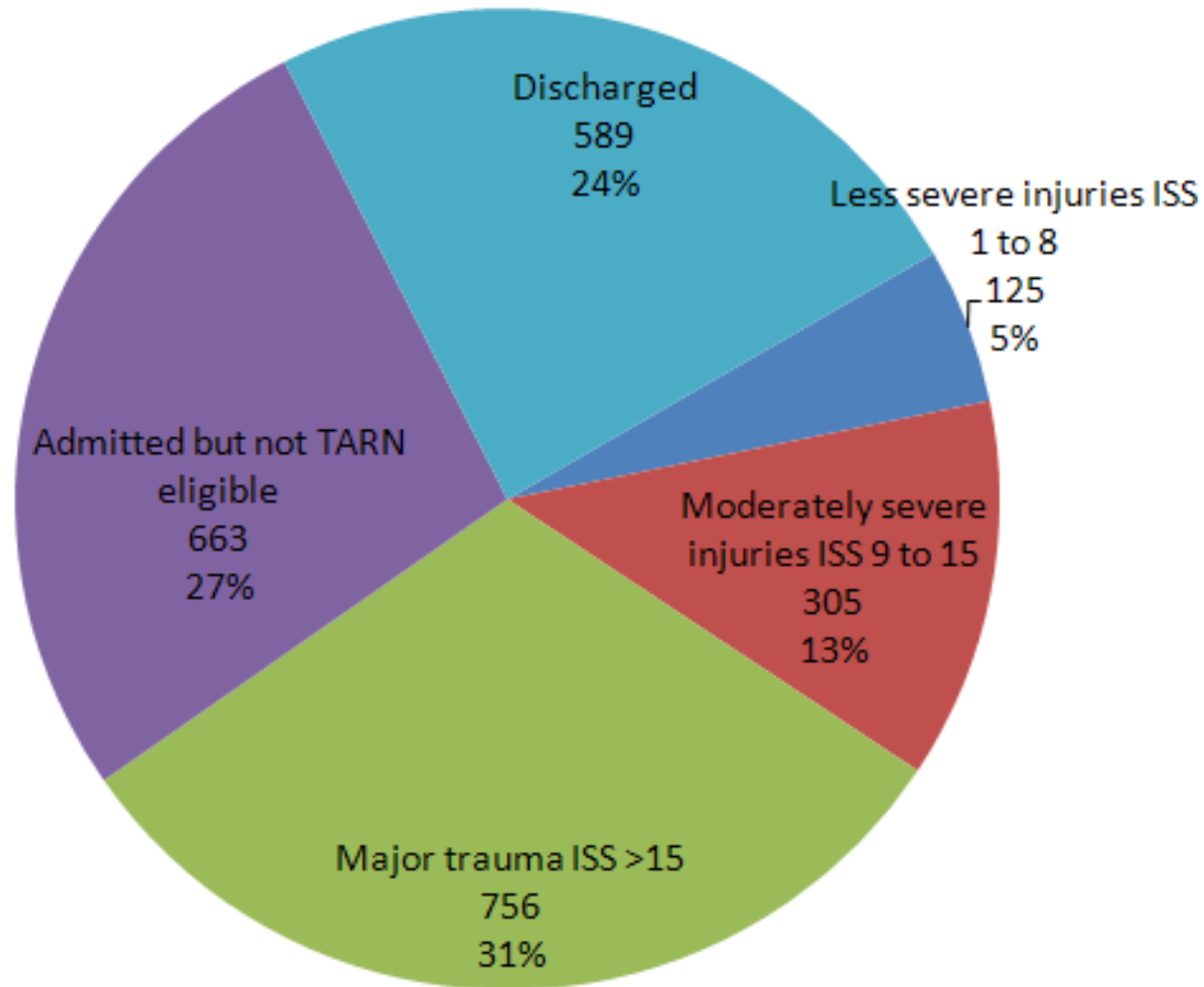
CCD/HEMS/BASICS (n=58, 7%)

Paediatric (n=63, 8%)

# Triage Tool positive patients by outcome

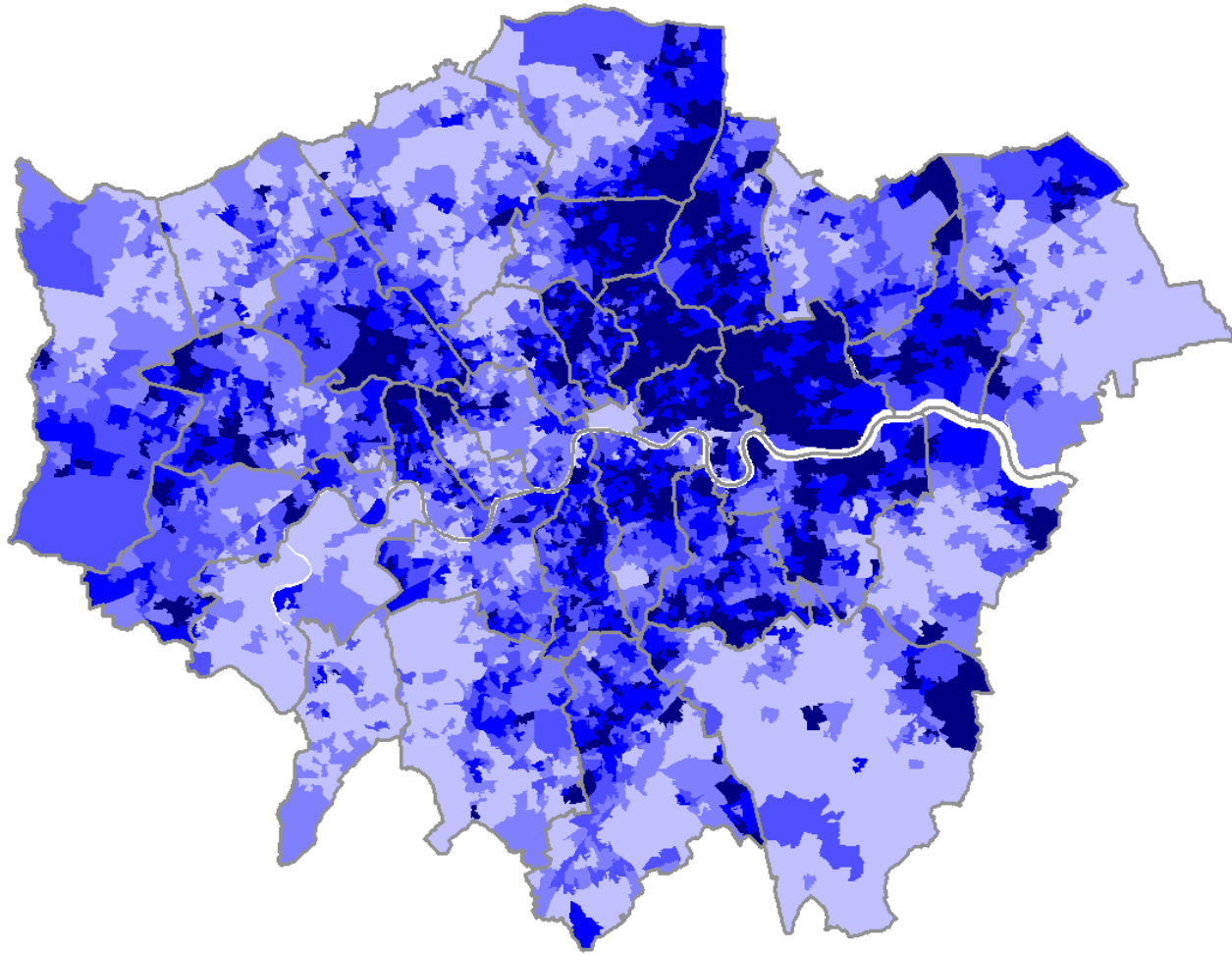
06/04/2010 - 30/11/2010

n = 2,438

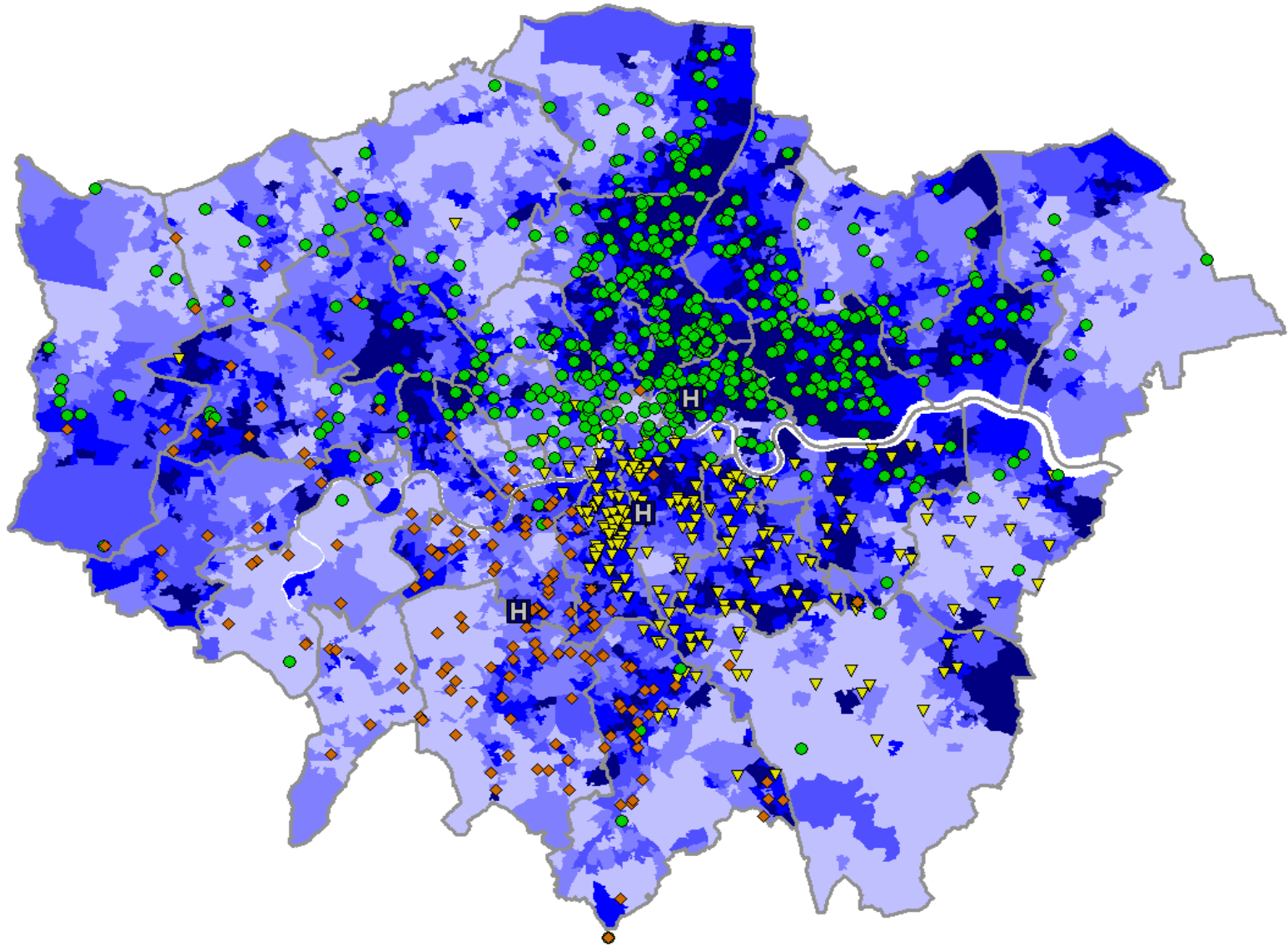




# Social deprivation in London

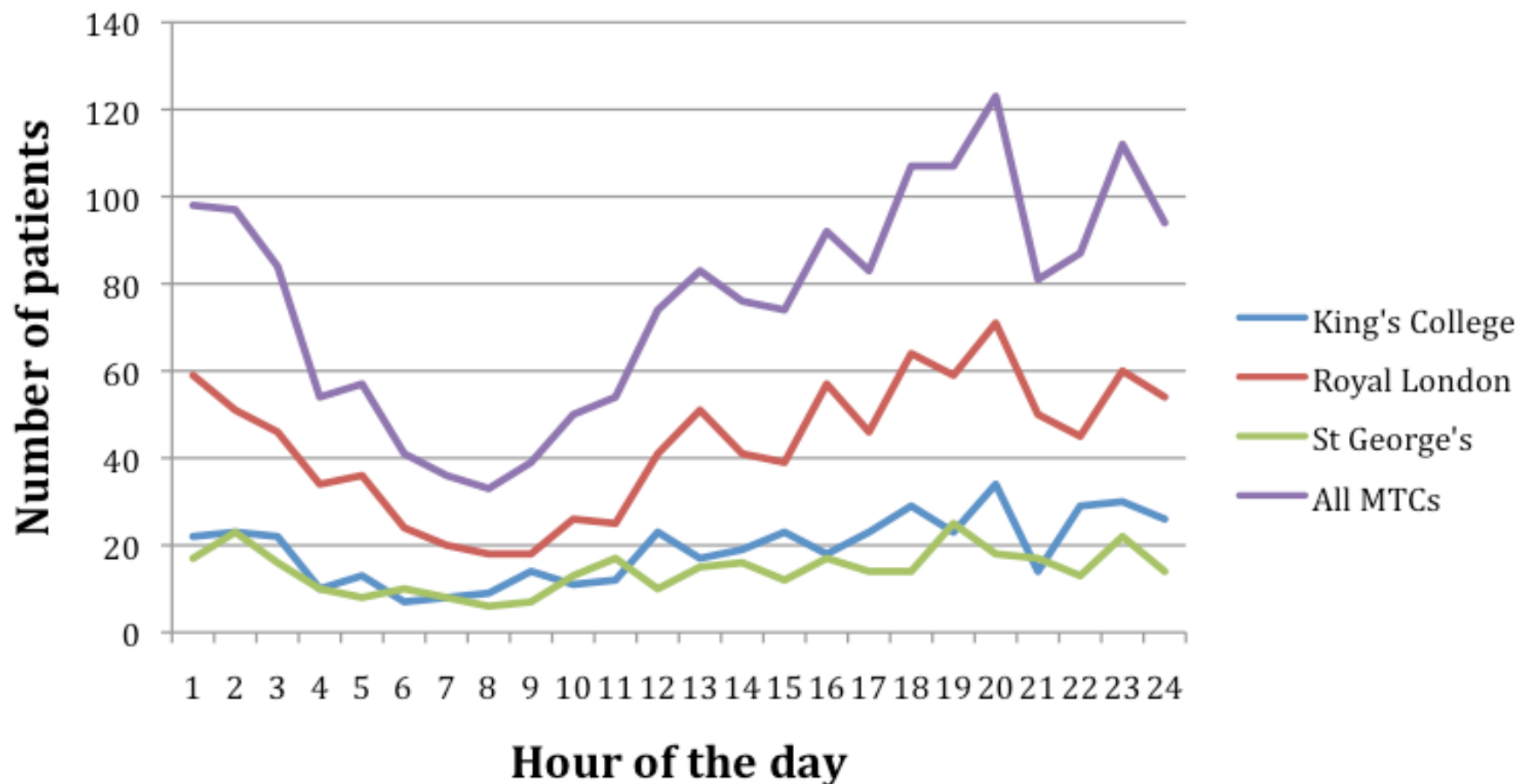


# Major trauma incidents and social deprivation

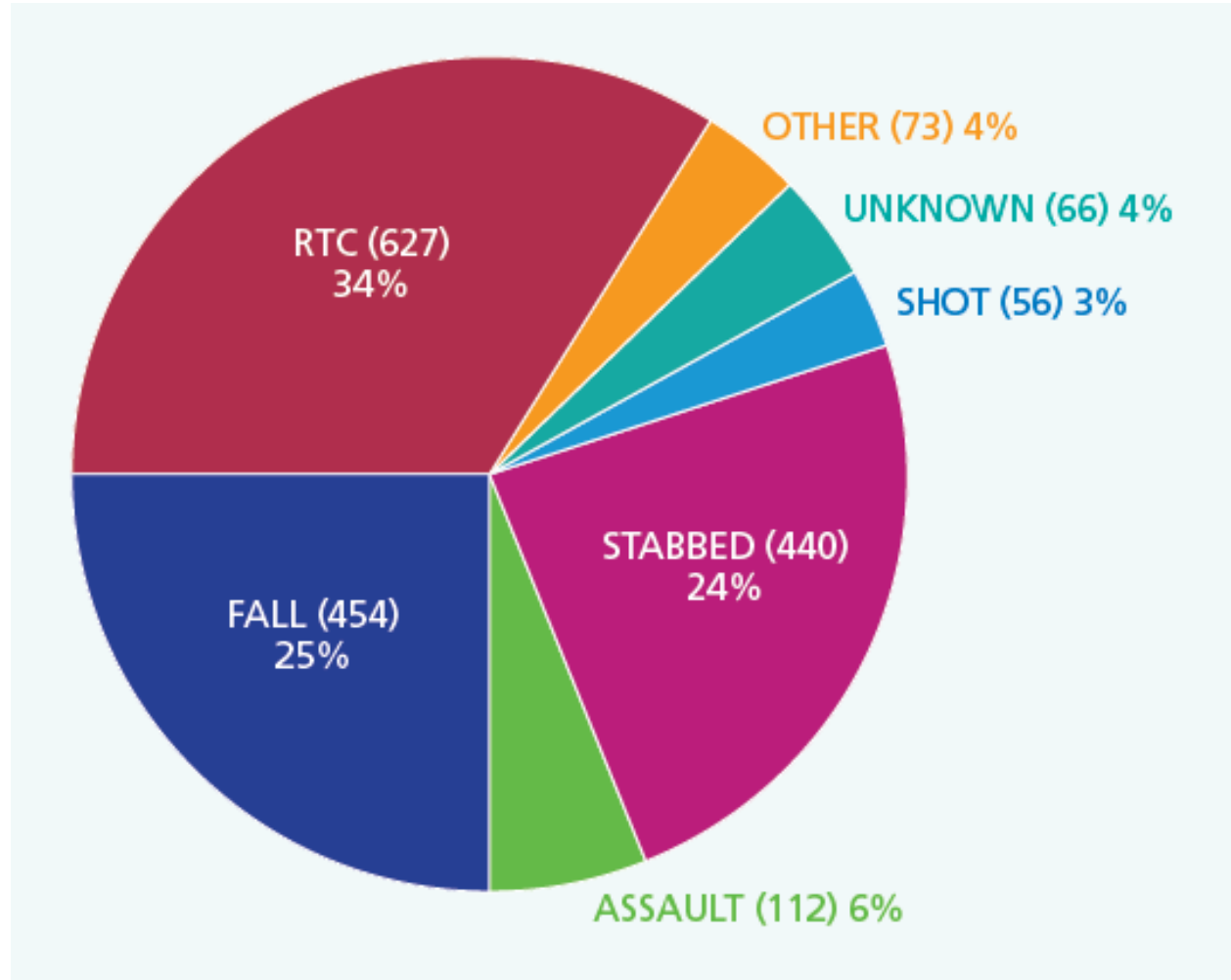


# All MTCs Triage Tool Positive patients by time of admission

06/04/10 to 30/09/10, n=1,828



# Triage tool positive patients by mechanism n = 1828



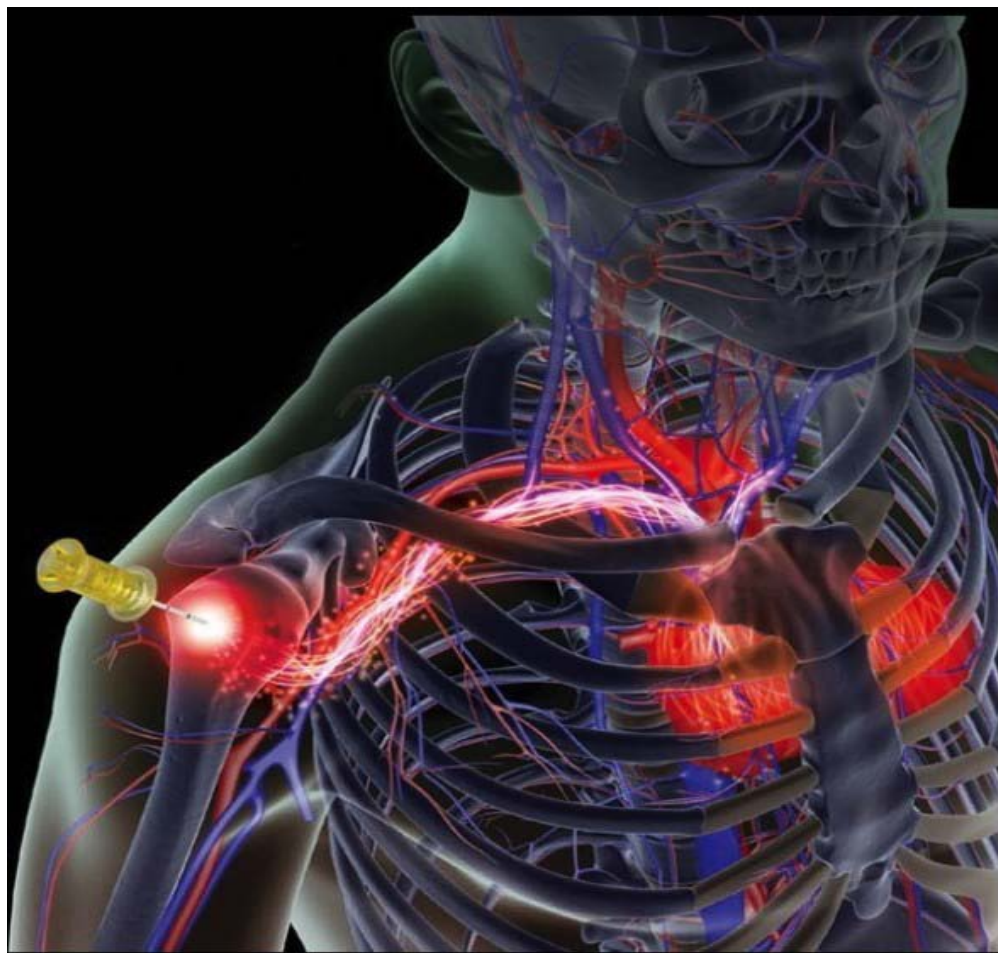


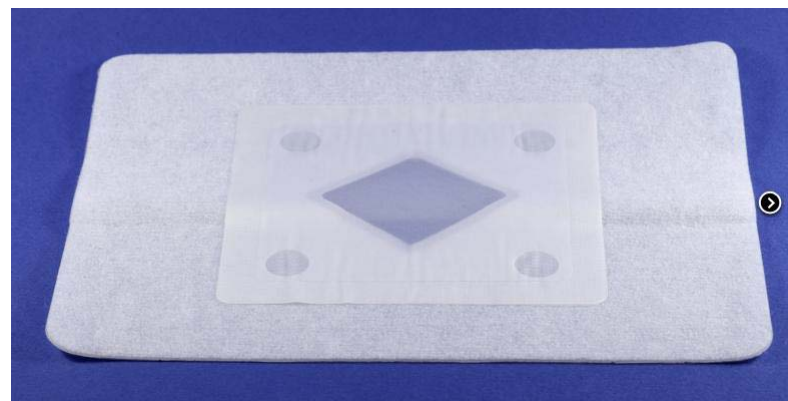
# Trauma equipment in use



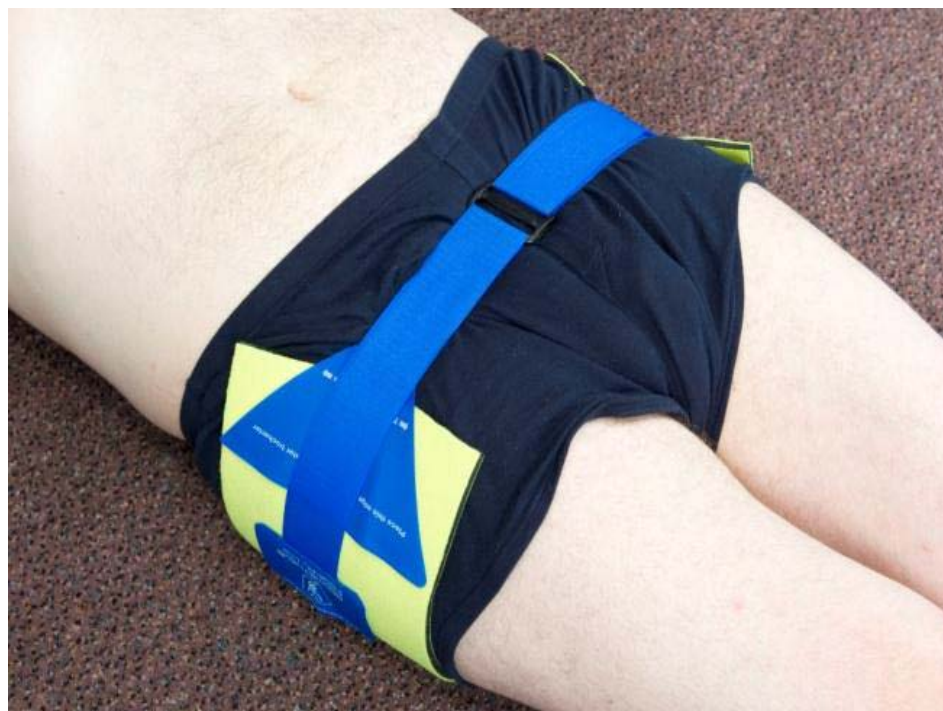
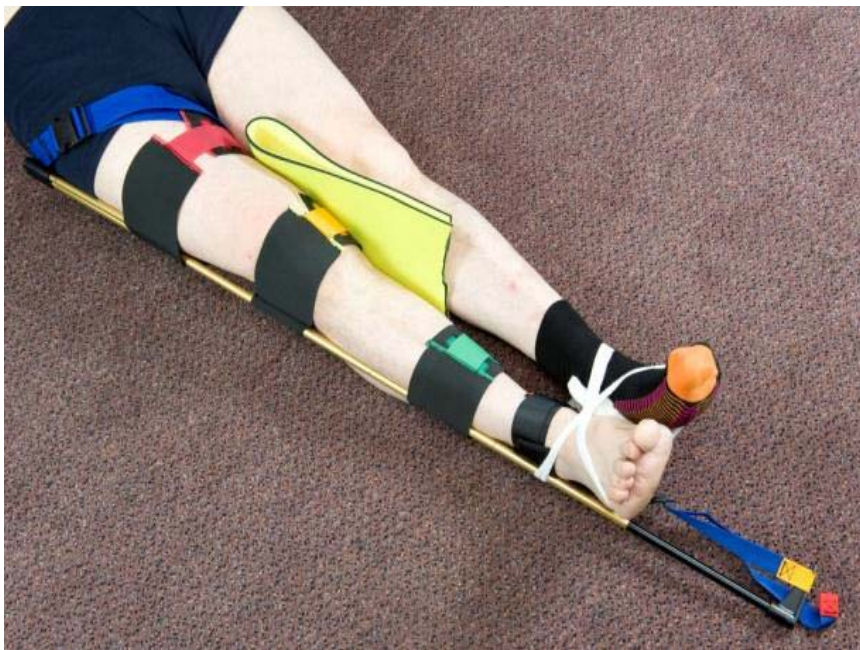












# The future



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## LONDON ADULT & CHILDREN 12-18 MAJOR TRAUMA DECISION TOOL

London Trauma Office **NHS**

Step 1	<p>Assess vital signs and level of consciousness</p> <p>1.1 Glasgow coma score less than 14</p> <p>1.2 Sustained systolic blood pressure less than 90</p> <p>1.3 Respiratory rate less than 10 or greater than 29</p>	<p>Yes to any one</p> <p>→</p>	<p>Convey to nearest <b>Major</b> Trauma Centre</p> <p>Ensure pre alert call is passed on PD09</p>
Step 2	<p>Assess anatomy of injury</p> <p>2.1 Chest injury with altered physiology</p> <p>2.2 Traumatic amputation/mangled extremity proximal to wrist/ankle</p> <p>2.3 Penetrating trauma below the head above the knees (not arms)</p> <p>2.4 Suspected open and/or depressed skull fracture</p> <p>2.5 Suspected pelvic fracture</p> <p>2.6 Spinal trauma suggested by abnormal neurology</p> <p>2.7 Open fracture of the lower limb proximal to the ankle</p> <p>2.8 Burns/scald greater than 30 percent</p> <p>2.9 Facial burns with complete skin loss to lower half of face</p> <p>2.10 Circumferential burns from a flame injury</p>	<p>Yes to any one</p> <p>→</p>	<p>Convey to nearest <b>Major</b> Trauma Centre</p> <p>Ensure pre alert call is passed on PD09</p>
Step 3	<p>Assess mechanism of injury</p> <p>3.1 Traumatic death in same passenger compartment</p> <p>3.2 Falls &gt; 20 ft (two stories)</p> <p>3.3 Person trapped under vehicle including 'one under'</p> <p>3.4 <del>Bullseye</del> to the windscreen and/or damage to the 'A' post of the vehicle caused by impact of individual outside of the vehicle</p>	<p>Yes to any one</p> <p>→</p>	<p>Convey to nearest <b>Major</b> Trauma Centre</p> <p>Ensure pre alert call is passed on PD09</p>
Step 4	<p>Assess special patient consideration. Patients who have sustained trauma but do not fit any of the above criteria but are</p> <p>4.1 Older patients (&gt;55 years)</p> <p>4.2 Pregnant (&gt;20 weeks)</p> <p>4.3 Known to have bleeding disorder or receiving current anti-coagulation therapy (warfarin)</p> <p>4.4 Morbidly obese</p>	<p>Yes to any one</p> <p>→</p>	<p>Patient <u>may</u> benefit from going to a <b>Major</b> trauma centre</p> <p><u>contact:</u> The Clinical Hub on PD09</p>
Step 5	<p>Assess system consideration. Patients who have sustained trauma but do not fit any of the above criteria but there are</p> <p>5.1 Significant crew concern <u>only</u> when discussed with a Trauma Paramedic within EOC</p>	<p>Yes to any one</p> <p>→</p>	<p>Patient <u>may</u> benefit from going to a <b>Major</b> trauma centre</p> <p><u>contact:</u> the Clinical Hub on PD09</p>

Is your patient at risk of **significant risk of bleeding**? **Signs of Shock** (diaphoretic)? **CONSIDER TRANEXAMIC ACID** – Do not delay on scene

Should the **airway** become compromised and can not be managed, consider conveying /diverting to the nearest Trauma Unit



### HANDOVER & PRE ALERT CALL

C CAD

A Age of Patient

T Time of Injury

M Mechanism of Injury

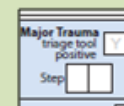
I Injuries found and suspected

S Signs (vital)

T Treatment given or required

Also handover **the step** that the patient triggered on the tool during the pre-alert call and during handover

Only Patients triggering the trauma tree should be taken to a major trauma centre, unless the patient is within the normal catchment of the emergency department. In this case you note L, T in the trauma tree trigger box on the PRF



# Paediatric trauma tool

## LONDON CHILDREN'S (UNDER 12) MAJOR TRAUMA DECISION TOOL

Step 1	Assess vital signs and level of consciousness		
	6.1 Glasgow coma score less than 14 6.2 Inappropriate behaviour post injury (too quiet or inconsolable) 6.3 Abnormal vital signs not explained by other cause for example crying, pain responses	Yes to any one	Convey to nearest <b>Major</b> Trauma Centre Ensure pre alert call is passed on PD09
Step 2	Assess anatomy of injury		
	7.1 Significant bruising to chest or abdomen 7.2 Traumatic amputation/mangled extremity proximal to wrist/ankle 7.3 Penetrating trauma below the head above the knees (not arms) 7.4 Suspected open and/or depressed skull fracture 7.5 Suspected pelvic fracture 7.6 Significant <del>deglorging</del> (soft tissue) injury 7.7 Spinal trauma suggested by abnormal neurology 7.8 Open long bone fracture (with significant soft tissue injury) 7.9 Multiple fractures (long bone) 7.10 Burns/scald greater than 20 percent 7.11 Facial burns with complete skin loss to lower half of face 7.12 Circumferential burns from a flame injury	Yes to any one	Convey to nearest <b>Major</b> Trauma Centre Ensure pre alert call is passed on PD09
Step 3	Assess mechanism of injury		
	8.1 Traumatic death in same passenger compartment 8.2 Uninterrupted fall over twice the patient's height (not bounding down stairs) 8.3 Person trapped under vehicle or large object (including 'one under x') 8.4 <del>Bullseye</del> to the windscreen and/or damage to the 'A' post of the vehicle by impact of individual outside of the vehicle 8.5 Bicycle injury resulting in abdominal and/or groin pain (thrown from or impacted on handle bars) 8.6 Ejection from inside car, van or lorry 8.7 Fall from or trampled by large animal	Yes to any one	Convey to nearest <b>Major</b> Trauma Centre Ensure pre alert call is passed on PD09
Step 4	Assess special patient consideration patient who have sustained trauma but do not fit any of the above criteria but are		
	9.1 Known to have bleeding disorder or receiving current anti-coagulation therapy (warfarin)	Yes to any one	Patient <u>may</u> benefit from going to a <b>Major</b> trauma centre <u>contact</u> : the Clinical Hub on PD09
Step 5	Assess system consideration patient who have sustained trauma but do not fit any of the above criteria but there are		
	10.1 Significant crew concern only when discussed with a Trauma Paramedic within <u>EOC</u>	Yes to any one	Patient <u>may</u> benefit from going to a <b>Major</b> trauma centre <u>contact</u> : the Clinical Hub on PD09

### CHILDREN'S VITAL SIGNS

#### Respiratory Rate

Age	Breaths per minute
<1 year	30-40
1-2 years	25-35
2-5 years	25-30
5-11 years	20-25

#### Pulse Rate

Age	Beats per minute
<1 year	110-160
1-2	100-150
2-5	95-140
5-11	80-120

### Glasgow Coma Score

Eye Opening	
Spontaneous	4
To speech	3
To pain	2
None	1

#### Motor Response

Obeys Commands	6
Localised pain	5
Withdraws pain	4
Abnormal flexion	3
Extensor response	2
No response	1

#### Verbal Response

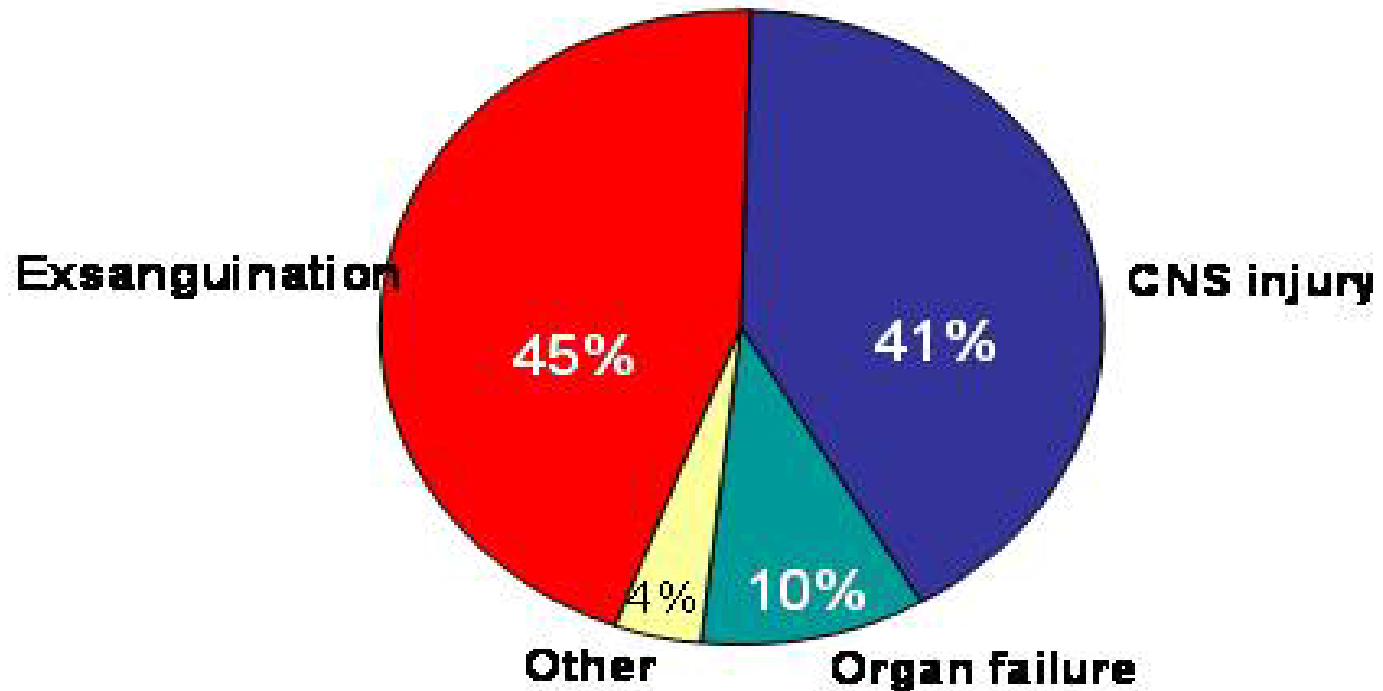
Orientated	5
Confused	4
Inappropriate words	3
Incomprehensible sounds	2
No verbal Response	1

#### Modified Verbal Response <4 years old

Appropriate words, Social smiles	5
fixes and follows objects	
Cries but is consolable	4
Persistent irritable	3
Restless, agitated	2
Silent	1



# Cause of trauma death

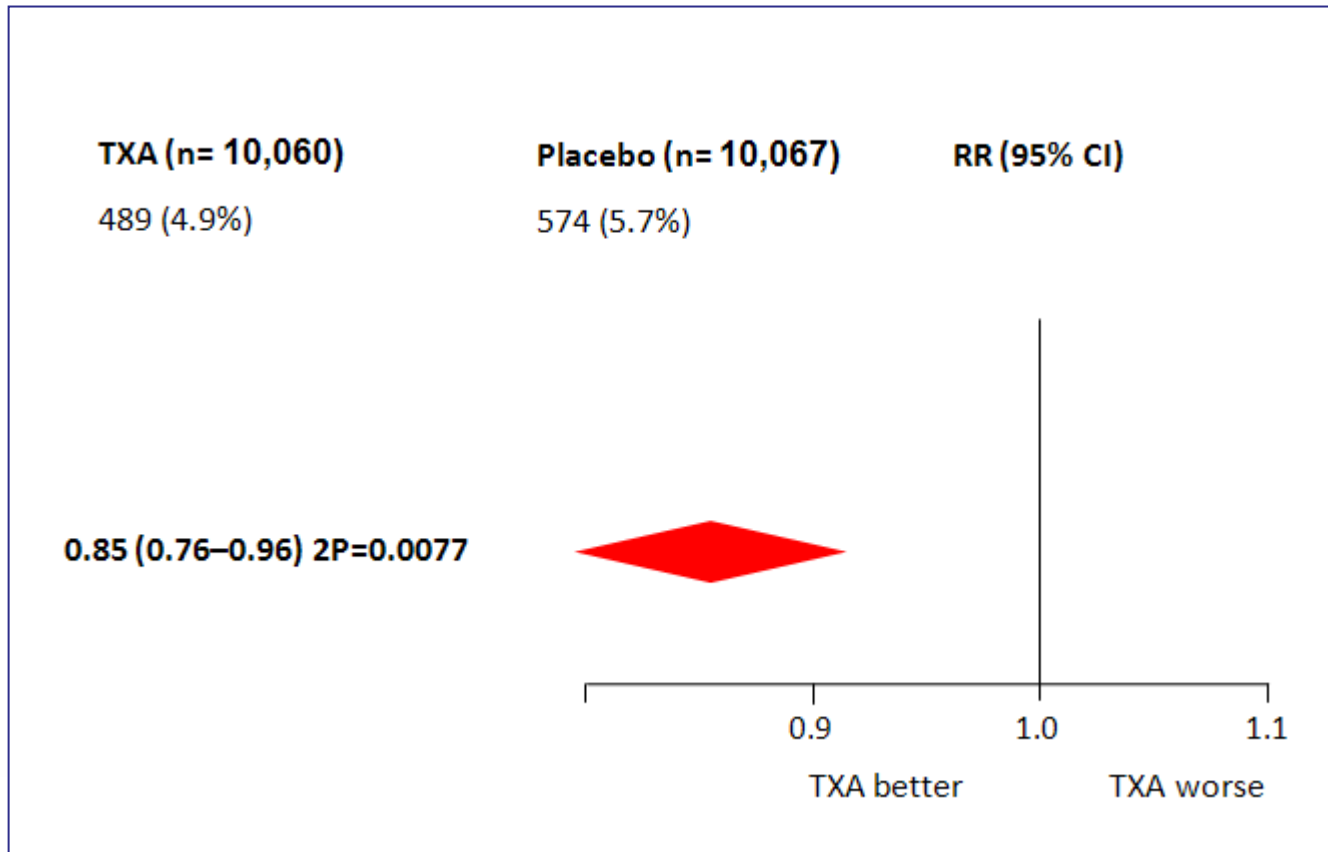


Saulis A et al. Epidemiology of trauma deaths: a reassessment. J Trauma 1995;38:185-193

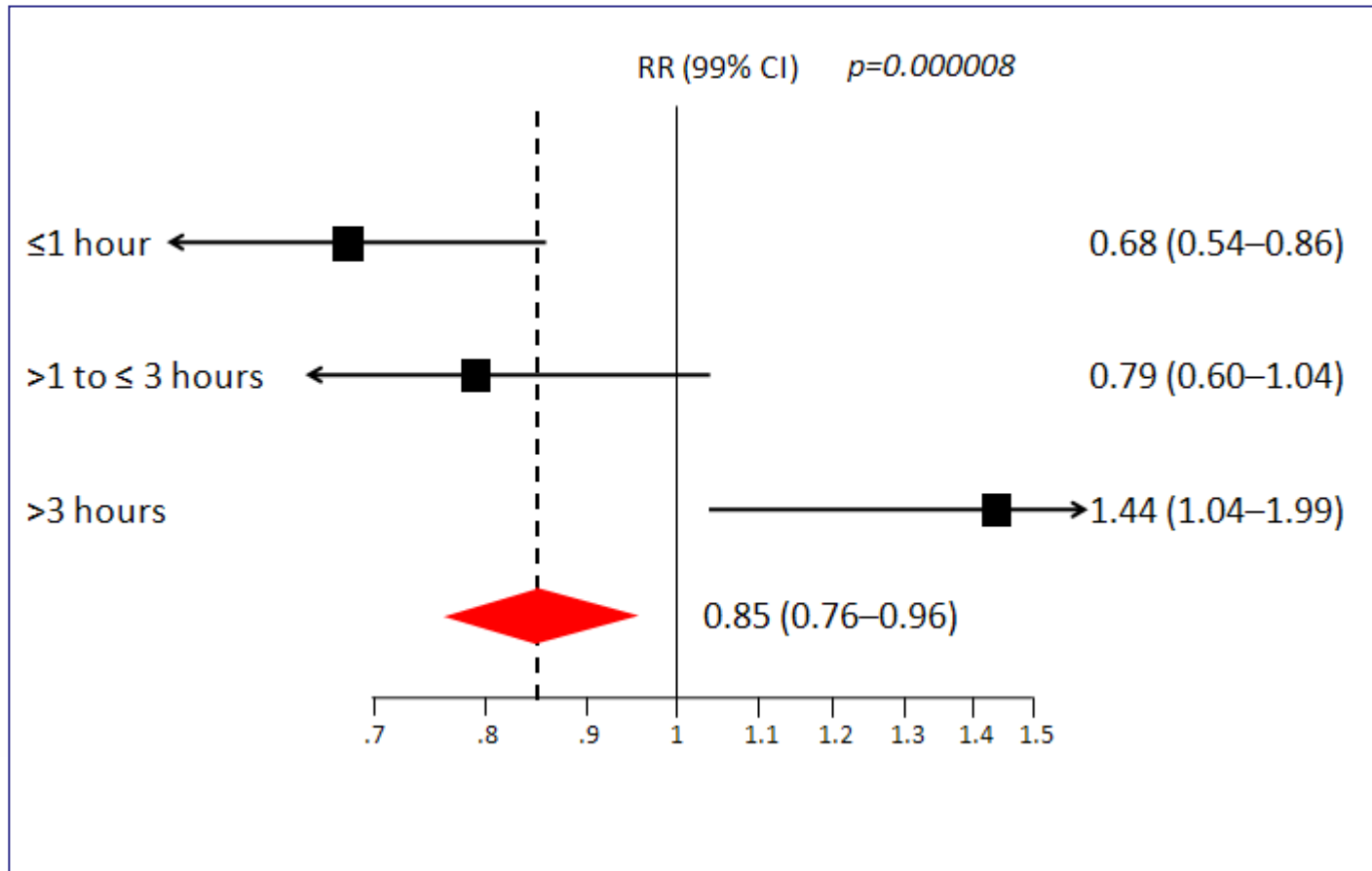




# Tranexamic acid



# Tranexamic acid





Thank You









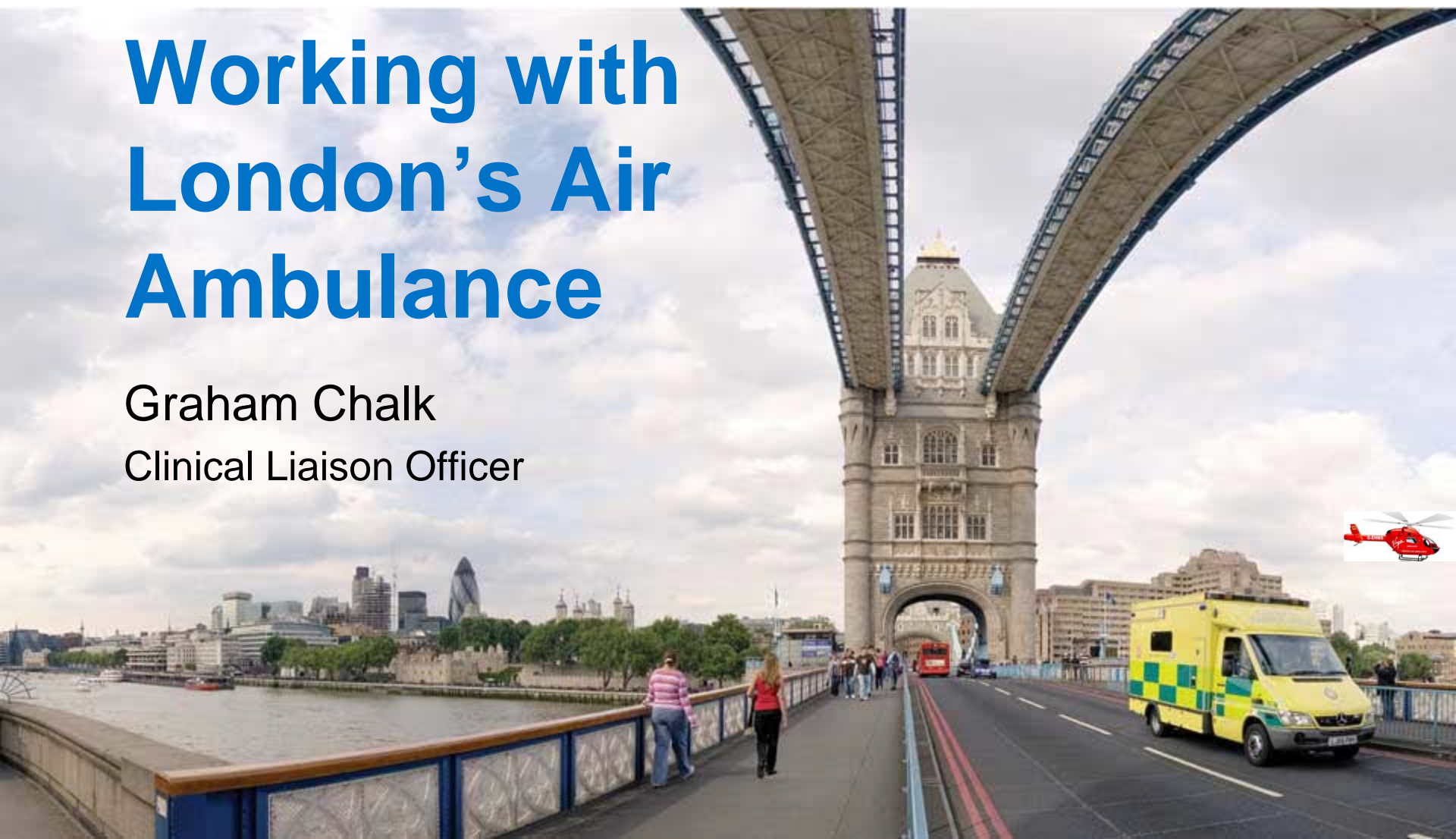
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# Working with London's Air Ambulance

Graham Chalk  
Clinical Liaison Officer



# A few facts and figures

- 7.8 million people living in London
- Rising to 10 million people during the working day.
- The London Ambulance Service receives 5000 calls a day



# A few facts and figures

- 5 major trauma calls every 24 hours
- 3200 paramedics and technicians
- About 1 major trauma per crew per year
- 1 Helicopter team











# Helicopters in Medicine







AMBULANCE

LONDON'S AIR AMBULANCE

G-EHMS

Virgin

MEGASTORE

4 DVDs  
FOR £20

PICCADILLY  
CIRCUS

THEATRE  
TICKETS







# Rapid Response Vehicle

Aircraft off line

Sunset in the winter

19:00 in the summer

Same principle

Same equipment & team

Same jobs

Longer response times?









MI/DATE AGE/SEX	MECHANISM
77 64 ♂	HYPD → CAR INTO TREE (GE)
77 24 ♂	Stab Rt lumbar region (GE)
77 20 ♂	Stab abdo & thigh (GE)
77 32 ♂	RTC MOTORCYCLIST GCS 6 CHEST INJ. (R) OPEN TIBIA (GE)
M1 38 ♂	BURNS HANDS/NECK/BOTH LEGS 20% GCS 15
M1 16 ♂	SUPERFICIAL WOUNDS (L) POST CHEST. (GA)
M1 50 ♂	HIE GCS 8 Post RTC vs Van isolated M.I. - RSI CB
M1 9 ♀	Crew reg. → ? spinal inj GA
M1 25 ♂	Fall from Moving Van GCS 8 RSI CB
M1 18 ♂	STAB, SHOT, HIT BY CAR GCS 5 → RSI GE
77 25 ♂	JUMPED 3 STOREYS COMBATIVE PTT RSI (GE)
77 10 ♀	RTC ?#S H/O OSTEOGEN. IMPERFECTA. PARENTS IN HILLINGDON C #S (GE)

# The Calls



**26% of calls**





# Key interactions

- Dispatch
- Exposure
- Training





Sometimes it's obvious





# What else are we looking for?



# Exposure







# Training













Thank you





# Questions



# Future events

[www.londonambulance.nhs.uk/getting\\_involved/events\\_and\\_seminars](http://www.londonambulance.nhs.uk/getting_involved/events_and_seminars)

**Saturday 3<sup>rd</sup> November**  
Health Fair, Southgate

**Thursday 29<sup>th</sup> November**  
Members' meet: pre-hospital  
care into the future

