Evacuation of Extra-Axial Haematomas at the Royal Victoria Infirmary, Newcastle

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Decompressive surgery should be performed for clinically significant extra-axial haematomas within 4 hours of their onset to improve neurological recovery and outcome[1,2]. Previous studies have shown that this is rarely achieved[3,4,5].

Methods:

Data was collected on primary (RVI was first hospital attended) and secondary transfer (attended non-neurosurgical hospital initially then transferred to the RVI) of patients to the neurosurgical unit at the RVI . This was performed retrospectively using patients notes for all patients who went to theatre for haematoma evacuation between February and August 2014. All of the patients included had isolated head injuries and none underwent any surgical procedure other than the evacuation of their haematoma.

Data recorded for each patient included – Glasgow Coma Score at injury scene and at arrival at primary hospital, findings of head CT, neurosurgical intervention performed at the RVI and timings (time of injury taken as time zero) to a. time to ambulance arrival, b. duration of time on scene, c. transfer time to primary hospital, d. time from arrival at hospital to CT scan, e. time from CT to neurosurgical referral, f. time from referral to transfer, g. transfer time, h. time from arrival at RVI to theatre.

Results:

All primary transfers had their extra-axial haematomas evacuated in under 240 minutes. Fig. 1 shows the mean time scale for the various points in the journey from injury to theatre.

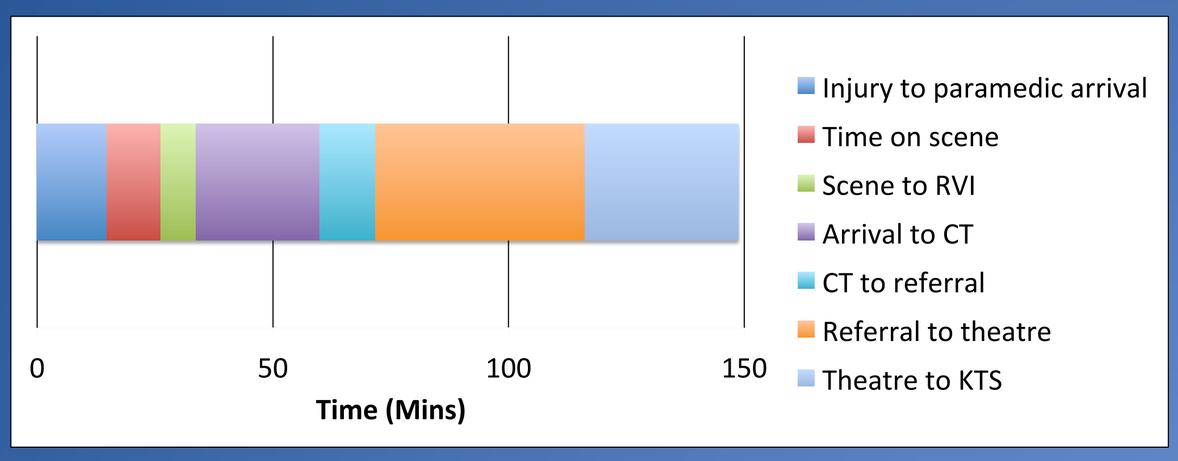

Figure 1 – Mean primary transfer times (n=4)

There were 4 patients included in the primary transfer data – all of whom had sub-dural haematomas.

All of the secondary transfers were subject to delays and none of the 13 patients in this group had their haematomas evacuated in under 4 hours.
There were 10 subdural and 4 extradural haematomas in this group (one patient had both). The mean time to start of evacuation from injury was 512 minutes (≈8½ hours) with a range of 315-720 minutes (5¼ - 12 hours). Fig. 2 shows the individual patient timeline for the secondary transfer group.

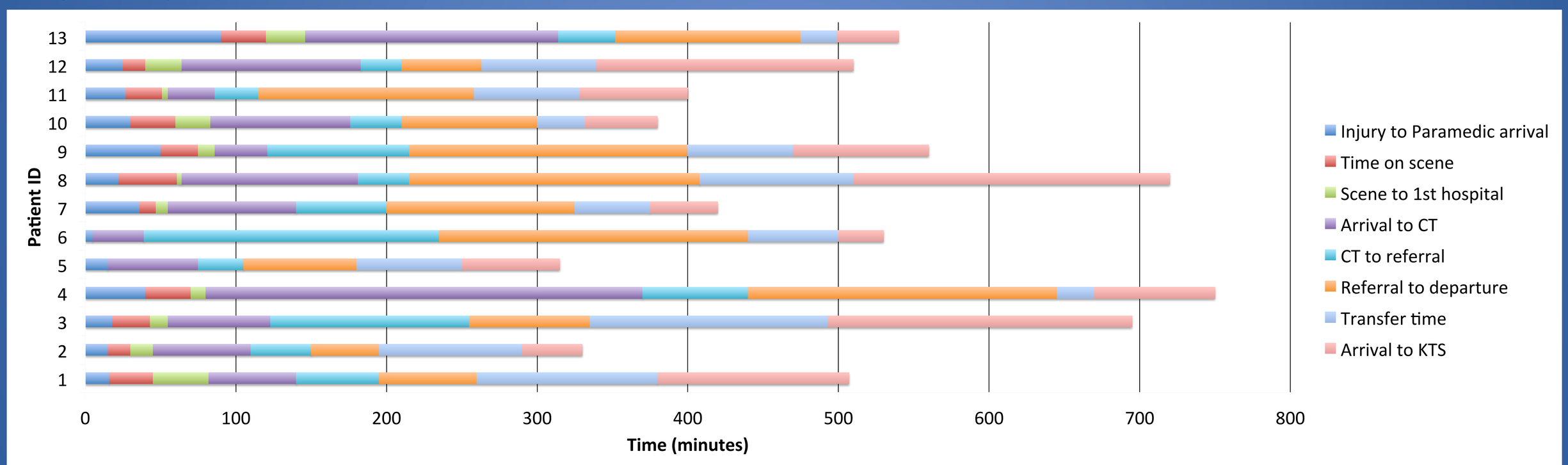

Figure 2 – Patient timelines for secondary transfer

Discussion:

The biggest delays in secondary transfer occurred; between arrival and CT at the primary hospital (mean 94 minutes), CT to neurosurgical referral (mean 65 minutes), referral to departure (mean 122 minutes) and then arrival at the RVI to surgical start (mean 94 minutes (30-210)). The actual transfer time was entirely dependent on the geographical location of the primary hospital and the traffic conditions at the time of day of transfer. Table 1 shows the breakdown of primary hospital locations for each of the secondary transfer group, the distances between these hospitals and the RVI and the ID number of patients transferred from each unit in normal working hours (08:00-18:00) and Out of Hours (18:00-08:00). There was no discernable pattern to the delays between those patients presenting in normal hours vs. out of hours.

Hospital	Number of Transfers	Distance to the RVI (Miles)	Patient ID transferred within "normal" hours	Patient ID transferred Out of Hours
Cumberland Infirmary (Carlisle)	7	59.4	6,7,9	1, 3, 11, 12
University Hospital of North Durham	1	16.9		2
Sunderland Royal Hospital	1	13.9	5	
Wansbeck General Hospital	1	17		13
South Tyneside General Hospital	2	10.7	4, 10	
West Cumberland Hospital (Whitehaven)	1	98.2	8	

Table 1 – location of primary hospital for secondary transfer patients

Documentation of reasons for delay was very poor across all patients both in the initial hospital and the RVI. Possible reasons for the delays include:

- Grade of person initially seeing patient and their ability to recognize the importance of a timely CT
- Access to CT out of hours in non-neurosurgical centres – or the speed of offsite reporting of these CTs
- Ability of doctors in the non-neurosurgical centres to interpret the CTs themselves before a formal report is issued (linked to grade of doctor seeing patient and increases the time between CT and referral if a formal report is needed)
- The availability of a neurosurgeon to take referrals – e.g. scrubbed in theatre or engaged discussing another referral
- Time for CT transfer to RVI PACS
- Secondary transfer delays – North East Ambulance Service response times and pressures, road and traffic conditions as well as geographical distance to the RVI

As a result of this study further work into a standardised referral pathway for the transfer of extra-axial haematomas to the RVI is being undertaken including the use of the major trauma bypass system to expedite transfer when a neurosurgeon is unavailable. Further education in all trauma units in the region needs to be undertaken to highlight the importance of timely clot evacuation and the process of expediting transfer for individual patients.

References:
1. **Royal College of Surgeons of England Trauma Committee**. The Royal College of Surgeons of England: A Position Paper on the Acute Management of Patients with Head Injury (2005). *Ann R Coll Surg Engl* 2005;87:323-25.
2. **Bullock M, Chesnut R, Ghaja, J et al.** Guidelines for the Surgical Management of Traumatic Brain injury *Neurosurgery 58 S2 1- S2 60 2006*
3. **Leech P, Childs C, Evans J *et al***. Transfer times for patients with extradural and subdural haematomas to neurosurgery in Greater Manchester. *Br J Neurosurg* 2007;21:11-15.
4. **Butlers D, Belli A**. A prospective study of the time to evacuate actue subdural and extradural haematomas. *Anaesthesia* 2009;64:277-81.
5. **Sergides IG, Whiting G, Howarth S, Hutchinson PJ**. Is the recommended target of 4 hours from head injury to emergency craniotomy achievable? *Br J Neurosurg* 2006;20:301-05.