[redacted]

Elderly Trauma C Spine Imaging Guidance

The Elderly Trauma Regional Working Group has been meeting every 2 months since August 2016. Various strands of work have been undertaken by different subgroups addressing specific aspects of elderly major trauma. At the meeting of this working group held on 1st February 2017 the group focused on cervical spine imaging.

The background to this meeting included:-

1. A review of the regional TARN figures for 2014-2015 that revealed 31 cases of delayed diagnosis (CT more than 1 day after presentation) of cervical spine injuries in the elderly. Twenty two of these cases were attributed to the 2 MTCs in the region. Laura Evans and Craig Ord reviewed these 22 cases and established that the vast majority of these cases (20) were transfers into the MTCs from TUs. We are aware that most of these cervical spine injuries that are identified in the elderly population are conservatively managed with Aspen collars or similar and not transferred to MTCs. Therefore this information would suggest that 31 patients with a significantly delayed/missed diagnosis of cervical spine injury during the 2014-2015 period is an underestimation and that this is an issue primarily encountered in TUs. It is likely that this is due to inadequate imaging of cervical spines in the elderly trauma population and a lack of awareness of the increased rick of cervical spine injury in this group. (appendix 1)
2. NICE guidance suggests that CT is the modality of choice for suspected cervical spine injuries in the elderly. NICE suggest that all patients ≥65 years in whom cervical spine injury is suspected should undergo CT scanning of the cervical spine, they further specify that in this group any neck pain should be considered reason to suspect cervical spine injury. Mechanism is not specifically mentioned and there is no guidance regarding the impact of cognitive impairment on assessing suspicion of cervical spine injury. (appendix 2)
3. Northumbria Trust recognised that there was a problem with lack of awareness of the risks and under-imaging of cervical spines in the elderly trauma patient a year ago and introduced more specific guidance detailing which patients should undergo cervical spine imaging. An audit of the impact of these guidelines had been undertaken by Lee Woolsey who was able to attend the meeting on 1st February to present the initial results of this audit. (Appendix 3)
4. Kate Williamson was able to report to the group on 1st February that North Tees have similarly recognised this issue and have developed a flow chart for all ED doctors to follow in an effort to increase imaging of cervical spine imaging. Unfortunately there is no data as yet to show the impact of these changes. (Appendix 4)
5. The Pan London group have very recently produced guidance that suggests all elderly patients meeting the current guidance for CT head scans should have their cervical spine scanned at the same time. Again there is no data to show the impact of implementing this change, although as part of the audit at Northumbria the impact in terms of increased demand on service of scanning all cervical spines of the trauma head CT patients we had done during the same period was included for comparison. (This would have resulted in a 6 fold increase in cervical spine CT scans as opposed to the doubling we saw with our more specific guidance). (Appendix 5)

[redacted]

Following presentation of the above information and further group discussion the following proposed regional guidance was put forward:-

- CT is the modality of choice for ≥65 yr olds
- All patients ≥65yr old post injury with any of the following should be suspected of cervical spine injury and considered for imaging with CT (discuss with senior doctor):

1. Any neck pain post injury
2. Fallen >2m and meets criteria for head CT
3. Who has new neurological deficit post injury
4. Who meets criteria for head CT and who are unable to reliably rule out neck pain due to cognitive impairment

This guidance relates specifically to trauma in the elderly (age range arbitrarily agreed as ≥65 years for the purposes of the group)

The above recommendations are to be revisited in the Regional Elderly Trauma meeting in April and if agreed they will go to NTN CAG in May 2017 for sign off.
Any comments or concerns please contact Charlotte Bates Charlotte.bates@nhct.nhs.uk
Please share these draft recommendations with your orthopaedic and radiology colleagues prior to April's meeting.

[redacted]

Appendix 1

TARN data for NTN showing cases over 65 years old with delayed CT imaging with cervical fractures in 2014 and 2015

Age	Gender	Mechanism	Time to CT (hours)	ISS
75	Male	Vehicle incident/collision	337.35	13
87.6	Female	Vehicle incident/collision	41.23	14
75.3	Male	Fall more than 2m	279.7	25
83.4	Female	Fall less than 2m	116.67	16
84.5	Male	Fall less than 2m	2221.03	25
73.3	Female	Fall more than 2m	24.25	10
69.6	Female	Fall less than 2m	137.87	4
81.3	Female	Fall less than 2m	48.8	14
87	Male	Fall less than 2m	101.62	9
81	Female	Fall more than 2m	273.12	9
66.8	Female	Fall more than 2m	138.62	4
65.4	Male	Fall more than 2m	72.8	13
82	Male	Fall less than 2m	211.48	9
68.6	Male	Vehicle incident/collision	36.77	17
75	Female	Fall less than 2m	216.75	9
78.2	Male	Fall less than 2m	88.4	5
78.1	Male	Fall more than 2m	126.9	9
76.2	Male	Fall more than 2m	42.63	8
67.6	Male	Fall less than 2m	82.93	25
72.8	Female	Vehicle incident/collision	35.35	29
86	Male	Fall less than 2m	80	4
78.8	Female	Fall more than 2m	107.6	13
86.7	Female	Fall less than 2m	36.32	18
87.3	Female	Fall less than 2m	698.38	10
88.2	Male	Fall less than 2m	50.45	13
80	Female	Fall less than 2m	498.75	12
88.1	Female	Fall more than 2m	42.28	45
76.5	Female	Fall less than 2m	139.48	18
87.2	Female	Fall less than 2m	92.52	9
91.6	Female	Fall less than 2m	33.6	9
71.8	Female	Fall less than 2m	649.13	8

[redacted]

Appendix 2: NICE recommendations

Risk factors indicating CT cervical spine scan within 1 hour

For adults who have sustained a head injury and have any of the following risk factors, perform a CT cervical spine scan within 1 hour of the risk factor being identified:

- GCS less than 13 on initial assessment. See recommendations on GCS.
- The patient has been intubated.
- Plain X-rays are technically inadequate (for example, the desired view is unavailable).
- Plain X-rays are suspicious or definitely abnormal.
- A definitive diagnosis of cervical spine injury is needed urgently (for example, before surgery).
- The patient is having other body areas scanned for head injury or multi-region trauma.
- The patient is alert and stable, there is clinical suspicion of cervical spine injury and any of the following apply:
    - age 65 years or older
    - dangerous mechanism of injury (fall from a height of greater than 1 metre or 5 stairs; axial load to the head, for example, diving; high-speed motor vehicle collision; rollover motor accident; ejection from a motor vehicle; accident involving motorised recreational vehicles; bicycle collision)
    - focal peripheral neurological deficit
    - paraesthesia in the upper or lower limbs.

A provisional written radiology report should be made available within 1 hour of the scan being performed.

Head injury: assessment and early management (2014) NICE guideline CG176

Appendix 3

Impact of New Local Guidance for Cervical Spine Imaging in Elderly Trauma

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Institution:-
Northumbria Healthcare Trust

Background:-
We were aware that older patients with cervical spine injuries were not receiving the level of timely investigation that our Trust would hope for. Consequently a Trust-wide Elderly Trauma Campaign was launched in February 2016. One element of our campaign covered the need to lower the threshold for imaging cervical spines after trauma in the elderly. Initially we suggested that we could include a CT of the cervical spine for every patient who met the criteria for a trauma head CT scan, however this was rejected by radiology. Subsequently we reviewed all missed cervical spine injuries and developed new Trust guidelines for c-spine imaging, including NICE guidance but which specified additional criteria for patients aged ≥65 years who should be deemed at high risk of cervical spine injury.

Guidelines:-
The new Trust guidance recommended CT of the cervical spine for all patients following trauma aged ≥65 years who:-

- Have any neck pain or tenderness since injury
- Have fallen from greater than standing height (>2m)
- Meet NICE criteria for trauma head CT and are cognitively impaired (delirium/dementia)

Additionally, patients aged ≥65 years presenting with injuries to more than one body area (head/neck, chest, abdo/pelvis) should be considered for whole body CT

Aims:-
We sought to assess the impact of the new guidelines and campaign on the number of cervical spine CT scans performed, fractures identified, incidental findings and delayed diagnoses.

Methods:-
Radiology searches identified all CT cervical spine scans performed during the 8 months prior to (16/06/15-15/02/16) and the 8 months following (16/02/16-15/10/16) the intervention. Outpatient scans and non-trauma scans were excluded. Each report was manually reviewed and categorised as: new (or newly unstable) fracture, incidental finding, or no significant new abnormality. Admissions data were analysed for patients with fractures to identify the first presentation to the Trust with the injury, or time of injury if the fall was sustained as an inpatient. The initial imaging modality used was also recorded.

[redacted]

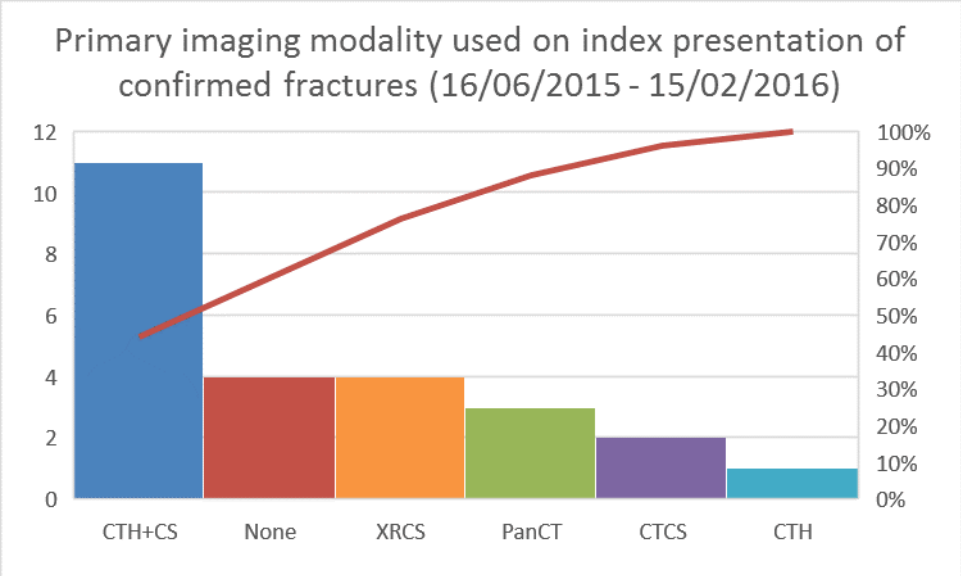
Results:-

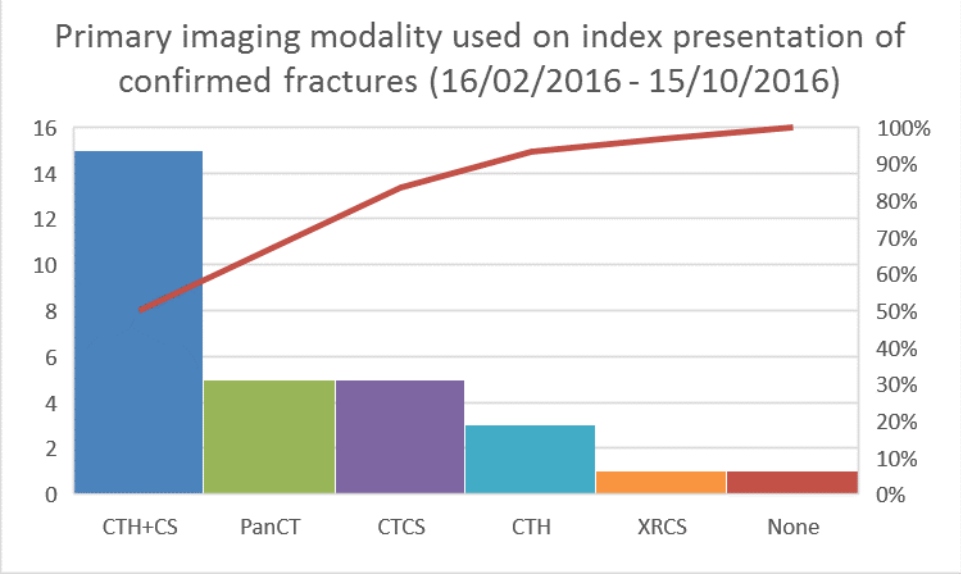
1. Table of results.

	Pre intervention	Post intervention
Number of scans	269	596
Number of fractures	25	30
Number of incidental findings	42	75

The total number of head CT scans post trauma for patients in this age range over the 8 months following the intervention was 1593. If all these patients had undergone a cervical spine CT as was first proposed this would have represented a 6 fold increase

2. Pareto charts showing difference in modality of imaging used pre and post intervention





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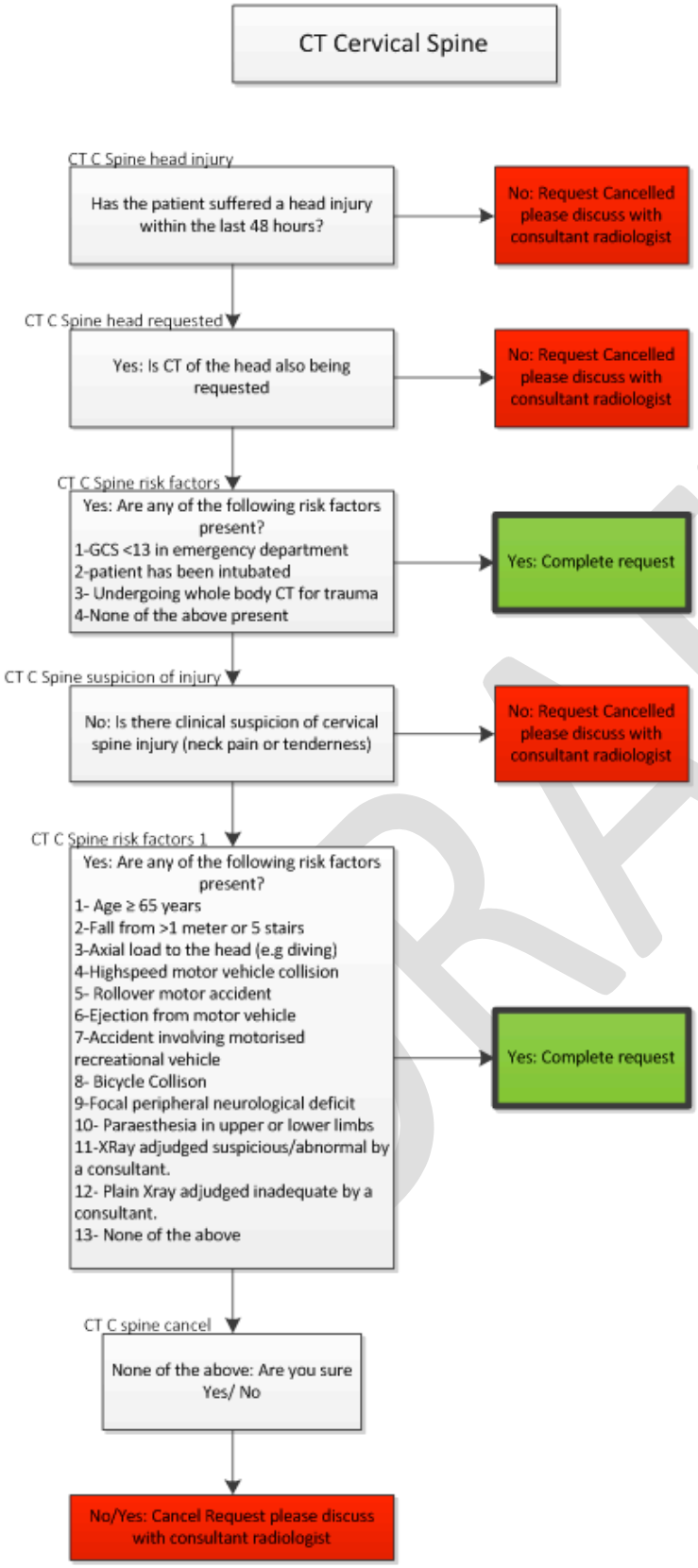
3. Table of median times pre and post intervention

	Pre Intervention	Post Intervention
Time to request	132min	48min
Time to scan	178min	105min
Time to report	234min	207min

4. There were 6 cases that had a delayed diagnosis in the 8 month period prior to the intervention and only 2 cases with a delayed diagnosis after the intervention. On review of both of these cases our new guidance was not followed on either occasion. Had our guidance been followed both of these cases would have been picked up on first presentation. One case was a patient who had complained of neck pain post fall but was unfortunately not imaged until they returned complaining of ongoing pain. The other patient was an in patient who fell on the ward, met the criteria for head CT as was anticoagulated but had been documented as having delirium prior to the fall and therefore under new guidance should have undergone cervical spine CT as well as head CT. Even including the 2 cases post intervention the increase in number of scans required to prevent one delayed diagnosis is 82.

Discussion:-
The new guidance has made an impact in terms of demands on our service with the associated cost increases; this must be balanced against the obvious improvement in patient safety and reduction of costs incurred due to delayed or missed diagnoses of these potentially unstable fractures. On balance it appears the increase in scanning required by the new guidance is entirely reasonable especially when compared to the 6 fold increase in scanning of cervical spines we would have seen if we had undertaken to scan all cervical spines of those ≥65years who met the current CT scan for a head trauma criteria.

Appendix 4



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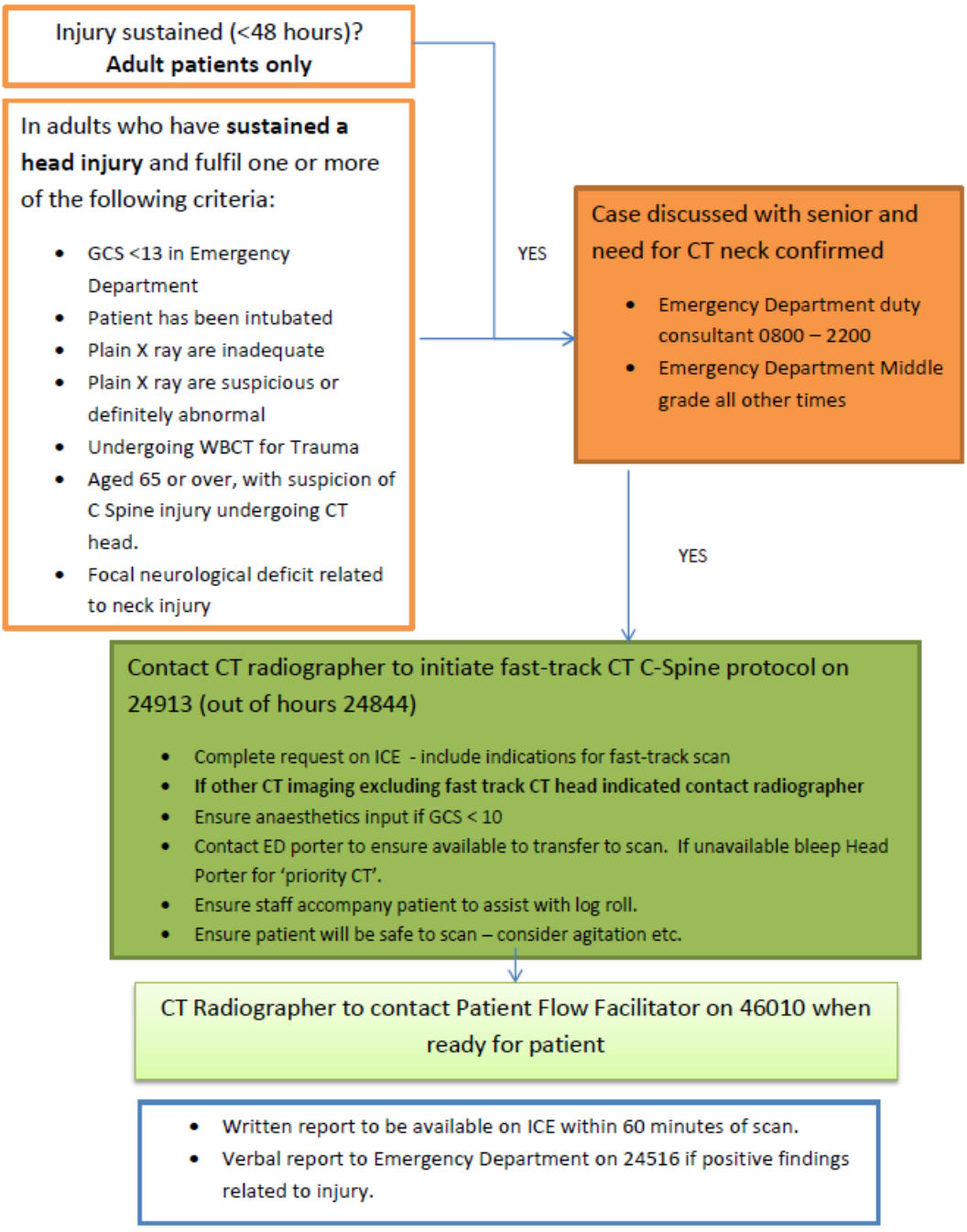
EMERGENCY DEPARTMENT

ADULT C SPINE FAST TRACK CT PATHWAY



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Appendix 5:
Pan London Elderly Trauma Guidelines suggest

"**In the emergency department.**
Where an elderly patient has clear external signs of head injury ***or*** has neck pain ***or*** has endured a fall, ***and*** if a decision has been made to CT the patient's head, this should include the cervical spine. (*See section on spinal immobilisation on page 12*.)"
"Assessment, imaging and imaging reporting should be completed as soon as possible so that patients are not held in a rigid cervical collar for longer than required after arrival at hospital (or decision to immobilise if not immobilised in pre-hospital environment).
Assessment, Imaging and Imaging report should be complete within two hours of arrival/decision to immobilise."

www.c4ts.qmul.ac.uk/downloads/plmts-management-of-elderly-trauma-09022017.pdf