Accuracy of Radiology trainee major trauma CT reports in a level 1 trauma centre

Poster No.: C-1734
Congress: ECR 2012
Type: Scientific Exhibit
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Keywords: Trauma, Audit and standards, CT, Emergency
DOI: 10.1594/ecr2012/C-1734

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Purpose

Major Trauma is a serious public health issue; it is the leading cause of death in patients under 45 years of age and a significant cause of short and long term morbidity. There is an estimated 20,000 cases of Major Trauma each year in England resulting in 5,400 deaths with many others resulting in permanent disabilities requiring long-term care (Regional Networks for Major Trauma, 2010). Worldwide, 16000 people die as a result of injury everyday (5.8 million deaths per year). This is projected to rise to 8.4 million deaths by 2020 (Lecky et al, 2010).

The care provided to a poly/major trauma patient in the first few hours can be critical. In conjunction with satisfactory initial trauma care in the emergency setting, early identification of the extent of injuries using a definitive imaging tool is pivotal. In the trauma setting Multi detector computed tomography (MDCT) of the head to pelvis is usually the technique of choice.

Radiology trainees play an important role in the provision of radiology services at our institution which is a level 1 trauma centre. They are often the first port of call for approving and reporting emergency CT scans. In providing this service, trainees assume independence and responsibility which is integral to their training.

In the context of poly trauma patients, the accurate and timely reporting of CT scans is key in the patient's immediate and subsequent management. Any major misinterpretation can adversely impact patient management. This task is made all the more challenging for Radiology trainees given the extent and complexities of injuries in this group of patients combined with the need for fast interpretation of large volumes of data on each scan.

The aim of this study was to assess the accuracy of radiology trainee’s reporting of poly trauma CT (PTC) reports in a level 1 poly trauma centre.
Methods and Materials

We retrospectively reviewed all PTCs performed during a 6 month period in 2011. The clinical requests, provisional reports by trainees and final reports by consultants were reviewed on the picture archiving and communication systems (PACS). Any discrepancies from the provisional reports were noted. Other information including scan request time and the time of issued provisional and final reports was also reviewed.

All trauma scans analysed were provisionally reported by a Radiology trainee (Year 2-6) and subsequently checked by a consultant Radiologist. The scan may be reported by either a junior (years 2-3), senior (years 4-5) or on occasions both trainees.

Our internal guidelines recommend a preliminary report within 1 hour and a consultant report within 24 hours of scanning. In the case of after hours CTs the consultant check is usually performed the following morning. An on call consultant Radiologist was always available if needed the after hours setting. Any discrepancies found by the consultant were added to the provisional report as an addendum, and major changes are immediately communicated to the clinical team.

Discrepancies were categories as having no acute significance or impacting on patient management. The latter group was further subdivided into:

a) No impact on initial management until authorised report (i.e. within 24 hours)

b) Minor impact

c) Major impact on patient management; defined as a discrepancy which may detrimentally change patients management in the first 24 hours potentially resulted in serious or life threatening complication.

Imaging was performed using a Siemens SOMATOM definition dual energy CT scanner, located within the accident and emergency department.

Statistical analysis was performed using a Chi squared test to compare error rates between junior and senior trainees.
Results

There were 315 scans provisionally reported by a trainee in the 6 month period studied.

The average age of the patients was 39yrs (median = 35). 12% (39) patients were under 18. The youngest patient scanned was 5 months of age.

The average time taken for scan to be performed, from the request time, was 33 minutes (median =23). The average time from the scan to the provisional report being issued was 72 minutes (median = 62).

213 (67%) of the provisional reports were generated within 1 hour of the scan being completed.

The commonest mechanisms of injury are demonstrated in fig 1 with Road traffic accidents (RTAs) 151 (48%), falls 96 (30%) and penetrating injuries 17 (5%) representing the largest groups.

Of the 208 scans performed the distribution of body parts scanned are demonstrated in fig 2 with Head, cervical spine, thorax, abdomen 208 (66%) and Head and cervical spine 57 (18%) representing the largest groups.

66% (207) of scans had acute findings. 34% (108) had no identifiable injuries on CT.

Discrepancies between provision radiology trainee and consultant reports:

- 149 (47%) PTCs were provisionally reported by Junior trainees. 110 (35%) were provisionally reported by senior trainees and the remaining 56 (18%) were jointly reported by the junior and senior trainee.
- 88 (28%) of the provisional reports were amended.
  - 36 were of no acute significance
  - 52 impacted patient management.
    - 39 no initial impact on patient management
    - 10 minor impact
    - 3 major impact

Sub analysis of cases with discrepancies:
• Scans reported by juniors were compared against those reported by seniors or juniors and seniors together) to assess whether seniority affected error rates.

• 48 scans (32%) reported by juniors were amended, compared to 40 (24%) of those reported by seniors. See fig 3. The observed difference did not reach statistical significance however (P=0.11).

| Chi squared contingency table (Junior vs. Senior trainee discrepancies) |
|---------------------------------------------------------------|-----------------|-----------------|
| Reports with discrepancies                                   | Junior trainee  | Senior trainee  |
| 48                                                             | 40              |
| Reports with no discrepancies                                 | 101             | 126             |
| Number of reports (as a percentage of total reports)          | 149 (47%)       | 166 (53%)       |
| Chi square=2.57, Degree of freedom =1, P=0.11                 |

• Similarly the proportion of scans with discrepancies that would impact patients' management were smaller in the senior group 20 (12%) Vs. 32 (21%) in the junior group. Furthermore all three cases of reports containing major discrepancies were by junior trainees.

<table>
<thead>
<tr>
<th>Junior trainees</th>
<th>Seniors trainees</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of total PTCs reported</td>
<td>149</td>
</tr>
<tr>
<td>No of PTCs with discrepancies</td>
<td>48</td>
</tr>
<tr>
<td>Proportion of total scans containing discrepancies</td>
<td>32%</td>
</tr>
<tr>
<td>Significance of discrepancy:</td>
<td>No acute significance: 16 (11%)</td>
</tr>
<tr>
<td></td>
<td>Impact on management: 32 (21%)</td>
</tr>
<tr>
<td>Severity of discrepancies impacting management:</td>
<td>No immediate impact: 25 (17%)</td>
</tr>
<tr>
<td></td>
<td>Minor impact:4 (3%)</td>
</tr>
<tr>
<td></td>
<td>Major impact:3 (2%)</td>
</tr>
</tbody>
</table>
Interpretation of poly trauma scans poses particular challenges. These studies tend to involve many parts of the body with large volumes of images to analyse, and are often complicated by a combination of extensive injuries, the need for rapid construction of reports and most importantly perhaps, the potential implications of interpretation errors in terms of management.

These challenges are highlighted in a prospective study by Agostini, et al (2008) who analysed 105 double-reports of trauma scans by two senior Radiologists and found 75 (71%) cases with missed findings on the initial interpretation of the examination, 31 (11%) of which were considered to be severe misses.

In our study, we found a significantly smaller discrepancy rate of 28% with only 3 cases (1%) of major discrepancy. This discrepancy rate is similar to that reported by (Briggs et al, 2010) who found a discrepancy rate of 28% between provisional trainee reports and final consultant reports among 130 cases.

Carney et al (2003) reported a lower discrepancy rate of 6% (1% major discrepancy) between preliminary trainee and final consultant reports among 513 CT scans. However, their sample included all CT examinations and was not limited to poly trauma scans.

We found a higher proportion of discrepancies in reports generated by senior trainees compared to junior trainees, which was not statistically significant. Similarly, Briggs et al (2010) did not find a statistically significant association between seniority of reporting trainee and likelihood of a miss.

We found 88 cases (28%) of discrepancies, the incidence of major errors was low (1%). These figures are comparable or more favourable than the current literature to the best of our knowledge. The study by Agostini et al (2008) shows a high discrepancy rate in reporting of poly trauma scans, even when both reports are generated by senior radiologists, hence highlighting the inherent difficulties in reporting of trauma scans. Given the very small number of major misses in our study; it is reasonable to conclude that radiology trainee reporting of PTC scans, without immediate consultant supervision in the on call setting has a low major discrepancy rate (1%) and is safe.
Fig. 1

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Fig. 2

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Conclusion

The incidence of major errors of poly trauma CT reports generated by Radiology trainees was low at 1% and minor discrepancies 28% (which is comparable to current literature). We conclude that Radiology trainee reporting of poly trauma CT, including in after hours settings, has a low major discrepancy rate and therefore safe and acceptable for a level 1 trauma centre.
References


http://www.dh.gov.uk/en/Publicationsandstatistics/Lettersandcirculars/Dearcolleagueletters/DH_120048
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