Acute Abdomen In The Emergency Department: Is CT A Time Limiting Factor?

David Chenhan Wang; Craig R. Parry; Michael Feldman; George Tomlinson; Josée Sarrazin; Phyllis Glanc

David Chenhan Wang
MS-III, Faculty of Medicine
University of Toronto
davidc.wang@mail.utoronto.ca
Disclosures

- None to disclose
ED overcrowding is a well-recognized issue in Canada.\(^1\)

**Objective**

To quantify and integrate key emergency department (ED) and radiology department workflow time intervals within the ED length-of-stay (LOS) for patients presenting with an acute abdomen requiring a computed tomography (CT) scan.

Limited research on the specific time intervals associated with image acquisition.

---

1. Murphy et al. BMJ. 2011;342:d2983
Methods

- An 11-month (December 2009 – Nov 2010) retrospective review of all Emergency Department cases

**Inclusion Criteria:**
- Adult patients with acute abdomen that required urgent CT Abdomen & Pelvis

**Exclusion Criteria:**
- Trauma Protocol
- Direct Ward Admissions
- Repeat CT study within same visit
Methods

1. ED Length of Stay (LOS)
2. Radiology Turnaround Time (TAT)

## Summary of ED Abdominal CT Studies

<table>
<thead>
<tr>
<th>Patient Demographics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total CT AP Performed</td>
<td>2292</td>
</tr>
<tr>
<td>Exclusions</td>
<td>98</td>
</tr>
<tr>
<td>Mean age</td>
<td>60.1 years (SD=18.9 years)</td>
</tr>
<tr>
<td>Male : Female</td>
<td>47:53</td>
</tr>
<tr>
<td>Disposition</td>
<td>49.4% Inpatient 50.6% Discharged</td>
</tr>
</tbody>
</table>
Results

- Median ED LOS was 9.2 hours (90\textsuperscript{th} percentile: 15.7 hours)

- Intervals associated with CT workflow (CT Request to 1\textsuperscript{st} CT Report) accounted for 29\% (2.67 hours) of the total ED LOS
  - Radiology Report TAT 9\% of LOS (0.87 hours)

- 3 three unique patterns of ED disposition
  - Disposition after initial imaging report
  - Disposition prior to report
  - Disposition prior to CT scan
# Results

<table>
<thead>
<tr>
<th>Time Interval</th>
<th>N</th>
<th>Median (hours)</th>
<th>% of LOS</th>
<th>90th %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triage to MD assess</td>
<td>2194</td>
<td>2.15</td>
<td>23.3</td>
<td>5.34</td>
</tr>
<tr>
<td>MD Assess to CT request</td>
<td>2133</td>
<td>1.37</td>
<td>14.9</td>
<td>4.57</td>
</tr>
<tr>
<td>First report to disposition decision</td>
<td>1903</td>
<td>2.05</td>
<td>22.2</td>
<td>6.41</td>
</tr>
<tr>
<td>ED LOS</td>
<td>2194</td>
<td>9.22</td>
<td>n/a</td>
<td>15.7</td>
</tr>
<tr>
<td>Triage to physical discharge</td>
<td>2194</td>
<td>10.9</td>
<td>n/a</td>
<td>24.9</td>
</tr>
</tbody>
</table>

**Table 1 – ED LOS Time Intervals**
### Table 2 – CT Acquisition Time Intervals

<table>
<thead>
<tr>
<th>Time Interval</th>
<th>N=</th>
<th>Median (hours)</th>
<th>% of median ED LOS</th>
<th>90th percentile (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT Request to CT start</td>
<td>2180</td>
<td>1.55</td>
<td>16.8</td>
<td>3.57</td>
</tr>
<tr>
<td>CT Request to Porter Schedule</td>
<td>2189</td>
<td>0.38</td>
<td>4.1</td>
<td>1.92</td>
</tr>
<tr>
<td>Porter Schedule to CT Start</td>
<td>1444</td>
<td>0.5</td>
<td>5.4</td>
<td>2.45</td>
</tr>
<tr>
<td>CT Start to CT Complete</td>
<td>1439</td>
<td>0.25</td>
<td>2.7</td>
<td>0.52</td>
</tr>
<tr>
<td>CT Complete to first</td>
<td>2193</td>
<td>0.87</td>
<td>9.4</td>
<td>2.43</td>
</tr>
</tbody>
</table>
Results – Pattern 1

N(%) = 1818 (83%)
Results – Pattern 2

N(%) = 154 (7%)
Results – Pattern 3

N(%) = 124 (6%)
Radiology TAT to first report was under 1 hour (9% of total LOS)

Overall mean LOS higher than current guidelines
- Level I Trauma Centre
- Higher acuity cohort?¹

Largest time intervals associated were non-radiology related
- Triage to CT request account for approx. 40% of total ED LOS²

² Rathlev et al.
Discussion

- Total imaging acquisition time interval account for approx. 29% of ED LOS (2.67 hours)

- Non-identical patterns of disposition for patients = over/under-estimation of contribution of radiology?
  - Pattern 2: Wet-reads?¹
  - Pattern 3: Diagnosis was made without imaging

Discussion

- Single institution study (trauma centre)
- Retrospective study design
  - Outlier data
- Our study serves as a baseline study for future reporting of image acquisition time intervals as well as for future QI initiatives at SBHC
Radiology report TAT for CT was not the limiting step in ED LOS

Patients do not have identical ED transit pathways and this may under- or over-estimate the relative contributions of image acquisition workflow timeline

Demonstrates importance of site-specific time-line interval analysis for QI monitoring and interventions

Image acquisition process is a potential area for quality improvement (QI) initiatives
Acknowledgements & Funding Organizations

- Dr. Phyllis Glanc – Supervision and guidance
- Funding: Department of Medical Imaging @ University of Toronto
- Dr. Michael Schull- SHSC Department of Emergency Medicine
- Andrew Volkening – PACS Administrator – Department of Medical Imaging, Sunnybrook Health Sciences Centre

Thank you for your...
To quantify and integrate key emergency department (ED) and radiology department workflow time intervals within the ED length-of-stay (LOS) for patients presenting with an acute abdomen requiring a computed tomography (CT) scan.