Emergency Radiology workflow analysis during a simulated MCI in a level 1 trauma centre

SB O’Neill, F Walstra, S Qamar, J Powell, N Murray, S Barrett, T Martin, A Ho, S Nicolaou, L Louis

Department of Emergency & Trauma Radiology, Vancouver General Hospital, University of British Columbia
Mass Casualty Incidents

- Large number of casualties, short time period
- Exceeds normal capacities
- Paradigm shift to the greatest good for the greatest number of patients

Roles of Radiology

- **Image** critically injured patients for immediate medical/surgical intervention
- **Communicate** relevant findings in a fast, appropriate and accurate manner
Quality Improvement

**Aim Statement**

We have no idea how good or effective our current response is in an MCI setting and this is crucial for service planning!

**Problem Statement**

To determine our baseline response in an MCI and iteratively improve this over 18 months, led by Emergency Radiology.
Plan:

- Simulate an MCI scenario and examine workflow.
- Act as a road test for team, workflow, CT protocol and network.
- Help estimate maximum capacity and establish where delays happen.
Do:

- 6 ‘patients’ requiring whole body CT in rapid succession
- Volunteer used for transfer to/from CT, spinal lifts, scan positioning/set-up with phantom substituted for scan acquisition.
- Scan acquired as per routine trauma WBCT, images reformatted and sent to PACS.
- Time for each step in process documented.
- Post-exercise debrief for team.
Study:

PDSA

CT Door to door

CT Door

Initial images Workstation PACS

Initial images PACS

End of Scan

Off Table

CT Door

On Table

Scan Initiation

7.65 min

50 sec

8.45 min

18 sec

163.4 min (range 43-205)

8.5 min

4 min

12.8 min

30 sec

54 sec

5.92 min
PDSA

Act:

Happy with our maximum capacity (6/hr) – in line with literature – no further action

Not happy with network delays – something we had previously suspected but not quantified.

Dataset ➔ driving force behind institutional network upgrades.

greater ➔ new dedicated server for Emergency CT

greater ➔ backend software improvements

greater ➔ network hardware installation in progress

greater ➔ frontend software improvements Jan 2020,
**P:** same exercise (6 ‘patients’), all undergo WBCT

**A:** plan to repeat exercise following completion of network upgrades (early 2020)

**S:** no real improvement in times following server and back end upgrades

**D:** as before but collect data on image transfer times only

**2nd cycle**

**PLAN**
- Define the objective, questions and predictions. Plan data collection to answer questions.

**DO**
- Carry out the plan. Collect data and begin analysis of the data.
- Complete the analysis of the data. Compare data to predictions. Summarize what was learned.

**ACT**
- Plan the next cycle. Decide whether the change can be implemented.
**P:** same exercise, 2 ‘patients’ underwent pared back WBCT* without reformats

**S:** faster transfer for ‘disaster WBCT protocol’

**A:** Research study in progress to validate and optimise ‘disaster protocol’

**D:** as before but collect data on image transfer times only

*‘disaster protocol’, approx. 2200 images v 25000
Conclusions

- Even in Level 1 trauma centre with established Emergency Radiology service and proven algorithms for polytrauma imaging, there is potential for optimisation of workflows.

- Simulations allow for team familiarity with the MCI algorithm, streamlining of processes and workflows.

- In this case demonstration of previously unrecognised stumbling blocks to efficiency that may have remained occult without this real-time practice.