Compliance with National Guidelines for Stroke in Radiology

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Stroke

- Stroke is a medical emergency, often referred to as a ‘Brain Attack’
- There are approximately 152,000 strokes in the UK every year.....
  ......that’s more than one every 5 minutes
- One in five strokes are fatal
The Problem

- Revised clinical guidelines for stroke released by the Royal College of Physicians in December 2012

- 50% reduction in the maximum time frame from symptom onset of stroke to delivery and report of a CT head scan to 12 hours

- 4.5 hour time window for administration of thrombolysis treatment

- How can the Royal Gwent Hospital comply with this re-alignment of standards?
CT Scanning at RGH

- 2 CT Scanners
- Mix of scheduled and unscheduled patients
- Scheduled CT scans - outpatients
- Unscheduled CT scans - A&E patients and inpatients
  - Stroke patients
    - Thrombolysis
    - Routine stroke
CT Scanning at RGH

- Normal working hours – 8am-6pm (Monday – Friday)

- Out of hours service
  - On-call radiographer
  - A&E radiography team

- Reporting CT scans
  - Produce a diagnosis
  - Consultant radiologists at the RGH and other sites occupied by ABUHB
Choice of Methodology

- **Familiarisation with the system**
  - Observation within the CT unit
  - Staff shadowing
  - Discussion with radiography staff

- **Patient individuality**
- **Specific quantitative output**
- **‘What if..?’ scenario analysis**

...Discrete Event Simulation
Data Collection Methods

- RadIS II data set
  - Historical CT activity at RGH over 2 years (June 2011 – May 2013)

- Symphony data set
  - Related A&E activity (June 2011 – May 2013)

- Manually recorded data
  - Procedure times on CT scanner

- Radiologist questionnaire
Data Analysis - CT Requests

Unscheduled CT Requests

- A&E Thrombolysis
- A&E Routine Stroke
- A&E Immediate
- A&E Today
- Inpatient Thrombolysis
- Inpatient Routine Stroke
- Inpatient Immediate
- Inpatient Today
- Inpatient Tomorrow

Proportion
Data Analysis - Time Dependency

- Month of Year
- Day of Week
- Hour of Day

- Non-parametric Wilcoxon and Kruskal Wallis testing
- CART Analysis
Simulation Model
## Preliminary Results

### A&E Thrombolysis

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### Inpatient Routine Stroke

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### Guideline Measure

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<td>Thrombolysis Treatment</td>
<td>85.87%</td>
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<td>24 Hour Routine Stroke</td>
<td>90.70%</td>
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What If 1 - CT Scanning Rules

- **Scenario 1**
  - All routine stroke patients are seen for a CT head scan on the day of request

- **Scenario 2**
  - Routine stroke patients are prioritised ahead of other non-urgent, unscheduled patients
What If 1 - Initial Results

- Significantly reduced overall time in the system under each scenario
- 6 hour 18 minute reduction in overall time in the system estimated under scenario 1
- 97.95% compliance with 12 hour guidelines under scenario 2
What If 1 - Further Results

- No significant impact upon waiting time for a urgent or pre-scheduled CT scan
- No increased task demand out of hours services
What If 2 - Increased CT Capacity

- **Scenario 1**
  - Third CT scanner located in the CT unit
  - Same scanning rules as the current two machines

- **Scenario 2**
  - CT scanner located in A&E
  - Administer CT scans to A&E patients only
What If 2 - Initial Results

 Scenario 1 - Additional scanner in CT Unit
   - 22% improvement in compliance with 12 hour stroke guidelines
   - Reduced demand for out of hours services by an average of 3 patients per week

 Scenario 2 - CT scanner in A&E
   - 13.5% improvement in compliance with 12 hour stroke guidelines
   - Significant benefits for stroke patients predicted if time in A&E prior to CT request could be reduced
What If 3 - Reporting CT Scans

- Routine stroke reports marked as urgent
  - Significant reduction of 21 minutes in estimated average time in the system
  - Predicted decrease in maximum expected throughput time by over 5 hours
  - Effect on other aspects of radiologist work?

- Reduction in time delay between CT scan delivery and report finalisation
  - Current conditions
  - Revised priority rules for CT scanning
What If 3 - Reporting CT Scans

4x greater benefit for routine stroke patients under revised priority conditions
Further Analysis

- Extended Hours
  - Comparison of 6am – 6pm and 8am – 8pm CT scanning
  - Greatest benefit with 8am – 8pm service
  - 21 additional outpatient appointments
**Conclusions**

- Significant increase in compliance with revised guidelines under an initial modification to CT scanning protocols for routine stroke.
- Further benefits from a revision of priority rules.
- Efforts in reducing time to report has greatest benefit under an initial revision of CT scanning priority rules.
- Extended hours between 6pm and 8pm.
Further Research

- Cost-efficiency analysis
- Workforce skill-mix
- CT scanner located in the SCCC
- Outpatient schedule of appointments
- Queueing theory approach
Thank you for listening

Any Questions?

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