Streamlined Pancreatic Cyst Evaluation on MRI Abbreviated Protocol (SPaCEMAP) - Reducing waiting times in a General Hospital setting

A Quality Improvement Project

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Background

• In general, waiting times for outpatient MRI appointments are too long.
• Ever increasing demand for more imaging studies, due partly to:
  – Increasing age of patient population requiring both acute and chronic investigations.
  – Further advances in technology with new novel techniques – more can be done now.
• MRI studies to follow up a pancreatic cyst are time-consuming and expensive.
  – Increased time in the scanner increases cost of scan.
• Reducing time to scan a follow-up pancreatic cyst will save cost to the patient, and also allow the institution to scan more patients.
Project Analysis

• Mission statement – Achieve a 50% reduction in scan acquisition time of an outpatient MRI scan over a course of 6 months for a patient attending for follow-up of a known pancreatic cystic lesion.

• Baseline data of MRI scans done for PC follow up was collected.

• Possible reasons for long waiting times for MRI studies explored.

Project Analysis

• Preliminary interviews with body imaging Radiologists who routinely report such MRI scans indicate that not all scan sequences are helpful for diagnosis.

• Evidence that contrast-enhanced sequences are unnecessary and a short protocol suffices\(^1\), \(^2\).

• Retrospective study to test feasibility of implementing a short protocol study in our local institution.

• Study performed on 30 consecutive patients who presented for PC follow up between January 2015 and July 2017.

PDSA Testing

• 1st PDSA cycle aimed to streamline and determine a suitable abbreviated MRI protocol.
• All MRI examinations were performed on a Siemens MAGNETOM Aera (1.5 Tesla) machine.
• Three body radiologists (RP, CT, SC) each with 6 to 9 years experience independently read and interpreted the 30 cases.
• First, they reviewed the initial (baseline) MRI study.
• Next, they reviewed only selected sequences on the follow-up MRI, which we proposed as the Short Protocol.
• Scoring made as to how confident they felt interpreting the study with only these sequences (axial and coronal T2w, axial T1w).
• They were then allowed to review other sequences individually (post-contrast axial T1w, 3D MRCP, axial T1w in/out), and if these added value to interpreting the study.
• Results collated via a using a self-administered survey form.

Results

<table>
<thead>
<tr>
<th>Responses</th>
<th>Ave. Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using only “short protocol” (axial and coronal T2w, axial T1w), was it sufficient to assess interval change?</td>
<td>7.92</td>
</tr>
<tr>
<td>How confident do you feel about verifying the scan based on a full study</td>
<td>7.95</td>
</tr>
<tr>
<td>How confident do you feel about verifying the scan based on the short protocol sequences only?</td>
<td>7.67</td>
</tr>
</tbody>
</table>

• Using the FP, radiologists rated their confidence in verifying the scan at a mean score of 7.95 out of 9, while their diagnostic confidence averaged 7.67 on the short protocol (SP).
  – No statistically significant difference (t-test p=0.01).
• Radiologists deemed that the SP is sufficient in assessment for interval change.
Results

Does this sequence add value?  Yes (%) No (%)
Post-contrast T1W 10.3 89.7
MRCP 17.3 82.7
T1W in/out 0.04 96.6

- The radiologists perceived that in 89.7% of cases the post-contrast T1w did not add value, compared with 82.7% for volumetric T2w MRCP sequence and 96.6% for T1w in-and-out of phase sequences.
- No additional finding was detected in the omitted sequences that could not be detected in the SP.

PDSA Testing

- Sequences in shortened protocol currently accepted in use after group discussion by all the Body Imaging Radiologists.

<table>
<thead>
<tr>
<th>Sequences</th>
<th>Slices</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axial T1 In Out Phase</td>
<td>38</td>
<td>1:12</td>
</tr>
<tr>
<td>Coronal T2 Haste</td>
<td>30</td>
<td>1:05</td>
</tr>
<tr>
<td>Axial T2 Haste</td>
<td>38</td>
<td>1:13</td>
</tr>
<tr>
<td>Axial T1 (VIBE)</td>
<td>72</td>
<td>0:15</td>
</tr>
<tr>
<td>Coronal Space3D</td>
<td>72</td>
<td>4:18</td>
</tr>
<tr>
<td>Coronal thick slabs (done if 3D not optimal)</td>
<td>8</td>
<td>0:50</td>
</tr>
</tbody>
</table>

- Omitted sequences thus far are axial T2w fat-saturated, DWI/ADC, post-contrast 4 phase dynamic Vibe.
- Reduced acquisition time of 9 min 19 seconds from 17 min 22 seconds (53.6%).
- Based on total time each sequence takes.
  - Does not account for external issues such as mobilizing patient onto bed, or if a sequence needs redoing due to artefact.
**Discussion**

- Our Quality Improvement project successfully achieved a 50% reduction in scan acquisition time of an outpatient MRI scan over a course of 6 months for a patient attending for follow-up of a known pancreatic cystic lesion.
- No statistically difference in the diagnostic confidence of radiologists.
- No additional finding was detected in the full protocol study that was not discerned on the short protocol.
- Calculated potential cost savings may be up to SGD$372 (USD$270.79) per study, due to the shorter scan time and omission of contrast agent.
- Removed need for intravenously administered Gadolinium contrast agent
  - Potential safety concerns about Gadolinium deposition.

**Next Step**

- 2\textsuperscript{nd} PDSA cycle: to remove T1w in-and-out sequence and 3D MRCP as results find these sequences not useful.
  - Potentially reduce another 5:30 min in scan time.