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

A Quality Improvement Project

Gideon Ooi, Colin Tan, SC Cheong, Ram Pratab Jeyaratnam, Muhamat nor FE, Maaz Mohammad Salah, Jeffrey Fong

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.

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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.

1. Is Gadolinium Necessary for MRI Follow-Up Evaluation of Cystic Lesions in the Pancreas? Preliminary Results. Michael Macari et al. American Journal of Roentgenology 2009 192:1, 159-164
2. Pancreatic MRI for the surveillance of cystic neoplasms: comparison of a short with a comprehensive imaging protocol. Pozzi-Mucelli RM et al. Eur Radiol. 2017 Jan;27(1):41-50

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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.

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Results

Responses	Ave. Score
Using only "short protocol" (axial and coronal T2w, axial T1w), was it sufficient to assess interval change?	7.92
How confident do you feel about verifying the scan based on a full study	7.95
How confident do you feel about verifying the scan based on the short protocol sequences only?	7.67

- 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.

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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.

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PDSA Testing

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

Sequences	Slices	Timing
Axial T1 In Out Phase	38	1:12
Coronal T2 Haste	30	1:05
Axial T2 Haste	38	1:13
Axial T1 (VIBE)	72	0:15
Coronal Space3D	72	4:18
Coronal thick slabs (done if 3D not optimal)	8	0:50
Total scan duration		**8:03 (to 8:53)**

- 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.

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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.

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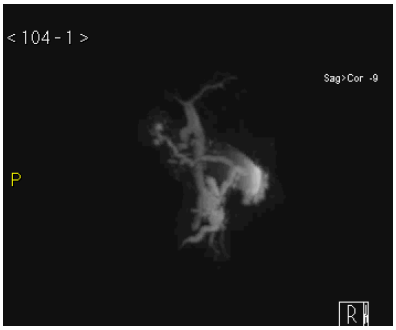
Next Step

- 2nd 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.



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