AIM STATEMENT
100% of urgent/abnormal microbiology results for KGH ED patients, will be flagged and readily accessible to KGH ED Physicians (either on the electronic record or as a centrally located hardcopy) within 4 months of the start of this project. (October 30, 2018 – February 28, 2019)

BACKGROUND
Medical care by Emergency Physicians can be asynchronous, such that the physician who orders investigations may not be the same physician who is on duty to interpret the results. The implications of microbiology and diagnostic imaging (DI) results falling through these predictability gaps is serious. ED Physicians are at risk due to high degrees of ambiguity, partial information availability and asynchronous coverage. The follow up system was haphazard and paper based.

BASELINE DATA
October 2018 Recognition of the Quality Gap and Barriers
• Paper based system, difficult to quantify.
• System relied upon vigilance and written notes
• Physicians concerned about sporadic follow up, quality and risks.
• We estimate dozens of positive microbiology labs with delayed or no follow up.
• Flagged x-ray results (2-6 per day) were not necessarily getting picked up or receiving next day follow up.

CHANGE IDEAS TESTED
PDSA SET 1 - Revised Paper Process:
✓ Daily Physician Review Process - 2 ED physicians
✓ Review all positive microbiology results (+ paper)
✓ Follow-up x-rays performed after hours/flaged by the radiologists as requiring follow-up.

RESULTS
✓ Major improvement in MD follow-up
✓ Difficult to measure paper based system
✓ Still relied upon unit clerk to move paper
✓ Burning platform for technological change

PDSA SET 2 - IMIT Iterative Interventions:
• Significant IMIT synergies became apparent:
  ED Call back in Meditech
  Physician usability testing of Meditech functionality
  Enabled electronic follow-up (auditable process)

PharmaNet Integration
• Medication list in NOW visible to KGH ED Physicians

PDSA SET 3 – Incorporate Radiology Reports (Jan 2020):
• Flagged radiology results that require follow up are integrated into the call back system.
• Collaboration with respirology department for streamlined referrals for incidental lung nodules requiring follow up.
• Subtle MSK x-ray findings are flagged by radiologists which triggers a call back, ensuring next-day follow up by an ED physician.

ED CALL BACK (Meditech)
Follow-Up within the EMR (Electronic Medical Record)
Physician Uptake:
✓ Peer to Peer (Supported by IMIT)
✓ Video tutorial for colleagues – Feb 14 Dr Reid
✓ In person tutorial for KGH ED Doctors – Feb 20 Dr Reid
✓ Feedback on usability / update data

Subject/Summary Call
Auto-generated call for the following results:
  - Organism present: Trichomonas Antigen Rapid
  - 25 Apr 2019 22:48 PCT: The following MIC procedure has triggered this follow-up call. Please see EMR for result details:
  - Organism present: Trichomonas Antigen Rapid

Data from 2019 Mar 04 to 2020 Apr 29

Call List
<table>
<thead>
<tr>
<th>Call List</th>
<th>ED Micro Result Follow Up</th>
<th>ED Micro Result Follow Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Action</td>
<td>Action</td>
</tr>
<tr>
<td></td>
<td>No Call Needed/On Antibiotic</td>
<td>No Call Needed/On Antibiotic</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Scheduled Date/Time</td>
<td>Scheduled Date/Time</td>
</tr>
<tr>
<td></td>
<td>Actual Date/Time</td>
<td>Actual Date/Time</td>
</tr>
<tr>
<td></td>
<td>Rescheduled Date/Time</td>
<td>Rescheduled Date/Time</td>
</tr>
</tbody>
</table>

Call List Summary
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Data After 2 Months
KGH ED physician response to abnormal results are now in the auditable electronic patient record.

KGH ED PHYSICIAN FOLLOW UP PERFORMANCE:
91% - Closed within one day of opening.
5.6% - Calls reopened for editing
75% (25/33) – Physicians with access have followed up on calls
62% (410/666) – OF ED Call back activity was in the KGH ED Streaming area

MEASURES:
Balancing: Physician work time (reduced), Unit Clerk Workload (reduced)
Process: Improved reliability of new ED Call back process
Outcome: Improved degree/timing of microbiology follow-up

FUTURE - Potentially use ED Callback to:
✓ Enable pulmonary DI follow-up
✓ Cellulitis (return to ED for antibiotics) follow-up
✓ Spread to other Interior Health Emergency Departments using physician peer to peer “SuperUser” (+ IMIT support). Nine (9) other IH ED sites currently have Meditech EDM module

RESULTS: HIGHER QUALITY / LOWER COST / EASIER

<table>
<thead>
<tr>
<th>KGH EMERGENCY DEPARTMENT</th>
<th>A: PAPER Chow (4000 reports/yr)</th>
<th>B: ELECTRONIC (4000 reports/yr)</th>
<th>Benefits (A-B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician follow up time / cost per patient</td>
<td>15 Minutes Pt, $147,600/yr MD Follow up</td>
<td>8 Minutes Pt, $75,720/yr MD Follow up</td>
<td>EFFICIENCY 70% savings/yr</td>
</tr>
<tr>
<td>Unit clerk time saved</td>
<td>$4,500/yr Clerk time saved/yr</td>
<td>$6,800/yr Physician time saved/yr</td>
<td>WASTE REDUCTION $203,200 physician time saved/yr</td>
</tr>
<tr>
<td>Effectiveness / Reliability / Completion</td>
<td>53% Estimated</td>
<td>91% within 24 hrs (rare)</td>
<td>EFFECTIVENESS: 71% improved</td>
</tr>
<tr>
<td>System Usability / Utility</td>
<td>POOR</td>
<td>72% Usability</td>
<td></td>
</tr>
<tr>
<td>Wanted Physician Time (duplication) / GP follow up</td>
<td>14 hrs/week estimated</td>
<td>Less waste</td>
<td></td>
</tr>
<tr>
<td>Reduced KGH ED Workload</td>
<td>20% of reports were for admitted pts</td>
<td>No way to know follow up occurred elsewhere</td>
<td></td>
</tr>
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</table>

RETURN ON INVESTMENT = 3.73 x

BENEFITS: $183,008/yr.
Efficiency ($68,880 + $4928) + Reduced waste ($109,200)
COST OF IMPROVEMENT (One time cost) $38,695 = KGH ED PQI Project/Support
ECONOMIC IMPACT = $144,313 in 2018/9 = Benefit-Cost = $183,008/yr. – Cost $38,695
RETURN ON INVESTMENT = 3.73 x (Benefit-Cost)/Costs = ($38,695)/$38,695

SPREAD ROI Estimated: To IH Emergency Departments with Meditech EDM Module Access (9)
• ESTIMATED COST TO SPREAD = ~ $13,000 (total includes physician “SuperUser” time)
• ESTIMATED BENEFITS/COST SAVINGS FROM SPREAD = $724,409/yr.
• ESTIMATED 5-YEAR IMPACT = > $3.5 Million

TEAM INVOLVED
Dr. James Reid – Dept. Head Emergency Medicine KGH
Project Participants:
• Dr. Amanda Wilmer - Medical Microbiology
• Hope Byrne, PPL, KGH Lab
• Joyce Hebert, PCC, KGH Lab
• Trevor Zacharius
• Dr. Mike Partrick (radiologist)
• Dr. Julio Dommini
• Todd Kinnee, Daniel Atkinson, Diane Jones, Kelsey Garner (IMIT Physician Systems / Lab Systems)
• Wrae Hill, PQI Consultant

LEARNING OUTCOMES
• Take the necessary time to thoroughly understand current workflow, keeping an eye on failure points and opportunities
• Gather a team of experts to look for solutions together from a Clinical, IMIT and Human Factors Usability lens. (Test / Test / Test)
• Develop the physician’s “SuperUser” skills in mentoring colleagues to adapt/adopt the new system. Physician provides meaningful feedback by using short videos and data on team performance
• Had fun creating a new way of working with IMIT & Physicians

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