Hello everyone and welcome! We really appreciate your continued interest in this collaborative and look forward to getting started. First we will start with a few housekeeping reminders:

1) To reduce the likelihood of feedback during the call, we’ve muted everyone.
2) Please use the chat function to ask questions. We have time at the end of the presentations to respond to any questions submitted during the webinar, and, we’ll open to a Q&A format at the end
3) The webinar is being recorded. We will post it later and provide a link so you can review or share with any member of your team unable to be on the call. Please frame any questions with the understanding it will be part of the recording.
Meeting Agenda

- Welcome- Fisher
- Project Background- Lally
- Methods- Chaudhury
- Findings- Hu
- Product Review- Fisher
- Next Steps- Raval
- Q&A

Here is our agenda for today.

1) Welcome
   1) Introduce new PSQC member hospitals since our last meeting in October 2020

2) Project background-why we chose to tackle this
   1) Ionizing radiation stewardship is important in the pediatric population
   2) CT use is binary-you either got one or you didn’t
   3) Literature is clear on the risk
   4) Imaging modality is within the hospital’s span of control

3) Methods-how we made our assessment
   1) Conduct qualitative interviews with select group of high performers and all low performers on July 2020 Appy CT report
   2) Interview guide is based on Theoretical Domains Framework
   3) Want to find practice differences between high and low

4) Findings
   1) Success in reducing CT use variable
   2) Key factors necessary to achieve change
5) Product review
   1) Used key findings from interviews to create an implementation guide
   2) Guide includes:
      1) Introduction to project
      2) How to
      3) Aim statement
      4) Quality Measures
      5) Intervention strategies
      6) Appendices
      7) Tools

6) Next steps
   1) Peer coach roster
   2) Tiered structure of support available to any site wanting to participate in this QI project
   3) Real time data available from NSQIP to measure progress
   4) QI requirements of CSV

7) Q&A
First, let me say I’m proud that we are on track with the timeline we shared with you in October last year. Despite the pandemic.
Welcome!

- New PSQC member hospitals:
  - Janet Weis Children’s Hospital | Geisinger
    Danville, PA
  - Beaumont Children’s Hospital
    Royal Oak, MI

Second-welcome to our new PSQC member hospitals.
Third-want you all to know that the PSQC Executive Committee have approved expanding our membership to any NSQIP pediatric hospital-this will allow international sites to join as well.
Project Background

Kevin Lally, MD, MS, FACS
PSQC Executive Director
Surgeon-in-Chief, Children’s Memorial
Hermann Hospital
Houston, TX
Why did we choose to work on CT use reduction as our first PSQC project? Several reasons.
Upon inception, the PSQC has focused on Appys as a procedure with high volume across all our settings. Reviewing the collaborative report in February, it looked like OS and SSI reduction in complex appys was a good place to start. The Jul 2020 SAR had consistent rates.
However, when we started to chart it out we found too much variability in this measure between SAR cycles.

For example, in Jan, the PSQC SAR for comp OS/SSI we have 3 high performers and 1 low performer. In July, we had 6 high performers and 2 low performers. Of those, only 1 low performer was the same and 2 high performers were the same.

This could all be attributed to the fact not enough data points yet and we will continue to track this of course. But that kind of variability makes any QI project very difficult to initiate. Plus, given the many contributing factors outside our control in SSI reduction-bathing, patient compliance with discharge instructions, antibiotic regimen- we felt our focus should narrow to a project with some consistency.
As we looked deeper at the data, we saw the CT utilization might be a better place to start. It is relatively easy to measure. It does not require must in the way of risk adjustment—it’s binary so the patient either got a CT scan or didn’t. And as is clear from this graph, many of our PSQC hospital members are still using CT a lot. This made this project, we felt, a better first project for the PSQC.
We’ve known about the risk of exposing pediatric patients to ionizing radiation for some time. In August 2001, the Society for Pediatric Radiology sponsored its first ALARA conference. Since then the topic has gained attention and understanding across the pediatric care community. In December 2014, Dr. Gary Freed and his colleagues at UMich proposed a quality measure to ARHQ’s CHIPRA core measure project titled: **Overuse of Imaging: Policy for ALARA Specific to Imaging Children**. The CHIPRA PQMP (pediatric quality measures program) adopted this quality measure in April 2015. Measure compared performance at those sites with a stated ALARA policy in place to those without.
Over the years, several studies have found a correlation between early age radiation exposure to later age cancer development. This study, Radiation Exposure from Pediatric CT scans and Subsequent Cancer Risks in the Netherlands, from Dr. Meulepas and colleagues, was a large retrospective study covering the time frame of 1979-2014. The study demonstrated a statistically significant dose-effect for brain tumors.
In January of this year, the above study from South Korea looked at the effects on dose-effect from CT scans performed specifically for appendicitis, both pre and post appendectomy. The study found a significant relationship between CT exposure and incidence of leukemia. The age group most at risk is 0-15 years.
Given the evidence, it’s pretty clear that we should do CT scans on children as seldom as we reasonably can. However, you can see from this graph from Jan 2020 Appy SAR that many NSQIP children’s hospitals do use a CT as a primary imaging modality.
Okay. So we know what the challenge is—reduce CT use. But how are we going to do that? The PSQC implementation committee decided to undertake a qualitative approach to find out why some hospitals do pretty good on this measure and others don’t. I’m going to let Ms. Azraa Chaudhury, a med student at Northwestern working with Mehul Raval, and helping us out on this project, tell you more about that.
Methods

Azraa Chaudhury, B.A.
First Year Medical Student
Northwestern University
Feinberg School of Medicine
1) Identify high and low performers from July 2020 Targeted Appy SAR

   We have 7 member hospitals who fall into the high outlier status (aka needs improvement) category (red dots)
   18 hospitals who fall into the low outlier status (aka exemplary) category (green dots)

2) Dr. Lally reached out to all 7 of the high outliers and 7 of the low outliers, inviting them to participate in the project by participating in a qualitative interview around their imaging practices. This would necessitate unblinding to the implementation committee members. All 14 agreed to do so.
Methods

- 13 hospitals interviewed (6 low performers, 7 high performers)
  - 13 surgeons
  - 5 PEM
  - 5 radiology
  - 5 SCR
Theoretical Domains Framework

Sources of behaviour

TDF Domains

Soc - Social influences
Env - Environmental Context and Resources
Id - Social/Professional Role and Identity
Bel Cap - Beliefs about Capabilities
Opt - Optimism
Int - Intentions
Goals - Goals
Bel Cons - Beliefs about Consequences
Ref - Reinforcement
Em - Emotion
Know - Knowledge
Cog - Cognitive and Interpersonal skills
Mem - Memory, Attention and Decision Processes
Beh Reg - Behavioural Regulation
Phys - Physical skills
The interview guide we developed using TDF, starts with basic demographic questions like years of experience and average number of suspected appendicitis patients you help take care of per month.

Imaging practice questions fall along the TDF domains we highlighted before. We ask about how a case is managed when arrives in ED to OR. The responses and any follow up from the interviewer get at knowledge (awareness of ALARA); organization/institution (resources/clinician skills); patient (patient type influences care approach); social and professional role (consultation on imaging); and social influences (clinicians’ have different practice patterns based on their own experiences).

The last area of questions addresses potential barriers to implementation/change (systemic/practice patterns).
As we used qualitative interviews as our data collection approach, we needed to use a framework which provided the best approach for our desired goal. The theoretical domains framework (TDF) is the approach we chose. It is useful for identifying barriers and facilitators that influence behavior change. It is frequently used in implementation science and knowledge translation. In the case of the PSQC, for our first project our behavior targeted for change is the use of CT in pre-op imaging of appendicitis patients. Our goal is specific—**who** needs to change; **when** the change should occur (pre-op); **How often** it should be done (a % of cases); **with whom** they need to work to achieve the behavior change.

Our project methodology is qualitative.

The sampling strategy includes the appropriate stakeholders using qualitative interviews. Recommended minimum sample size for this approach is **10**. We are using **14**.

An interview guide was developed using 10 of the 14 domains with an emphasis on 5 including: knowledge, organization, patient, social/professional role and social influences.
As we started to talk with our hospitals, we identified practice gems which may be replicable across the PSQC member hospitals. We appreciate that being able to invest in technology or staff may seem the obvious ‘fix’-but-that is not practical, especially in the current fiscal environment.
As we completed interviews, we would transcribe and code them using MAXQDA. You can see here how we organized the coding using the TDF. We consulted with a healthcare quality improvement assistant professor with a special interest in implementation science and knowledge translation to provide independent review of our coding method to assure our approach was appropriate. The coding results play a huge role in how the implementation guide was developed.

To introduce what we discovered from this process, I’ll turn the presentation over to my colleague Dr. Andrew Hu.
Findings

Andrew Hu, MBChB
Surgical Research Scholar
Division of Pediatric Surgery, Ann & Robert
H. Lurie Children’s Hospital of Chicago
4 key themes impacting CT usage

1. Imaging resources
2. Protocol implementation and adherence
3. Presence of a champion
4. QI resources and experience
Majority of HPs have 24/7 high quality pediatric US

High performers

- We have 24/7 US in house tech support at the main hospital... that kind of changed our workflow considerably. So we have the consistency and availability to perform an US on and off hours...

- ...our US techs are very good. We have a few very experienced and are technically facile... the other [thing] is... it’s only pediatric radiologists who are interpreting our US

Low performers

- Not having 24/7 ultrasound is another problem and then probably our diagnostic imaging is not great. We get a lot of non-diagnostic ultrasounds unfortunately...

- And then at night we have adult people covering... This is in the setting of sonography techs... 2 of 7, would actually be able to go ahead and reliably find an appendix on the exam.
Majority of HPs have adhered to pre-op imaging protocols and US performance protocols

High performers

- We adopted a guideline for evaluation that included the pediatric appendicitis score and used that to help us guide whether imaging was necessary based on likelihood of appendicitis.
- We met with all the [US] techs that were there at that time and we started over in terms of what does our process look like to evaluate appendicitis and then in conjunction with surgery, we agreed on a standardized template.

Low performers

- Even though we have the algorithm, they may think that they know what to do better than we do so they may say, get a CT scan.
- At one point about eight years ago developed a protocol that was supposed to ... decide whether imaging was needed or not. However, with turnover in our ER staff, they pretty much have ignored that and go straight to imaging almost right off the bat.
All HPs had one champion supporting CT reduction

High performers
- It was him who got it going, ... we used to do an appendix ultrasound on every abdomen ultrasound [because] the technologist needed the practice.
- I think we had champions in each section that did the work but I think they had the support of their entire sections to make decisions for the group.

Low performers
- 1 of our senior partners here was interested in it and he literally gave up on the project because it was just going nowhere and he spent a huge amount of his own time...and it just went nowhere...unless it's a priority up high it just doesn't get a lot of weight.
- I think some of it has to do with current leadership and hopefully that leadership will change at some point in the future and then it might be a good avenue to change that ... I'm not sure my beating my head against the wall too many times is worth it for me right now.
Majority of HPs have QI infrastructure in place for interdisciplinary collaboration

High performers

We all are up to date on our division and institutional quality performances. We review them that our NSQIP meetings with regularity. We review aggregate data that’s meaningful to people for people to talk about all the time.

We have a whole QI department... We have clinical quality and then more recently they established an Excellence department which is more process focused...in our clinical quality department, we have nurses pretty much exclusively that helped support

Low performers

...quality department is myself and my director who’s actually leaving, so there’s going to be some restructuring there and I’m not sure how that’s going to look

We don’t have any dedicated administrative and academic time for quality improvement
Factors supporting CT reduction at HPs

Factors driving success

- Radiology champion
- Continued data monitoring
- Monetary incentives
- Culture of collaboration

“...I think having someone in radiology who's willing to be the champion is critical. Because again, like I said, before you're dead in the water, if that radiologists aren't buying [in]

“...I had to measure [CT use] and report it monthly

“...If you ordered a CT, you got a call from the Chief of Radiology asking why

“...So you know, money talks. We have a percentage of bonus tied up into these quality metrics

“...We are extraordinarily well integrated... pediatric surgery and radiology grew up together at our institution
Barriers to CT reduction at LPs

Barriers to CT reduction

- Personnel
  - Radiologists
  - US techs
- Protocols
  - Establishing protocols
  - Sustaining protocol adherence

“3 pediatric radiologists and about a hundred other radiologists will share call.”

“There isn’t a lot of emphasis amongst the techs on being able to find the appendix and make it a useful study.”

“[Our approach to suspected appy patients] has historically been a free for all but we are trying to work on a protocol now.”

“We have interns that are monthly, and we have 2nd years that are 6 weeks and then we have our fellows...even though we have the algorithm, they may think they know what to do better.”

“”
Differences in CT Reduction

Table - Differences in CT Reduction Facilitators between High and Low Performers

<table>
<thead>
<tr>
<th>Facilitators of CT Reduction</th>
<th>High Performers (N = 7)</th>
<th>Low Performers (N = 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24/7 US Availability</td>
<td>100%</td>
<td>67%</td>
</tr>
<tr>
<td>24/7 Pediatric Radiologist Availability</td>
<td>57%</td>
<td>0%</td>
</tr>
<tr>
<td>24/7 Pediatric US Technicians</td>
<td>86%</td>
<td>33%</td>
</tr>
<tr>
<td>MRI Availability for Appendicitis</td>
<td>29%</td>
<td>0%</td>
</tr>
<tr>
<td>Appendicitis Workup Protocol</td>
<td>57%</td>
<td>33%</td>
</tr>
<tr>
<td>US Performance Protocol</td>
<td>43%</td>
<td>17%</td>
</tr>
<tr>
<td>CT Reduction Champion</td>
<td>86%</td>
<td>17%</td>
</tr>
<tr>
<td>Dedicated QI Department</td>
<td>86%</td>
<td>67%</td>
</tr>
<tr>
<td>Prior Multidisciplinary QI Collaboration</td>
<td>71%</td>
<td>17%</td>
</tr>
</tbody>
</table>

US – Ultrasound  
MRI – Magnetic Resonance Imaging  
CT – Computed Tomography  
QI – Quality Improvement
Limitations

- No Administration/C Suite Viewpoints
- No Imaging Technician Viewpoints
- Data is limited in its generalizability as only dedicated children’s hospitals are interviewed
- Potential for bias as interviewees are aware of the purpose for our interviews
Product

Terry Fisher, MPH, PMP
Sr. Program Manager
Pediatric Surgery Quality Collaborative
UT McGovern Medical School
On April 12th, we shared the PSQC CT reduction implementation guide with every PSQC member hospital. The guide is intended as a tool to support any QI change you may want to undertake at your hospital. I’d like to give a very high level overview of the guide and its contents. As a quality improvement tool, it is constructed around QI terminology.
The implementation guide you all received covers the following: an introduction to the project rationale; basics on how to make best use of the guide; an Aim statement for the PSQC as a whole; Quality measures based on what our qualitative interviews revealed; some intervention strategies developed from a key driver diagram; and appendices which include templates, protocols, flow charts and literature you might use as you start a project at your hospital; and tools from others, like IHI and NSQIP, you can use as resource. As part of the introduction, we acknowledge the bias toward ultrasound in the quality measures and key driver interventions. This bias is a result of the qualitative information we gathered. As we explained earlier, we talked with 7 of our high performing hospitals. As it happened, the majority of them use ultrasound as a primary imaging approach. This was not intentional and this bias in no way means that MRI is not a great approach too. As you’ll hear later, we will be proving additional information on MRI focused CT reduction strategies in the future.
We set a collaborative wide aim of reducing the Collaborative CT use rate from 24.5% as of July 2020 to 15% by June 30, 2022. We recognize it will take some time to see any change in the numbers. The goal date of 6/30/22 will cover NSQIP data cuts covering the time after the release of this guide. In addition to our aim, we set a balancing measure. Its important that any change in imaging practice not have the unintended effect of increasing the incidence of unnecessary surgeries from negative appys. The 1.75% number is a reflection of our July 2020 rate as a collaborative of 1.8%.
Quality Measures

- **Structural Measure #1:**
  - Presence of a written ED triage algorithm for assessment of patients who present with RLQ complaint utilizing a validated tool (PAS, Alvarado, etc.)

- **Structural Measure #2:**
  - Presence of a written guideline/protocol/algorith on imaging for pediatric patients with suspected appendicitis who present in ED

- **Structural Measure #3:**
  - Presence of an ultrasound imaging report template for appendicitis in pediatric patients

- **Process Measure #1:**
  - Development of an intradepartmental imaging workgroup

- **Process Measure #2:**
  - Proportion of patients presenting with RLQ pain triaged utilizing your institution’s designated tool

- **Process Measure #3:**
  - Proportion of patients presenting with RLQ pain with CT scans ordered

- **Outcome Measure #1:**
  - Reduction of CT utilization

We developed 3 structural measures, 3 process measures and of course our ultimate outcome measure. The measures derive from the key driver diagram we created around the qualitative interview response. You can choose to work on any or all of these quality measures. You may find that you already have some of them in place. The important thing I think is that you try to adopt at least one. The guide will not make your hospital magically perform better on CT use. But it can assist you, both practically and administratively, get started.
Intervention Strategies

- **Key Driver 1:** Multidisciplinary approach to quality improvement using best practices in imaging
  - *Cultivate a workgroup with representation from key stakeholders*
- **Key Driver 2:** Written protocol/algorithm for triage of suspected appendicitis in ED
  - *A written protocol/algorithm would incorporate a validated pediatric appendicitis assessment tool (PAS, Alvarado, etc.-see appendix) in any imaging decisions made in the ED for suspected appendicitis.*
- **Key Driver 3:** Written protocol for performance and interpretation of ultrasound for appendicitis
  - *A written protocol which details how an ultrasound for suspected appendicitis is conducted (see appendix for examples) with guidance on grading of imaging, what level of appendix visualization qualifies as a positive finding, negative finding or equivocal finding, and what secondary factors support a positive finding.*
Intervention Strategies

- **Key Driver 4**: Training of ultrasound technicians on imaging of appendix
  - Develop a standardized training for all sonographers.

- **Key Driver 5**: Ultrasound report template in EHR
  - Develop a standardized report for imaging for appendicitis embedded in the HER

- **Key Driver 6**: Imaging strategy for patients with BMI ≥ 30.
  - Develop a protocol around conducting ultrasound imaging of patients with high BMI when an initial ultrasound is inconclusive.
In the appendix, we have provided reporting templates, validated triage tools, triage protocols and imaging protocols shared by some of our interview participants, and relevant literature links. Also included are the fishbone and key driver diagrams we used in developing the guide. The documents we attached to the Guide, are intended to give you a better understanding of our approach and include the IHI toolkit, TDF definitions, the interview guide used, and a step-by-step NSQIP data collection guide for your SCRs to use (if they aren’t already familiar) to pull real time data as you measure your progress.

I want to thank everyone who helped in this process. Dr. Raval is going to talk about next steps.
Next Steps

Mehul V. Raval, MD, MS, FACS, FAAP
Associate Professor of Surgery and Pediatrics, Northwestern University
Feinberg School of Medicine
Ann & Robert H. Lurie Children’s Hospital of Chicago
First of all, I really want to take just a minute and thank all of you who participated in the qualitative interview process. Your time and insight were essential to creating the implementation guide. We learned so much from all of you and hope what we’ve put together will be beneficial. And as part of the guide, we want to offer a few other resources to you.
Next Steps

- Roster of Peer Coaches
- Tiered structure of support
- Real time data from NSQIP registry from your SCR

We’ve been talking a lot about how we as a collaborative can support any of you who decide to take on this CT reduction project as a whole, or who may want to tackle just one or a few of the quality measures or intervention steps outlined in the guide.
We’ve been talking a lot about how we as a collaborative can support any of you who decide to take on this CT reduction project as a whole, or who may want to tackle just one or a few of the quality measures or intervention steps outlined in the guide. We’ve settled on a 3 tiered approach starting with the very passive step of sharing the implementation guide with all of you. For some of you, we know this will be enough. But for those of you who may need a little more, we’ve assembled a roster of peer coaches from several of our member hospitals. Our coaches have all participated in change efforts at their respective hospitals and moved away from CT as a primary imaging modality to MRI or ultrasound. Our coaches can provide guidance on who and how to engage other members of your clinical team to make changes. Finally, we can provide some limited one-on-one support to a few.
In addition to sharing the guide with all of you, this is the first of 4 quarterly webinars (Terry has already shared the dates but will follow up with invites) we will host on this topic. On the next webinar in July, we’ll invite a couple of our members who have had success moving to US. They will share their insights and challenges to help you and answer questions. Likewise, the October webinar will focus on MRI. The final webinar of this series will be the 1st quarter of 2022. We hope at least a few of you will have started to work on this improvement project and will be willing to present on where you are and how you got there.
Finally—as what we hope will be an additional incentive for you to attempt this QI project, we want to remind you that CSV v2.0 is coming. And as you likely know, participation in a QI project will be required for certification.
We’d like to spend the remaining time answering your questions. Please use the raise hand function if you’re on the desk top app. Otherwise, please text me.
The slide deck and a link to the recording of this webinar will be forwarded to all as soon as it is available. It will also be posted on our website. There is an appendix which includes the complete interview guide as it currently stands as well as other resources of interest.
Resources

- Children’s Health Insurance Program Reauthorization Act (CHIPRA). Overuse of Imaging: Policy for ALARA Specific to Imaging Children Measure 0243.

- Children’s Health Insurance Program Reauthorization Act (CHIPRA). Overuse of Imaging: Policy for ALARA Specific to Imaging Children Measure 0243 Measure Fact Sheet.
