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.
Today we’re going to discuss some of the tools from implementation science that will hopefully assist in making any change you initiate ‘stick’. Our agenda today is:

1) Importance of culture and context
2) COM-B framework
3) CFIR framework
4) Mapping COM-B to TDF
5) The behavior change wheel
6) Example of a successful change project
7) Presentation from Inova’s Dr. Cynthia Gibson on a PEWs project they started
   1) Process
   2) Data
   3) Challenges to sustainability
Now that we’ve discussed how to select your project and some of the tools you can use to identify areas where you can focus any change, it’s time to talk about how do you actually implement a change because all the process mapping and key diagraming isn’t going to actually make anything change. You need to develop an implementation strategy.

This presentation is influenced by my own experience, or frustration, with my team and I coming up with a great intervention to improve outcomes on a single floor of TCH, just to watch it die a slow painful death. We followed all the QI steps that we’ve discussed before but we really failed to consider how was the change going to be implemented and how individual behavior could make or break it.
Change is dynamic

“People are not passive recipients of innovations. ....they seek innovations, experiment with them, evaluate them, find (or fail to find) meaning in them, develop feelings (positive or negative) about them, challenge them, worry about them, complain about them, ‘work around’ them, gain experience with them, modify to fit tasks, and try to improve or redesign them”*


I feel like this quote is a perfect illustration of the many challenges you face trying to implement change. I’d substitute the word ‘change’ for ‘innovation’. I’ve been diving into the implementation science literature trying to better understand what must be done to sustain change. This presentation reflects what I’ve learned from my participation in a mini-course hosted by the Center for Implementation, reading many back issues from Implementation Science and especially, Susan Michie, who with her colleagues in London, have created some very useful tools/frameworks for planning for a successful implementation.
In order to implement a new process, you have to focus on changing current behavior. In order to change behavior, you need to make a ‘behavioral diagnosis’.
How to go about a behavioral diagnosis? In 2011, Susan Michie from University College of London, developed with her colleagues a model of behavior. This is referred to as the COM B model. For behavior to change, 3 conditions need to exist. C=capability; O=opportunity; M=motivation; and B=behavior. Dr. Michie developed this model with her colleagues as a means to specify what behavior element needs to change. It is used to identify what needs to change in order for an intervention to be effective. A particular behavior will occur only when the individual we need to make a change has the capability and opportunity to engage in the desired behavior and is more motivated to engage in that behavior over other competing behaviors. The arrows (single and double headed) indicate the potential influences between each of the components within a system. Opportunity can influence motivation as can capability; a particular behavior can have an influence on motivation, capability and opportunity and vice versa.
From the 2011 Michie et al article *The Behavior Change Wheel: Capability* is defined as “the individual’s psychological and physical capacity to engage in the activity concerned. It includes having the necessary knowledge and skills. An example for our CT project might be do the sonographers have the right training to recognize appendicitis on ultrasound.
Motivation is defined as all those brain processes that energize and direct behavior, not just goals and conscious decision making. It includes habitual processes, emotional response, as well as analytical decision making. An example might be do our sonographers have enough time to do the appy cases or are they overwhelmed with other tasks? Are they maybe expected to be in the adult suite more?
**Opportunity** is defined as all the factors that lie outside the individual that make the behavior possible or prompt it.” An example may be that the sonographers need additional training to feel comfortable to image peds patients and appy in particular.
This updated 2020 COM-B model clearly illustrates influences and provides definitions. To identify the behavior where change is needed, you must first make a ‘behavioral diagnosis’. The diagnosis is essentially what behavior do you want to target. And this must be done with precision.
You need to identify **who** needs to do **what**, **when**, **where** and **how**. Landing on which behavior you should start with, you should ask yourself if the behavior changes, what is the likely impact, how easy is it going to be, are you able to identify a behavior that aligns with cultural preference, acceptability and cost, and how likely is it the change will spillover or influence others.
In making your behavioral diagnosis, context is also important. The contextual framework for implementation research (CFIR) identifies all the elements influencing change based on the context. Without consideration of the context in which you are trying to implement change, you are not likely to be successful. Successful change must occur at multiple levels.
And somehow, you need to create an implementation strategy that addresses all of these components. Adaptability is included in the list of characteristics but is likely one of the most important characteristics of any change strategy. Without adaptation, interventions often come to a setting as poor fit “resisted by individuals who will be affected by the intervention, and requiring an active process to engage individuals in order to accomplish implementation”
The BCW: from behavioural diagnosis to intervention design. This is another tool which encompasses all the elements from the CFIR, TDF and COM-B. I find it very appealing in its relative simplicity. This is the culmination of the work done by Dr. Michie et al.

It consists of three layers. The hub identifies the sources of the behaviour that could prove fruitful targets for intervention built on the COM-B model. Surrounding the hub is a layer of nine intervention functions to choose from based on the results of your behavioral diagnosis. The outer layer, the rim of the wheel, identifies seven policy categories that can support the delivery of these intervention functions. The BCW starts with the questions: what conditions internal to individuals and in their environment (social and physical) need to be in place for a behavior change to occur?
The COM-B is the center of the BCW.
Intervention layer of the behavioral change wheel
Policy layer of BCW.
Steps to Intervention

Understand Target Behavior
1. Define problem in behavioral terms
2. Select target behavior
3. Specify target behavior
4. Understand what needs to change to achieve target behavior

Design Intervention
Identify
5. Intervention functions
6. Behavior change techniques

Deliver Intervention
7. Mode of delivery
8. Policy categories
All of these tools we’ve looked at can be thought of as what leads ultimately to this Venn diagram. For an intervention to work, the ‘fit’ must be good. Fit can be visualized as the sweet spot where the environmental context and characteristics of the intervention overlap.
You have to plan for sustainability too. It should be a part of your implementation plan. It is important to define exactly what it is you want to sustain.

Is it the **what?** The **how** (change strategies)? The **outcomes?** A combination of all three?

Sustainability does not mean you have to keep everything the same all the time

- Different factors affect sustainability at different levels
- **Spread** is the horizontal diffusion of an intervention (this is an organic process)
- **Scale-up** is the vertical diffusion of an intervention (this is more of a deliberate process)
- Having the right supports in place when sustaining, spreading and scaling is critical to the success of these endeavors
The COM-B Framework in Action

Opportunity
- Alcohol hand rub beside every bed

Motivation
- Persuasive posters
- Encouraging patients to ask

Capability
- No intervention

The following slides are from Susan Michie. She details why an initial intervention to increase nurse hand hygiene in UK hospitals was not successful. A link to her entire slide set is in the appendix. The clean your hands campaign failed on the initial try.
Hand Hygiene example

- Nurses have the capability to clean their hands
  - But not to
    • pay attention to this behavior over other competing behaviors
    • develop routines for noticing when the behavior does not occur, and plans for acting in future

The ‘C’ was not addressed in the intervention. In order for an intervention to be successful, the implementation process must address all components of the model of behavior. The baseline ‘capability’ is that of course nurses can clean their hands. But all the environmental/contextual factors which were inhibited fidelity were not part of the initial intervention attempt.
Fix

- Train staff to
  - set goals and
  - make action plans
- Enable:
  - observe their behavior and give feedback
  - support development of action plans

How the capability component of the model of behavior was addressed. The staff were trained on how to set goals for compliance and tools to enable the desired behavior.
An outside group was used to make the real time observations around hand hygiene compliance. They gave immediate feedback on individual observations and created a display board in the main gathering area of each unit displaying their level of compliance and its relation to their stated goal. There was some incentive used to encourage compliance at the individual level and group level with action steps when observed compliance was less than the goal for the unit.
Maintaining Change

- Changing behavior is hard
  - Maintaining that change is harder
- Effective strategies
  - Don’t rely on individual choice and decision-making
  - Do rely on the environment and making behavior automatic
    - environmental support and prompts
    - building routines
    - feedback
    - rewards and incentives

I’ve lifted this from a presentation by Susan Michie. Think of this as the path to sustainability.
Please join me in welcoming Dr. Cynthia Gibson from Inova Children’s in Fairfax, VA. She’s going to share her hospital’s experience with implementing a QI project with multiple stakeholders.
Incoming Transfer Improvement Initiative
Inova Children’s Hospital: PEWS for PTS
Purpose

- Right patient in the right place for the right care
- Reduce rapid upgrades to higher level of care of admissions to the Pediatric unit
- Improve communication with transport team and receiving physicians
- Establish process of evaluation by Physician Transport Services crews using validated inpatient scoring system
- Establish consistent assessment tool for PTS use
Patient Story:

• 2 yo transferred from outside facility with respiratory distress
• Upon arrival to ward, patient noted to be in severe respiratory distress and lethargy. Poor air movement with significant retractions, head bobbing, grunting and tachypnea.
• Patient was quickly transferred to PICU for acute respiratory failure and need for higher level of support.
What is PEWS?
**Pediatric Early Warning System**

Scoring system based on:
- **Assessment**
  - Neurologic
    - Level of Consciousness (LOC)
  - Cardio-vascular
    - Capillary Refill Time (CRT)
    - Skin Color
  - Respiratory
    - Effort
    - Devices (Oxygen L/min, Tracheostomy)
- **Vitals signs**
  - Heart rate
  - Respiratory Rate

*A preventative* measure that screens acutely ill children for risk of clinical deterioration and thereby requiring further evaluation/intervention or escalation of care.
How does it work?

• Quantifies the severity of illness based on three system assessment and vital signs
• Identifies patients AT RISK for clinical deterioration
• Trends the progression of illness severity
• Improves the communication between nursing staff and physicians (and transport teams)
## PEWS Score Chart

<table>
<thead>
<tr>
<th>Level of consciousness (LOC)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Awake</strong></td>
<td>Awake</td>
<td>Sleeping/easily arousable</td>
<td>Sedated/easily arousable</td>
<td>Unarousable</td>
<td>UA or unresponsive</td>
</tr>
<tr>
<td><strong>Cardiovascular</strong></td>
<td>Pink</td>
<td>Pale</td>
<td>Dusky</td>
<td>Gray and/or mottled</td>
<td>Gray and/or mottled</td>
</tr>
<tr>
<td>Cap refill</td>
<td>Cap refill &lt; 3 seconds (all extremities)</td>
<td>Cap refill = 3 seconds (all extremities)</td>
<td>Cap refill = 4 seconds (all extremities)</td>
<td>Cap refill ≥ 5 seconds (all extremities)</td>
<td>Cap refill ≥ 5 seconds (all extremities)</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>20 pts above normal</td>
<td>20 pts above normal</td>
<td>20 pts above normal</td>
<td>&gt;30 pts above normal</td>
<td>&gt;30 pts above normal</td>
</tr>
<tr>
<td>Bradycardia</td>
<td>&gt;10 pts below normal</td>
<td>&gt;10 pts below normal</td>
<td>&gt;10 pts below normal</td>
<td>&gt;10 pts below normal</td>
<td>&gt;10 pts below normal</td>
</tr>
<tr>
<td>Respiratory</td>
<td>Unlabored</td>
<td>Mild</td>
<td>Moderate</td>
<td>Severe</td>
<td>sev</td>
</tr>
<tr>
<td>No increased accessory muscle use or retractions</td>
<td>No increased accessory muscle use or retractions</td>
<td>No increased accessory muscle use or retractions</td>
<td>No increased accessory muscle use or retractions</td>
<td>Grunting</td>
<td>Grunting</td>
</tr>
<tr>
<td>RR 10-19 pts above normal parameter</td>
<td>RR 20-29 pts above normal Parameter</td>
<td>RR 30-49 pts above normal Parameter</td>
<td>RR &gt;50 pts above normal Parameter</td>
<td>RR 5-9 liters/min</td>
<td>RR 5-9 liters/min</td>
</tr>
<tr>
<td>MILD Accessory muscle use or retractions</td>
<td>MODERATE Accessory muscle use or retractions</td>
<td>SEVERE Accessory muscle use or retractions</td>
<td>RR &gt;10 pts above normal parameter</td>
<td>RR &gt;10 pts above normal parameter</td>
<td>RR &gt;10 pts above normal parameter</td>
</tr>
<tr>
<td>4-7 liters/min</td>
<td>6-10 liters/min</td>
<td>≥10 liters/min</td>
<td>RR &gt;10 pts below normal parameter</td>
<td>RR &gt;10 pts below normal parameter</td>
<td>RR &gt;10 pts below normal parameter</td>
</tr>
<tr>
<td><strong>Children's Hospital</strong></td>
<td>INOVÁ</td>
<td>INOVÁ</td>
<td>INOVÁ</td>
<td>INOVÁ</td>
<td>INOVÁ</td>
</tr>
</tbody>
</table>
Initiation and planning

- Identify partners at PTS
- Develop process map and action to scores
- Initial education of PTS educators
- Roll-out education to all PTS crews
- Initiation of scoring
- Data collection and monitoring
- Ongoing process improvement
Transport Algorithm – React to score

- Score 0-3: Proceed with transport, no need to call accepting MD
- Score 3 in one category or Total 4: Call accepting MD and relate score and clinical findings and receive further instructions regarding transport
- Score >= 5: Call Pediatric Intensivist and relate clinical findings and receive further instructions
Initial PTS PEWS Audit Data

- Sept to Oct 2019
- 75% completion of initial PEWS, 58% completion of all 3.
- 59% completion by CCP, 50% by ALS, 0% by BLS crew

<table>
<thead>
<tr>
<th>Score</th>
<th>Number</th>
<th>Outcome of call</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>85</td>
<td>No call required</td>
</tr>
</tbody>
</table>
| 3 in one of 4 | 10 | 2 continued to gen pedi  
|        |        | 4 went to IMC/ICU (3 upgraded to HPNC)  
|        |        | 4 already to ICU/IMC |
| 4+ points | 4 | Already scheduled for ICU/IMC  
|        |        | One 7 upgraded from ED to ICU |
## Results - immediate upgrades

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4 2018</td>
<td>8</td>
</tr>
<tr>
<td>Q1 2019</td>
<td>2</td>
</tr>
<tr>
<td>Q2 2019</td>
<td>3</td>
</tr>
<tr>
<td>Q3 2019</td>
<td>4</td>
</tr>
<tr>
<td>Q4 2019</td>
<td>1</td>
</tr>
</tbody>
</table>
2021 Initial Data (Jan and Feb)

- 255 transports, 118 with PEWS scores (90 to ward/PICU 46% completion)
- PICU scores > 3 = Jan 5/15, Feb 3/19 with scores 4x3, 5x1, 6x2, 9x2, remainder 3 or less.
- 23 ED to ED transfers scored (2x1, 3x2, 7x1, 20x0)
- 4 NICU scores (2, 3x2, 9)

<table>
<thead>
<tr>
<th>Score</th>
<th>Number</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>81</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>5 or greater</td>
<td>6</td>
<td>One to HFNC (6)</td>
</tr>
</tbody>
</table>
Review of “missed” cases

- Any unexpected upgrades entered in Safety Always are reviewed clinically and reviewed by PTS for PEWS scores
- One-Call transfer phone conversation recordings are reviewed
- Some patients don’t score high regardless and still need escalation of care for variety of reasons
- Scores of 3 in one category could still require upgrade once seen by physician team
- Case described - score of 6-8 on admission
Positive Outcomes

- Reduced immediate upgrades during 1st quarter of use
- Has empowered PTS crews to speak up when an assessment is not as expected
- Improved relationship and communication with referral hospitals with PTS
Barriers encountered

- Covid-19
  - Interference in process sustainability
  - Decrease in pediatric admissions and transports
  - PPE and transport rule changes
- Working with outside partner
  - Turnover of transport personnel, change in management
  - Access to data, one person’s spreadsheet
  - Unexpected death of individual partner
- Data not automatic
  - Embedded in transport summary
  - Difficult to obtain, each chart has to be reviewed by hand
Next Steps

• Need educational reset and renewal
  • New partner at PTS
  • 2020 data is a wash

• Develop ongoing process
  • obtain and evaluate data
  • assess upgrades and review for process improvement
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.
Appendix


