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1. TCH Cardiovascular Anesthesia; 2. TCH Kangaroo Crew; 3. TCH Vascular Access Team; 4. TCH Emergency Center; 5. Sawbones® Design Engineer; 6. TCH Simulation Center; 7. TCH CVICU; 8. TCH PICU; 9. TCH Hematology; 10. TCH Women's Health; 11. TCH Float Pool Educator; 12. TCH NICU; 13. TCH Innovative Solutions Council

BACKGROUND

Current task trainer simulation models lack end user perspective in their designs. A significant need exists for wearable, low-cost, realistic, and durable task trainers that enable more versatile training options. Easily accessible training videos addressing unique challenges in the clinical environment are indicated as well. The Wearable Task Trainer Project Lead is the founding Chair of the Innovative Solutions Council (ISC), a nurse-led, interdisciplinary, shared governance venue that supports staff-led solutions. Innovation has been adopted as a competency for the nursing profession¹. Since its inception 3 years ago, ISC has developed processes and tools to address clinical deficiencies brought forth by staff. ISC supports front-line innovators with policy and product design, implementation, study, and dissemination. As a result, ISC members have developed five new product design freezes, two of them being the Wearable Peripheral Intravenous (PIV) and Wearable Port Task Trainers.

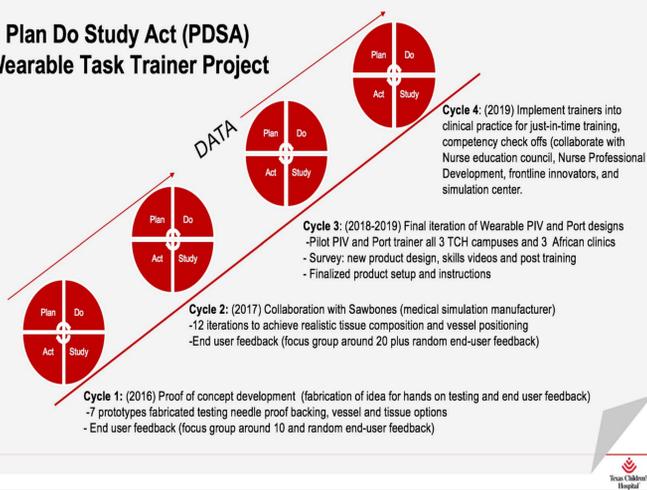
PROJECT GOALS

1. The project lead, with support from ISC, will develop versatile and realistic simulation tools that will enhance clinician's bedside knowledge and competency with peripheral IV (PIV) insertion and port access.
2. ISC members will acquire an understanding of the innovation process, document and refine the innovation steps and share lessons learned.

QUALITY IMPROVEMENT TOOLS

- Key driver diagram
- Plan Do Study Act cycles

Plan Do Study Act (PDSA) Wearable Task Trainer Project



METHODS

Proof of Concept Development:

- **Proof-of-Concept (POC):** a process to verify the feasibility of concept functionality.
- **Prototype development:** a valuable tool in the POC process that allows the innovator to visualize and simulate how the design actually functions².
- **Needs assessment:**
 - Identified potential needs from simulation center, educators, and staff representing emergency center, hematology-oncology, kangaroo transportation crew, vascular access team and pediatric intensive care units.
 - Identified quality indicators potentially impacted by development and dissemination of task trainers and skills technique videos.
 - Increase staff competency/confidence on vascular access.
 - Increase staff, patient and family satisfaction.
 - Decrease PIV infiltrates, vascular access nurse calls.

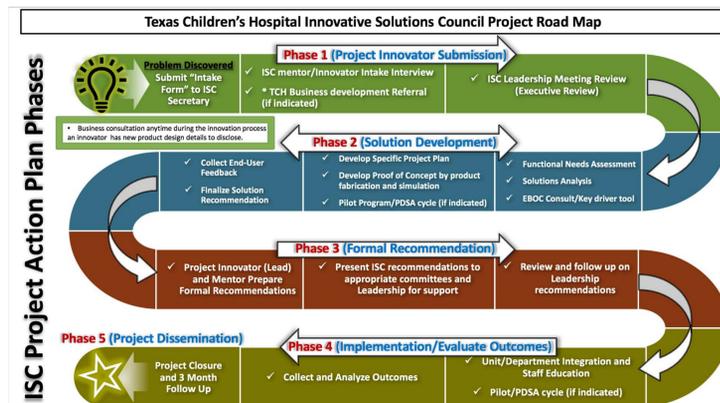
Solutions development:

- Product search on existing task trainers
 - Searched internal/external institution, Google, YouTube, and literature search. Documented results in Microsoft OneNote.
- Utilized quality improvement tools (Key driver diagram and PDSA cycles)
- Designed and fabricated multiple prototypes (PIV/Port trainers and skills videos) to demonstrate proof-of-concept to garner feedback from end users and leadership.
- Presented refined prototypes demonstrating proof-of-concept to ISC, nursing, simulation center and business development for funding support.
- External collaboration with Sawbones an industry leader in medical simulation models to further develop the prototypes.
- Piloted and surveyed final prototypes and skills technique videos.

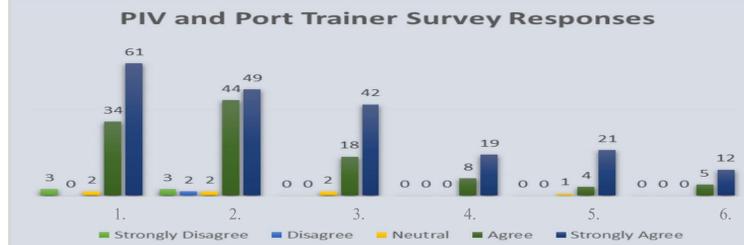
OUTCOMES

Proof of Concepts

- PIV and Port Trainer prototype design freeze
- Prototype durability test
 - PIV: >800-1000+ sticks (24G needle)
 - Port trainer: >1000+ sticks
- Developed PIV and Port Trainer skill videos
- RedCap survey completion to determine prototype design and skills video end-user feedback
- Finalized Wearable Task Trainer product set up and instructions



PIV AND PORT TRAINER RESULTS



100% surveyed (173) from 14 different clinical settings recommended both of the trainers to their colleagues.

1. The PIV trainer's skin, soft tissue, and vein simulates a real experience when palpating for the vein.
2. The PIV trainer's skin, soft tissue, and vein simulates a real experience when puncturing with a needle.
3. The video demonstration increased my understanding of PIV insertion.
4. The port trainer skin and soft tissue simulates a real experience when palpating for the port.
5. The port trainer skin, soft tissue, and titanium port simulate a real experience when accessing and de-accessing with a needle.
6. The video demonstration increased my understanding of port accessing and de-accessing techniques.

DISCUSSION

Design, development and implementation of the Wearable Task Trainers has produced valuable outcomes and opportunities to share lessons learned. Incorporating quality improvement tools was crucial in engaging front-line staff and finalizing products.

Impact

Versatile, realistic, durable designs provided at-cost to TCH

• Increase access to simulation training tools for TCH staff

Potential patient safety outcomes

- Increase staff competency on vascular access
- Increase staff, patient and family satisfaction
- Decrease PIV infiltrates and vascular access nurse calls

Next steps

- Continue post training survey data collection (TCH, Global Hope)
- Multidisciplinary approach to inspire novel training concepts
- Share lessons learned

LESSONS LEARNED

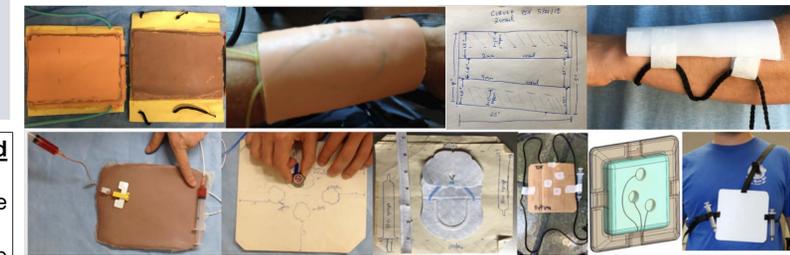
Videography

- Prepare script before filming.
- Utilize small grease board to document beginning of each scene.
- Smart phone; GoPro (spider tripod, gimbal, head mount, selfie stick).
- Always film and take pictures horizontal (helps with video editing)
- Film different angles simultaneously while talking through skill.
- Be aware of back drop and wear gloves.



Prototype development

- Document prototype development and feedback using videos, pictures, PowerPoint and Microsoft OneNote.
- Start with basic materials to determine size, shape and concept.
- Test materials in small mockups prior to refined prototypes.
- Utilize simulation/end user feedback to evaluate POC.
- Share videos via YouTube (unlisted); Gmail, and Dropbox.
- Plan/budget for multiple final prototypes to pilot.



RECOMMENDATIONS

- Be persistent; innovation is a marathon, not a sprint.
- Innovation requires multidisciplinary collaboration.
- Incorporate institutional quality initiatives during the needs assessment and garner leadership support early.
- Develop hands-on prototypes to demonstrate proof-of-concept to end users and leadership which helps gain support.
- Collaborate with a small focus group during prototype phases to gain feedback, momentum, interest, and exposure.
- End user feedback is key to a valuable final solution³.
- Manage expectations and expect project adjustments.
- A thorough PDSA cycle and pilot programs are critical to understanding clinical, staff, and organizational impacts.
- Utilize QR codes for easy accessibility to survey and skills videos.

REFERENCES

¹Davis, P.D. & Marshall, D. R. (2014). Teamwork: an essential for leading and launching innovation. *Nursing Administration Quarterly*, 38(3), 221-229.

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³Shaywitz, D. (2019). *Hard lessons for would-be health innovators from UCSF expert*. Retrieved from <https://www.forbes.com/sites/davidshaywitz/2019/01/31/hard-lessons-for-would-be-healthcare-innovators-from-ucsf-expert/#66a12c1a6517>