

## Background

An assessment on training for peripheral intravenous (PIV) catheter insertion in children identified several consistent needs. A significant gap exists for **versatile, low-cost, realistic, durable and wearable PIV trainers** that enable more training options for frontline staff.

## Goals/Objectives

The goal of the innovation project was to develop a **Wearable PIV Task Trainer and skills technique video playlist that will increase frontline staff engagement**. Frontline innovators will design the *Wearable PIV trainer*, implement them into clinical settings and measure outcomes. Our secondary goal was to document the innovation process and share the lessons learned.

## Methods

The project team incorporated innovation processes, inexpensive technology, interdisciplinary collaboration, user feedback, and quality improvement tools to develop a novel PIV Task Trainer program proof-of-concept.

## Proof-of-Concept (POC) Development Process

- Phase 1: Discover and validate the “need”**
- Need validated by frontline staff
  - Quality indicators:
    - Increase staff confidence and competence in vascular access and care
    - Decrease PIV infiltrates and IV start attempts
- Phase 2: Investigate available/utilized products**
- Explore ways a “need” can be solved **without creating a new product**
  - Project goals not readily available on the market - therefore progressed to new product development
- Phase 3: New product development -user feedback**
- 10 prototype iterations to finalize **RediStik™ Wearable PIV Trainer Kit**
    - Basic in-house prototypes to garner feedback and support leading to **collaboration with Pacific Research/Sawbones®** on the refined prototypes
  - Videos utilized for prototype documentation, sharing and skills video development
    - 5 design recommendation videos to **Sawbones® Design Engineer**
    - Videos explaining key design goals are a valuable communication tool
    - 4 skills videos produced by frontline staff for the pilot
    - Inexpensive video equipment: *Google Pixel w/gimbal*

## Phase 4: Pilot/survey final prototype and skills video

Final prototype surveyed in 14 clinical areas within Texas Children’s Hospital and Global HOPE clinics in Sub-Saharan Africa.

## Results

**Phase 5: Implement and Share** <https://www.sawbones.com/redistik-piv-training-module-dark-skin-tone1703-459-10.html>

### RediStik™ Wearable PIV Trainer Pilot Outcomes

- Pilot provided valuable feedback to finalized PIV trainer set-up and instructions
- In use throughout TCH and Global HOPE clinics in Sub-Saharan Africa
- 100% (100 surveyed) recommended to their colleagues for training
- **RediStik™ Wearable PIV Trainer** novel tissue formula provides the ability to practice **skin preparation techniques with alcohol** or CHG, **visualization, palpation** and puncture of the vein with **blood flash confirmation, threading of the catheter** into the intravascular space, **drawing back blood** and administering saline flush. **Wearable design** can be quickly secured to a person or mannequin’s arm as well as used in tabletop simulations.
- **Dressings are safely applied to the skin and do not leave adhesive residue.**
- **1,000 + punctures** with 24GA catheters
- **Dark/light skin tone** options combined with a **Large and small rolling vein** in each trainer provide scenarios for **palpation/stabilization and difficult access techniques**



Figure 1-3: RediStik™ Wearable PIV Trainer during Pilot

### Global HOPE Center of Excellence in Malawi Outcomes

One of the sites used for evaluation of the **RediStik™ Wearable PIV Trainer** included Global HOPE Center of Excellence in Malawi, founded by Texas Children’s Cancer Center. In Malawi, all children with cancer receive chemotherapy through peripheral intravenous catheters (PIVC); this administration method increases risk for extravasation.

- A quality improvement project was implemented to improve PIV insertion and care.
- Education on proper PIV insertion was developed and included the use of the **RediStik™ dark tone PIV trainers** and newly developed **PIV insertion/maintenance videos** to teach nurses proper technique.
- Nurses completing the training found the **RediStik™ Dark Tone PIV Trainer** and newly developed **skills videos** extremely helpful and improved their PIV insertion skills.
- **Open Source FREE education resources available:** link to the Global HOPE Learning Academy where the Open Courses are held: <https://txchglobalhope.moodle.school>.



Figure 4-5: Dark tone RediStik™ Wearable PIV Trainer in Malawi

Figure 6-7: Pre and post data results from a 9 month quality improvement program in Malawi to decrease PIV start attempts and extravasation on pediatric hematology/oncology patients.

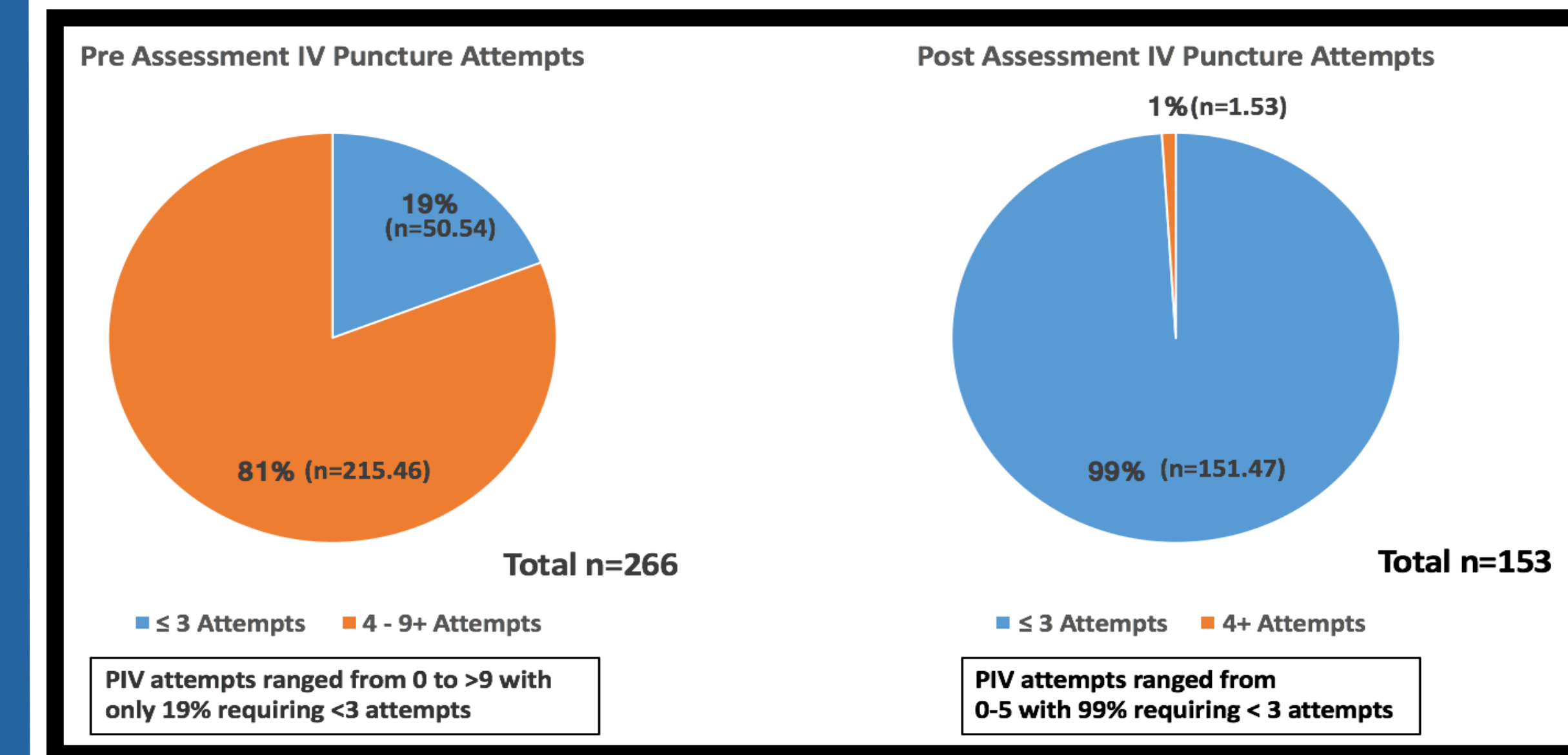


Figure 6: Pre assessment evaluation on **PIV insertion attempts** in 266 children ranged from 0 to >9 with only 19% requiring <3 attempts. Post assessment evaluation revealed **significant improvement** on **PIV insertion attempts** in 153 children ranged from 0-5 with 99% requiring < 3 attempts!

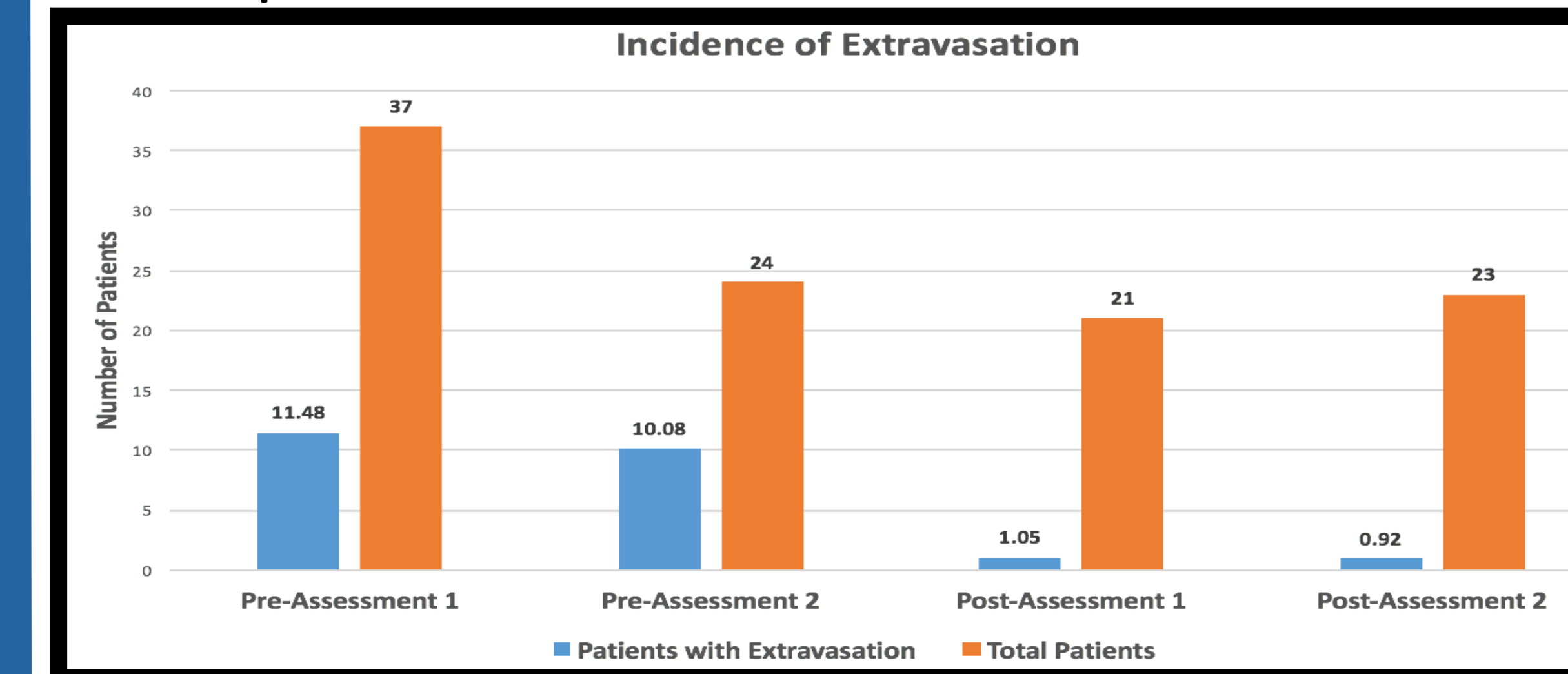


Figure 7: Pre-assessment data revealed a **high incidence of extravasation** in two separate prevalence studies - **32% of 37 children and 42% of 24 children**. Post-assessment in two separate assessments revealed **significant improvement with 5% of 21 children and 4% of 23 children** had evidence of extravasation.

## Conclusions

Design, development and implementation of the **RediStik™ Wearable PIV Trainers** has produced cost-effective training tools, valuable outcomes and opportunities to share lessons learned. Collaboration with Global HOPE Centers of Excellence has been an unexpected outcome positively impacting the Global HOPE team and children receiving cancer treatment. **RediStik™ Wearable PIV Trainers** and **skills videos** are currently in use throughout TCH and Global HOPE clinics in Sub-Saharan Africa and continue to be involved in quality improvement projects. **skills videos** and **curriculum** are open source and the trainers are available for **purchase globally**.

## References

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