

### Background

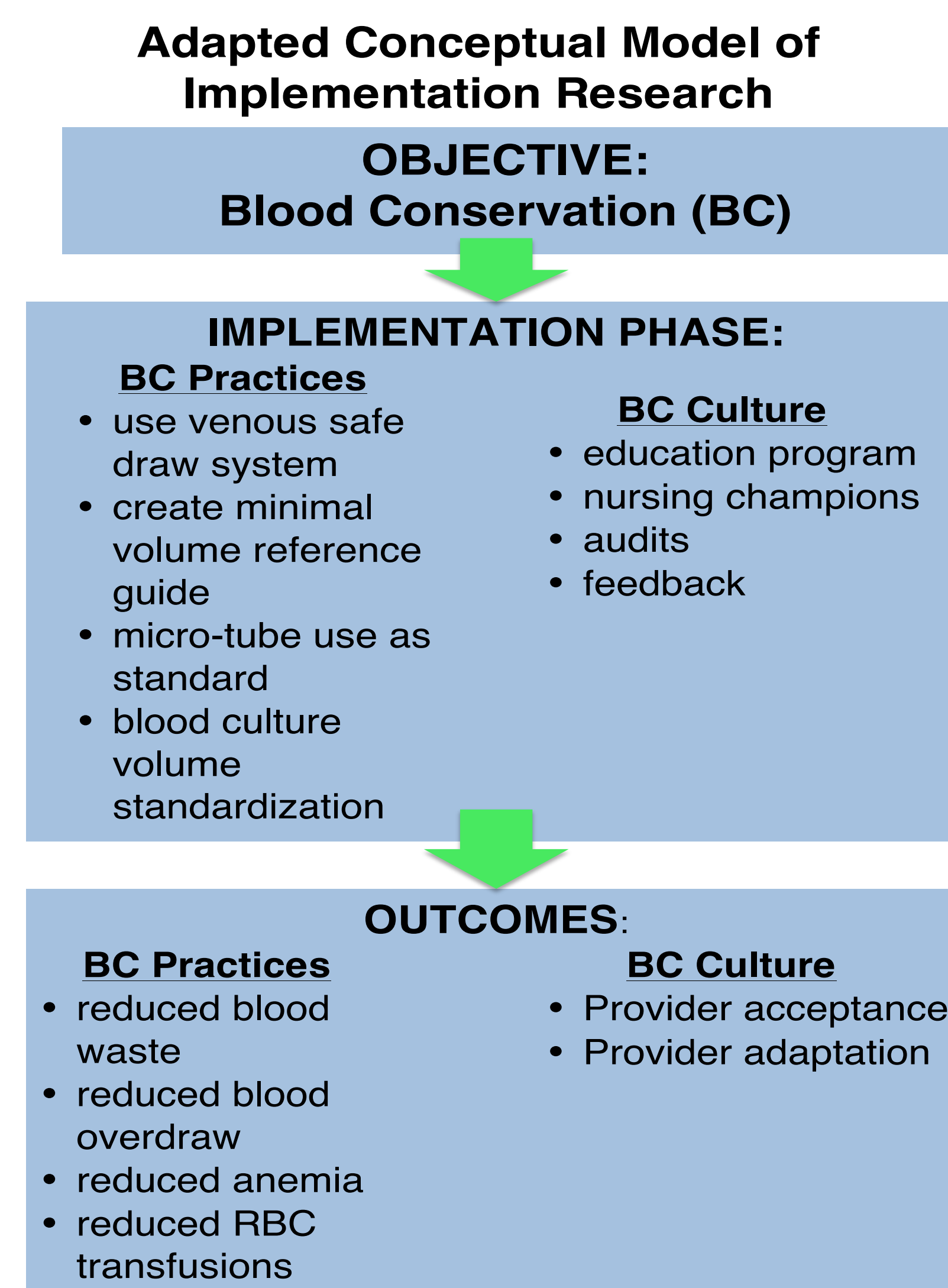
- Monitoring of PICU patients requires repeated blood sampling
- Excessive sampling can lead to anemia
- Upon Pediatric Intensive Care Unit (PICU) admission:
  - 33% of patients are anemic & 41% develop anemia (Bateman et. al., 2008)
- Anemia increases PICU length of stay and days of mechanical ventilation (Bateman et. al., 2008)
- Anemia is often treated with Red Blood Cell (RBC) transfusion
- RBC transfusion is associated with increased healthcare costs & morbidity (Bateman et al., 2008; Gauvin et al., 2012)
- Blood Conservation (BC) strategies are needed in the PICU

### Purpose

- Create sustainable changes in PICU practice & culture to reduce the amount of blood overdraw
- Investigate PICU nurses blood sampling practices
- Understand why PICU blood sampling practices exist
- Reveal clinically-relevant approaches to decrease blood sampling-induced anemia and RBC transfusion in critically ill pediatric patients

### Conceptual Model

Using an adapted Conceptual Model of Implementation Research (Proctor et. al., 2009), we identified implementation strategies and desired outcomes for BC.



### Methods

**Step 1:** Developed & administered a survey of PICU nurses perceptions of BC

**Step 2:** Held focus groups with PICU nurses

- Shared survey results
- Identified motivators & barriers to changing practice & culture

**Step 3:** Designed BC interventions

**Step 4:** Created & implemented an educational program

- Shared focus group results
- Introduced BC interventions

### Survey Findings

PICU Nurse Perceptions of BC	
<b>Response Rate</b>	98% of PICU nurses participated
<b>Minimal Volumes</b>	Information not well-known Information not easily accessible
<b>Micro-tubes</b>	Not as easily available as standard volume tubes Not always used when available
<b>Blood waste</b>	Large blood waste discarded when drawing from a central line Variety of practices & attitudes about returning blood waste

### Focus Group Findings

Barriers & Motivators to BC	
<b>Response Rate</b>	82% of PICU nurses participated
<b>Motivators</b>	"It's the right thing to do." Study increased awareness
<b>Barriers</b>	RN minimum volume knowledge deficit RN lack of attention to volume of blood routinely drawn RN blood waste knowledge deficit Current Lab Reference Guide is under-utilized Current Lab Reference Guide does not have necessary information for BC RNs have easier access to large volume tubes over micro-tubes Lack of closed-loop system for drawing from central lines Current policies limit blood waste return Poor communication between PICU and laboratory staff Inconsistent RN practices

### Blood Conservation Interventions

#### Minimal Volume Reference Guide

- Collaborated with laboratory staff to develop a minimal volume bedside reference guide
- Includes exact blood volume required for testing
- Covers >50% of laboratory combinations used in PICU
- Shows what laboratory combinations require a standard-volume tube vs. a micro-tube
- Easily accessible to reference prior to drawing blood

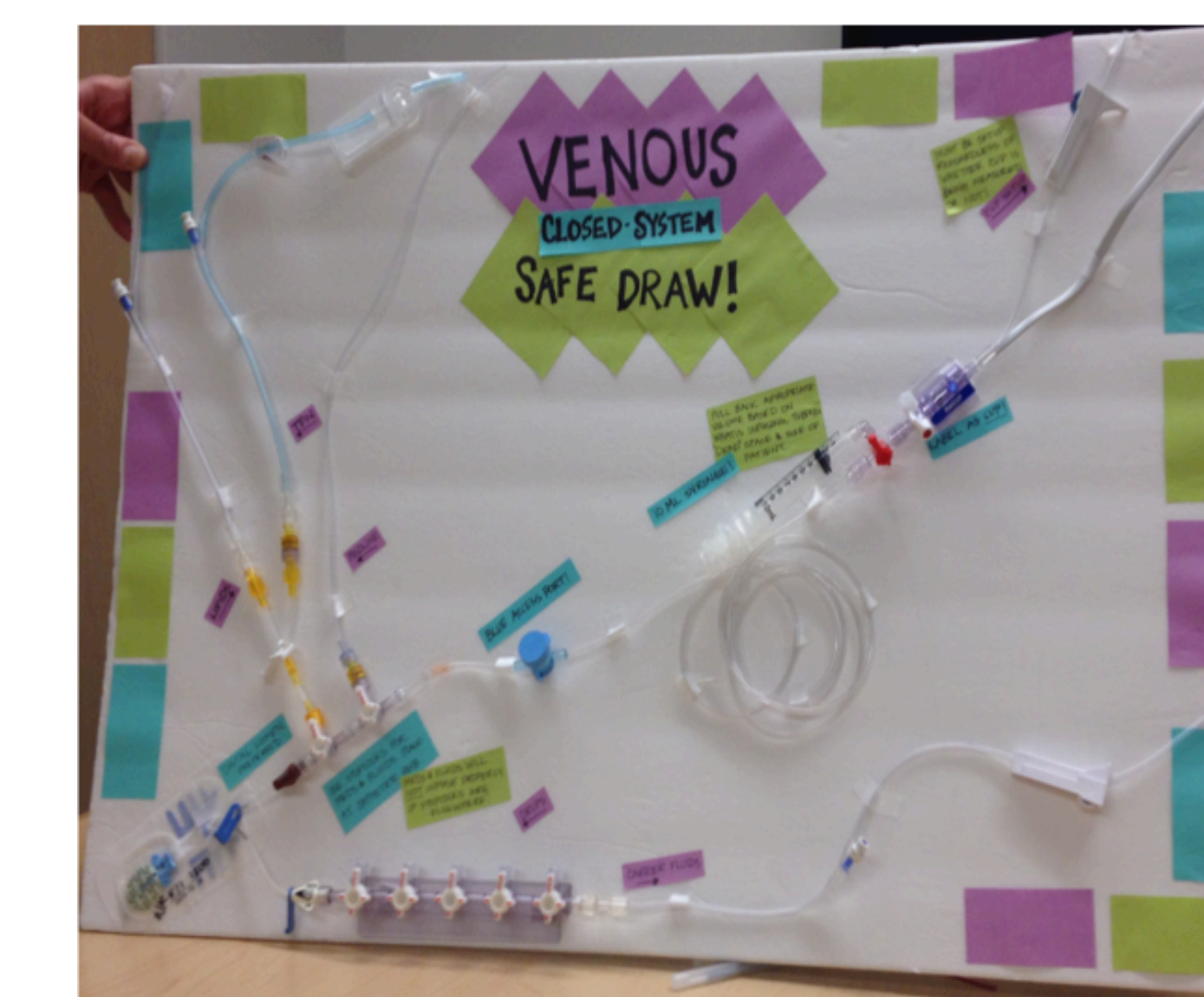
#### Micro-tube Standardization



- Changed stock levels of micro-tubes & standard-volume tubes in patient rooms
- More micro-tubes are now easily available for nursing staff to use

#### Venous "Safe Draw" Closed-loop System

- A closed-loop system for central-line blood draws was developed
- System allows waste blood to be returned to patient
- System trialed on a select number of PICU patients



#### Blood Culture Policy Change

- Blood culture policy not consistent with best practice in pediatric hospitals
- Blood culture sample volume drawn inconsistent throughout hospital
- The blood culture policy changed for PICU patients
- Less blood required for patients with multiple blood access sites

#### Old policy:

Send 1ml per year of age, up to 15 mls PER LUMEN of lines being cultured

Example: 3-year-old patient

Has a double lumen Broviac and an arterial line = 3 lumens  
Send 3 mls per lumen = 9 mls of blood total

#### New Policy:

Send 1ml per year of age, up to 15 mls TOTAL

Example: 3-year-old patient

Has a double lumen Broviac and an arterial line = 3 lumens  
Send 1ml of blood per lumen = 3 mls of blood total

#### Education Program

- Weekly 5-minute in-services on each of the BC interventions
- In-services held immediately prior to BC intervention "Go Live" date
- BC education also included during routine staff education days
- Question & answer sessions about BC project progress

#### Formative Evaluation

- All PICU nurses reached with education program during regular work hours
- Communication system established for PICU nurses & laboratory staff to log BC problems
- Weekly follow-up & feedback sought from nursing & laboratory staff

### Implications

- A post-implementation study is in progress to assess:
  - Blood waste
  - Blood overdraw
  - Blood sampling-induced anemia & PRBC transfusions
- If our BC Interventions are effective, they may:
  - Become the standard of care in PICU practice
  - Be applied to other areas of the hospital &
  - Be initiated in other institutions

### References

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