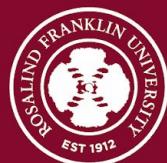


Development of an Education Module and Cognitive Aid for Amniotic Fluid Embolism (AFE) Management at a Midwestern Community Hospital: An Evidence-Based Practice Project

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Faculty Advisor: Peter Kallio, DNP, CRNA, APNP



Presenters



Maryna Gaston, SRNA



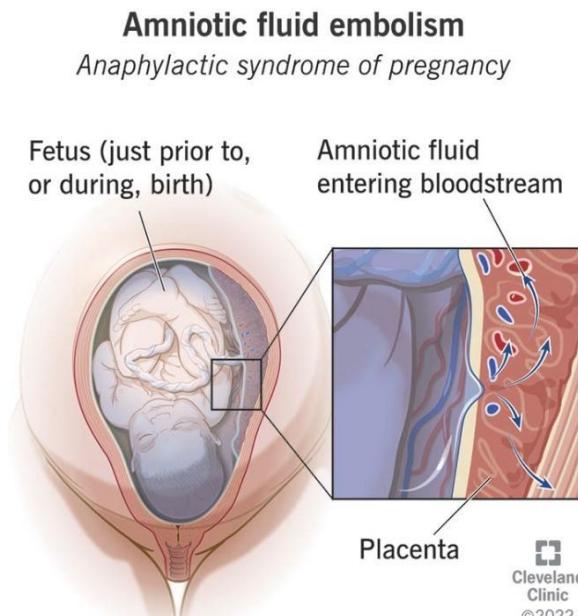
Madison Stout, SRNA

Objectives

- Understand the clinical presentation and basic management steps of AFE
- Describe the steps in developing an evidence-based practice project to improve provider knowledge and confidence
- Discuss the results of an educational module and cognitive aid implementation on provider knowledge and clinical preparedness for AFE

Background

- An AFE is a **rare** and **life-threatening** obstetric emergency that requires prompt recognition and aggressive multidisciplinary management
- **Low incidence** and **high mortality**
- No existing universal treatment or management protocol



Clinical Significance

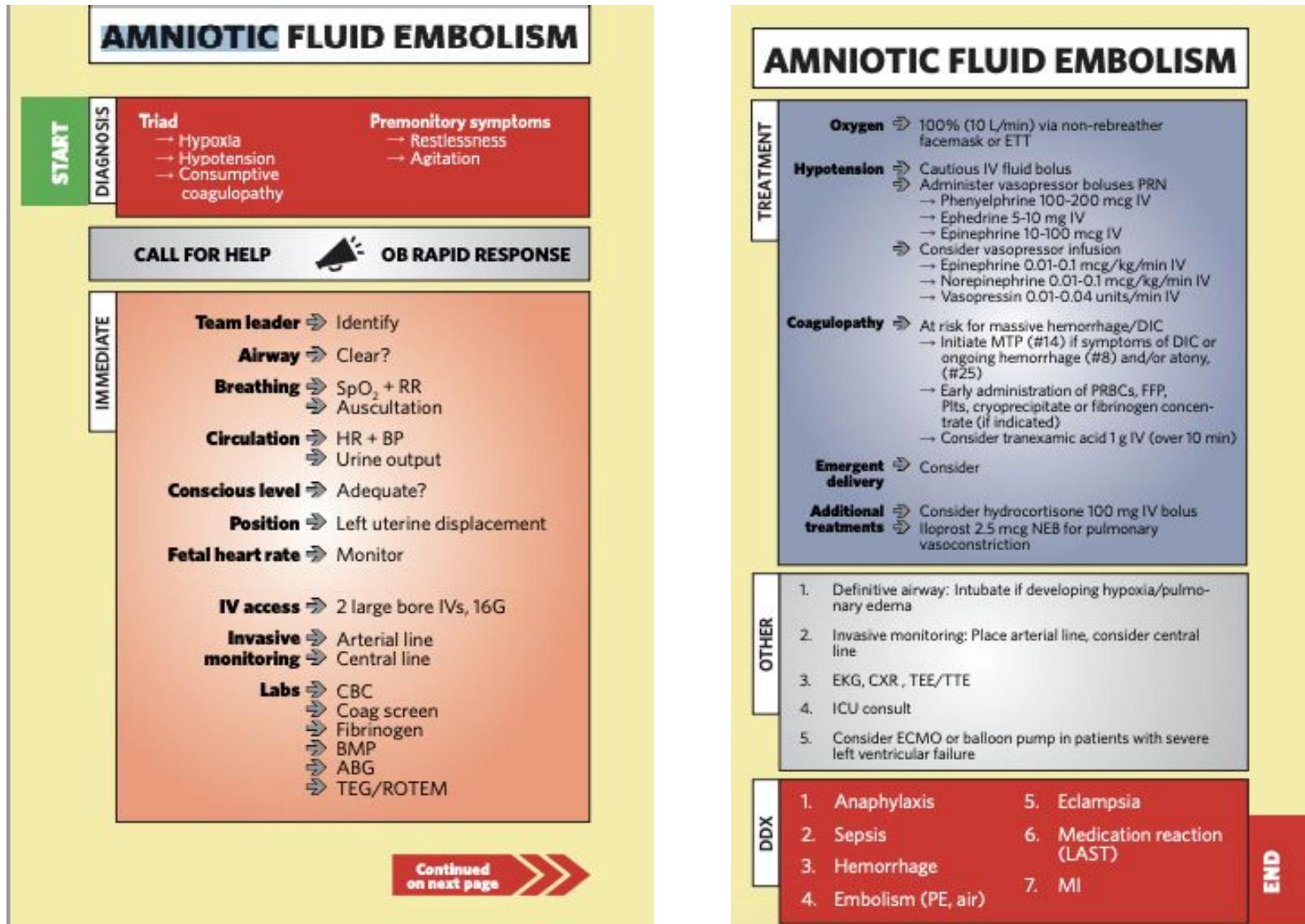
- **Affects 2-8** out of every 100,000 deliveries
- **Accounts for 7.5%-10%** of maternal mortality in the U.S
- **20-60%** mortality rate
- Leading cause of peripartum maternal cardiac arrest
- Second leading cause of peripartum maternal mortality
- Provider/facility inexperience
- No risk factors that would modify standard care

Amniotic Fluid Embolism

- Anaphylactoid type reaction to amniotic fluid entering the maternal circulation during labor or immediately postpartum
- Classic triad of symptoms: ***hypoxia, hypotension, and coagulopathy***

- **Society of Maternal and Fetal Medicine diagnostic criteria:**
 - Sudden cardiopulmonary collapse or SBP < 90 mmHg
 - Oxygen saturation less than 90%
 - Documentation of evident DIC prior to hemorrhagic or shock-induced coagulopathy
 - Absence of fever (38.0°C) during labor

Current Practice Guidelines



Atropine, Ondansetron, Ketorolac

The “AOK” Protocol



Atropine

- Counteracts the vagal-mediated reflex that results in severe systemic hypotension

Ondansetron

- Inhibits serotonin-mediated platelet aggregation and can help prevent worsening of serotonin mediated pulmonary vasoconstriction

Ketorolac

- Inhibits the activation of thromboxane-2 (a robust stimulator of platelet activation and aggregation and a potent vasoconstrictor that is activated during times of tissue injury and inflammation)

Organizational Need

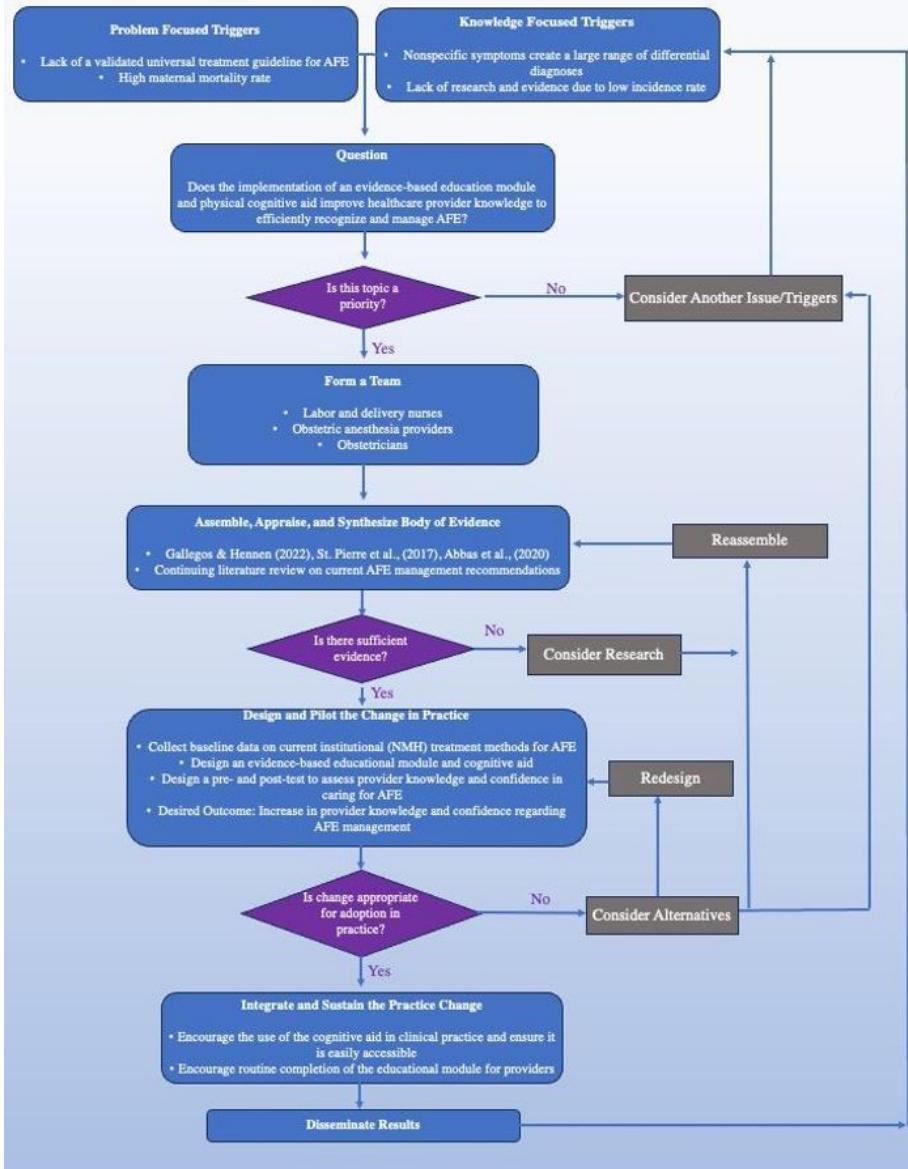
- Huntley, IL is deemed a micropolitan area with a population of roughly 28,000
- The CDC's Pregnancy Mortality Surveillance System (PMSS) found that among micropolitan areas, pregnancy-related mortality accounted for 21.8 deaths per 100,000 live births from 2017-2019
- Huntley Hospital recently acquired another local hospital's L&D population and now has a 20-bed L&D unit
- Management expressed interest and need for facility specific AFE education

Project Aims

Develop a facility specific web-based educational module and cognitive aid (CA)

Increase provider knowledge and confidence in their ability to recognize and manage AFE

Determine if the web-based educational module improved provider knowledge and confidence levels through pre- and post-assessments



Modified Iowa Model of Evidence-Based Research

Methods

Quality Improvement (QI) determination obtained

In-person and email communication with OB management to determine specific department needs

Educational module and CA were created within the Teachable platform through Skills on Point

Pre- and post-assessments constructed using Qualtrics software

Physical laminated copies of CA posted in various locations on the OB unit

Prospective participants were provided a link to the module via email

Data was collected and analyzed within Qualtrics

Project Overview

- **Design**
 - A comparative single group pre- and post-test study was performed from April 29, 2024 through July 1, 2024
- **Sampling**
 - A link to the education module was sent to all OB anesthesia providers, obstetricians, and labor and delivery nurses via email
 - Providers were also notified of project in person
- **Participants**
 - 42 providers were provided the link to participate
 - 20 providers enrolled in the module
 - 5 providers completed the module
 - 3 nurses, 1 obstetrician, 1 certified registered nurse anesthetist (CRNA), 0 anesthesiologists

Web-Based Education Module

Amniotic Fluid Embolism Recognition and Management



Amniotic Fluid Embolism:
Recognition and Management

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Doctor of Nursing Practice in Nurse Anesthesia Doctoral Project

Introduction: 1 / 1

Introduction to AFE

[Start Lesson](#)

Module Content

01

Part One

- AFE pathology overview
- Progression of AFE
- Statistics of AFE
- The Problem AFE presents

02

Part Two

- Associated risk factors
- Signs and Symptoms
- Diagnostic Criterion
- Differential diagnoses

03

Part Three

- AOK overview
- AOK case studies

04

Part Four

- Immediate management of AFE
- Immediate treatment of AFE
- Hospital-specific OB initiatives

05

Part Five

- CA introduction
- PDF copy of CA

AFE Cognitive Aid

AMNIOTIC FLUID EMBOLISM

RECOGNITION AND MANAGEMENT CHECKLIST

CONSIDER AMNIOTIC FLUID EMBOLISM IF THERE IS SUDDEN RESPIRATORY DISTRESS AND/OR CARDIOVASCULAR COLLAPSE IN A LABORING OR POST-PARTUM PATIENT

SIGNS & SYMPTOMS

CLASSIC TRIAD

HYPOXIA
HYPOTENSION
COAGULOPATHY

EARLY SYMPTOMS

ANXIETY
AGITATION
IMPENDING DOOM
CONFUSION

DYSPNEA
NAUSEA
VOMITING
FETAL DISTRESS

CALL RAPID RESPONSE # 5-5555
OBTAIN OB EMERGENCY CART

IMMEDIATE MANAGEMENT

1. CALL FOR HELP - IDENTIFY POSSIBLE AFE
2. SECURE AIRWAY, BREATHING, CIRCULATION (ABCs)
3. INITIATE AOK PROTOCOL (ATROPINE, ONDANSETRON, & KETOROLAC)
4. POSITION PATIENT IN LEFT UTERINE DISPLACEMENT
5. MONITOR FETAL HEART RATE
6. OBTAIN 2 LARGE BORE IVs
7. CONSIDER PLACING AN ARTERIAL OR CENTRAL LINE
8. COLLECT LABS
 - CBC, COAGS, FIBRINOGEN, BMP, ABG, TEG / ROTEM



IMMEDIATE TREATMENT

OXYGENATION

- 100% O₂ VIA NON-REBREATHER OR ETT
- INTUBATE IF CONCERN FOR HYPOXIA OR PULMONARY EDEMA



HEMODYNAMICS

- IV FLUID BOLUSES
 - CRYSTALLOID/COLLOID
- VASOPRESSORS
 - PHENYLEPHRINE, NOREPINEPHRINE, EPHEDRINE, VASOPRESSIN
- INOTROPES
 - EPINEPHRINE, MILRINONE, DOBUTAMINE



COAGULOPATHY

- INITIATE MTP (CALL BLOOD BANK: 654-0807)
- ADMINISTER UTEROTONICS IF NEEDED
- ADMINISTER 1g TRANEXAMIC ACID



ADDITIONAL TREATMENTS

- HYDROCORTISONE IV BOLUS
- PULMONARY VASODILATORS (ILOPROST, NITRIC OXIDE, SILDENAFIL)
- EMERGENT DELIVERY OF FETUS
- ECMO OR BALLOON PUMP FOR PATIENTS WITH REFRACTORY CARDIOGENIC SHOCK

DIFFERENTIAL DIAGNOSES

- MATERNAL HEMORRHAGE
- SEPSIS
- ANAPHYLAXIS
- LAST
- ECLAMPSIA
- EMBOLUS (PE, air)
- MI

Knowledge Assessment and Self-Efficacy Survey

Knowledge Assessment	Self-Efficacy Survey
<ul style="list-style-type: none">• 10 question multiple choice questions with four possible answer choices	<ul style="list-style-type: none">• Modified after the PPHSE and tailored specifically to AFE
<ul style="list-style-type: none">• Questions written by the authors based on content provided in the education module	<ul style="list-style-type: none">• Eight statements using a continuous Likert Scale from 1 (never) to 8 (always)

RESULTS



Knowledge Assessment Scores

(mean percentages)

Nurses (n=3)

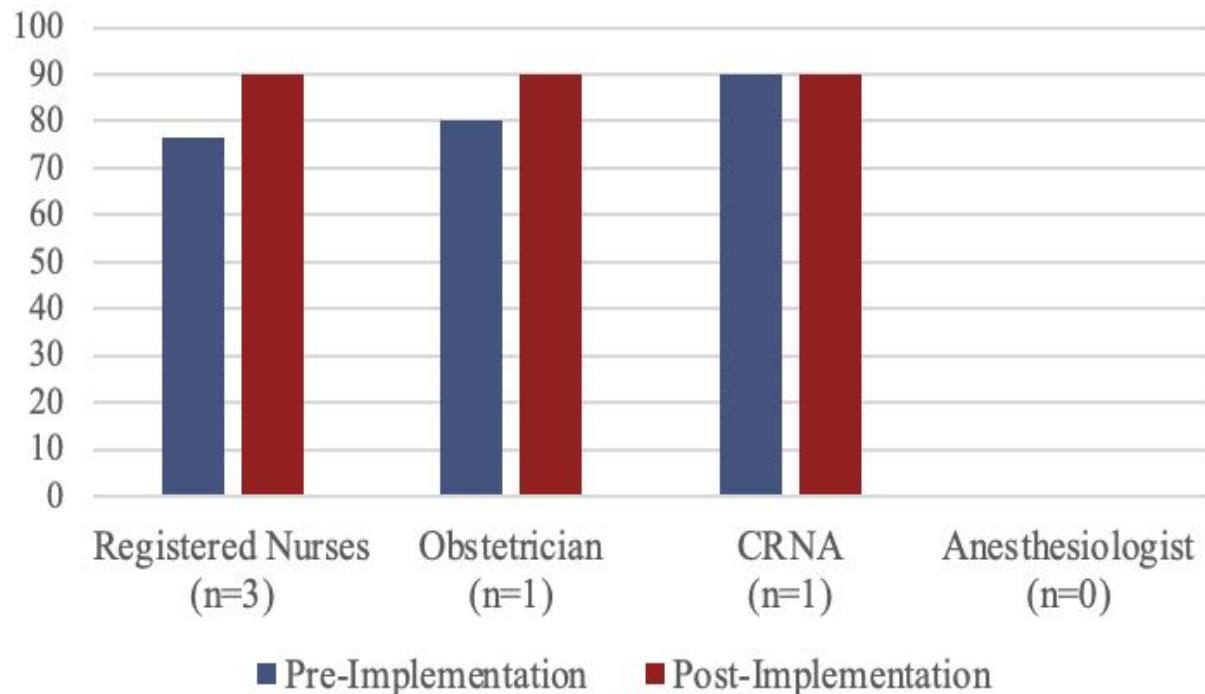
- Pre-test: 76.7%
- Post-test: 90%

Obstetrician (n=1)

- Pre-test: 80%
- Post-test: 90%

CRNA (n=1)

- Pre-test: 90%
- Post-test: 90%



Self-Efficacy Scores (medians)

Nurses (n=3)

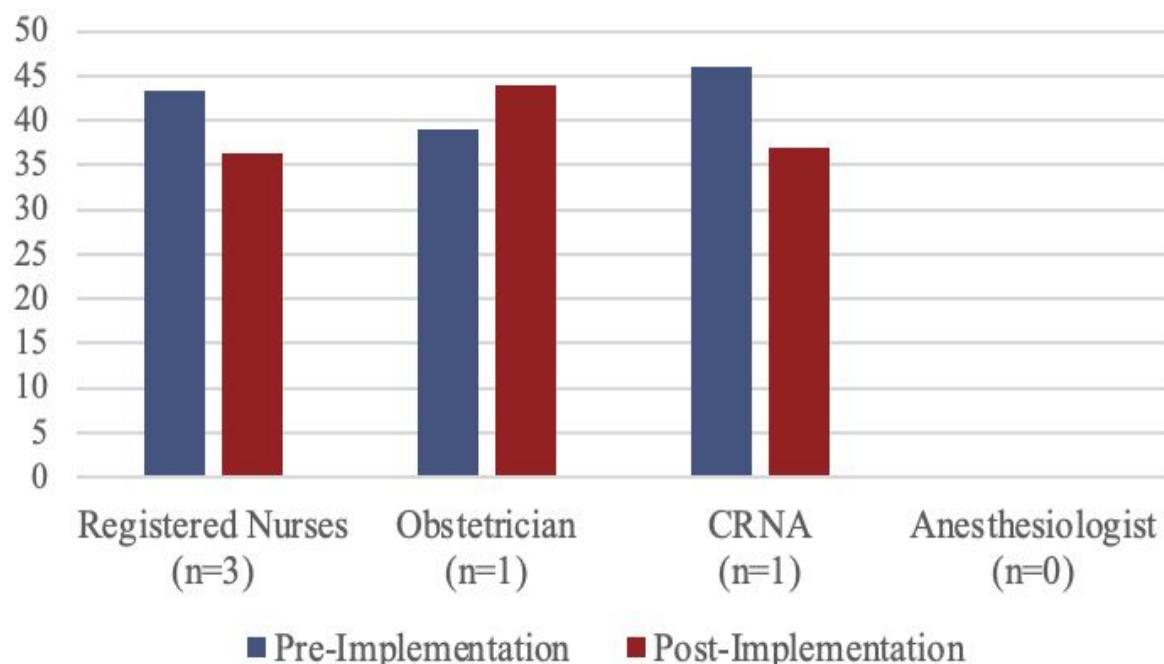
- Pre-test: 43.3
- Post-test: 36.3

Obstetrician (n=1)

- Pre-test: 39
- Post-test: 44

CRNA (n=1)

- Pre-test: 46
- Post-test: 37



Note: Medians reported, a lower score indicates higher self-efficacy

Barriers to Implementation

- Lack of engagement and participation
- Lack of participation incentive
- Time requirement
- Anesthesia group turnover
- Software issues



Clinical Impact and Sustainability

- Clinical significance in the absence of statistical significance reflected by overall increase in knowledge and confidence scores
- Staff encouraged to reference the physical CAs posted throughout OB unit and operating rooms
- Module and CA will be available free of charge for anyone to access at EBP Connect

Translation to Practice

- Educational modules and CAs have proven to be effective in increasing provider knowledge and confidence to perform in real-life crises
- CAs can provide a visual to more efficient, streamlined care and reduce the chance of human error in the event of an emergency
- Better outcomes due to individualized care and increased vigilance in at-risk patients

Recommendations to Improve Implementation

- Increased time frame for data collection to allow for larger sample size
- Implementation at a larger singular or multiple institutions
- In-person educational presentation with time dedicated to pre- and post-assessment completion to increase participation

References