



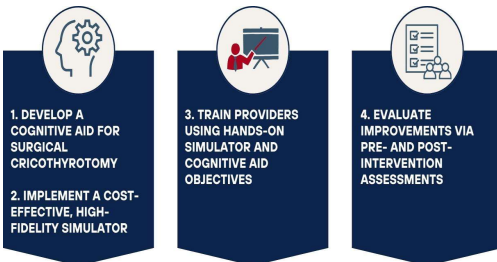
Purpose

- Improve prehospital provider confidence, competence, knowledge, and skill in performing surgical cricothyrotomy
- Evaluate the feasibility of integrating simulation and cognitive aids into prehospital training

Background

- Cricothyrotomy is a life-saving intervention in a cannot intubate, cannot oxygenate (CICO) scenario, yet providers often report low confidence & limited experience performing this critical skill (Bessman et al., 2021)
- Challenges:**
 - High-risk, low-frequency procedure
 - Limited training opportunities for prehospital providers in Southern Arizona
 - Lack of standardized cognitive aids and high-fidelity simulation access

Objectives



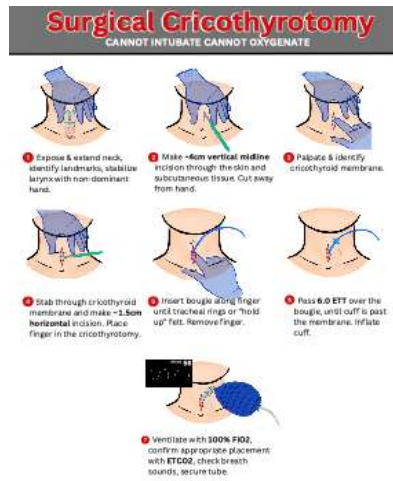
Methods

Design

- Pretest-posttest quality improvement project
- Participants: prehospital providers (Certified emergency paramedics, Critical-care RNs, EMTs)

Intervention

- Cognitive aid** - adapted from *Stanford Emergency Manuals* and customized to meet the needs of a prehospital environment
- Simulator** - REALCric simulator, low-cost, high-fidelity model using 3D-printed trachea and porcine tissue for realism
- Training Session** - recorded PowerPoint (< 5 minutes), introduction of cognitive aid, hands-on simulation



Assessment Measures & Tools

- Confidence:** adapted C-scale (1-5 Likert scale)

1. I am certain that my performance is correct:

1	2	3	4	5
not at all certain	certain for only a few steps	fairly certain for a good number of steps	certain for almost all steps	absolutely certain for all steps

- Perceived Competence:** Perceived Competence Scale (1-7 Likert scale)

1. I feel confident in my ability to perform a surgical cricothyrotomy in an emergency cannot intubate cannot ventilate situation.

1	2	3	4	5	6	7
Not true at all		Somewhat true				Very true

- Knowledge:** 5-question multiple-choice quiz

- Skill:** Cricothyrotomy Skills Assessment tool (valid & reliable tool by Melchior et al., 2015)

Parameter	0	1	2	3	4
Preparation of the head	Failed to perform	Performed, but insufficiently	Performed successfully		
Preparation	Failed to perform	Performed, but insufficiently	Performed successfully		
Appropriate depth of incision	Incorrect and shallow	Correct but insufficient	Correct and determined		
Proper placement of ETT	Chronic and insufficient	Nonlinear but deliberate	Linear and deliberate		

*Points from 0-4 are given to each of the 4 observations. The total score is divided by the time spent in minutes, creating a score per minute on the final score.

Results

Demographics

- Total participants: **15**

Years Experience	Previous Simulation Experience	Previous Real-Life Experience
• 0-5 years: 33%	• Yes – 60%	• Yes – 27%
• 5-10 years: 20%	• No – 40%	• No – 73%
• > 10 years: 47%		

Key Findings

- Confidence:**
 - Significant improvement** ($p < 0.01$; Cohen's $d = 2.03$)
 - Post-intervention scores averaged **6.45 points higher** than pre-intervention
- Competence:**
 - Significant improvement** ($p < 0.01$; Cohen's $d = 1.96$).
 - Post-intervention average score **increased by 43%**
- Knowledge:**
 - No statistically significant improvement** ($p = 0.083$; Cohen's $d = 0.45$)
 - 15% Increase** in mean scores post-intervention
- Skills Performance:**
 - Significant improvement** ($p < 0.01$; Cohen's $d = 0.97$)
 - Average procedural time: **54 seconds faster** post-intervention.

	C-Scale			Perceived Competence Scale			Knowledge Score			Skill Score			Skill Time (minutes)		
	Pre-Mean	Post-Mean	P-value	Pre-Mean	Post-Mean	P-value	Pre-Mean	Post-Mean	P-value	Pre-Mean	Post-Mean	P-value	Pre-Mean	Post-Mean	P-value
Total Participants (n=15)	15	19	<0.01	4	5	<0.01	39%	54%	0.08	5	10	<0.01	18	13	<0.01
Those WITH simulation experience (n=9)	5	20	**	4	5	**	48%	60%	**	6	11	**	15	11	**
Those WITHOUT simulation experience (n=6)	10	17	**	3	5	**	40%	43%	**	5	9	**	18	16	**
Those WITH real-life experience (n=4)	17	22	**	5	6	**	60%	80%	**	9	12	**	17	13	**
Those WITHOUT real-life experience (n=11)	10	18	**	3	5	**	40%	60%	**	5	10	**	16	15	**

**sample size too small to run data analysis

Conclusions/Recommendations

- High-fidelity simulation and cognitive aids:**
 - Improve confidence, competence, and skills.
 - Enable providers to manage surgical airway scenarios effectively and efficiently.
- Feasible and scalable training model for rural and urban EMS agencies as well as prehospital provider education as a whole
- Future direction**
 - Expand training across more EMS agencies.
 - Assess long-term skill retention and sustainability

References

