



## **A Low-Cost Method for Simulating a Cricothyrotomy Procedure in a Ghanaian Nurse Anesthesia Program.**

Brett Morgan, DNP, CRNA

Sylvanus Kampo, CRA, RN, PhD (c)

Virginia C. Muckler, DNP, CRNA, CHSE

# Learning Objectives

1. Discuss factors associated with the need for low-cost simulation experiences in developing countries.
2. Describe the development of a low-cost simulation tool for teaching needle cricothyrotomy procedures.
3. Identify outcomes related to the use of a low-cost, low fidelity simulation tool for teaching needle cricothyrotomy procedures

***The following applies for Brett Morgan, Virginia C. Muckler, and Sylvanus Kampo:  
The presenters received no sponsorship nor have financial or commercial support for this project.***

# Background of Collaboration

- 2013: First BSc program for Nurse Anesthetists in Ghana at University for Development Studies (UDS) in Tamale
- 2013: Collaboration between UDS and Duke University established
- 2014: Distance-based program begins at UDS in collaboration with Duke
- 2017: 40 graduates of the distance- based program



# Background on Project

- As part of a collaborative between Duke University and UDS, simulation was introduced
- Simulation training requests from UDS aligned with their students' current coursework
- Management of a difficult airway that progressed to needle cricothyrotomy was identified as curricular need
- There were concerns with equipment inventory and needs
- The distance-based students were currently practicing anesthesiologists but had no previous simulation experience before our visit



# Rationale for the Project

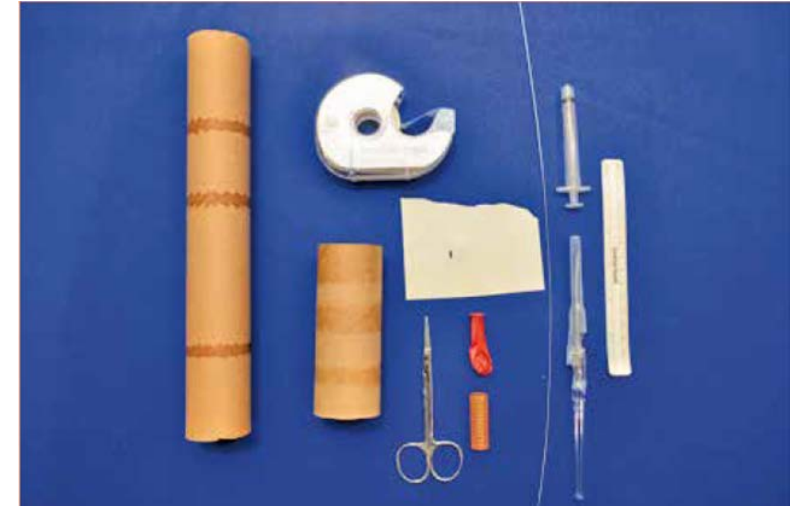
- Simulation is used to train healthcare professionals on cognitive, motor, critical thinking, and communication skills, all of which contribute to role development
- The nurse anesthesia profession commonly uses the empirical knowledge gained from simulation as an integral component of training
- The lofty cost associated with high-fidelity simulation is a limiting factor to its use
- Because of scarce resources, faculty in developing countries are challenged to provide their students with simulation experiences

# Aims of the Project

1. Develop a low-cost method for teaching students how to perform a needle cricothyrotomy and use a retrograde wire for securing a difficult airway
2. Incorporate the method into the curriculum of the distance-based nurse anesthesia program
3. Evaluate the method and make recommendations for continued use

# Innovation

- In the UDS classroom, anesthesia students were oriented to the materials and taught to construct the simulated trachea
- The total cost of supplies for 20 simulated tracheas was less than 12 USDs
- Participants were encouraged to consider what inexpensive resources were readily available in their own country if equipment substitutions were necessary
- Participants were then guided through the steps of performing a needle cricothyrotomy and a retrograde wire intubation using the simulated trachea



# Evaluation of the Experience

- Students were asked to complete an anonymous survey to assess their simulation experience
- The Student Satisfaction and Self-Confidence in Learning survey consisted of 13 questions:
  - satisfaction with the learning experience
  - perception of self-confidence in the skill taught using simulation
- Demographic information was gathered from surveys conducted during associated projects



# Project Participants

- A total of 15 UDS students participated in the simulation activity
  - 9 were men and 6 were women
  - The average age was 35.6 years (range, 30-54 years)
  - The average years of experience as a nurse anesthetist was 5 (range, 2-12 years)



# Survey Results

- Overall, the students in this group reported the experience as a positive learning opportunity
- When addressing satisfaction with the simulation, all students:
  - Reported that the teaching methods were helpful and effective (93.3% strongly agree, 6.7% agree)
  - Believed that they were provided with a variety of learning materials to promote learning (73.3% strongly agree, 26.7% agree)
  - Felt that the simulation was taught suitable to the way they learned (66.7% strongly agree, 33.3% agree).
  - Reported increased confidence in mastering content (33.3% strongly agree, 66.7% agree)
  - Felt they were developing skills useful for clinical practice (73.3% strongly agree, 26.7% agree)
- Most students:
  - Enjoyed the experience (66.7% strongly agree, 26.7% agree)
  - Found the materials motivating and helpful (80.0% strongly agree, 13.3% agree)



# Discussion

- In settings where resources limit the availability of high fidelity simulation equipment, low cost techniques can be used to offer meaningful and beneficial learning experiences.
- Even in the case of high acuity, low frequency interventions, such as the emergency cricothyrotomy, students in lower resource settings can benefit from the opportunities associated with simulation.
- By using low cost, easily obtainable items, faculty in nursing programs can create access to these opportunities that are easily replicated and sustained.

# Selected References

- Hayden, J., Smiley, R., Alexander, M., Kardong-Edgren, S., Jeffries, P., 2014. The NCSBN national simulation study: a longitudinal, randomized, controlled study replacing clinical hours with simulation in prelicensure nursing education. *Journal of Nursing Regulation*, 5(2 suppl):S2-S64.
- Hawkins, R., Bendickson, L., Benson, P., Osborne, L., McPherson, J., Todd, L.,...Bohan, K., (2014). A pilot study evaluating the perceptions of Certified Registered Nurse Anesthetists toward human patient simulation. *AANA Journal*, 82(5), 375-84.
- International Nursing Association for Clinical Simulation and Learning. (2013). Standards of best practice: Simulation. Retrieved from <http://www.inacsl.org/files/journal/Complete%202013%20Standards.pdf>
- Jeffries, P. R., 2012. *Simulation in Nursing Education: From Conceptualization to Evaluation*, 2nd ed. New York, NY: National League for Nursing.
- Muckler, V. C., Kampo, S., & Morgan, B. (2017). Creation of a low-cost simulated trachea for deliberate practice of needle cricothyrotomy and retrograde wire use. *AANA Journal*, 85(4), 271-5.
- National League for Nurses. (2015). A vision for teaching with simulation. Retrieved from [http://www.nln.org/docs/default-source/about/nln-vision-series-\(position-statements\)/vision-statement-a-vision-for-teaching-with-simulation.pdf?sfvrsn=2](http://www.nln.org/docs/default-source/about/nln-vision-series-(position-statements)/vision-statement-a-vision-for-teaching-with-simulation.pdf?sfvrsn=2)
- National League for Nursing. Student Satisfaction and Self-Confidence in Learning. [http://www.nln.org/docs/default-source/defaultdocument-library/instrument-2\\_satisfaction-and-self\\_confidence-inlearning.pdf?sfvrsn=0](http://www.nln.org/docs/default-source/defaultdocument-library/instrument-2_satisfaction-and-self_confidence-inlearning.pdf?sfvrsn=0). Revised December 22, 2004. Accessed August 29, 2014. Updated link accessed June 6, 2017.