Implementation and Evaluation of Student-Led Instruction onAirway Management in the LVHN Surgery Clerkship.

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Implementation and Evaluation of Student-Led Instruction onAirway Management in the LVHN Surgery Clerkship

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Introduction

- **Airway management** is an educational topic that the American College of Surgery and Association for Surgical Education considers a **universal skill for all physicians and medical students** regardless of level in medical education.[1,2]
- USF SELECT students have **minimal exposure** to airway management prior to the start of fourth year. Current education consists of:
  - BLS certification at the start of first and third year.
  - Half-day rotation with anesthesia during the surgery clerkship.
  - Logbook requirements of 5 intubations during the surgery clerkship.
- **Limitations** to gaining additional clinical experiences during the clerkship include:
  - Feasibility in teaching more than one student per anesthesia team at a time (Figure 1).
  - Gaining trust of the anesthesia team with limited knowledge and/or experience in airway management prior to medical school.
  - Other ongoing academic requirements, e.g., SELECT education and the Family Medicine clerkship.

Project Goals and Objectives

- Introduce a student-designed workshop to teach fundamental principles of airway management during the Surgery clerkship.
- Incorporate simulation to practice skills on airway management trainers.

Methods

1. Formed an **implementation team** and obtained **equipment at no cost** from the LVHN Simulation Center and Surgery Education Center.
2. Participated in clinical rotations in anesthesiology at the University of Pittsburgh, University of Miami, and LVHN. Training included **simulation education as a learner** at the WISER Simulation Center in Pittsburgh, PA.
3. Facilitated workshops on expert-recommended topics[3] during the clerkship lecture period on Friday afternoons.
   - Airway anatomy and assessment
   - Physiology of oxygenation and ventilation
   - Optimal bag-valve-mask (BVM) ventilation
   - Placement of airway adjuncts
   - Chin-lift/jaw thrust
   - Intubation with direct laryngoscopy (DL)
   - Insertion of a laryngeal mask airway
4. Applied the Delphi Method to revise the workshop based on student feedback for each subsequent block (Figure 2).
5. For quality assurance, experts in airway management reviewed the slide presentation used to facilitate instruction (Figure 2).
   - Dr. Thomas McLoughlin, LVHN Dept. Chair of Anesthesiology
   - Dr. Charles Worrilow, LVHN Emerg. Med. Clerkship Director
6. Evaluated student's comfort to perform skills and technical errors before and after instruction (Figures 3 and 4).

Table 1. Student Participants

	Block 1	Block 2	Block 3
SELECT MS3s	13	12	12
Former Paramedics	1	0	0
PCOM MS3s	0	2	2
Visiting MSs	2	0	0
PA Students	0	0	1
Pre-med Students	1	1	0
TOTAL # of Students	16	14	15

Results

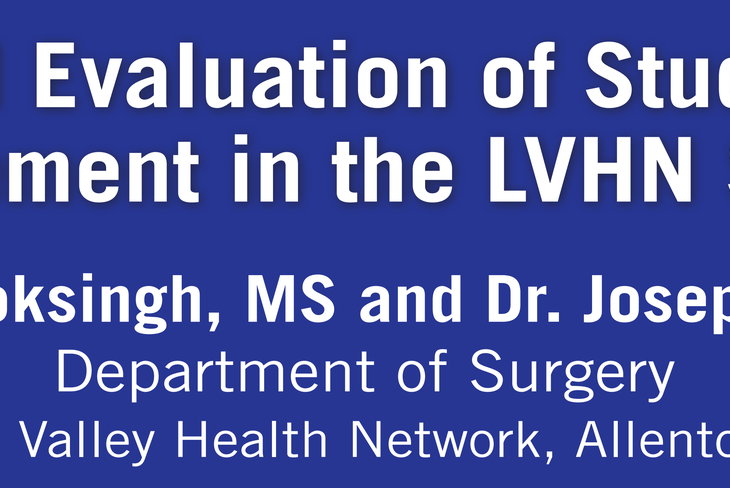


Figure 1. Airway Management During Induction of Anesthesia

This is common arrangement of the anesthesia team (blue), surgeons (gray), and OR staff (green) during airway management. A. medical student (red) can take the place of a student RNA (pink) when a CRNA (light blue) does not have an assigned student.

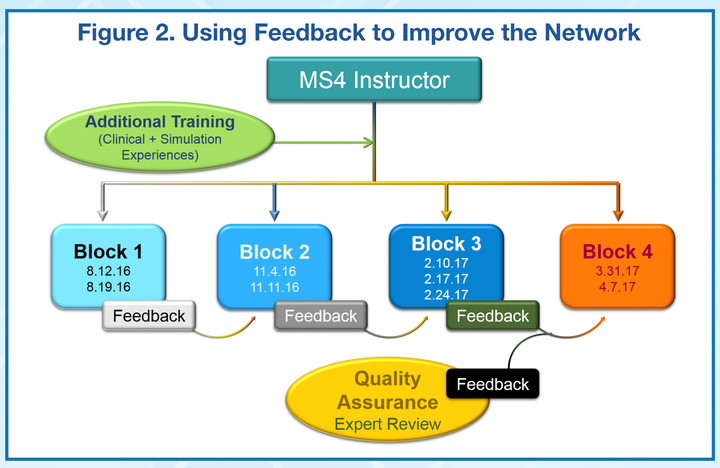


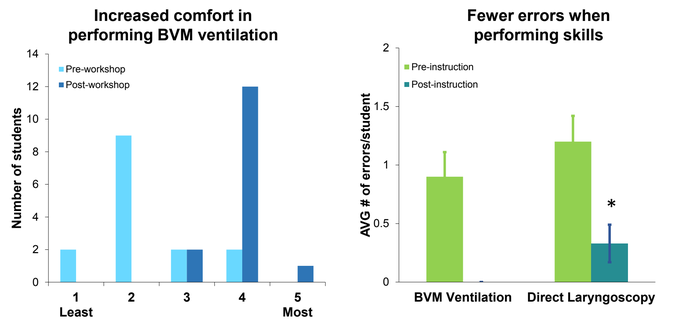
Figure 2. Using Feedback to Improve the Network

Using the Delphi Method, **students in each block** provided feedback on **1)** difficulties in performing airway management skills, **2)** key "take aways", and **3)** ways to improve the workshop for the next block. As a modification to the Delphi Method, **experts** confirmed that the content was appropriate and made corrections to improve instruction.

Figure 3. Performing Airway Management

Students worked in groups of 3-4 to practice airway management skills on task trainers. Simulation allowed the instructor to **1)** demonstrate skills, **2)** correct technical errors, and **3)** provide improve efficiency.

Figure 4. Impact of the Workshop



On a 5-point Leichardt scale, students in block 3 (n = 15) **reported significantly greater comfort in performing BVM ventilation after instruction** (2.27 ± 0.23 vs. 3.93 ± 0.12; 95% CI [2.12 – 1.21], p<0.0001). After instruction, students committed **no errors when performing BVM ventilation** (0.90 ± 0.21 vs 0 ±0; 95% CI [0.49 – 1.38], p<0.001) and **significantly fewer errors in DL** (0.90 ± 0.21 vs 0 ±0; 95% CI [0.49 – 1.38], p<0.001).

Discussion

- The **Delphi Method** is a useful strategy to identify and quickly respond to educational needs based on student feedback.
- **Student-reported difficulties** when rotating with the anesthesia team are likely due to having minimal prior knowledge and experience. Difficulties include:
  - Not **having enough knowledge prior to** performing airway management skills on patients.
  - Not able to easily **follow sequence of events** during airway management.
  - Not knowing **how to get involved** or how to ask to get involved.
  - **Earning trust** of the anesthesia team to get more clinical experience.
- **Limitations** to gaining additional clinical experiences during the clerkship include:
  - **Increased comfort** in performing BVM ventilation (Figure 4).
  - Made **fewer errors** in BVM ventilation and DL on an airway management trainer following instruction (Figure 4).
  - Students reported taking **more initiative to get involved** with airway management in the OR due to increased knowledge.
  - Students reported having increased understanding of the sequence of events during induction of anesthesia.

Conclusions

- Introducing a workshop that incorporated simulation and was based on student feedback was a feasible and effective strategy to give medical students more opportunities to practice airway management without:
  - Jeopardizing patient safety.
  - Interrupting routine workflow of the anesthesia team.
- There was an empirical improvement in student knowledge resulting in increased understanding and involvement in airway management when providing patient care.
- **Future Improvements:**
  - **Scheduling the workshop earlier in the clerkship:** students felt that they would have benefited from the workshop prior to their anesthesia rotation.
  - **Incorporating validated simulation education on airway management**[4] to enhance medical education. Due to participants' biases and group dynamics, caution should be exercised when interpreting and responding to generalizations, e.g., student feedback about a problem using the Delphi method.

References:

1. Acton, et al. *ACS Bulletin:* **35-39,** 2015.
2. JGlass, et al. *Am J Surg* **207:165-169,** 2014.
3. Baker P. *Anesthesiol Clin* **33:381-395,** 2014.
4. Muratore, et al. *Am J Surg* **213: 233-23,** 2017.

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