Hands-On Naloxone Training: Advancing Curriculum and Assessment Through Simulated Manikins Learning – The Continued Study

Austin Gordon OMS-IV, Brooke Nelson OMS-IV, Addison Shenk OMS-IV,
Tobias Addis, OMS-III, Alexandra Reagan, OMS-III, Penny Clanor, OMS-III, Natalie Graham, OMS-III, James Mahaney, PhD
Edward Via College of Osteopathic Medicine - Blacksburg, VA

Introduction

In 2023, the Virginia Department of Health reported the State Death Count for all-drug related overdoses to be 2,463, of which 2,058 were attributable to opioid class drugs. Opioids, especially fentanyl, persist as a significant public health threat, with 79% of all overdose deaths being related to fentanyl or its analogues. The most well-known opioid overdose reversal agent is naloxone (Narcan) (Fig. 7). This drug is widely available across Virginia over-the-counter. Naloxone functions through competitive inhibition of the opioid receptor.

The Virginia Department of Behavioral Health and Developmental Services (DBHDS) has developed an opioid overdose and naloxone education program called REVIVE!, which provides lay-person training on how to identify and treat an opioid overdose with naloxone **(Fig. 6)**. The Edward Via College of Osteopathic Medicine - VA Campus has established an Overdose Prevention Task Force (OPTF), whose mission is to provide REVIVE! training to its students in order to mitigate the effects of the opioid epidemic, which has a particularly strong impact in the institution's service area - the Appalachian Region.

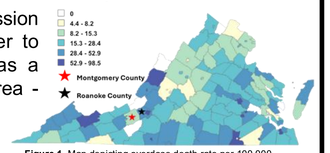

Figure 1. Map depicting overdose death rate per 100,000 Virginia Residents in 2023. [1]

The primary aims of this research are to:

- **AIM 1:** Measure the performance and confidence benefits in students receiving *novel* scenario-based simulation training in addition to the *traditional* didactic REVIVE! curriculum with a realistic Simulation-Based Assessment (SBA).
- **AIM 2:** Measure the 6-month material retention benefit in students who received *novel* scenario-based simulation training in addition to the *traditional* didactic REVIVE! curriculum on a Post-Didactic Questionnaire (PDQ).

Methods

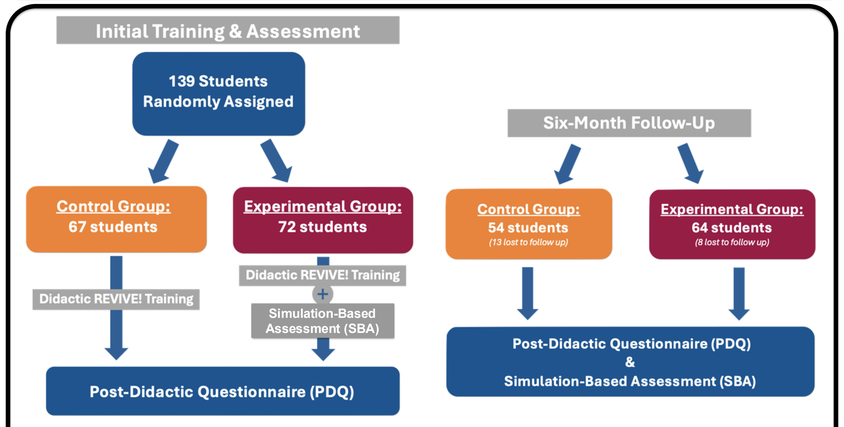

Figure 2. Example flowchart of group assignments, exposures, and assessments for the class of 2027.

Over the course of two years, 255 first year medical students were recruited from the VCOM-Virginia classes of 2027 (n=139) and 2028 (n=116). The study consisted of two parts. In the initial portion, participants were given traditional didactic REVIVE! training, after which they were divided into two groups. The control group received no additional training, whereas the experimental group underwent an additional Simulation-Based Assessment (SBA). Both groups were given a Post-Didactic Questionnaire (PDQ) to measure their knowledge of the REVIVE! learning objectives. At 6-months post-training, both groups were given the identical SBA and PDQ. SBAs were assessed on ability to correctly identify an opioid vs non-opioid case, time to recognition, and self-reported confidence to perform the skills in a real-world situation.

A two-tailed, t-test was used to compare the time to recognition and confidence in real world performance. A t-test was also performed to compare the PDQ score-change between the control and experimental groups at 6-month follow-up.

Results

Simulation-Based Assessment (SBA) Performance between Experimental and Control Groups at Six-Month Follow-Up

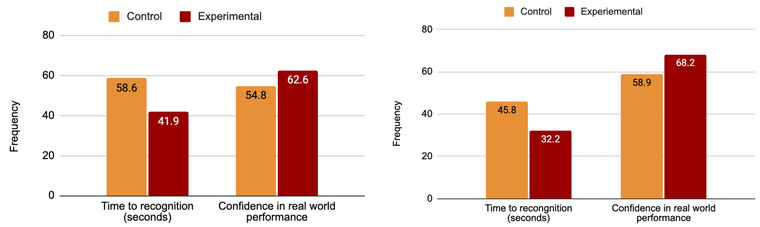

Figure 3. (A) Class of 2027 time to recognition and confidence in real world performance of the control and experimental groups during simulation. (B) Class of 2028 time to recognition and confidence in real world performance of the control and experimental groups during simulation. (A) With a p-value of 0.000559 for time to recognition and a p-value of 0.037 for confidence in real world performance, the results are both statistically different. (B) A p-value of 0.00351 for time to recognition and a p-value of 0.0825 for confidence in real world performance were found, showing statistically significant results for time to recognition, but not for confidence level.

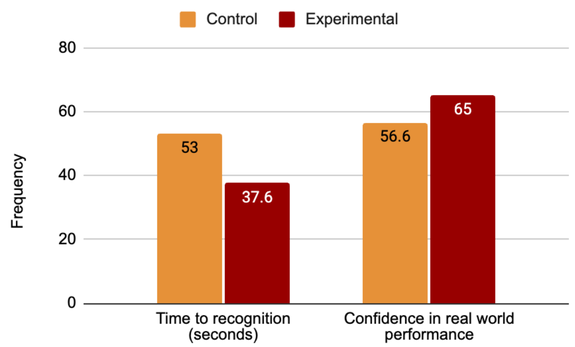

Figure 4. Histogram comparing time to recognition and confidence in real world performance of control and experimental groups from all participants across class of 2027 and 2028. With a p-value of 0.0000193 for time to recognition and a p-value of 0.0127 for confidence in real world performance, the results are both statistically different.

Post-Didactic Questionnaire (PDQ) Score Change at Six-Month Follow-Up

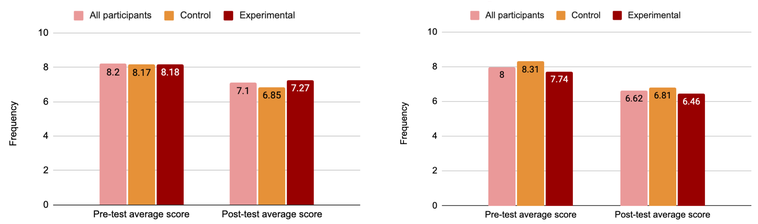

Figure 5. (A). Class of 2027 PDQ score change of the control group (n=54) vs. experimental group (n=64) at 6-month follow-up. (B). Class of 2028 PDQ score change of the control group (n=42) vs. experimental group (n=50) at 6-month follow-up. The average score change for the control groups was -1.41 and for the experimental groups was -1.18. There was not a statistically significant difference between groups in score change at follow-up (P-value of 0.24).

Discussion

AIM 1: Performance in Simulated Experience

- There was a significant difference in average time to recognition between the simulation-trained group and didactic-trained group for both the class of 2027 and class of 2028 (Fig. 3).
- There was a significant difference in confidence in real world performance (0-100) between the simulation-trained group and didactic-trained group for the class of 2027, however the class of 2028 confidence levels did not reveal a significant difference (Fig. 3).
- The combined data for both classes of participants showed a significant difference for both average time to recognition and confidence levels when comparing the control and experimental groups (Fig. 4)
- These results suggest that the addition of our novel scenario-based simulation training may better prepare students for practical application of acquired knowledge, possibly leading to improved performance in an opioid overdose related emergency

AIM 2: Material Retention

- Retention was lost at a higher rate for the traditional didactic (control) training group compared to the novel, realistic scenario-based simulation (experimental) group.
- The average difference between assessment scores at initial intake and 6-months for the control group was -1.41, whereas the experimental group difference was -1.18, this was not a significant difference in long-term retention of knowledge (Fig. 5).

Limitations

- All study participants were first-year osteopathic medical students. Their level of medical knowledge may limit generalizability to the greater public.
- The discrepancy in confidence levels between the Class of 2027 and 2028 is thought to be a result of lower power for the Class of 2028 data given that there were fewer participants for that class. We believe the combined data is more representative of what would be seen in future study populations as the project continues.

Future Directions:

- Continue the study with VCOM-VA Class of 2029.
- For future studies, the protocol should be revised to improve standardization of the simulation-based assessment to limit evaluator subjectivity.
- Relay study results to DBHDS and NRV Community Services to improve efficacy of training in the community and to broaden the generalizability of these findings.
- Consider implementing this study protocol on groups more comparable to the general population.

Additional Information

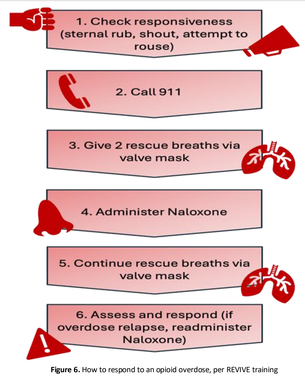

Figure 6. How to respond to an opioid overdose, per REVIVE training

Figure 7. Image of Narcan nasal spray. [2]

References

Acknowledgements

The research team would like to acknowledge the Simulation Center, associated staff, and student interns at the Edward Via College of Osteopathic Medicine for their support in implementation of this study.