Experience of a Head and Neck Otolaryngology Surgical Simulation and Cadaveric Dissection Bootcamp in Ghana

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Introduction

The population of Ghana is approximately 30.8 million.[1] Currently, approximately 50 otolaryngologists serve Ghana's patient population with a small population being head and neck trained.[2] In part, this is caused by a low level of satisfaction with the otolaryngology training programs offered and their didactic teaching.[3] Simulation training and cadaver dissection are well-established educational tools in the United States that can supplement and expand on traditional training in residency. The curriculum for Otolaryngology residency training in Ghana is still developing to accommodate a growing resident cohort. Simluation and cadaveric dissection courses provide an avenue to develop hands-on skills and self-efficacy and also address some of Ghana's unmet didactic needs. Additionally, global humanitarian efforts focused on curriculum development and resident training may have expansive effects.

Objectives

1. To evaluate the feasibility of a surgical simulator and cadaveric dissection Otolaryngology bootcamp in Ghana.
2. To evaluate how a surgical simulator and cadaveric dissection bootcamp affects trainee self-efficacy.

Table 1 Pre and post-survey questions and mean response scores for surgical skills simulator bootcamp (10 is highest response); SD: standard deviation. *p<0.05

Survey Question	Pre Mean Score (SD)	Post Mean Score (SD)
1. My confidence level in my ability to remove an ear canal foreign body.	6.24 (3.28)	8.89 (1.33)*
2. My confidence level in my ability to drain a peritonsillar abscess.	4.19 (2.95)	8.72 (1.76)*
3. My confidence level in my ability to perform fiberoptic and indirect laryngoscopy.	4.52 (3.42)	8.22 (1.65)*
4. My confidence level in my ability to perform mask ventilation on a patient.	5.38 (2.38)	9.06 (0.91)*
5. My confidence level in my ability to intubate a patient.	4.05 (2.89)	8.28 (1.73)*
6. My confidence level in my ability to manage epistaxis.	6.10 (2.43)	9.11 (1.29)*
7. My confidence level in my ability to perform a cricothyroidotomy.	3.43 (2.97)	8.39 (1.70)*
8. My confidence level in my ability to change a tracheostomy tube.	5.71 (3.71)	9.17 (1.38)*
9. My confidence level in my ability to close wounds.	6.57 (2.32)	8.88 (1.32)*
10. My confidence level in my ability to manage a patient with angioedema and airway compromise.	3.86 (2.12)	8.59 (1.65)*
11. My confidence level in my ability to manage a patient with laryngospasm.	3.14 (2.14)	8.17 (1.54)*
12. My confidence level in my ability to manage a patient with a neck hematoma.	4.05 (2.50)	9.00 (1.29)*
13. My confidence level in my ability to manage a patient in a team setting.	6.43 (2.13)	8.61 (1.42)*

Table 2 Pre and post-survey questions and mean response scores for cadaveric dissection course (10 is highest response); SD: standard deviation. *p<0.05

Survey Question	Pre Mean Score (SD)	Post Mean Score (SD)
1. My confidence level in understanding the steps to perform a neck dissection.	4.42 (2.62)	7.55 (1.40)*
2. My confidence level in my ability to perform a neck dissection.	2.84 (2.30)	6.35 (1.93)*
3. My confidence level in understanding the steps to perform a thyroidectomy.	4.95 (2.46)	8.10 (1.34)*
4. My confidence level in my ability to perform a thyroidectomy.	2.63 (2.62)	7.00 (1.87)*
5. My confidence level in understanding the steps to perform a parotidectomy.	4.53 (3.20)	7.55 (1.47)*
6. My confidence level in my ability to perform a parotidectomy.	3.26 (2.69)	6.75 (2.02)*
7. My confidence level in understanding the steps to perform a tracheotomy.	7.32 (2.90)	9.20 (0.87)*
8. My confidence level in my ability to perform a tracheotomy.	6.89 (3.26)	9.15 (1.01)*
9. My confidence level in understanding the steps to perform a laryngectomy.	4.42 (3.05)	8.15 (1.39)*
10. My confidence level in my ability to perform a laryngectomy.	2.00 (2.00)	6.95 (1.86)*

Methods

The Penn State College of Medicine, collaborating with the University of Ghana Medical Center, hosted a multi-day course for Ghanaian Otolaryngology residents in September 2024 with the goal of building surgical capacity. This included a skills simulation and emergency scenarios bootcamp and a head and neck surgical cadaveric dissection course. Pre- and post-surveys were administered to evaluate changes in resident self-efficacy. Responses were analyzed via paired T-test, a $p < 0.05$ was considered statistically significant.

Results

A total of 23 participants attended the bootcamp and cadaveric dissection course each. Of these, 12 were medical officers, 18 otolaryngology residents, 3 residents of other specialties, and 1 nurse. Responses to all post-course survey questions showed statistically significant improvement ($p<0.05$), corresponding to improved confidence, comfort, and understanding of included procedures **(Table 1-2)**. The mean difference was higher in medical officers compared to otolaryngology residents, indicating that there were greater improvements to self-efficacy in more junior residents **(Table 3)**. Free-response feedback showed participants found the hands-on components and simulations to be the most beneficial aspects of the course. The availability and quality of equipment were major areas for improvement.

Conclusion

Hands-on simulator and dissection courses have a positive benefit on resident training in Ghana in terms of self-efficacy. Despite existing challenges, experiential learning opportunities may be helpful in improving education in resource-restricted environments and improve downstream clinical patient care.

Table 3 Mean difference of pre-to-post survey scores for medical officers and otolaryngology residents for the simulator bootcamp; SD: standard deviation, n: number.

Mean Difference of Pre-to-Post Survey Scores for Simulator Bootcamp

Question Number	Medical Officer			Otolaryngology Resident		
	Mean	SD	n	Mean	SD	n
1	4.25	0.83	4	1.56	1.95	9
2	5.00	0.71	4	3.22	2.20	9
3	5.25	1.48	4	2.67	1.89	9
4	3.75	2.68	4	3.56	2.11	9
5	3.50	1.50	4	3.38	2.34	8
6	4.00	1.58	4	2.89	1.73	9
7	5.00	1.87	4	4.33	2.49	9
8	5.25	2.05	4	2.11	2.96	9
9	3.67	1.70	3	2.67	2.40	9
10	5.25	1.79	4	4.44	1.89	9
11	4.75	1.30	4	4.33	1.05	9
12	5.50	1.12	4	3.89	2.23	9
13	1.75	0.83	4	1.89	1.59	9

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The authors have nothing to disclose.