Barriers to Video Laryngoscopy in Low-Middle Income Countries

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Structured Abstract

Background

Video laryngoscopy (VL) was first introduced into western healthcare practice in 2001. Since its introduction, it has become the standard for safely and efficiently managing a difficult airway. Unfortunately, using this practice-changing technology is not a privilege that all countries have. Many countries, specifically low-middle-income countries (LMICs), encounter barriers preventing them from accessing this technology. These barriers include, but are not limited to, financial resources, education, and training. Recently these barriers were crossed when using a 3D printed VL scope, the AirAngel blade, in a surgical mission to Guatemala. At a small, rural surgical clinic, this device was used to safely manage the airway of a patient possessing the characteristics significant for a suspected difficult airway.

Clinical Question

Does a 3D printed video laryngoscope, like the AirAngel Blade, effectively and safely accommodate the VL needs of patients with a suspected difficult airway in LMICs?

Evidence Based Discussion

Using a VL scope for this patient was based on assessment of the patient's physical characteristics placing her at an increased risk for a difficult airway. Video laryngoscopy increases likelihood of intubating a patient on the first try, decreasing the time to secure a patient's airway, and decreases complications with managing a difficult airway. Video laryngoscopy is normally not available at this clinic due to barriers to accessing this technology. Consequentially, research has consistently shown that there is a higher rate of airway complications in LMICs. Barriers to accessing VL technology include cost, education and training, and a poor business environment. Popular VL scopes in the US cost anywhere from $1500 - $3500, however, a 3D printed AirAngel blade is around $100. Research has shown that 3D printed technology is a reasonable technology to use to reduce the barriers to cost associated with VL technology in LMICs. 3D printed technology is not the only necessary equipment for introducing a low-cost alternative to traditional VL scopes, like the AirAngel blade. Other resources necessary include an Android smart phone, and a compatible flexible endoscope for using the AirAngel blade. For an innovative technology to become standard of care, literature supports installing an effective education and training strategy with a country's anesthesia providers. Advocacy efforts with business and government leaders are also encouraged to navigate poor business and regulatory environments in specific LMICs.

Translation to Practice

As the literature has shown, 3D printer technology enables anesthesia providers to create cost-effective solutions to oftentimes expensive problems. This is the case for 3D technology in VL scopes. The AirAngel blade has been successful in providing the benefits associated with traditional VL while mitigating the cost-burden on LMICs associated with VL. Initial steps towards applying this evidence into practice include partnering with hospitals/clinics in LMICs with a need for the AirAngel blade. Through the partnership, a CRNA can determine if the facility would benefit from integrating the AirAngel blade into practice. Once need and benefit is determined, an education and training strategy would be formed and carried out by CRNAs native to the LMIC or otherwise uniquely connected to the LMIC. This training program would involve a) educating nurse anesthetists (or nurses with additional training in anesthesiology) regarding the physiology behind why and when it is appropriate to use a VL scope, b) training in how to use the AirAngel blade to successfully manage a patient's airway, c) training in managing the AirAngel blade product and associated equipment, and d) provide follow-up instruction periodically to ensure the success of this strategy. If the LMIC did not have nurse anesthetists or nurses educated in anesthesiology (as not all countries have specific titles or board-certified nurse anesthetists), the first step would be to find and educate nurses interested in providing anesthesia in anesthesiology.

Future research that could provide additional clarity on this issue includes examining the success rate of programs like these. Other topics of importance include determining the various business and regulatory environments in different LMICs, to better understand other barriers that could be present. Lastly, a systematic RCT or meta-analysis to specifically target the success rate of the AirAngel blade in LMICs would be beneficial as well.

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Keywords: video laryngoscopy, low-middle income countries, 3D printing

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Learning Outcomes

At the completion of the presentation, the participants will be able to:
1. Analyze the various barriers to accessing video laryngoscopy scopes in low-middle income countries (LMICs).
2. Understand how CRNAs in the United States can aid the global anesthesia community by using 3D technology to equip anesthesia providers with VL scopes in LMICs.