
Strong Support for a Context-Specific Curriculum on Non-Technical Skills for Surgeons (NOTSS)

Y Lin^{1,2}, JW Scott^{1,3,4}, Z Mutabazi⁵, D Smink^{3,4,6}, S Yule^{3,4,6}, R Riviello^{1,3,4,6}, G Ntakiyiruta⁵¹Program in Global Surgery and Social Change, Harvard Medical School, Boston, MA²Department of Surgery, University of Colorado, Aurora, CO³Center for Surgery and Public Health: Harvard Medical School, Harvard T.H. Chan School of Public Health, and the Department of Surgery, Brigham and Women's Hospital, Boston, MA⁴Department of Surgery, Brigham and Women's Hospital, Boston, MA⁵Department of Surgery, College of Medicine and Health Sciences, University of Rwanda, Kigali, Rwanda⁶STRATUS Center for Medical Simulation, Brigham & Women's Hospital, Boston, MA**Correspondence to:** Yihan Lin, Email: yihan.lin@mail.harvard.edu**DOI:** <http://dx.doi.org/10.4314/ecajs.v21i3.1>

Introduction

In the operating room, almost one-half of all surgical errors happen as a result of a failure of non-technical skills, rather than technical mistakes¹. These non-technical skills, identified as situation awareness, decision making, communication and teamwork, and leadership, are critical to the success of a procedure². However, in the current training model, the majority of our efforts have been placed on developing the technical expertise of trainees, often with a missing emphasis on teaching these non-technical skills.

Fortunately, there has been increasing acknowledgement of the critical nature of non-technical skills to provide high-quality surgical performance. A curriculum has been specifically designed to teach surgical residents these skills through observation and feedback, called Non-Technical Skills for Surgeons (NOTSS)². The NOTSS curriculum is composed of didactic lectures, teaching videos, discussion sessions, as well as a rating tool to identify areas for personal performance improvement and monitor progress. This curriculum was first developed in Scotland and has been tested in multiple different settings, including the United States, where it has since been integrated into the core training for surgical residents. However, there has not been an evaluation of non-technical skills in low- and middle-income settings. Specifically, little is known about the non-technical skills used by providers in LMICs and how to adapt existing NOTSS educational tools to the LMIC context.

Due to the importance of this topic, our goal was to obtain more information on how the NOTSS curriculum could be integrated into a low- and middle-income setting. As the authors work in the setting of Rwanda in a tertiary government hospital with surgical trainees, we hoped to characterize the attitudes of Rwandan surgical care providers on existing and modified NOTSS curricula.

Methods

Initially, we conducted 35 interviews with Rwandan providers including surgeons, anesthesiologists, and nurses. We also observed multiple operations, for over 50 hours, in operating rooms (ORs) at three tertiary Rwanda public hospitals. We found that although the NOTSS taxonomy was created in Scotland, the taxonomy was very relevant to the setting of Rwanda. Based on the data from our interviews, we adapted the existing NOTSS curriculum for the Rwandan context.

Our modified curriculum was presented via a one-day NOTSS master class at the University Teaching Hospital of Kigali, Rwanda. The master class utilized simulated OR videos from the US to reinforce learning of non-technical skills. We then surveyed 30 Rwandan surgeons, anesthesiologists, nurses, and trainees regarding their impressions of the components of the adapted NOTSS curriculum – situation awareness, decision making, teamwork/communication, leadership, and newly identified contextual factors – and its applicability to the Rwandan surgical context. Clinicians' attitudes regarding the accuracy, contextual applicability, and

preferred use of a modified NOTSS curriculum in Rwanda were assessed using questionnaires with a 4-point Likert scale.

Results

Twenty-five (83.3%) of the 30 participants completed the survey. Participants found the existing NOTSS taxonomy overwhelmingly consistent with their experience. When surveyed on how similar the main categories were to the Rwandan context, participants reported an 87% agreement for situation awareness, a 96% agreement for decision making, a 100% agreement for teamwork and communication, and a 92% agreement for leadership (Figure 1). However, the existing NOTSS videos, which were filmed in the United States under simulated conditions, were less representative with only 20% of respondents reporting strong clinical similarity to their context and 32% reporting little or no similarity to their context (Figure 2). 92% of respondents would prefer videos filmed in Rwanda with more applicable clinical scenarios. Participants also identified elements related to NOTSS that were novel to the Rwandan context, which include resource variability, multi-lingual theatre, variable capacity for rescue, and dynamic provider roles (where a shortage of staff results in surgical team members having to play multiple roles throughout an operation). Nearly all (96%) participants would like for a variant of NOTSS taught and implemented in Rwanda, and the vast majority (76%) prefers a context-specific curriculum.

Table 1. Are the following NOTSS categories relevant to the Rwandan context?

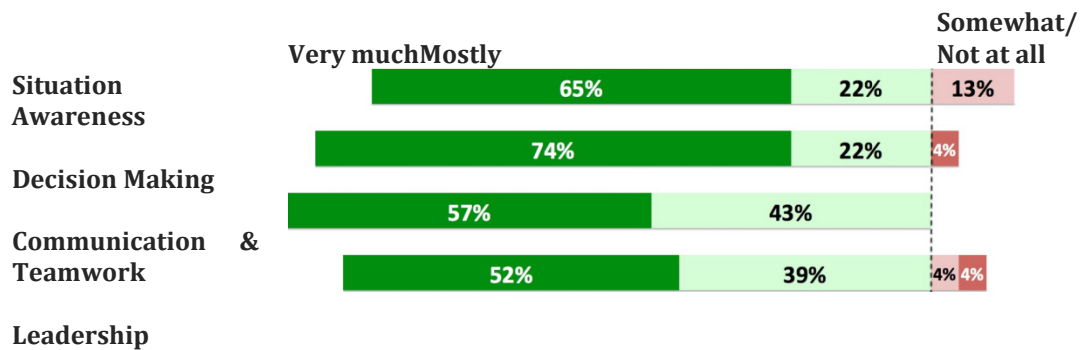
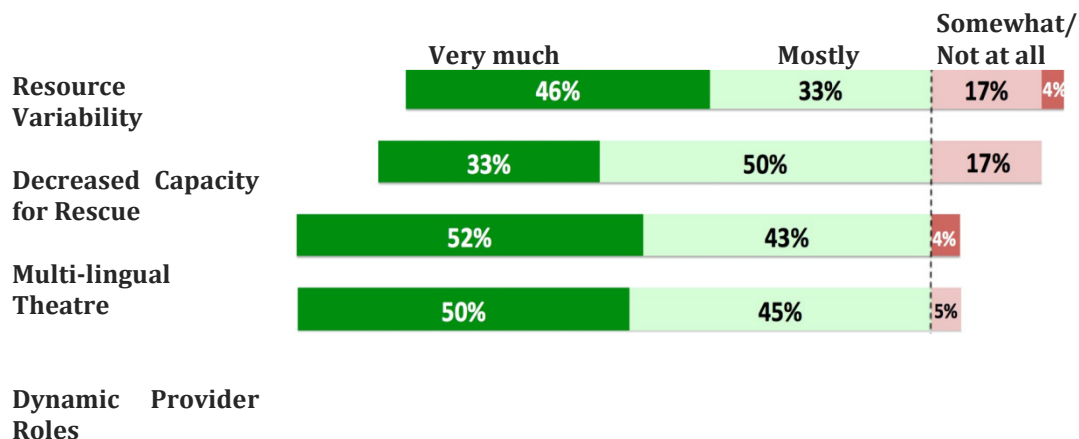


Table 2. Are the following unique to the Rwandan context?



Next Steps

These results show that the NOTSS curriculum is applicable and desired in Rwanda. However, such a curriculum should be context-specific, integrating unique aspects of the LMIC context and relevant clinical scenarios. These findings should be used to adapt NOTSS to LMIC contexts and tested for usability, reliability, and effectiveness in improving surgeons' non-technical skills. Therefore, the group plans to create a curriculum which is focused on providers practicing in LMICs, so as to improve outcomes in the operating rooms.

References

1. Gawande AA, Zinner MJ, Studdert DM, Brennan TA. Analysis of errors reported by surgeons at three teaching hospitals. *Surgery* 2003;133: 614-21.
2. Yule S, Flin R, Paterson-Brown S, Maran N, Rowley D. Development of a rating system for surgeons' non-technical skills. *Medical Education* 2006;40:1098-1104.