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Multidisciplinary Difficult Airway Course: An Essential Educational Component of a Hospital-Wide Difficult Airway Response Program

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OBJECTIVE: A hospital-wide difficult airway response team was developed in 2008 at The Johns Hopkins Hospital with three central pillars: operations, safety monitoring, and education. The objective of this study was to assess the outcomes of the educational pillar of the difficult airway response team program, known as the multidisciplinary difficult airway course (MDAC).

DESIGN: The comprehensive, full-day MDAC involves trainees and staff from all provider groups who participate in airway management. The MDAC occurs within the Johns Hopkins Medicine Simulation Center approximately four times per year and uses a combination of didactic lectures, hands-on sessions, and high-fidelity simulation training. Participation in MDAC is the main intervention being investigated in this study. Data were collected prospectively using course evaluation survey with quantitative and qualitative components, and prepost course knowledge assessment multiple choice questions (MCQ). Outcomes include course evaluation scores and themes derived from qualitative assessments, and prepost course knowledge assessment MCQ scores.

SETTING: Tertiary care academic hospital center

PARTICIPANTS: Students, residents, fellows, and practicing physicians from the departments of Surgery, Otolaryngology Head and Neck Surgery, Anesthesiology/Critical Care Medicine, and Emergency Medicine; advanced practice providers (nurse practitioners and physician assistants), nurse anesthetists, nurses, and respiratory therapists.

RESULTS: Totally, 23 MDACs have been conducted, including 499 participants. Course evaluations were uniformly positive with mean score of 86.9 of 95 points. Qualitative responses suggest major value from high-fidelity simulation, the hands-on skill stations, and teamwork practice. MCQ scores demonstrated significant improvement: median (interquartile range) pre: 69% (60%-81%) vs post: 81% (72%-89%), $p < 0.001$.

CONCLUSIONS: Implementation of a MDAC successfully disseminated principles and protocols to all airway providers. Demonstrable improvement in prepost course knowledge assessment and overwhelmingly positive course

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evaluations (quantitative and qualitative) suggest a critical and ongoing role for the MDAC course. (J Surg Ed ▮:▮▮▮-▮▮▮. © 2018 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: surgical training, simulation, multidisciplinary, airway management, difficult airway, clinical competency

COMPETENCIES: Practice-Based Learning and Improvement, Patient Care and Procedural Skills, Medical Knowledge, Interpersonal and Communication Skills

INTRODUCTION

A difficult airway exists when an anesthesiologist or other experienced provider is unable to ventilate a patient's lungs using bag-mask ventilation or is unable to intubate the trachea using direct laryngoscopy.[1] Management of a difficult airway—particularly in an emergency situation outside of the operating room—presents an important and somewhat unique dilemma from a medicolegal, procedural, and patient safety point of view. Although difficult airways are uncommon, complications associated with difficult airway management can be life-threatening. This situation arises less frequently in the operating room and intensive care environments, with studies quoting rates from 0.4% to 6.2% of all intubations.[2-4] When emergency airway management occurs outside the controlled environment of the operating room, this rate increases to 9% to 12%.[5-7] Despite the relative rarity of difficult airway events, from a patient safety and medicolegal standpoint, they remain extremely high yield. A closed claims analysis published in 2005 showed that brain injury and death were claimed in over half of all perioperative airway incidents and that individual pay-outs for such events were as high as $8,500,000.[8] The United Kingdom conducted an ambitious project on airway complications known as the Fourth National Audit Project, or NAP4. Results from the NAP4 report mirrors the North American experience in many ways, with a high rate of death and brain injury, and higher complication rates for out-of-operating room settings.[9] However, NAP4 also expanded on certain aspects of difficult airway complications, noting an increased risk of airway complications for obese patients and for airway events occurring after hours. Finally, the NAP4 report also noted an association between airway complications and providers who lacked training and expertise to use certain airway adjuncts such as fiberoptic techniques or capnography.

Given the low-frequency, high-stakes nature of emergency difficult airway events, The Johns Hopkins Hospital developed a hospital wide, multidisciplinary program to address this unique problem. The details and outcomes of the difficult airway response team (DART) program have been well described by Mark et al.[10] and have garnered international interest.[11] In brief, the program began in the early 1990s as a joint venture between the departments of Anesthesiology and Critical Care Medicine (ACCM) and Otolaryngology, Head and Neck surgery (OHNS). At that time, the program was targeted specifically at the response to intraoperative difficult airway events. The initial comprehensive airway program focused on improving safety, operations, and education inside the operating room and resulted in a significant decrease in airway-related adverse events.[12] In response to a series of airway-related adverse events within The Johns Hopkins Hospital, the scope of the DART program was expanded to include out-of-operating room difficult airway events. This change involved the incorporation of emergency medicine (EM) and trauma/acute care surgery (due to their 24-hour in-house coverage models) into the DART program as well as a substantial increase in the focus on multidisciplinary education. Ultimate approval for this phase of the DART program was gained in 2008 and was jointly funded by the Johns Hopkins Patient Safety Committee of and by the 4 departments involved in the initiative: ACCM, OHNS, Surgery, and EM.

The operations and patient safety aspects of the DART program, again as described previously by Mark et al,[10] were expanded upon from the pre-2008 time period. Call schedules and in-house coverage for out-of-operating room events were established. The logistics of universal airway equipment availability were expanded with the deployment throughout the hospital of a fleet of "DART carts" containing all essential airway equipment. The emergency response paging system was overhauled with the addition of a DART pager list. However, the most radical and important change in focus for the DART program in moving to out-of-operating room events occurred in the realm of education. For such a program to be successful in the hectic, interprofessional, and uncontrolled environment of out-of-operating room difficult airway events, a substantial hospital-wide educational undertaking was needed. It was in this setting that the multidisciplinary difficult airway course (MDAC) was created. The objective of this article is to describe the MDAC and qualitatively and quantitatively measure its effect on the course participants.

MATERIALS AND METHODS

The DART program's airway research database was reviewed by the Institutional Review Board (IRB) of Johns Hopkins University School of Medicine (NA_00089582). As a hospital-wide quality improvement project, the DART program was deemed exempt, and the IRB waived the need for informed consent for research related to the operational, safety, or educational aspects of the program.