# An Innovative Use of an Online Procedure Logbook to Improve Airway Training among Anesthesiology Residents

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**Original Article**

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*Abstract*

**Introduction:** We performed a single-institution pilot study to determine the potential value of an electronic logbook of airway procedures performed during a one month airway rotation for anesthesiology residents. For two years, CA-3 residents taking an advanced airway management rotation entered all airway procedures in this electronic logbook. We expected this logbook to produce results of potential use to program directors by determining the numbers of specific procedures performed by each resident.

**Methods:** All residents taking this rotation were required to enter specific data from each airway procedure into our on-line electronic logbook. Entered information was available in tabular form to the program director and each resident. Numbers of procedures with each technique were compared among residents and to a previously determined target number of procedures for several techniques.

**Results:** Sixty seven residents entered data for nine specific airway procedures over a 24 month pilot study duration. When compared to target numbers of procedures for specific techniques, we discovered most residents performed less than 2 standard deviations from the target number with flexible fiberoptic intubation (usually exceeding the target number) but greater than 3 standard deviations with surgical and percutaneous procedures (usually falling short of the target number). Analysis also determined that resident experience exhibited considerable variability as shown by the ranges of several techniques. Though there was a wide range of numbers for most techniques, most were within two standard deviations of the mean values of the technique.

**Conclusions:** The authors conclude that this electronic logbook was easily administered at minimal cost and administrative effort. Future studies may confirm the logbook as a feasible intervention permitting anesthesiology training programs to increase the breadth of data related to their resident airway education.

**Key words:** Airway management training, Clinical Competency, Clinical Assessment

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## Manuscript

### Introduction

Anesthesiology literature lacks a common definition of "competency" in airway management. Therefore, many anesthesiology training programs substitute numbers of supervised procedures as a proxy for adequacy of training.

Even this unofficial definition lacks credibility. A task force commissioned by the Society for Airway Management (SAM )that surveyed American and Canadian anesthesiology programs detected no commonly agreed upon minimum number of supervised procedures to achieve competency in specific airway management techniques.[1] More importantly, few programs could produce numbers of specific procedures performed by each resident despite widespread use of paper logbooks.

The Accreditation Council for Graduate Medical Education (ACGME) requires residents to submit annual numbers of supervised procedures for certain techniques. However, the selected techniques do not represent a current consensus of which techniques should be taught or how many supervised procedures of these limited techniques should be performed. [2]Because individual programs may emphasize or overlook certain techniques and have different target numbers for these techniques, the ACGME data are of limited use.

To remedy this lack of practical data for program directors, the authors of the Society for Airway Management task force recommended an electronic logbook for airway training. [1] Table 1 lists differences between the Montefiore Online Airway Procedure Logbook (MOAPL) and the ACGME website. The MOAPL created at our institution differs from the ACGME database in that it includes (1) more techniques, (2) more detailed clinical information on the sequence, success, and complications of each event, (3) supervisory faculty names, and (4) designations for awake and sedated intubations.

In this pilot study, we required all residents taking a one month advanced airway rotation to use this electronic logbook during their rotation. We hypothesized it was feasible to collect relatively complete MOAPL data, with minimal cost and effort, for an advanced airway rotation. The data provided would extend beyond the scope of current ACGME airway data collected.

### Methods

Our anesthesiology program at Montefiore Medical Center in New York requires all residents to take a one month rotation in advanced airway management. Prior to this pilot study, information about the airway experience was limited to faculty and resident impressions. During this pilot study, we required all residents to enter all airway procedures performed during this rotation. Procedures performed during other rotations were not recorded.

Figure 1 illustrates the entry page of the logbook and the first data entry page.
Based on informal data collected by the SAM survey, our program director previously assigned target numbers of supervised procedures for each of several techniques**.** [1] We expected, as part of

the rotation, that the actual number of procedures performed in each of these techniques would meet or surpass this target number. As residents entered information during this pilot study, they could compare their running totals with the target numbers of our program through an on-screen display.

Residents were encouraged to enter procedures on the same day as the actual procedure. While the program director and faculty encouraged residents to enter all procedures, logbook entries were not compared to anesthesia records or ACGME case log data.

We noted any modifications in airway training added by our program director after evaluation of the pilot study results.

IRB exemption was granted for this retrospective, observational study.

**Results**

Over a 24 month period, 67 residents participated. They entered data from 3,607 supervised procedures, an average of 54 procedures per resident per month. As an example of data collected, Table 2 shows total procedures performed compared to target totals as well an analysis of mean, median and range.

Data revealed that videolaryngoscopy, awake intubation, and intubation through supraglottic airways fell short of the target number, while direct laryngoscopy and flexible fiberoptic intubation techniques exceeded the target number.

Some residents achieved large numbers in some techniques but little or no experience in others. Examples of the large range in techniques are flexible fiberoptic and direct laryngoscopy with the Miller blade. Flexible fiberoptic intubation demonstrated a resident minimum of 8 and a maximum of 30. Similarly direct laryngoscopy with a Miller blade demonstrated a resident minimum of 12 and a maximum of 38 (table 3). Additionally, wide variation existed in a number and variety of procedures performed by individual residents; examples are shown in Table 3**.**

**Discussion**

This online airway logbook successfully permitted collection of a detailed log of airway management procedures.

After this tally was available, the program director made changes in airway training. Examples of these changes included altering daily resident assignments to maximize opportunities for specific procedures and arranging an additional CA-3 rotation on the Otorhinolaryngology service to gain surgical airway skills.

Two observations indirectly related to anesthesia resident training were made: (1) Many faculty lacked airway skills themselves; additional airway training was made for faculty remediation. (2)

Directors of non- anesthesiology training programs (e.g., respiratory therapy) expressed interest in the MOAPL to document procedures by their trainees rotating through our service to gain airway experience.

Our informal impression is that data entry into this electronic logbook was not more onerous or time-consuming than ACGME entry, but we did not measure either parameter. Once in use, the website required minimal maintenance from our departmental IT officer. Based on our experience creating this pilot website, we expect future modifications to reflect changing devices or techniques which will require minimal additional effort. The authors intend to maintain the MOAPL website locally and make it available to other institutions.
The pilot study has significant limitations. The authors can neither determine if residents entered data for all procedures they performed, nor can the changes to the advanced airway rotation by the program director be conclusively attributed to the MOAPL. Information from the MOAPL may not be more robust than that from the ACGME case log database as the ACGME case logs are presently mandatory for program accreditation while our logbook is not. Additionally, it is unclear whether the modification of training to SAM targets will improve skills in advanced airway management.

In spite of these limitations, the MOAPL was subsequently applied to all residents during their three year training, starting with the next entering CA-1 year. Before our pilot study was completed, use of this electronic logbook expanded to nine other anesthesia training programs in North America and India. This extensive data collection may permit larger, controlled, prospective studies to determine the real value, if any, of an electronic airway procedure logbook to improve airway training at anesthesiology residencies.

The authors conclude that this electronic logbook was easily administered at minimal cost and administrative effort. Future studies may confirm the logbook as a feasible intervention permitting anesthesiology training programs to increase the breadth of data related to their resident airway education.

## Acknowledgements, Disclaimers

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**Financial disclosures and potential conflicts of interest:** None.

## References

1. Pott LM, Randel GI, Straker T, et.al, A Survey of Airway Training among US and Canadian Anesthesiology Residency Programs. Journal of Clinical Anesthesiology. 2011 Feb 23(1):15-26.

2. Borovcanin Z, Shapiro JR. Design and Implementation of an Educational Program in Advanced Airway Management for Anesthesiology Residents. Anesthesiology Research and Practice. 2012; vol 2012, Article ID 737151. http://www.hindawi.com/journals/arp/2012/737151/ accessed May 13, 2014

## Tables

### Table 1- Comparison of ACGME and Montefiore Online Airway Procedure Logbooks

| | Montefiore Online Airway Procedure Logbook | ACGME WEBSITE |
|---|---|---|
| **Supervising faculty** | X | X |
| **Ease of use** | X | X |
| **Resident demographics** | X | X |
| **Particular techniques** | X | X |
| **Patient demographics** | | X |
| **Participation of personnel other than residents** | X | |
| **Tracking of multiple attempts/multiple devices at intubation on same patient** | X | |
| **Tracking of specific airway complications** | X | |
| **Baseline comparison of residents to other institutions nationally** | *****X | **X |
| **Baseline comparison of residents to other institutions internationally** | X | |
| **Extra analysis/ multiple reports to program director** | X | |
| **Tracking of airway nerve blocks** | X | |
| **Extensive airway device list** | X | |
| **Participation mandatory** | * | X |

***Sample of accredited programs, maybe required to participate locally by individual program**

**** All United States accredited programs**

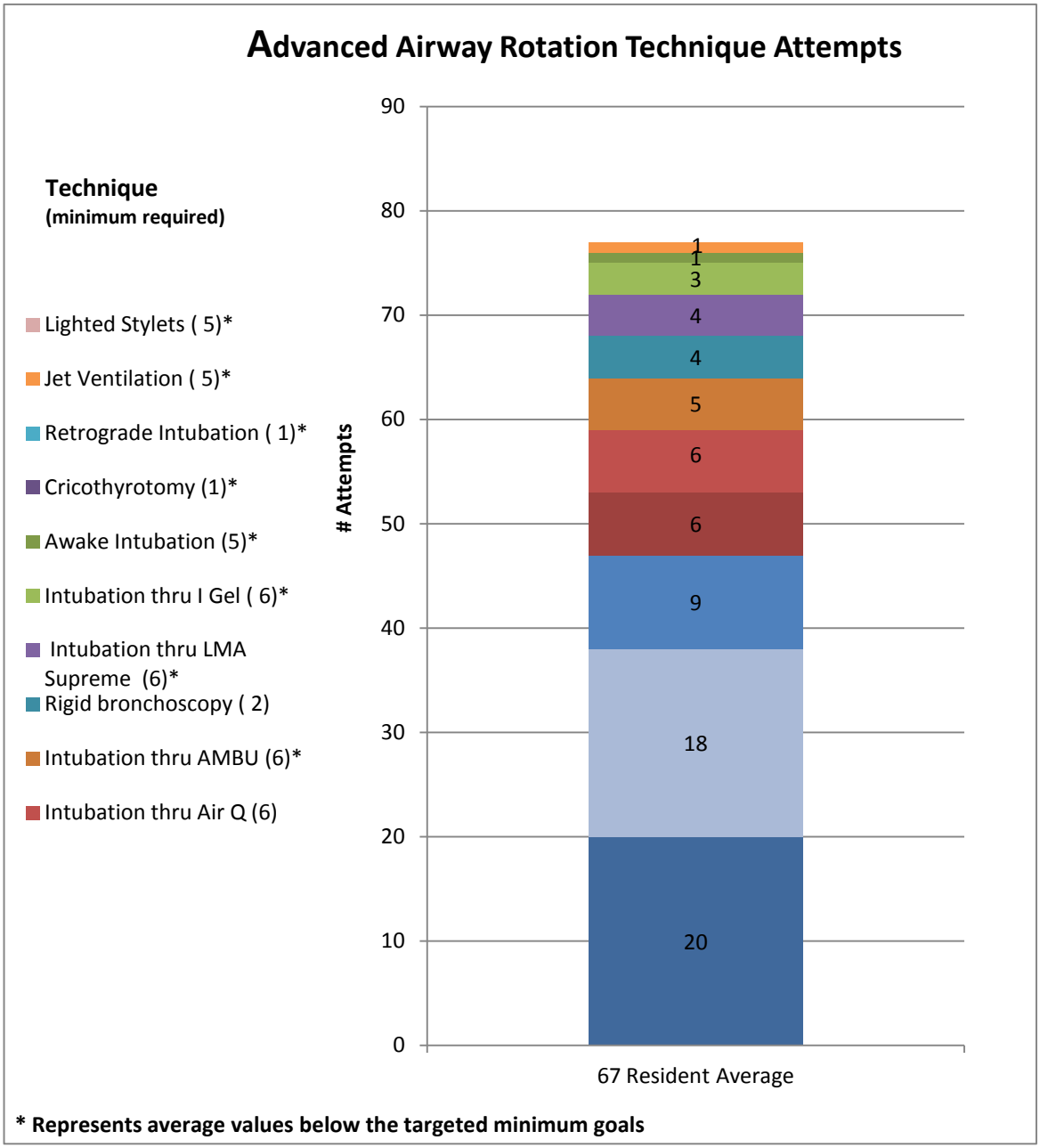
**Table 2 – Total number of procedures for 67 residents with mean, median, and range for 1 month advanced airway rotation**

| Airway Technique | Target Goal/Procedures per resident | Mean Procedures per resident | Median Procedures per resident | Range Procedures per resident | Total procedures 67 residents 24 months |
|---|---|---|---|---|---|
| **Direct laryngoscopy-Miller** | 10 | 20 | 35 | 12-38 | 1354 |
| **Videolaryngoscopy*** | 10 | 6 | 13 | 8-20 | 414 |
| **Awake Intubation** | 5 | 1 | 1 | 0-1 | 84 |
| **Cricothyrotomy **** | 1 | 0 | 0 | 0 | 5 |
| **Rigid Bronchoscopy** | 2 | 4 | 6 | 0-10 | 298 |
| **Intubation thru AMBU** | 6 | 5 | 6 | 5-9 | 43 |
| **Intubation thru Classic LMA** | 6 | 9 | 9 | 6-11 | 64 |
| **Intubation thru Air Q** | 6 | 6 | 8 | 7-10 | 45 |
| **Intubation thru I Gel** | 6 | 3 | 4 | 3-6 | 19 |
| **Intubation thru LMA Supreme** | 6 | 4 | 5 | 3-5 | 37 |
| **Retrograde Intubation** | 1 | 0 | 0 | 0 | 0 |
| **Jet Ventilation** | 5 | 1 | 1 | 1-4 | 34 |
| **Flexible fiberoptic** | 15 | 18 | 20 | 8-30 | 1210 |
| **Lighted Stylets** | 5 | 0 | 0 | 0 | 0 |
| **Total All Procedures** | 89 | 77 | - | - | 3607 |

*** Includes Airtraq which is an optical laryngoscope**

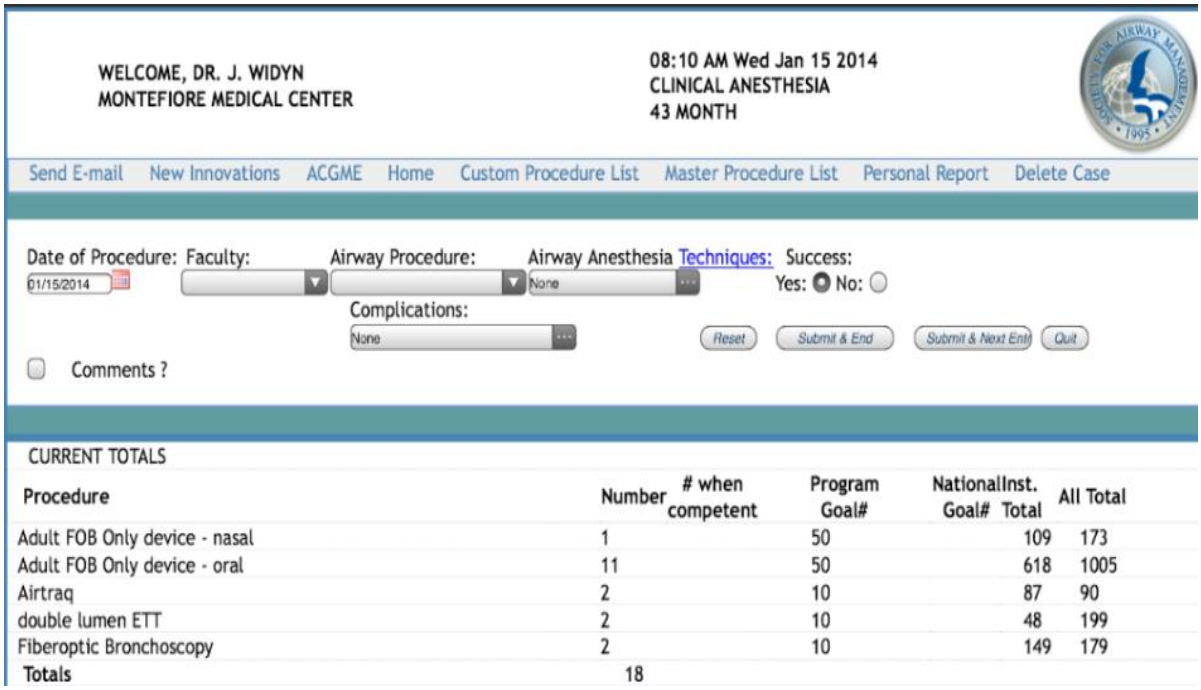
**** 5 procedures attempted on mannequin – none were successful**

**Table 3 - Resident technique attempts and averages**




The number "0" represents either no attempts or successful attempts in cricothyrotomy, retrograde intubation or lighted stylet.

**Figure 1- Sample Website Log In and Entry Page**


| Procedure | Number | # when competent | Program Goal# | NationalInst. Goal# | Total | All Total |
|---|---|---|---|---|---|---|
| Adult FOB Only device - nasal | 1 | | 50 | | 109 | 173 |
| Adult FOB Only device - oral | 11 | | 50 | | 618 | 1005 |
| Airtraq | 2 | | 10 | | 87 | 90 |
| double lumen ETT | 2 | | 10 | | 48 | 199 |
| Fiberoptic Bronchoscopy | 2 | | 10 | | 149 | 179 |
| Totals | 18 | | | | | |