

## Mobile Anesthesia Applications as Point-of-Care Tools for CRNAs in Clinical Practice

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### Abstract

The practice of anesthesia requires knowledge of procedures, patient conditions, comorbidities, and medications, as well as the ability to continually assess and respond to the patient's status. The use of mobile anesthesia applications (apps) has become increasingly common among Certified Registered Nurse Anesthetists (CRNAs) to provide immediate access to current information regarding anesthesia administration and to support optimal patient care. The purpose of this study was to assess the use of mobile anesthesia apps used by CRNAs as point-of-care (POC) tools in their anesthesia practice.

Data reported was collected from a survey designed to sample CRNAs who have been in practice for three years or less ("recent" graduates) and who utilize mobile anesthesia apps. The survey was offered to members of a Facebook group called *CRNAs and SRNAs*. A total of 160 practicing CRNAs completed the survey and reported the ways they currently use a mobile anesthesia app. Users report benefits to practice from using these apps. This data should be encouraging to the developers of mobile health care apps and a motivating factor for more practitioners to utilize them.

### INTRODUCTION

The practice of administering anesthesia is in a continuous state of growth and change, which presents a challenge to both the novice, as well as the experienced practitioner. Mobile apps, specific to the practice of anesthesia, can provide immediate access to up-to-date information on techniques, specific patient populations, medications, surgical procedures, and patient conditions, as well as other tools that can assist practitioners in optimal management of cases<sup>1,2,3,4,5</sup>. Such technologies have been successful in many areas of health care practice and can play an important role in reducing errors and improving patient outcomes<sup>6,7,8,9</sup>. The most commonly used apps by anesthesia providers (anesthesiologists, CRNAs) include Epocrates, followed by a combination of Vargo Anesthesia, Medscape and Blockbuddy<sup>8</sup>.

## METHODOLOGY

The purpose of the project was to examine the use of mobile apps by CRNAs in their practice. A literature review was conducted using CINAHL, Cochrane Library, PMC, PubMed, and ResearchGate databases. Search terms used for the review included “health care apps”, “mobile anesthesia apps”, “mobile apps as point-of-care tools”, “common areas in anesthesia”, “technology to improve health care”, “mobile devices in health care”, “smartphones in health care”, and “mobile apps to decrease perioperative errors”.

A survey (Appendix A) was developed using the Technology Acceptance Model (TAM), a theoretical framework that explains how a user’s *perception* of usefulness and *ease* of use will determine whether or not they utilize available technology<sup>2</sup>. Volunteers were recruited from a private Facebook group named “CRNAs and SRNAs”, consisting of practitioners who use mobile anesthesia apps and are currently in practice with 3 years, or less, of experience. A group post explained the purpose of the survey consisting of 11 questions that included multiple-choice, fill-in-the blanks, and yes/no answers. Years of experience, clinical practice setting(s), specific mobile app(s) used, and opinions about standardization of mobile apps were also elicited. Data collection took place from June 13, 2019 through June 29, 2019, with 169 participants: 9 did not use apps, and 160 completed the survey.

159 participants responded to the question regarding which specific mobile app(s) they use. 96.2% use Vargo Anesthesia. Other ancillary apps included Block Buddy, ASRA Coags, SafeLocal, Heartpedia, UpToDate, Micromedex, Mednax CSA, Sanford Guide, Pedi Anesthesia, Epocrates, Medscape, MedEx, Pedi STAT, as well as anesthesia drug handbook and textbook apps.

## RESULTS

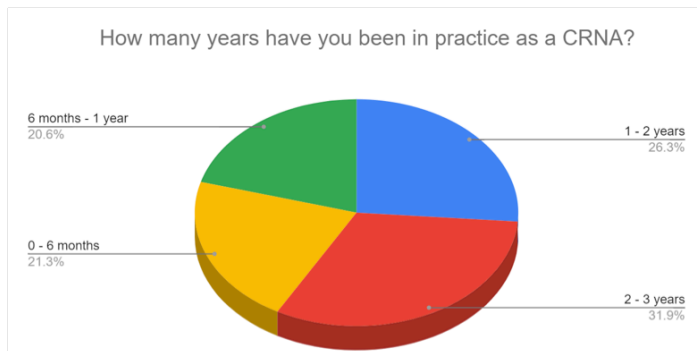


Figure 1. Years of experience as a CRNA.

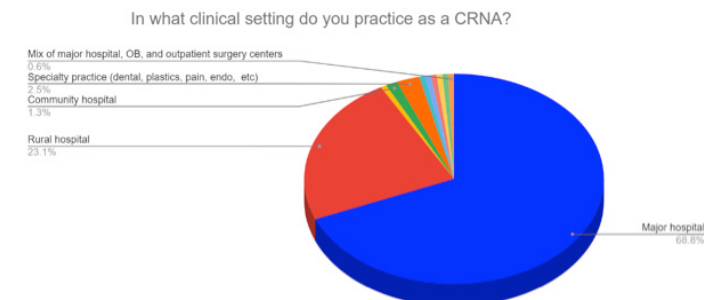


Figure 2. Clinical Practice Setting.

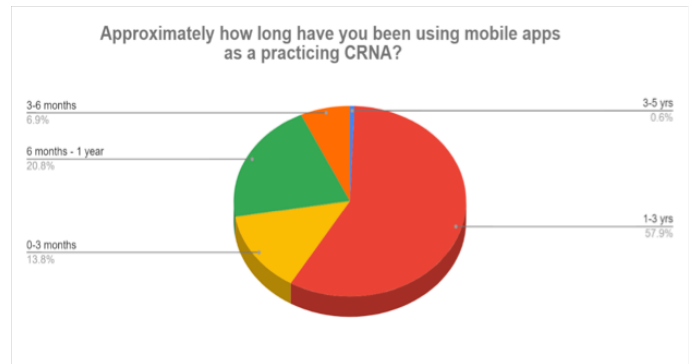


Figure 3. Length of time using a mobile anesthesia app as a practicing CRNA

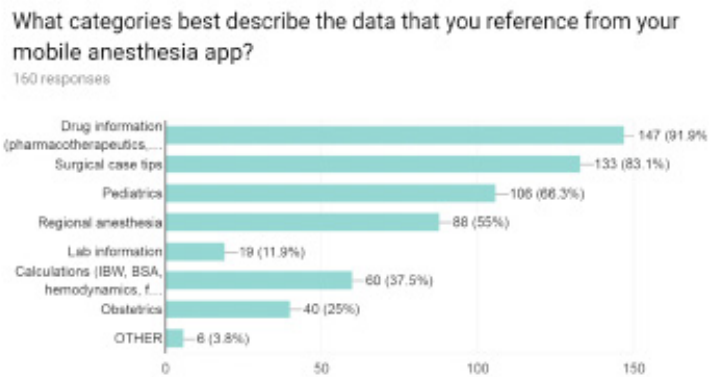


Figure 4. Data referenced using mobile health care apps.

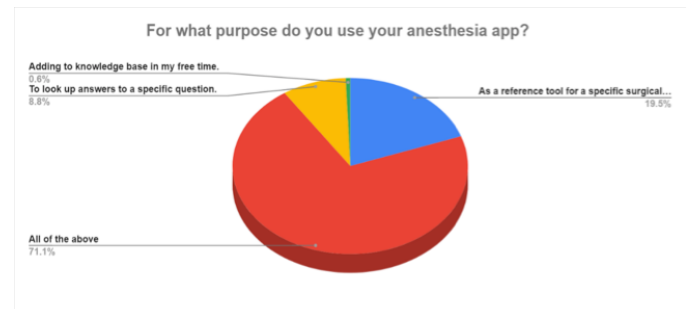


Figure 5. Purpose of using mobile anesthesia apps.

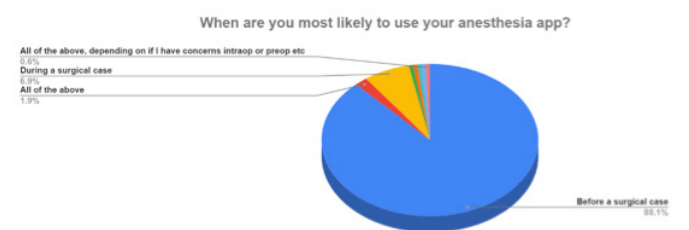
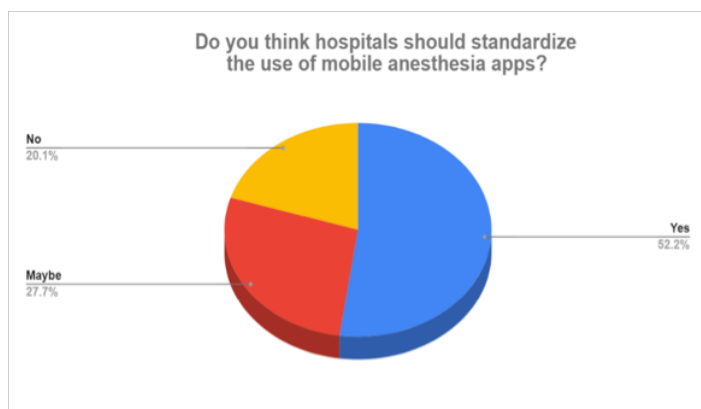
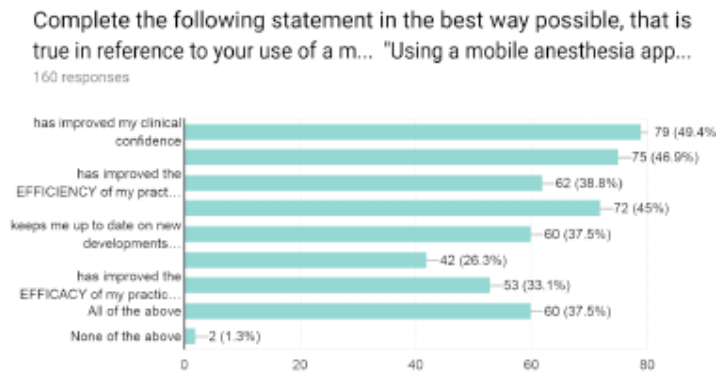
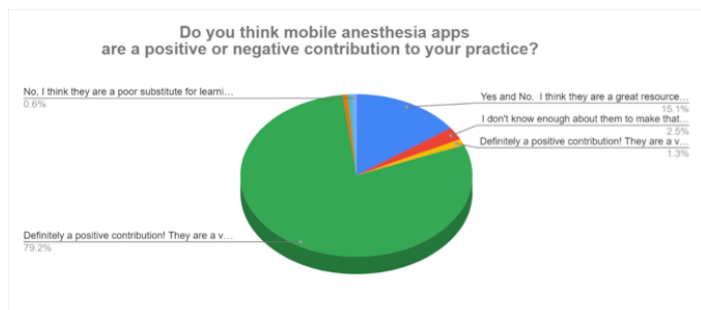


Figure 6. When CRNAs are most likely to use a mobile anesthesia app.

**Figure 7. Impact of using mobile anesthesia apps on CRNA practice.**



**Figure 8. Opinions on the standardization of mobile anesthesia by hospitals (N=160).**



**Figure 9. Mobile anesthesia apps positively or negatively contributing to CRNA practice.**

## DISCUSSION

It has been opined that mobile apps provide ready access to necessary information<sup>10,11</sup> that would otherwise only be available in textbooks, but there is a lingering belief that mobile devices present a distraction from patient care or even that the use of mobile devices in a patient care setting is unprofessional<sup>12</sup>. Even in this time of a computer in every pocket, some voice concern that they do not have the skills or knowledge to effectively use them. But considering that anesthesia is one of the most technology-intensive fields in healthcare practice, those attitudes are rapidly becoming anachronistic.

This study did not address such issues, nor was it intended to do so. But the data do demonstrate that the willingness of recent CRNAs to use mobile apps as POC tools is largely dependent on their ability to recognize the usefulness (and hopefully the limitations) of these apps in the practice setting.

As a caveat, although many anesthesia providers regularly use mobile health care apps, their employers may not explicitly authorize, monitor, or provide oversight for their use, and such issues should be broached before using them in the OR. A follow-up study would address usage and attitudes among more experienced CRNAs to evaluate the evolving needs for access to data before, during, and after procedures requiring anesthesia.

### Appendix A. Survey Questions

How many years have you been in practice as a CRNA?

In what clinical setting do you practice as a CRNA?

Do you currently use a mobile anesthesia app for a resource in your practice as a CRNA?

What mobile anesthesia app(s) do you use?

Approximately how long have you used a mobile anesthesia app as a practicing CRNA?

What categories best describe the data that you reference from your mobile anesthesia app?

For what purpose do you use your anesthesia app?

When are you most likely to use your anesthesia app?

Complete the following statement in the best way possible in reference to your use of a mobile anesthesia application (you may choose more than one selection).

Do you think hospitals should standardize the use of a mobile anesthesia app(s) for their anesthesia providers, including paying for any fees to support use of the app(s)?

Do you think mobile anesthesia apps are a positive or a negative contribution to your profession?

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## About the Authors

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Dr. Daniel Strickland is Medical Director of WJ Medical Associates where he serves as collaborating physician for a group of advanced practice providers in family medicine, pediatrics, and occupational health. He is also medical director for Stepping Stone of North Carolina, a state approved opioid treatment program.

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