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Original Article

Satisfaction with telemedicine among anesthesiologists during the COVID-19 pandemic

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The COVID-19 pandemic has rapidly changed the way that health care providers interact with patients, particularly through the widespread implementation of telemedicine. Previous studies in other medical specialties have examined the role of telemedicine and physician satisfaction with the modality [1], but no such studies have been reported in the field of anesthesiology. The purpose of the study was to evaluate the scope of use and satisfaction with telemedicine among anesthesiologists who were ASA and ESAIC members.

We developed a survey that was sent out to anesthesia providers through the European Society of Anaesthesiology and Intensive Care (ESAIC) and the American Society of Anesthesiology (ASA). The survey was open for the duration of 30 days, after which it was closed and no new responses could be generated. The survey comprised three major sections and examined, (1) the characteristics of the anesthesia providers, (2) the settings within which they were using telemedicine, and (3) their satisfaction with the experience. We performed analyses to determine if there was a significant difference in satisfaction for those who used telemedicine prior to COVID-19 compared to those who started using it during the pandemic.

There were a total of 708 responses from various provider demographics. Satisfaction with developing patient rapport was higher than satisfaction with airway and physical exam. Providers who were using telemedicine before the pandemic had consistently higher rates of satisfaction across all the sub-categories. Familiarity with the software could have played a role in this result. Overall, satisfaction among users was high and the majority of practitioners, 86.3%, plan to continue using telemedicine in their practice.

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1. Introduction

The first report of telemedicine being implemented in the field of anesthesia was in 2004 [1]. Historically, telemedicine has been seen as an opportunity to provide patients in remote and rural areas with better access to healthcare that is traditionally found in bigger cities [2]. It has also been studied as a method to reduce patient inconvenience and cost associated with preoperative evaluations, with high rates of patient and provider satisfaction [3]. A sizeable study performed at a large, urban, academic medical center found that preoperative evaluations using telemedicine had high rates of patient satisfaction, cost savings, and did not result in increased day-of-procedure cancellations [4]. Despite these findings and continuous technological advancements, telemedicine had not been widely adopted by anesthesia providers prior to the COVID-19 pandemic.

Several studies predicting the future of telemedicine in anesthesia were published just prior to the onset of the COVID-19 pandemic [5–8], however it was impossible for them to predict the effect that the pandemic would have on the use of telemedicine in healthcare in general, let alone in the provision of care by anesthesiologists. The provision of anesthesia, including intubation and ventilation, is fraught with risk of exposure to aerosol-borne diseases, including SARS-COV-2, and has been of considerable concern throughout the pandemic [9]. Even more concerning is
that a large proportion of COVID-19 infections are transmitted by asymptomatic and pre-symptomatic individuals [10], resulting in risk of exposure from unknowingly infected patients undergoing elective procedures. An ostensibly minor interaction, such as pulling down a mask to perform an accurate airway assessment in a preoperative clinic, could expose anyone in the vicinity to a potentially lethal disease [11].

Provider satisfaction with telemedicine in other medical specialties has been investigated [12], however, to date no studies have been done to determine anesthesia provider satisfaction with telemedicine during the COVID-19 pandemic.

The purpose of this study was to evaluate the scope of use of telemedicine and the satisfaction with it among anesthesia providers who are ASA or ESAIC members. We hoped to further elucidate the characteristics of providers using telemedicine and compare satisfaction rates between providers who were using it before the pandemic and those who were not. We hypothesized that the use of telemedicine would have increased dramatically since the beginning of the COVID-19 pandemic and that providers would be more satisfied with rapport building than with physical and airway exams.

2. Methods

We developed an anonymous survey comprising of three main sections (Fig. 1). The sections focused on (1) the characteristics of the anesthesia providers, (2) the settings within which they were using telemedicine, and (3) their satisfaction with the experience. If the respondents answered that they were not using telemedicine, the survey ended without asking further questions. The survey was created on Qualtrics XM (Seattle, Washington, USA). The study (i21-00701) was reviewed and approved by the NYU Langone Health IRB. The study was determined to meet the criteria for exemption for written consent.

The survey was distributed to members of the European Society of Anaesthesiology and Intensive Care (ESAIC) via the mailing list on May 30, 2021. Following IRB approval, the survey was distributed to members of the American Society of Anesthesiology (ASA) on three consecutive Saturdays (August 7, 14, and 21, 2021) also via the mailing list. The survey was open for the duration of 30 days, after which it was closed and no new responses could be generated. This manuscript adheres to the applicable TREND guidelines [13].

All statistical analyses were performed using Microsoft Excel. Descriptive statistics were calculated for all continuous and categorical variables. Continuous variables were reported as a mean and standard deviation, while categorical variables were reported as frequencies with percentages. A two-sample t-test assuming unequal variances was used to compare continuous variables. A value of p < 0.05 was considered statistically significant.

3. Results

We received 708 responses from anesthesia providers. Physician anesthesiologists were responsible for 97.9% of the responses. Most
of the responses came from the United States (55.6%) and Europe (35.2%), while 3% were from Africa/the middle east and 2% from Asia. The primary specialty of the providers was predominantly anesthesiology (84.6%), with pain medicine and critical care physicians representing 4% and 1% respectively. 9% of respondents practiced both anesthesiology and pain medicine.

Of the 708 responses we received, 35.5% of the respondents were using telemedicine. Of those currently using telemedicine, 69.2% did not use it prior to the COVID-19 pandemic. The majority of respondents practiced in an academic medical center (52.1%), followed by non-teaching hospitals (33.0%) and surgery centers (9%). The types of telemedicine visits conducted are further described in Fig. 2. Providers were most commonly using telemedicine preoperatively (51.9%), followed by in a pain clinic or office-setting (31.6%). The average duration of a telemedicine visit varied widely with the most common being 11–15 min (29.1%) followed closely by 16–20 min (28.6%), and 21–30 min at 14%.

The overall satisfaction with telemedicine among anesthesia providers during the COVID-19 pandemic was high, at 70.4% ± 25.3%. Satisfaction with developing patient rapport was similarly high, at 68.6% ± 24.9%. Satisfaction with conducting a physical exam and an airway exam was lower, at 34.5% ± 30.4% and 43% ± 33.1%, respectively. When we separated the respondents into two categories of those who already used telemedicine prior to the pandemic and those who did not, we found significant differences in rates of satisfaction across all subtypes (Table 1). Overall, those who used telemedicine prior to the pandemic were more satisfied with it. Most anesthesia providers (86.3%) intend to continue using telemedicine after the COVID-19 pandemic.

4. Discussion

The effects of the COVID-19 pandemic have been far-reaching, ranging from loss of life and ongoing symptomatic disease due to COVID-19, [14] to significant global socio-economic implications [15], to interrupted education and increased psychological burden on our children [16]. We would be hard-pressed to find an aspect of our lives that has not been affected by the pandemic. Thus, it is of utmost importance to mitigate the spread of disease and decrease the disruption it has caused in our society. Various measures have been taken to reduce the risk of exposure to the virus, including transitioning from using telemedicine primarily as a cost- and time-saving measure in rural areas to a widespread practice across medical specialties and geographic locations.

Our study found that anesthesiologist implementation of telemedicine has increased considerably since the start of the COVID-19 pandemic (69% of the responders now using telemedicine did not use it prior to the pandemic), and most plan to continue using it in some capacity beyond the pandemic. The majority of providers are satisfied with telemedicine overall, particularly with rapport building, but there is significant room for improvement in satisfaction with the physical and airway exams. These findings support our hypothesis.

We found that providers who were using telemedicine prior to the pandemic had statistically significant and consistently higher rates of satisfaction across all subcategories than those who did not use it before the pandemic. Our study does not have the capacity to provide any further information to explain those differences. However, we suspect that it could be due to familiarity with the software and ease of use, in addition to the fact that they chose to use telemedicine instead of being required to do so by outside circumstances.

Fig. 2. Types of telehealth visits.
The ability to evaluate the airway is a critical part of an anesthesia provider’s preoperative evaluation and allows the provider to adequately prepare when a difficult airway is expected. We found low rates of provider satisfaction with conducting an airway exam over a telemedicine platform. A negative opinion of telemedicine airway exams may be preventing more providers from using telemedicine for preoperative evaluations, and we could benefit from trying to improve and standardize the virtual exam. A recent study aimed at validating a telemedical airway exam found that there was no difference in the grading of thyromental distance measurements between the groups [17]. They found that having adequate lighting to see the back of the throat was an issue. Perhaps having patients use a ring light or flashlight to illuminate their throats would improve the quality of the airway exam. Using a ruler or an object of standard size might help providers improve the quality of the other aspects of the airway exam as well. Further studies are needed to develop a standardized approach that allows performing a reliable airway examination using telemedicine.

This study is based on a survey, so it naturally has the weaknesses that are inherent to an optional survey, including sampling bias. In addition, the survey was only sent out to members who subscribe to the mailing lists of the ASA and ESAIC. There are many anesthesia providers who are not members of those societies and therefore did not have the opportunity to respond to our survey, including providers in other parts of the world (although about 10% of the respondents were located outside of both Europe and North America) as well as non-physician providers. The survey was published in English only, so only people fluent in English could take part in the study. Our survey results were largely collected from physicians, and a limitation of the study is the lack of data from other anesthesia providers, including but not limited to nurse anesthetists. Future studies into this subject matter could gather information from a larger and more diverse group of providers. Another limitation of the study was based in the way some questions were formulated. There were certain questions in the survey where respondents could only choose one answer despite the fact that it was possible for multiple of the answers to apply to them. This became clear to us through responses typed in the “Other” answer boxes, and we sorted the survey responses into the appropriate categories to the best of our ability. However, if future studies are conducted with a similar survey structure, it could be beneficial for respondents to be able to choose multiple answer options or to have questions phrased in a way that limits confusion.

Table 1

| Overall Satisfaction | Rapport Satisfaction | Physical Exam Satisfaction | Airway Exam Satisfaction |
|----------------------|----------------------|-----------------------------|---------------------------|
| Pre-Pandemic Users   | 76.2% ± 22.8%        | 45.2% ± 31.3%               | 50.3% ± 30.4%             |
| Post-Pandemic Users  | 77.0% ± 24.5%        | 68.6% ± 24.9%               | 40.4% ± 33.1%             |
| All Users            | 70.4% ± 25.3%        | 34.5% ± 30.4%               | 43.0% ± 33.1%             |
| P-values (Pre- vs. Post-Pandemic Users) | 0.03                  | 0.02                        | 0.003                      | 0.04                      |

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CRediT authorship contribution statement

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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