

3-1-2021

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Recommended Citation

Quintão, Vinícius Caldeira; Simões, Claudia Marquez; Munoz, Gibran Elias Harcha; Barach, Paul; Carmona, Maria José Carvalho; and Brazilian Network for Research on Complications in Anesthesia BRANCA, "A Brazilian national preparedness survey of anesthesiologists during the coronavirus pandemic" (2021). *College of Population Health Faculty Papers*. Paper 144.
<https://jdc.jefferson.edu/healthpolicyfaculty/144>

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SHORT COMMUNICATION

A Brazilian national preparedness survey of anesthesiologists during the coronavirus pandemic



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Received 8 December 2020; accepted 2 February 2021

Available online 19 February 2021

The coronavirus disease 2019 (COVID-19) pandemic has forced healthcare systems to examine the judicious allocation of scarce medical resources to the highest priority patients. Healthcare professionals, especially anesthesiologists, are at risk of infection during airway management. Personal Protective Equipment (PPE) has become a critical item to prevent the contamination of the anesthesiologists, with numerous papers reporting on the uneven use, PPE reuse guidance and availability.^{1–3} Despite explicit occupational protection recommendations, many anesthesiologists have been infected, and some have died.

With the spread of the disease, in April 2020, the United States of America was the epicenter of the pandemic, and access to PPE remained a significant concern. Several locations reported a shortage of PPE. Despite the American Society of Anesthesiologists recommending the use of N95 masks and complete vestments, the US and Brazil went through a PPE shortage crisis. With the emergence of second waves around the world, PPE shortage remains a major concern.

There is limited data describing the full extent of availability of PPE and the actual changes implemented in Brazil and their approaches to improve pandemic preparedness. A report from the Brazilian Medical Association (AMB) stated that the most missing PPE was the N95 masks, accounting for around 87% of the 2,000 complaints.⁴ This survey aims to describe the current: (1) preparedness efforts of anesthesiologists in Brazil, (2) changes in policies/procedures/guidelines, and (3) to assess the

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perceptions of occupational safety by Brazilian anesthesiologists.

We conducted a cross-sectional national survey of anesthesiologists across Brazilian hospitals. This study was conducted according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) and the Checklist for Reporting Results of Internet E-surveys (CHERRIES) guidelines. This survey was reviewed and approved by the local institutional review board (IRB) at Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo (Research approval number: 4.074.87).

The questionnaire was developed and reviewed by physicians and researchers with expertise in anesthesiology, critical care, and survey development. A pilot study was performed with twenty anesthesiologists to test for length and comprehensibility, content, and ease of completion. The survey was pretested to improve the face validity (whether or not the survey measures what it is supposed to measure) and content validity (the degree to which the survey is representative of the topic). A link and a QR code were created to send the survey through the Brazilian Society of Anesthesiology (SBA) and São Paulo Society of Anesthesiology (SAESP) mailings and social networks. Two email reminders were sent by the study coordinator. Data were automatically stored and protected in REDCap®. Statistical analysis of only completed questionnaires was performed using STATA® 15.1. Data are presented as frequencies.

The survey was conducted from June 29 to July 31, 2020 and included 34 items in multiple parts addressing seven themes: 1) demographics, 2) patient flow during the pandemic, 3) changes to the staffing models related to the pandemic, 4) use of PPE, 5) changes in clinical practice and innovations, 6) current modalities of training, and 7) COVID-19 testing.

We received 511 complete responses out of 945 (54%), of which 10.4% were anesthesiology residents ($n = 53$). Regarding the gender of the respondents, 55% were male, 44.8% female, and 0.2% other. Almost 40% of the respondents had more than 20 years of professional experience in anesthesiology, and 86.7% practiced clinical anesthesia in private hospitals (43.4%). Most respondents work in hospitals with less than 100 beds (26.2%), followed by hospitals with more than 400 beds (25.8%).

Sixty-one percent reported working in a dedicated COVID-19 unit. More than 55% reported caring for patients in the OR, 22.7% in the ICU, 20.7% during airway or rapid response teams, 5% are caring for COVID-19 patients on a ward, 4.7% in the emergency room, and 4.9% in other areas, such as diagnostic exams or during critical patient transportation within or between hospitals. Most parts of the hospitals seemed to have the operational capability preserved when the survey was answered (69.3%). Yet, nearly a quarter of the respondents reported that their hospitals were opening additional COVID-19 units.

Elective surgeries were not reduced in only 4.3% of the hospitals. At most hospitals (33.3%), there was a reduction of 50% of the volume of elective procedures. In 29.4% of the hospitals, elective procedures were reduced by 80%. In 19.8% of the hospitals only emergency surgeries were allowed, including in non-COVID-19 dedicated institutions. The specialized COVID-19 hospitals reported only conducting emergency procedures.

The majority (48.7%) reported the creation of dedicated teams to assist COVID-19 patients. A third of respondents (35.8%) reported changing in medical functions and 15.9% reported changing in the work shift length. Telemedicine or remote assistance was reported by 21.7% of respondents as a change of work pattern during the pandemic.

Regarding PPE, 11.5% of the respondents reported no access to PPE. More than a half (54.8%) reported PPE scarcity and 16.6% reported unavailability to reuse or other reported situations, for instance, lack of HEPA filters, and malfunctioning PPE. Also, some respondents stated that the PPE was unavailable at the beginning of the pandemic, but the availability improved over time. With the lack of PPE, 16% of anesthesiologists were forced to use makeshift PPE equipment. The most common were 3D printed face shields (12.5%) and homemade surgical masks (6.3%). [Table 1](#) summarizes the use of different PPE in clinical scenarios.

Considering airway management, the most frequent innovative measure taken during this period was to reduce the number of people in the room during intubation (74.6%), followed by the use of video laryngoscope (44.2%), use of checklists (36%), introducing new communication methods between the staff (16.4%), and introducing digital technology and telemedicine (15.1%).

Some respondents emphasized that their hospitals do not have the measures to enhance safety (37.6%), but others answered their hospitals had checklists (42.7%), buddy systems (26.4%), spotters (19.2%), and a higher number of healthcare professionals (11.9%).

In regard to donning and doffing PPE competencies, most hospitals did not formally evaluate (70.5%), but in 20.7% competencies were formally assessed in clinical situations, 1% through a written test, 11.5% with simulation, 3.7% with structured feedback, and 5.7% evaluated with recorded videos of the areas.

The primary concern when assisting a COVID-19 patient is the lack of PPE (41.9%), followed by the frequent changes in clinical recommendations and protocols (37%), lack of PPE training (34.1%), absence of clinical recommendations and protocols (29%), patient overcrowding (28.4%), lack of staff (21.3%), and lack of nurses (20%).

We asked if hospitals conducted training sessions of PPE use and 72.2% answered they had, 14.5% responded they didn't, and 13.3% didn't know. This differs from the Associação Paulista de Medicina survey made with all medical specialists, in which only 15.5% of the total were trained.⁵ The training sessions were lecture based and sessions were applied (51.1%) using videos (42.5%), small group training (40.3%), and other categories such as photos, WhatsApp groups, and posters with instructions (2.2%).

A very controversial topic reported was regarding testing for COVID-19. Most institutions are testing only symptomatic patients (39.1%). In some other situations testing is being performed, such as for preoperative elective patients (27.6%), high-risk patients (24.9%), high-risk health professionals (19.8%). In only 25.6% of the respondents all healthcare professionals were tested, and 10% reported that no staff testing was done.

COVID-19 has placed extraordinary and sustained resource demands on anesthesia and critical care services. This survey provides a first snapshot of the current preparedness efforts among a set of Brazilian hospitals during the

Table 1 Preparedness efforts of Anesthesiologists for COVID-19.

Type of PPE	For general care % (n = 511)	Airway intubation % (n = 511)	For non-COVID-19 % (n = 511)
Surgical mask	80%	73.8%	85.3%
Mask N95 / PFF2	93.2%	96.5%	75.9%
Respirator with air purifier	8.4%	10.8%	5.9%
TNT apron	55.8%	50.1%	50.3%
Waterproof apron	67.7%	76.1%	46.6%
Waterproof coveralls/jumpsuit	11.5%	15.7%	5.7%
Waterproof shoe protection	15.7%	21.1%	11.2%
Cap	93.9%	89.8%	86.1%
Balaclava (head and neck protection)	8.4%	9.8%	5.1%
Single gloves	79.3%	70.3%	83.8%
Double gloves	42.9%	57.9%	36%
Protective goggles	84.7%	87.9%	78.9%
Face shield	92.2%	94.9%	75.7%
Waterproof shoes (booties)	5.5%	8.2%	4.3%

first months of the pandemic. The majority of surveyed hospitals implemented dramatic changes to their workflow and adapted their staffing models, with nearly a quarter creating dedicated COVID-19 care units.

This survey has several limitations. While 511 anesthesiologists and residents responded, this represents only a sample of all Brazilian anesthesiologists and hospitals, which may impact the generalizability of our findings. Additionally, the survey responses are inherently prone to bias and may not always accurately reflect the actual practice of clinical performance, rather than policies and intent.

We conclude, in this first national survey, that the current preparedness efforts among Anesthesiologists in Brazil during the first wave of the COVID-19 pandemic have been highly variable and at least 11.5% of the respondents had no access to PPE, representing a major threat to providers.

COVID-19 should serve as a warning to prompt a radical rethink of the way Anesthesiologists practice infection control. Anesthesiologists have implemented several strategies including modifications to staffing and workflows, changes in their acute resuscitation and airway management, treatment protocols, limiting personnel's exposure to contagion, while using simulation as a training modality to support protocol changes in response to COVID-19. We need to use this once in a century crisis as an opportunity to implement better individual and organizational occupational learning. We must make the scientific process more transparent and inclusive by making scientific knowledge, methods, data, and evidence freely available and accessible for everyone.

Conflict of interest

The authors declare no conflicts of interest.

Acknowledgment

We acknowledge the Scientific Department of the Brazilian Society of Anesthesiology (SBA) to support the survey's divulgation to the associate Brazilian anesthesiologists.

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