The Impact of COVID-19 on the Personal Protective Equipment Practices and Preferences of Craniofacial Surgeons

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Background: The COVID-19 pandemic has raised concern about healthcare worker exposure risk. Surgeons operating near the aerodigestive tract are at particularly high risk, given the respiratory spread of SARS-CoV-2. This study examines the practices and opinions of craniofacial surgeons as they adapt to a worldwide epidemic.

Methods: An electronic survey study was conducted on practicing craniomaxillofacial surgeons regarding their preference of personal protective equipment use before, during, and after the pandemic in patients with or without COVID-19 infection, as well as demographic data. Statistical analysis was performed to compare changes in behaviors and preferences and differences across demographic groups.

Results: Craniofacial surgeons changed their behaviors significantly during the pandemic, with 91.5% of respondents wearing N95 masks or powered air purifying respirators for operations involving exposure of the nasal or oral airways on untested patients, compared with 4.3% before the pandemic (P < 0.001). For examinations in the clinic, 100% reported wearing a mask during the pandemic compared with 40.3% before the pandemic (P < 0.001). After the pandemic is over, 31.9% of surgeons planned to continue using an N95 mask or powered air purifying respirator for craniomaxillofacial cases and 80.9% planned to continue using masks in clinic. Overall, 46.8% of respondents believed that N95 masks should be the standard for craniofacial surgery.

Conclusions: The COVID-19 pandemic has significantly shifted the practices and opinion of craniofacial surgeons toward more protective personal protective equipment. These results indicate that this is likely to persist after the pandemic is over, which may limit surgeon exposure to airborne disease and help the field withstand future epidemic outbreaks. (Plast Reconstr Surg Glob Open 2021;9:e3686; doi: 10.1097/GOX.0000000000003686; Published online 22 June 2021.)
droplets originating from these surfaces.\textsuperscript{5,6} As a result, practitioners in fields such as craniofacial surgery, otolaryngology, dentistry, and oral surgery have expressed valid concerns regarding the risk of contracting the virus in the course of their work.\textsuperscript{7} Several professional societies have published recommendations that operations during the COVID-19 pandemic should be limited to urgent or emergent procedures.\textsuperscript{8–13} However, because it becomes clearer that the COVID-19 outbreak is likely to continue through the remainder of 2021 and may persist beyond that, considerations for the continuation of head and neck procedures have to be made. This survey study focuses specifically on the expert opinions of craniofacial surgeons and their practices, as the world reflects closely on and looks beyond the COVID-19 pandemic.

METHODS

A survey study was conducted of active members in the American Society of Craniofacial Surgeons (ASCFS), consisting primarily of practicing surgeons in the field of craniomaxillofacial surgery. The survey consisted of 17 required questions regarding their preference of personal protective equipment (PPE) use before, during, and after the pandemic in patients with or without COVID-19 infection, as well as eight required demographic questionnaires (Table 1). The survey instrument was distributed by email to qualifying members, and survey responses were collected over a 2-month period from June 4, 2020 to August 4, 2020. Qualifying members included practicing craniomaxillofacial attending surgeons who met the criteria for ASCFS active membership (Table 2). Email rejections or error messages were excluded from the study. Survey responses were gathered anonymously with the option of providing contact information to be used only for drawing a gift card incentive. Survey data were collected in spreadsheet format and analyzed using Microsoft Excel (Microsoft Corp, Redmond, Wash.). Question responses were sorted by demographic information such as practice type, location, age, and gender. Respondents who did not actively practice craniofacial surgery were excluded from analysis. Statistical analysis was performed utilizing two-tailed Fisher’s exact tests in GraphPad Prism (GraphPad Software, La Jolla, Calif.) and Microsoft Excel (Microsoft Corp, Redmond, Wash.). Statistical significance was set at the conventional standard of a $P$ value less than 0.05.

RESULTS

The survey form was distributed to 296 qualifying member email addresses. Forty-three emails resulted in rejection or error messages, signaling failed receipt of those surveys. Thus, a calculated 253 survey forms were successfully sent. A total of 48 responses were received for a survey response rate of 19.0%.

### Table 1. Questions Included in the Study Survey Instrument

| COVID-19 Practices of Craniofacial Surgeons Questionnaire |
|-----------------------------------------------------------|
| Do you regularly perform craniofacial procedures in your practice? |
| If so, what percentage of your practice consists of craniofacial surgery? |
| What percentage of your practice involves the exposure of nasal or oral airways? |
| Before the COVID-19 pandemic, what kind of facial PPE did you use for craniofacial procedures involving exposure of the nasal or oral airways? |
| Before the COVID-19 pandemic, what kind of facial PPE did you use for nasal or oral airway examinations in the clinic? |
| Currently during the COVID-19 pandemic, what kind of facial PPE would you use for patients testing POSITIVE for COVID-19 undergoing craniofacial procedures involving exposure of the nasal or oral airways? |
| Currently during the COVID-19 pandemic, what kind of facial PPE would you use for patients testing NEGATIVE for COVID-19 undergoing craniofacial procedures involving exposure of the nasal or oral airways? |
| Currently during the COVID-19 pandemic, what kind of facial PPE would you use for patients testing NEGATIVE for COVID-19 undergoing craniofacial procedures NOT involving exposure of the nasal or oral airways? |
| Currently during the COVID-19 pandemic, what kind of facial PPE would you use for patients NOT TESTING for COVID-19 undergoing craniofacial procedures NOT involving exposure of the nasal or oral airways? |
| Currently during the COVID-19 pandemic, what kind of facial PPE would you use for patients NOT TESTING for COVID-19 undergoing craniofacial procedures involving exposure of the nasal or oral airways? |
| Currently during the COVID-19 pandemic, what kind of facial PPE would you use for patients NOT TESTING for COVID-19 undergoing craniofacial procedures NOT involving exposure of the nasal or oral airways? |
| Has the COVID-19 pandemic changed your opinion about what PPE should be used for craniofacial procedures involving exposure of the nasal or oral airways? |
| Should the use of N95 masks be standard for all craniofacial procedures involving exposure of the nasal or oral airways? |
| After the COVID-19 pandemic, what kind of facial PPE do you plan on using for craniofacial procedures involving exposure of the nasal or oral airways? |
| After the COVID-19 pandemic, what kind of facial PPE do you plan on using for craniofacial procedures NOT involving exposure of the nasal or oral airways? |
| After the COVID-19 pandemic, what kind of facial PPE do you plan on using for nasal or oral airway examinations in the clinic? |
| Please select the gender you most identify with |
| What category represents your age in years? |
| How many years have you been in practice? |
| How would you describe your practice setting? |
| How would you describe your practice location? |
All but one of the respondents (or 95.6%) were actively practicing craniofacial surgery and thus were included in the analysis. Seventy-two percent of the respondents were men and 27.7% were women. The majority of those surgeons (55.3%) were aged between 35 and 44 years, while 25.5% were between 45 and 54 years, 17% were between 55 and 64 years, and 2.1% were over 65 years. This corresponded to 68.1% of respondents between 0 and 9 years in practice, 8.5% between 10 and 19 years in practice, and 21.3% over 20 years in practice. The survey group consisted of surgeons from a variety of practice settings. These included academic practice (61.7%), employed hospital practice (17%), multispecialty group practice (10.6%), solo private practice (8.5%), and group private practice (2.1%). These practices spanned across several different types of locations in the United States, including 61.7% in large metropolitan areas (population: 1.5 million or more), 25.5% from metropolitan areas (population: 500,000 to 1.5 million), 10.6% from medium-sized urban areas (population 200,000 to 500,000), 2.1% in small urban areas (population 50,000 to 200,000), and none from rural areas (Fig. 1).

Before the COVID-19 pandemic, the vast majority (95.7%) of craniofacial surgeons routinely used standard surgical masks for operations involving exposure of the nasal or oral airways. This has changed dramatically during the COVID-19 pandemic, with only 8.5% of surgeons opting for a standard surgical mask for untested patients \((P < 0.001)\). The rest prefer either N95 masks (78.7%) or powered air purifying respirators (PAPR) (12.8%) for personal protection during procedures involving exposure of the airways. These numbers shifted more in favor of PAPR (25.5%) rather than N95 (66%) for patients testing positive for COVID-19. PAPR were generally not used for patients testing negative for COVID-19, but 61.7% still wore N95 masks while 38.3% wore standard surgical masks (Fig. 2). Similar precautions were taken for patients undergoing procedures not involving exposure of the airways. For untested patients, 21.3% wore standard surgical masks, 63.8% wore N95 masks, and 14.9% wore PAPR. For patients testing positive for COVID-19, only 6.4% opted for standard surgical masks, while 74.5% wore N95 masks, and 19.1% wore PAPR. For patients with proved negative COVID-19 tests, 46.8% opted for standard surgical masks and 53.2% wore N95 masks. Of note, 89.4% of respondents routinely tested all patients before an operation and 93.6% of surgeons would only perform nonurgent operations on patients that had been tested for COVID-19.

Since the pandemic, behaviors have also changed significantly with nasal or oral airway exams in the clinic (Fig. 3). Before the rise of COVID-19, 57.4% of surgeons wore no mask in clinic while 40.4% wore standard surgical masks. In the midst of the pandemic, no respondents reported wearing no PPE, while 42.6% opted for standard surgical masks and 57.4% wore PAPR. Of note, 91.7% of respondents routinely tested all patients before an operation and 93.6% of surgeons would only perform nonurgent operations on patients that had been tested for COVID-19.
masks, 53.2% elected to wear N95 masks, and 4.3% preferred PAPR. Once the pandemic is over, about 51.1% of surgeons plan to continue using a standard surgical mask in clinic, while 29.8% plan to use a N95 mask, and 19.1% plan to revert back to wearing no mask for nasal or oral airway exams. These reported numbers for mask wearing of any kind during and after the pandemic constitute a stark contrast compared with before the pandemic began ($P < 0.001$).

In the operating room, only 68.1% of surgeons plan on returning to a standard surgical mask for cases involving the airways after the COVID-19 pandemic is over. Compared with only 4.3% before the pandemic, 29.8% of surgeons plan on wearing N95 masks in the operating room after the pandemic is over ($P = 0.001$) and 2.1% would go as far as to wear PAPR as the standard PPE of choice. In fact, 51.1% of craniofacial surgeons reported that the COVID-19 pandemic has changed their opinion on what PPE should be used for craniomaxillofacial procedures involving exposure of the nasal or oral airways.

**DISCUSSION**

The COVID-19 pandemic has undoubtedly changed healthcare workers’ perspectives on their susceptibility to contagious airborne diseases and the choice of PPE for...
The COVID-19 pandemic has significantly changed the expert opinion of craniofacial surgeons regarding the use of PPE in their medical practices. Overall, surgeons have shifted en masse to more protective face masks for patients undergoing craniofacial procedures regardless of testing status and for examinations involving the aerodigestive tract during the pandemic. This is likely to endure after the pandemic is over, as approximately half of the craniofacial surgeons believe that the pandemic has changed their opinion on PPE use and that N95 masks should be standard for operations involving exposure of the airways once the pandemic is over. These changes in behavior due to COVID-19 may help limit surgeon exposure to other airborne diseases in the future and help prepare the field for future epidemic outbreaks.

CONCLUSIONS

The COVID-19 pandemic has significantly changed the expert opinion of craniofacial surgeons regarding the use of PPE in their medical practices. Overall, surgeons have shifted en masse to more protective face masks for patients undergoing craniofacial procedures regardless of testing status and for examinations involving the aerodigestive tract during the pandemic. This is likely to endure after the pandemic is over, as approximately half of the craniofacial surgeons believe that the pandemic has changed their opinion on PPE use and that N95 masks should be standard for operations involving exposure of the airways once the pandemic is over. These changes in behavior due to COVID-19 may help limit surgeon exposure to other airborne diseases in the future and help prepare the field for future epidemic outbreaks.

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