# Evidence Search Service Results of your search request

## PPE for surgery during COVID-19

**ID of request:** 22941  
**Date of request:** 28th April, 2020  
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Please acknowledge this work in any resulting paper or presentation as: Evidence search: PPE for surgery during COVID-19. Rhys Whelan. (28th April, 2020). ABERTAWE/SWANSEA, UK: Bwrdd Iechyd Prifysgol Bae Abertawe Library Services.

**Sources searched**  
Bulletin of the Royal College of Surgeons of England (1)  
Public Health England (PHE) (3)  
Royal College of Surgeons Edinburgh (1)  
Royal College of Surgeons of England (RCS) (1)

**Date range used** (5 years, 10 years): No date range   
**Limits used** (gender, article/study type, etc.): No limits   
**Search terms and notes** (full search strategy for database searches below):

I have searched Medline, Embase and WHO COVID-19 database. I have included the search strategies and results below.

I have also searched the websites of relevant organisations: Public Health Wales, Public Health England, Royal College of Surgeons, Royal College of Surgeons of Edinburgh.

This left us with a total of 211 results. I then removed the duplicates leaving a total of

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### [C. Search History](#SearchHistory)

## A. National and International Guidance

#### Public Health England (PHE)

**COVID-19: management of exposed healthcare workers and patients in hospital settings** (2020)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=0423ed2e51dc24fcd825b807d89b624f)

**Considerations for acute personal protective equipment (PPE) shortages** (2020)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=1f525f667d4c68b39ba9acb541da0cbf)

**COVID-19 personal protective equipment (PPE)** (2020)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=a6616e6d0149397fd30fc5849adf4025)

#### Royal College of Surgeons (RCS)

**RCS statement on latest Public Health England PPE guidance** (2020)

Professor Neil Mortensen

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=a3b45d4e2623b33972b641fa253f81dd)

**COVID-19: Good Practice for Surgeons and Surgical Teams** (2020)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=69e04b3645ccb969489ac39812ac0e5b)

#### Royal College of Surgeons Edinburgh

**RCSEd President responds to latest PPE guidance published by Public Health England (PHE)** (2020)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=4a02247918cb00e007bb738e1e2ccecf)

## B. Original Research

1. **3-D Printed Protective Equipment During COVID-19 Pandemic**  
   Wesemann Christian Materials 2020;:No page numbers.

While the number of coronavirus cases from 2019 continues to grow, hospitals are reporting shortages of personal protective equipment (PPE) for frontline healthcare workers Furthermore, PPE for the eyes and mouth, such as face shields, allow for additional protection when working with aerosols 3-D printing enables the easy and rapid production of lightweight plastic frameworks based on open-source data The practicality and clinical suitability of four face shields printed using a fused deposition modeling printer were examined The weight, printing time, and required tools for assembly were evaluated To assess the clinical suitability, each face shield was worn for one hour by 10 clinicians and rated using a visual analogue scale The filament weight (21–42 g) and printing time (1:40–3:17 h) differed significantly between the four frames Likewise, the fit, wearing comfort, space for additional PPE, and protection varied between the designs For clinical suitability, a chosen design should allow sufficient space for goggles and N95 respirators as well as maximum coverage of the facial area Consequently, two datasets are recommended For the final selection of the ideal dataset to be used for printing, scalability and economic efficiency need to be carefully balanced with an acceptable degree of protection

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=85d98daf34fbbf3b99e30d6d34329e4f)

1. **A Commentary on Safety Precautions for Otologic Surgery during the COVID-19 Pandemic**  
   Saadi R. A. Otolaryngology Head and Neck Surgery 2020;:No page numbers.

There are insufficient data regarding the safety of otologic procedures in the setting of the coronavirus disease 2019 (COVID-19) pandemic. Given the proclivity for respiratory pathogens to involve the middle ear and the significant aerosolization associated with many otologic procedures, safety precautions should follow current recommendations for procedures involving the upper airway. Until preoperative diagnostic testing becomes standardized and readily available, elective cases should be deferred and emergent/urgent cases should be treated as high risk for COVID-19 exposure. Necessary otologic procedures on positive, suspected, or unknown COVID-19 status patients should be performed using enhanced personal protective equipment, including an N95 respirator and eye protection or powered air-purifying respirator (PAPR, preferred), disposable cap, disposable gown, and gloves. Powered instrumentation should be avoided unless absolutely necessary, and if performed, PAPR or sealed eye protection is recommended. Copyright © American Academy of Otolaryngology-Head and Neck Surgery Foundation 2020.

1. **A Commentary on the Management of Total Laryngectomy Patients During the COVID-19 Pandemic**  
   Hennessy M. Head & neck. 2020;16:No page numbers.

The Coronavirus disease-2019 (COVID-19) pandemic has rapidly spread across the world, placing unprecedented strain on the healthcare system. Healthcare resources including hospital beds, ICUs, as well as personal protective equipment (PPE) are becoming increasingly rationed and scare commodities. In this environment, the laryngectomee (patient having previously undergone a total laryngectomy) continues to represent a unique patient with unique needs. Given their surgically altered airway, they pose a challenge to manage for the otolaryngologist within the current COVID-19 pandemic. In this brief report, we present special considerations and best practice recommendations in the management of total laryngectomy patients. We also discuss recommendations for laryngectomy patients and minimizing community exposures. This article is protected by copyright. All rights reserved.

1. **A COVID-19 Patient Who Underwent Endonasal Endoscopic Pituitary Adenoma Resection: A Case Report**  
   Zhu W. Neurosurgery 2020;17:17.

BACKGROUND AND IMPORTANCE: A pituitary adenoma patient who underwent surgery in our department was diagnosed with COVID-19 and 14 medical staff were confirmed infected later. This case has been cited several times but without accuracy or entirety, we feel obligated to report it and share our thoughts on the epidemic among medical staff and performing endonasal endoscopic surgery during COVID-19 pandemic. CLINICAL PRESENTATION: The patient developed a fever 3 d post endonasal endoscopic surgery during which cerebrospinal leak occurred, and was confirmed with SARS-CoV-2 infection later. Several medical staff outside the operating room were diagnosed with COVID-19, while the ones who participated in the surgery were not.

1. **A Guide to Facial Trauma Triage and Precautions in the COVID-19 Pandemic**  
   Hsieh T. Y. Facial Plastic Surgery & Aesthetic Medicine 2020;16:16.

COVID-19 is an emerging viral illness that has rapidly transmitted throughout the world. Its impact on society and the health care system has compelled hospitals to quickly adapt and innovate as new information about the disease is uncovered. During this pandemic, essential medical and surgical services must be carried out while minimizing the risk of disease transmission to health care workers. There is an elevated risk of COVID-19 viral transmission to health care workers during surgical procedures of the head and neck due to potential aerosolization of viral particles from the oral cavity/naso-oropharynx mucosa. Thus, patients with facial fractures pose unique challenges to the variety of injuries and special considerations, including triaging injuries and protective measures against infection. The proximity to the oral cavity/naso-oropharyngeal mucosa, and potential for aerosolization of secretions containing viral particles during surgical procedures make most patients undergoing operative interventions for facial fractures high risk for COVID-19 transmission. Our proposed algorithm aims to balance patient care with patient/medical personnel protection as well as judicious health care utilization. It stratifies facial trauma procedures by urgency and assigns a recommended level of personal protective equipment, extreme or enhanced, incorporating current best practices and existing data on viral transmission. As this pandemic continues to evolve and more information is obtained, the protocol can be further refined and individualized to each institution.

1. **A RANDOMIZED TRIAL OF INSTRUCTOR-LED TRAINING VERSUS VIDEO LESSON IN TRAINING HEALTH CARE PROVIDERS IN PROPER DONNING AND DOFFING OF PERSONAL PROTECTIVE EQUIPMENT**  
   Christensen Liva Disaster Med Public Health Prep 2020;:1-15.

OBJECTIVE: This study compared live instructor-led training in Personal Protective Equipment (PPE) donning and doffing with video-based instruction. It assessed the difference in performance between (i) attending one instructor-led training session in donning and doffing PPE one month prior to assessment, and (ii) watching training videos over the month. METHODS: This randomized controlled trial pilot study divided 21 medical students and junior doctors into 2 groups. Control group participants attended one instructor-led training session. Video group participants watched training videos demonstrating the same procedures, which they could freely watch again at home. After one month, a doctor performed a blind evaluation of performance using checklists. RESULTS: 19 participants were assessed after one month. The mean donning score was 84.8/100 for the instructor-led group and 88/100 for the video group; mean effect size 3,2 (95%CI: -7,5 to 9,5). The mean doffing score was 79.1/100 for the instructor group and 73.9/100 for the video group; mean effect size 5,2 (95%CI: -7,6 to 18). CONCLUSION: Our study found no significant difference in donning and doffing score between instructor-led and video lessons. Video training could be a fast and resource-efficient method of training in PPE donning and doffing in responding to the COVID-19 pandemic.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=3839b8f8eb99f17a219862d9fe612e77)

1. **A systematic risk-based strategy to select personal protective equipment for infectious diseases**  
   Jones Rachael M. American Journal of Infection Control 2020;:No page numbers.

Background: Personal protective equipment (PPE) is a primary strategy to protect health care personnel (HCP) from infectious diseases When transmission-based PPE ensembles are not appropriate, HCP must recognize the transmission pathway of the disease and anticipate the exposures to select PPE Because guidance for this process is extremely limited, we proposed a systematic, risk-based approach to the selection and evaluation of PPE ensembles to protect HCP against infectious diseases Methods: The approach used in this study included the following 4 steps: (1) job hazard analysis, (2) infectious disease hazard analysis, (3) selection of PPE, and (4) evaluation of selected PPE Selected PPE should protect HCP from exposure, be usable by HCP, and fit for purpose Results: The approach was demonstrated for the activity of intubation of a patient with methicillin-resistant Staphylococcus aureus or Severe Acute Respiratory Syndrome coronavirus As expected, the approach led to the selection of different ensembles of PPE for these 2 pathogens Discussion: A systematic risk-based approach to the selection of PPE will help health care facilities and HCP select PPE when transmission-based precautions are not appropriate Owing to the complexity of PPE ensemble selection and evaluation, a team with expertise in infectious diseases, occupational health, the health care activity, and related disciplines, such as human factors, should be engaged Conclusions: Participation, documentation, and transparency are necessary to ensure the decisions can be communicated, critiqued, and understood by HCP (C) 2019 Association for Professionals in Infection Control and Epidemiology, Inc Published by Elsevier Inc All rights reserved

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=555b793a13f5dd14bcb79fe898bed9a4)

1. **AJN On the Web Risk Stratification and PPE Use in Pediatric Endoscopy During the COVID-19 Outbreak: A Single-Center Protocol**  
   Say Daphne S. AJN The American Journal of Nursing 2020;:No page numbers.

SARS-CoV-2, the novel coronavirus causing coronavirus disease 2019 (COVID-19), is now a global pandemic Human-to-human transmission has been documented to occur through respiratory secretions, feces, aerosols, and contaminated environmental surfaces Pediatric patients present a unique challenge as they may have minimal symptoms and yet transmit disease Endoscopists face risk for infection with viruses like SARS-CoV-2, as the aerosol generating nature of endoscopy diffuses respiratory disease that can be spread via an airborne and droplet route We describe our center&#039;s methodology for pediatric patient risk stratification to facilitate responsible use of endoscopic resources during this crisis We also describe our recommendations for use of personal protective equipment by endoscopists, with the goal of ensuring the safety of ourselves, our anesthesiology and endoscopy staff, and our patients Address correspondence and reprint requests to Daphne S Say, MD, Assistant Clinical Professor, Division of Gastroenterology, Hepatology, and Nutrition, Department of Pediatrics, University of California, Davis, 2516 Stockton Boulevard, Ticon II, Sacramento, CA 95817 (e-mail: dsay@ucdavis edu) Received 26 March, 2020 Accepted 30 March, 2020 Conflict of Interest Disclosure: The authors have no conflicts of interest relevant to this article to disclose Funding Source: No funding was secured for this study Financial Disclosure: The authors have no financial relationships relevant to this article to disclose © 2020 by European Society for Pediatric Gastroenterology, Hepatology, and Nutrition and North American Society for Pediatric Gastroenterology

[10.1097/mpg.0000000000002731 this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=872774d95704f60c15a79592bb32d684)

1. **Approaches to the management of patients in oral and maxillofacial surgery during COVID-19 pandemic**  
   Zimmermann M. Journal of Cranio Maxillo Facial Surgery 2020;04:04.

Oral and maxillofacial surgery is correlated with a high risk of SARS-CoV-2 transmission. Therefore, the aim of the review is to collect and discuss aspects of the management of patients in oral and maxillofacial surgery during the COVID-19 pandemic. In order to save resources and to avoid unnecessary exposure to infected patients, there is the need to schedule interventions depending on their priority. During the peak of the pandemic, no elective surgery should be performed. Even urgent procedures might be postponed if there is a view to recovery of a COVID-19 patient within a few days. Emergency procedures do not allow any delay. Specialties with overlap in therapies should have well defined arrangements among each other concerning the treatment spectra in order to avoid redundancy and loss of resources. Inpatient and outpatient units have to be organized in such a way that the risk of cross-infection among patients is reduced to a minimum. Especially, testing of patients for SARS-CoV-2 is important to detect the infected patients at an early stage. When surgery is performed on COVID-19 patients, adequate personal protective equipment is crucial. There must be negative pressure in the operating room, and aerosol formation must be reduced to a minimum. In order to address the COVID-19 challenge adequately, significant changes in the infrastructure of outpatient units, inpatient units, and operating rooms are needed. In addition, the demands concerning personal protective equipment increase significantly. The major aim is to protect patients as well as the medical staff from unnecessary infection, and to keep the healthcare system running effectively. Therefore, every effort should be taken to make the necessary investments.

1. **As COVID-19 cases, deaths and fatality rates surge in Italy, underlying causes require investigation**  
   Rubino Salvatore J Infect Dev Ctries 2020;14:265-267.

COVID-19 case fatalities surged during the month of March 2020 in Italy, reaching over 10,000 by 28 March 2020. This number exceeds the number of fatalities in China (3,301) recorded from January to March, even though the number of diagnosed cases was similar (85,000 Italy vs. 80,000 China). Case Fatality Rates (CFR) could be somewhat unreliable because the estimation of total case numbers is limited by several factors, including insufficient testing and limitations in test kits and materials, such as NP swabs and PPE for testers. Sero prevalence of SARS-CoV-2 antibodies may help in more accurate estimations of the total number of cases. Nevertheless, the disparity in the differences in the total number of fatalities between Italy and China suggests investigation into several factors, such as demographics, sociological interactions, availability of medical equipment (ICU beds and PPE), variants in immune proteins (e.g., HLA, IFNs), past immunity to related CoVs, and mutations in SARS-CoV-2, could impact survival of severe COVID-19 illness survival and the number of case fatalities.

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1. **Équipements de protection individuelle (EPI) pour anesthésiologistes et autre personnel en charge des voies aériennes: principes et pratiques pendant la pandémie de COVID-19**  
   Lockhart Shannon L. Can. j. anaesth 2020;:No page numbers.

Healthcare providers are facing a coronavirus disease pandemic. This pandemic may last for many months, stressing the Canadian healthcare system in a way that has not previously been seen. Keeping healthcare providers safe, healthy, and available to work throughout this pandemic is critical. The consistent use of appropriate personal protective equipment (PPE) will help assure its availability and healthcare provider safety. The purpose of this communique is to give both anesthesiologists and other front-line healthcare providers a framework from which to understand the principles and practices surrounding PPE decision-making. We propose three types of PPE including: 1) PPE for droplet and contact precautions, 2) PPE for general airborne, droplet, and contact precautions, and 3) PPE for those performing or assisting with high-risk aerosol-generating medical procedures.

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1. **Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPC) guidelines for respiratory infectious diseases: a rapid qualitative evidence synthesis**  
   Houghton Catherine Cochrane Database Syst Rev 2020;4:CD013582-CD013582.

BACKGROUND: This review is one of a series of rapid reviews that Cochrane contributors have prepared to inform the 2020 COVID-19 pandemic. When new respiratory infectious diseases become widespread, such as during the COVID-19 pandemic, healthcare workers&#039; adherence to infection prevention and control (IPC) guidelines becomes even more important. Strategies in these guidelines include the use of personal protective equipment (PPE) such as masks, face shields, gloves and gowns; the separation of patients with respiratory infections from others; and stricter cleaning routines. These strategies can be difficult and time-consuming to adhere to in practice. Authorities and healthcare facilities therefore need to consider how best to support healthcare workers to implement them. OBJECTIVES: To identify barriers and facilitators to healthcare workers&#039; adherence to IPC guidelines for respiratory infectious diseases. SEARCH METHODS: We searched OVID MEDLINE on 26 March 2020. As we searched only one database due to time constraints, we also undertook a rigorous and comprehensive scoping exercise and search of the reference lists of key papers. We did not apply any date limit or language limits. SELECTION CRITERIA: We included qualitative and mixed-methods studies (with a distinct qualitative component) that focused on the experiences and perceptions of healthcare workers towards factors that impact on their ability to adhere to IPC guidelines for respiratory infectious diseases. We included studies of any type of healthcare worker with responsibility for patient care. We included studies that focused on IPC guidelines (local, national or international) for respiratory infectious diseases in any healthcare setting. These selection criteria were framed by an understanding of the needs of health workers during the COVID-19 pandemic. DATA COLLECTION AND ANALYSIS: Four review authors independently assessed the titles, abstracts and full texts identified by our search. We used a prespecified sampling frame to sample from the eligible studies, aiming to capture a range of respiratory infectious disease types, geographical spread and data-rich studies. We extracted data using a data extraction form designed for this synthesis. We assessed methodological limitations using an adapted version of the Critical Skills Appraisal Programme (CASP) tool. We used a &#039;best fit framework approach&#039; to analyse and synthesise the evidence. This provided upfront analytical categories, with scope for further thematic analysis. We used the GRADE-CERQual (Confidence in the Evidence from Reviews of Qualitative research) approach to assess our confidence in each finding. We examined each review finding to identify factors that may influence intervention implementation and developed implications for practice. MAIN RESULTS: We found 36 relevant studies and sampled 20 of these studies for our analysis. Ten of these studies were from Asia, four from Africa, four from Central and North America and two from Australia. The studies explored the views and experiences of nurses, doctors and other healthcare workers when dealing with severe acute respiratory syndrome (SARS), H1N1, MERS (Middle East respiratory syndrome), tuberculosis (TB), or seasonal influenza. Most of these healthcare workers worked in hospitals; others worked in primary and community care settings. Our review points to several barriers and facilitators that influenced healthcare workers&#039; ability to adhere to IPC guidelines. The following factors are based on findings assessed as of moderate to high confidence. Healthcare workers felt unsure as to how to adhere to local guidelines when they were long and ambiguous or did not reflect national or international guidelines. They could feel overwhelmed because local guidelines were constantly changing. They also described how IPC strategies led to increased workloads and fatigue, for instance because they had to use PPE and take on additional cleaning. Healthcare workers described how their responses to IPC guidelines were infl enced by the level of support they felt that they received from their management team. Clear communication about IPC guidelines was seen as vital. But healthcare workers pointed to a lack of training about the infection itself and about how to use PPE. They also thought it was a problem when training was not mandatory. Sufficient space to isolate patients was also seen as vital. A lack of isolation rooms, anterooms and shower facilities was a problem. Other important practical measures described by healthcare workers included minimising overcrowding, fast-tracking infected patients, restricting visitors, and providing easy access to handwashing facilities. A lack of PPE, and equipment that was of poor quality, was a serious concern for healthcare workers and managers. They also pointed to the need to adjust the volume of supplies as infection outbreaks continued. Healthcare workers believed that they followed IPC guidance more closely when they saw the value of it. Some healthcare workers felt motivated to follow the guidance because of fear of infecting themselves or their families, or because they felt responsible for their patients. Some healthcare workers found it difficult to use masks and other equipment when it made patients feel isolated, frightened or stigmatised. Healthcare workers also found masks and other equipment uncomfortable to use. The workplace culture could also influence whether healthcare workers followed IPC guidelines or not. Across many of the findings, healthcare workers pointed to the importance of including all staff, including cleaning staff, porters, kitchen staff and other support staff when implementing IPC guidelines. AUTHORS&#039; CONCLUSIONS: Healthcare workers point to several factors that influence their ability and willingness to follow IPC guidelines when managing respiratory infectious diseases. These include factors tied to the guideline itself and how it is communicated, support from managers, workplace culture, training, physical space, access to and trust in personal protective equipment, and a desire to deliver good patient care. The review also highlights the importance of including all facility staff, including support staff, when implementing IPC guidelines.

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1. **Caring for the carers: Ensuring the provision of quality maternity care during a global pandemic**  
   Wilson Alyce N. 2020;:No page numbers.

The COVID-19 pandemic is impacting health systems worldwide. Maternity care providers must continue their core business in caring and supporting women, newborns and their families whilst also adapting to a rapidly changing health system environment. This article provides an overview of important considerations for supporting the emotional, mental and physical health needs of maternity care providers in the context of the unprecedented crisis that COVID-19 presents. Cooperation, planning ahead and adequate availability of PPE is critical. Thinking about the needs of maternity providers to prevent stress and burnout is essential. Emotional and psychological support needs to be available throughout the response. Prioritising food, rest and exercise are important. Healthcare workers are every country&#039;s most valuable resource and maternity providers need to be supported to provide the best quality care they can to women and newborns in exceptionally trying circumstances.

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1. **Challenges and solutions for addressing critical shortage of supply chain for personal and protective equipment (PPE) arising from Coronavirus disease (COVID19) pandemic - Case study from the Republic of Ireland**  
   Rowan Neil J. Sci Total Environ 2020;725:138532-138532.

Coronavirus (COVID-19) is highly infectious agent that causes fatal respiratory illnesses, which is of great global public health concern. Currently, there is no effective vaccine for tackling this COVID19 pandemic where disease countermeasures rely upon preventing or slowing person-to-person transmission. Specifically, there is increasing efforts to prevent or reduce transmission to front-line healthcare workers (HCW). However, there is growing international concern regarding the shortage in supply chain of critical one-time-use personal and protective equipment (PPE). PPE are heat sensitive and are not, by their manufacturer&#039;s design, intended for reprocessing. Most conventional sterilization technologies used in hospitals, or in terminal medical device sterilization providers, cannot effectively reprocess PPE due to the nature and severity of sterilization modalities. Contingency planning for PPE stock shortage is important. Solutions in the Republic of Ireland include use of smart communication channels to improve supply chain, bespoke production of PPE to meets gaps, along with least preferred option, use of sterilization or high-level disinfection for PPE reprocessing. Reprocessing PPE must consider material composition, functionality post treatment, along with appropriate disinfection. Following original manufacturer of PPE and regulatory guidance is important. Technologies deployed in the US, and for deployment in the Republic of Ireland, are eco-friendly, namely vaporised hydrogen peroxide (VH2O2), such as for filtering facepiece respirators and UV irradiation and High-level liquid disinfection (Actichlor+) is also been pursed in Ireland. Safeguarding supply chain of PPE will sustain vital healthcare provision and will help reduce mortality.

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1. **Collaborative Multi-Disciplinary Incident Command at Seattle Children's Hospital for Rapid Preparatory Pediatric Surgery Countermeasures to the COVID-19 Pandemic**  
   Parikh S. R. Journal of the American College of Surgeons. 2020;11:No page numbers.

Washington State was the first U.S. state to have a patient test positive for COVID-19. Prior to this, our children's hospital proactively implemented an incident command structure which allowed for collaborative creation of safety measures, policies and procedures for both patients, families, staff and providers. Although the treatment and protective standards are continuously evolving, this commentary shares our thoughts on how an institution, specifically surgical services may develop collaborative process improvement to accommodate for rapid and ongoing change. Specific changes outlined include [1] early establishment of incident command [2] personal protective equipment conservation, [3] workforce safety, [4] surgical and ambulatory patient triage, and [5] optimization of trainee education. Please note that the contents of this manuscript are shared in the interest of providing collaborative information and are under continuous development as our regional situation changes. We recognize the limitations of this commentary and do not suggest that our approaches represent validated best practices. Copyright © 2020. Published by Elsevier Inc.

1. **Containing COVID-19 in the emergency room: the role of improved case detection and segregation of suspect cases**  
   Wee Liang En Acad. emerg. med 2020;:No page numbers.

AIMS: Patients with COVID-19 may present with respiratory syndromes indistinguishable from common viruses. This poses a challenge for early detection during triage at the emergency department (ED). Over a 3-month period, our ED aimed to minimise nosocomial transmission by using broader suspect case criteria for better detection and using appropriate personal protective equipment (PPE) for healthcare workers (HCWs) METHODS: All ED admissions with respiratory syndromes over a 3-month period were tested for COVID-19. The sensitivity and specificity of screening criteria in detecting COVID-19 was assessed. A risk-stratified approach was adopted for PPE usage in the ED, based on high-risk &quot;fever areas&quot; and lower-risk zones. When a case of COVID-19 was confirmed, surveillance was conducted for potentially exposed patients and HCWs. RESULTS: A total of 1,841 cases presenting with respiratory syndromes required admission over the study period. Amongst these, 70 cases of COVID-19 were subsequently confirmed. The majority (84.2%, 59/70) were picked up at ED triage as they fulfilled suspect case criteria. Of these, 34 met the official screening criteria; another 25 were picked up by the broader internal screening criteria. Over the 12-week period, the cumulative sensitivity of internal screening criteria was 84.3% (95% confidence interval, CI=73.6%-91.9%), whereas the sensitivity of the official screening criteria was 48.6% (95%CI=36.4%- 60.8%). Given the broadened internal criteria, the pre-existing ED &quot;fever area&quot; was insufficient and had to be expanded. However, there were no cases of nosocomial transmission from intra-ED exposure, despite extensive surveillance. CONCLUSION: Frontline physicians need to be given leeway to decide on the disposition of cases based on clinical suspicion during an ongoing outbreak of COVID-19. If a broader criterion is used at ED triage, ED facilities and isolation facilities need to be readied to accommodate a surge of suspect cases. Usage of appropriate PPE is essential in minimising nosocomial transmission.

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1. **Corona, COVID and kidney transplantation**  
   Sahay M. Indian Journal of Transplantation 2020;14:1-4.

Severe acute respiratory syndrome corona virus 2 (SARS CoV2) is responsible for corona virus disease (COVID-19). Many organizations have given guidelines for the prevention of COVID-19. Other societies have given updates regarding living and deceased donor transplantation during the pandemic. This article reviews the literature available on corona virus and its impact on living and deceased donor transplantation. Copyright © 2020 Indian Journal of Transplantation Published by Wolters Kluwer - Medknow.

1. **CORONA-steps for tracheotomy in COVID-19 patients: A staff-safe method for airway management**  
   Pichi B. Oral Oncology 2020;105 (no pagination):No page numbers.

1. **Coronavirus pandemic and Colorectal surgery: practical advice based on the Italian experience**  
   Di Saverio S. Colorectal disease : the official journal of the Association of Coloproctology of Great Britain and Ireland. 2020;31:No page numbers.

AIM: The current COVID-19 pandemic is challenging healthcare systems at a global level. We provide a practical strategy to reorganize pathways of emergency and elective colorectal surgery during the COVID-19 pandemic. METHOD(S): The authors, all from areas affected by the COVID-19 emergency, brainstormed remotely to define the key-points to be discussed. Tasks were assigned, concerning specific aspects of colorectal surgery during the pandemic, including the administrative management of the crisis in Italy. The recommendations (based on experience and on the limited evidence available) were collated and summarized. RESULT(S): Little is known about the transmission of COVID-19, but it has shown a rapid spread. It is prudent to stop non-cancer procedures and prioritize urgent cancer treatment. Endoscopy and proctological procedures should be performed highly selectively. When dealing with colorectal emergencies, a conservative approach is advised. Specific procedures should be followed when operating on COVID-19-patients, using dedicated personal protective equipment and adhering to specific rules. Some policies are described, including minimally-invasive surgery. These policies outline the strict regulation of entry/ exit into theatres and operating building as well as advice on performing procedures safely to reduce risk spreading the virus. It is likely that a reorganization of health system is required, both at central and local levels. A description of the strategy adopted in Italy is provided. CONCLUSION(S): Evidence on the management of patients needing surgery for colorectal conditions during the COVID-19 pandemic is currently lacking. Lessons learnt from healthcare professionals that have managed high volumes of surgical patients during the pandemic could be useful to mitigate some risks and reduce exposure to other patients, public and healthcare staff. Copyright This article is protected by copyright. All rights reserved.

1. **CORRESPONDANCE: Reflections and new developments within the COVID-19 pandemic**  
   Patel Z. M. International forum of allergy & rhinology. 2020;15:No page numbers.

1. **COVID-19 and ENT Pediatric otolaryngology during the COVID-19 pandemic. Guidelines of the French Association of Pediatric Otorhinolaryngology (AFOP) and French Society of Otorhinolaryngology (SFORL)**  
   Leboulanger N. Eur. ann. otorhinolaryngol. head neck dis 2020;:No page numbers.

OBJECTIVE: joint guidelines of the French Pediatric Otolaryngology Society (AFOP) and of the French Society of otorhinolaryngology - Head and neck Surgery (SFORL) on the management of paediatric otolaryngology patients in the context of the COVID-19 pandemic. METHODS: A nation-wide workgroup drew guidelines based on clinical experience, national and local recommendations and scientific literature. Proposals may have to be updated on a day-to-day basis. RESULTS: In children, incidence of symptomatic COVID-19 (1-5%) is low and of good prognosis. The indications for nasal flexible endoscopy should be drastically limited. If undertaken, full Personal Protective Equipment (PPE) including FFP2 masks are required, as well as use of a sheath. Saline nose wash done by caregivers other than parents at home should require PPE. Unless foreign body tracheobronchial aspiration is clinically obvious, CT-scan should be performed to confirm indication of endoscopy. Surgical indications should be limited to emergencies and to cases that cannot be delayed beyond 2 months (especially endonasal, endopharyngeal laryngo-tracheobronchial procedures). Postponement should ideally be a group decision and recorded as such in the medical file. Surgical techniques should be adapted to limit the risk of viral dissemination in the air, avoiding the use of drills, microdebriders, monopolar cautery or lasers. Continuous suction should be placed near the operating field. In case of confirmed Covid-19 cases, or suspected cases (or in some centres systematically), PPE with FFP2 mask should be worn by all staff members present in the operating room.

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1. **CoViD-19 e dispositivi di protezione individuale: qualcuno di noi morirà per la loro carenza**  
   Mandrola John Recenti Prog Med 2020;111:183-183.

The shortage of personal protective equipment exposes doctors and nurses to the risk of being infected by CoViD-19. Hospital managers and administrators ask healthcare professionals not to talk about the problem. In this way, however, the problem is enormously underestimated. It is unthinkable, explains the author, that your profession as a health worker can risk taking your life.

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1. **COVID-19 in forensic medicine unit personnel: Observation from Thailand**  
   Sriwijitalai W. Journal of Forensic and Legal Medicine 2020;72 (no pagination):No page numbers.

1. **COVID-19 Obstetrics Task Force, Lombardy, Italy: executive management summary and short report of outcome**  
   Ferrazzi E. M. International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics. 2020;08:No page numbers.

From February 24, 2020, a COVID-19 obstetric task force was structured to deliver management recommendations for obstetric care. From March 1, 2020, six COVID-19 hubs and their spokes were designated. An interim analysis of cases occurring in or transferred to these hubs was performed on March 20, 2020 and recommendations were released on March 24, 2020. The vision of this strict organization was to centralize patients in high-risk maternity centers in order to concentrate human resources and personal protective equipment (PPE), dedicate protected areas of these major hospitals, and centralize clinical multidisciplinary experience with this disease. All maternity hospitals were informed to provide a protected labor and delivery room for nontransferable patients in advanced labor. A pre-triage based on temperature and 14 other items was developed in order to screen suspected patients in all hospitals to be tested with nasopharyngeal swabs. Obstetric outpatient facilities were instructed to maintain scheduled pregnancy screening as per Italian guidelines, and to provide pre-triage screening and surgical masks for personnel and patients for pre-triage-negative patients. Forty-two cases were recorded in the first 20 days of hub and spoke organization. The clinical presentation was interstitial pneumonia in 20 women. Of these, seven required respiratory support and eventually did well. Two premature labors occurred. Copyright This article is protected by copyright. All rights reserved.

1. **COVID-19 pandemic: Effects and evidence-based recommendations for otolaryngology and head and neck surgery practice**  
   Kowalski L. P. Head and Neck. 2020;:No page numbers.

The 2019 novel coronavirus disease (COVID-19) is a highly contagious zoonosis produced by SARS-CoV-2 that is spread human-to-human by respiratory secretions. It was declared by the WHO as a public health emergency. The most susceptible populations, needing mechanical ventilation, are the elderly and people with associated comorbidities. There is an important risk of contagion for anesthetists, dentists, head and neck surgeons, maxillofacial surgeons, ophthalmologists, and otolaryngologists. Health workers represent between 3.8% and 20% of the infected population; some 15% will develop severe complaints and among them, many will lose their lives. A large number of patients do not have overt signs and symptoms (fever/respiratory), yet pose a real risk to surgeons (who should know this fact and must therefore apply respiratory protective strategies for all patients they encounter). All interventions that have the potential to aerosolize aerodigestive secretions should be avoided or used only when mandatory. Health workers who are: pregnant, over 55 to 65 years of age, with a history of chronic diseases (uncontrolled hypertension, diabetes mellitus, chronic obstructive pulmonary diseases, and all clinical scenarios where immunosuppression is feasible, including that induced to treat chronic inflammatory conditions and organ transplants) should avoid the clinical attention of a potentially infected patient. Health care facilities should prioritize urgent and emergency visits and procedures until the present condition stabilizes; truly elective care should cease and discussed on a case-by-case basis for patients with cancer. For those who are working with COVID-19 infected patients' isolation is compulsory in the following settings: (a) unprotected close contact with COVID-19 pneumonia patients; (b) onset of fever, cough, shortness of breath, and other symptoms (gastrointestinal complaints, anosmia, and dysgeusia have been reported in a minority of cases). For any care or intervention in the upper aerodigestive tract region, irrespective of the setting and a confirmed diagnosis (eg, rhinoscopy or flexible laryngoscopy in the outpatient setting and tracheostomy or rigid endoscopy under anesthesia), it is strongly recommended that all health care personnel wear personal protective equipment such as N95, gown, cap, eye protection, and gloves. The procedures described are essential in trying to maintain safety of health care workers during COVID-19 pandemic. In particular, otolaryngologists, head and neck, and maxillofacial surgeons are per se exposed to the greatest risk of infection while caring for COVID-19 positive subjects, and their protection should be considered a priority in the present circumstances. Copyright © 2020 Wiley Periodicals, Inc.

1. **COVID-19 Pandemic: Staged Management of Surgical Services for Gynecology and Obstetrics**  
   Weber Lebrun E. E. American Journal of Obstetrics & Gynecology 2020;03:03.

The COVID-19 pandemic has required an unprecedented global healthcare response requiring maintenance of existing hospital-based services while simultaneously preparing for high-acuity care for infected and sick individuals. Hospitals must protect patients and the diverse healthcare workforce by conserving personal protective equipment and redeployment of facility resources. While each hospital or health system must evaluate their own capabilities and surge capacity, we present principles of management of surgical services during a health emergency and provide specific guidance to help with decision-making. We review the limited evidence from past hospital and community responses to various health emergencies and focus on systematic methods for adjusting surgical services to create capacity, addressing the specific risks of COVID-19. Successful strategies for tiered reduction of surgical cases involve multi-disciplinary engagement of the entire healthcare system and use of a structured risk-assessment categorization scheme which can be applied across the institution. Our institution developed and operationalized this approach over three working days, indicating that immediate implementation is feasible in response to an unforeseen healthcare emergency.

1. **COVID-19 Pandemic: Survey of future use of personal protective equipment in optometric practice**  
   Pult Heiko Contact Lens and Anterior Eye 2020;:No page numbers.

Purpose The aim of this project was to evaluate which personal protective equipment (PPE) eye care practitioners (ECP) will use during the next months and also what they will ask the patient to use in clinical practice Methods A social-media survey was carried out, asking 257 optometrists and opticians in Germany, Austria and Switzerland (i) which PPE they intended to use in the future (after lockdown and before herd immunity and / or vaccine availability) and (ii) what they would ask the patient to do in terms of this Results 75% of the ECPs planned on wearing masks during refractions and 69% when fitting contact lens 62% of the ECPs also expected their patients to wear masks in these tasks This number is higher than for distance tasks such as fitting frames Around 90% of the ECPs would, in addition to hand washing, disinfect their hands and around 80% expected their patients to do so too Less than one third of ECPs favoured wearing safety spectacles, gloves and / or protective facial shields 73% planed on disinfecting frames after they would have been tried on by customers Conclusions In summary, most ECPs planed on continuing to use higher standards of PPE Those, who intended to wear masks themselves, would ask their patients to also do so, combined with hand disinfection

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1. **Covid-19: doctors are warned not to go public about PPE shortages**  
   Dyer Clare BMJ 2020;369:m1592-m1592.

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1. **Covid-19: Doctors challenge legality of government's PPE guidance**  
   Dyer Clare BMJ 2020;369:m1665-m1665.

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1. **Covid-19: Doctors performing resuscitation need higher level of PPE, says royal college**  
   Iacobucci Gareth BMJ 2020;369:m1644-m1644.

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1. **Covid-19: Doctors still at "considerable risk" from lack of PPE, BMA warns**  
   Iacobucci Gareth BMJ 2020;368:m1316-m1316.

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1. **Covid-19: Government appoints former Olympics chief to lead PPE production drive**  
   Rimmer Abi BMJ 2020;369:m1580-m1580.

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1. **Covid-19: Lack of PPE in care homes is risking spread of virus, leaders warn**  
   Iacobucci Gareth BMJ 2020;368:m1280-m1280.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=fc505e86b5367787c18345a1259f6174)

1. **Covid-19: PHE upgrades PPE advice for all patient contacts with risk of infection**  
   Sayburn Anna BMJ 2020;369:m1391-m1391.

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1. **Covid-19: Third of surgeons do not have adequate PPE, royal college warns**  
   Rimmer Abi BMJ 2020;369:m1492-m1492.

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1. **Covid-19: What’s the current advice for UK doctors?**  
   Rimmer Abi 2020;:No page numbers.

UK employers have a legal obligation under the Health and Safety at Work Act 1974 to protect staff from harm And the Control of Substances Hazardous to Health Regulations place a duty to carry out individual risk assessments to identify hazards, quantify risks, and put suitable controls in place, says Steven Nimmo, editor of the Occupational Medicine Journal “If the risk assessment establishes that personal protective equipment (PPE) is required then your employer must provide it, properly fit it, and provide suitable instruction and training in its use,” he says Public Health England’s guidance says that clinicians preparing to assess a patient with suspected covid-19 must wear PPE, which as a minimum should be a correctly fitted FFP3 respirator, gown, gloves, and eye protection 1 Doctors seeing patients with confirmed covid-19 must wear full PPE, including a FFP3 respirator, disposable eye protection, and preferably a visor, a long sleeved disposable gown, and gloves, PHE says For symptomatic, unconfirmed patients, doctors should wear a fluid resistant surgical mask, gloves, apron and eye protection if there is a risk of splashing into the eyes, PHE recommends 2 “Pregnant women and children are not at high risk,” Nimmo says “But the above legal obligations still apply Immunosuppressed people may well be …[TRUNCATED]

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1. **Decontamination and Reuse of N95 Respirators with Hydrogen Peroxide Vapor to Address Worldwide Personal Protective Equipment Shortages During the SARS-CoV-2 (COVID-19) Pandemic**  
   Schwartz Antony Applied Biosafety 2020;:No page numbers.

The SARS-CoV-2 (COVID-19) pandemic has placed a tremendous amount of strain on resources in the health care setting One of the most pressing issues is the rapid depletion of personal protective equipment (PPE) used in the care of patients This is a significant concern for health care workers’ health and safety Many entities have depleted or soon will exhaust their stockpile of PPE despite adopting PPE-sparing practices as the number of COVID-19 cases in the United States increases at an almost exponential rate and manufacturers struggle to keep up with the worldwide demand This potential shortage is particularly concerning for commonly used N95 respirators and powered-air purifying respirators (PAPRs) Recently, the US Occupational Safety and Health Administration (OSHA)1 even temporarily suspended the requirement to perform annual fit testing of respirators to allow entities to conserve respirators and preserve them for patient care These measures are unprecedented and highlight the urgent need for entities to develop solutions to proactively address what could be potentially a grave occupational health issue At Duke University and Health System, we have evaluated and will begin using hydrogen peroxide vapor to decontaminate and reuse N95 respirators In this communication, we briefly discuss the decontamination validation process and post-decontamination performance validation conducted at Duke This validation, which is supported by previous laboratory testing, funded by the US Food and Drug Administration (FDA), demonstrated that N95 respirators still met performance requirements even after decontamination with hydrogen peroxide vapor in the laboratory setting for over 50 times 2 While previous studies have shown the applicability of the hydrogen peroxide vapor process, we have also confirmed that the respirator still functions as designed, using our standardized human N95 fit testing methodology We will now use this internally validated and Duke Institutional Biosafety Review Committee (IBRC)–approved laboratory decontamination process in the clinical setting to dramatically extend the life of our N95 respirators We hope that sharing our processes through this brief communication can help other entities with access to hydrogen peroxide vapor to evaluate the potential applicability of this technology at their facility or partner with those who may already have this capability, including other private-sector life science organizations Process/Method We, like others, have implemented many Centers for Disease Control and Prevention (CDC)–approved N95 reuse practices, including employees reusing their own N95s for the duration of their shifts However, this alone may not be adequate to meet our anticipated need with various centers reporting multiple-fold higher use of PPE as their caseload increases In the interest of our workforce safety, the goal was thus to extend the life of our existing supply Duke University houses one of the National Institute of Allergy and Infectious Diseases (NIAID) Regional Biocontainment Laboratories (RBLs) as part of a nationwide network of high-containment laboratories and has extensive experience with the use of hydrogen peroxide vapor decontamination In addition, Duke University Health System had past experience with hydrogen peroxide vapor in the clinical setting as part of previous high-consequence pathogen preparedness exercises The Duke RBL, a biosafety level 3 (BSL-3) facility, contains a room specifically designed to use hydrogen peroxide vapor to decontaminate laboratory equipment and has been operational for over a decade This room currently uses a Bioquell (Horsham, PA, USA) ClarusTM C system with a 35% hydrogen peroxide solution and distribution system to disperse hydrogen peroxide vapor into the room in a uniform fashion In addition, we are evaluating the new Bioquell Z-2 and Bioquell ProteQ systems that will provide increased capacity and flexibility to our reprocessing needs The FDA-funded project, referenced previously, validated the decontaminat on of N95 respirators with hydrogen peroxide vapor for over 50 cycles with the reuse limiting factor being the elastic straps that started to show degradation 2 To address this, we plan to decontaminate and reuse N95s up to 30 cycles with a quality assurance (QA) step to ensure both qualitative and quantitative degradation has not occurred A cohort of respirators will be decontaminated with every cycle and will be used in standardized quantitative fit testing to ensure the integrity of the respirators is maintained over many decontamination cycles Procedures Approximately 100 3M (St Paul, MN, USA) 1860 N95s, previously used in quantitative employee fit testing, were collected and laid out on stainless steel wire racks in our hydrogen peroxide vapor processing room in the RBL The hydrogen peroxide vapor run consisted of the following 5 stages: conditioning, pregassing, gassing, gassing dwell, and aeration The existing RBL hydrogen peroxide vapor standard operating procedure (SOP) was employed and requires that the processing room attain a 480+-ppm level of hydrogen peroxide vapor with a “gassing” time of 25 minutes and a “gassing dwell” time of 20 minutes At the end of a cycle, during the aeration stage, fresh air was introduced into the room to increase the rate of catalytic conversion of hydrogen peroxide vapor into oxygen and water This procedure leaves no residue other than water When sufficient time had passed, we used a PortaSens II sensor (Analytical Technology, Inc , Collegeville, PA, USA) to ensure hydrogen peroxide levels were below the OSHA permissible exposure limit3 (PEL) of 1 0 ppm prior to entering the room In addition, we validated the efficacy of the decontamination process by using 9 individual 6-log biological indicators (Geobacillus stearothermophilus spores) See Figure 1 for representation of the decontamination setup and placement of biological indicators [truncated]

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1. **Desinfección del equipo de protección personal en la atención sanitaria de la pandemia covid-19**  
   El Salvador. Ministerio de Salud. Instituto Nacional de Salud 2020;:No page numbers.

A medida que la pandemia COVID-19 se acelera, los sistemas de salud a nivel mundial se han saturado con pacientes que buscan una atención rápida y eficiente La prevención de la propagación del virus entre los trabajadores de la salud (PS) y los pacientes depende del uso efectivo de equipos de protección personal (EPP), como guantes, mascarillas, gafas protectoras, protectores faciales, cofias, protectores de calzado y batas Debido a la magnitud del problema, se prevé una escasez de EPP, convirtiéndose en uno de los principales problemas en la atención de la pandemia Un aumento en el suministro de EPP requiere un gran aumento en el proceso de fabricación, un proceso que requiere de mucho tiempo y recursos, sin embargo, el número de enfermos aumenta en una velocidad alarmante En vista de esta situación, la comunidad científica comenzó a generar recomendaciones sobre las posibles soluciones, entre estas se pueden mencionar: la reorientación de material de protección que se utiliza en otras áreas como construcción, laboratorios de investigación, salones de belleza, dentistas, veterinarios y granjas, a los servicios de salud1 Otras propuestas están orientadas a la reutilización del EPP previo a un proceso de esterilización Para esto se propone la utilización de óxido de etileno, radiación UV o gamma, ozono y alcohol Otras propuestas son la impregnación de las mascarillas con cobre o cloruro de sodio Muchos científicos han reconocido que estos métodos de esterilización pueden comprometer la integridad estructural del EPP degradando las fibras de las máscaras y respiradores perdiendo su eficacia en el filtrado de partículas virales1 Otros planteamientos han descrito la utilización de EPP de tela, esto facilita su limpieza y desifección para su reutilzación segura, tal como se realizaba en épocas anteriores2 Este documento presenta las recomendaciones dadas hasta la fecha para la esterilización del EPP, en caso sea pertinente, ya que en algunos elementos la esterilización no es recomendada ya que compromete la capacidad de protección de los elementos, poniendo en riesgo la salud del personal de salud As the COVID-19 pandemic accelerates, healthcare systems worldwide have become saturated with patients seeking prompt and efficient care Prevention of the spread of the virus among healthcare workers (PS) and patients depends on the effective use of personal protective equipment (PPE), such as gloves, masks, goggles, face shields, caps, shoe protectors, and gowns Due to the magnitude of the problem, a shortage of EPP is anticipated, becoming one of the main problems in the attention of the pandemic An increase in the supply of PPE requires a great increase in the manufacturing process, a process that requires a lot of time and resources, however, the number of patients increases at an alarming rate In view of this situation, the scientific community began to generate recommendations on possible solutions, among these we can mention: the reorientation of protective material that is used in other areas such as construction, research laboratories, beauty salons, dentists, veterinarians and farms, to health services1 Other proposals are aimed at reusing the PPE prior to a sterilization process For this, the use of ethylene oxide, UV or gamma radiation, ozone and alcohol is proposed Other proposals are the impregnation of the masks with copper or sodium chloride Many scientists have recognized that these sterilization methods can compromise the structural integrity of EPP by degrading the fibers of the masks and respirators, losing their effectiveness in filtering viral particles1 Other approaches have described the use of fabric PPE, this facilitates its cleaning and disinfection for its safe reuse, as was done in previous times2 This document presents the recommendations given to date for the sterilization of PPE, if applicable, since in some elements sterilization is not recommended as it compromises the protection capacity of the elements, putting the health of health ersonnel at risk

1. **Does my PPE really work? A simulation-based approach**  
   Hughes Patrick G. Med. educ 2020;:No page numbers.

Healthcare workers have substantial concerns about the effectiveness of the personal protective equipment. Staff desired a refresher training with individual feedback of their abilities to don and doff effectively and assurance that if they donned and doffed correctly their equipment was effective. A nontoxic fluorescent solution, only visible under ultraviolet light, was utilized during the training. This solution was sprayed on and given as a nebulized treatment to a high-fidelity simulator during the scenario. It allowed educators and learners to easily visualize any contamination. This innovative training method demonstrated that following the PPE training improves workplace safety and decreases the risk of transmission.

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1. **Donning a new approach to the practice of gastroenterology: perspectives from the COVID-19 pandemic epicenter**  
   Sethi Amrita Clin. gastroenterol. hepatol 2020;:No page numbers.

The COVID-19 pandemic is seemingly peaking now in New York City and has triggered significant changes to the standard management of gastrointestinal diseases. Priorities such as minimizing viral transmission, preserving (personal protective equipment) PPE, and freeing hospital beds have driven unconventional approaches to managing GI patients. Conversion of endoscopy units to COVID units and redeployment of gastroenterology (GI) fellows and faculty has profoundly changed the profile of most GI services. Meanwhile, consult and procedural volumes have been drastically reduced. In this review we share our collective experiences, how we have changed our practice of medicine, in response to the COVID surge. While we will review our management of specific consults and conditions, the overarching theme focuses primarily on non-invasive measures and maximizing medical therapies. Endoscopic procedures have been reserved for those timely interventions that are most likely to be therapeutic. The role of multidisciplinary discussion, while always important, has now become critical. And the support of our faculty and trainees remains essential. Local leadership can encourage well-being by frequent team check-ins and foster trainee development through remote learning. Advancing a clear vision and a transparent process for how to organize and triage care in the recovery phase will allow for a smooth transition to our &quot;new normal.&quot;

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1. **Dynamic adaptation to COVID-19 in a Singapore paediatric emergency department**  
   Tan Ronald Ming Ren Emerg. med. j 2020;:No page numbers.

Singapore was one of the earliest countries affected by the coronavirus disease 2019 (COVID-19) pandemic, with more laboratory-confirmed COVID-19 cases in early February 2020 than any other country outside China. This short report is a narrative review of our tertiary paediatric emergency department (ED) perspective and experience managing the evolving outbreak situation. Logistic considerations included the segregation of the ED into physically separate high-risk, intermediate-risk and low-risk areas, with risk-adapted use of personal protective equipment (PPE) for healthcare personnel in each ED area. Workflow considerations included the progressive introduction of outpatient COVID-19 testing in the ED for enhanced surveillance; adapting the admissions process particularly for high-risk and intermediate-risk cases; and the management of unwell accompanying adult caregivers. Manpower considerations included the reorganisation of medical manpower into modular teams to mitigate the risk of hospital transmission of COVID-19. Future plans for a tiered isolation facility should include structural modifications for the permanent isolation facility such as anterooms for PPE donning/doffing; replication of key ED functions in the tent facility such as a separate resuscitation room and portable X-ray room; and refresher PPE training. Dynamic reassessment of ED workflow processes, in conjunction with the hospital and national public health response, may help in managing this novel disease entity.

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1. **Early Institutional Head and Neck Oncologic and Microvascular Surgery Practice Patterns Across the United States During the SARS-CoV-2 (COVID19) Pandemic**  
   Patel R. J. Head & Neck 2020;24:24.

BACKGROUND: The SARS-CoV-2 (COVID-19) pandemic has caused rapid changes in head and neck cancer (HNC) care. "Real-time" methods to monitor practice patterns can optimize provider safety and patient care.

1. **Elective surgery in the time of COVID-19**  
   Diaz A. American Journal of Surgery. 2020;:No page numbers.

The COVID-19 pandemic has placed a significant strain on the United States health care system, and frontline healthcare workers are rapidly altering their professional responsibilities to help meet hospital needs. In an effort to decrease disease transmission and conserve personal protective equipment (PPE), surgeons have witnessed one of the most dramatic changes in their practices with rapidly decreasing numbers of elective surgeries. Copyright © 2020 Elsevier Inc.

1. **Electronic Personal Protective Equipment: A Strategy to Protect Emergency Department Providers in the Age of COVID-19**  
   Turer Robert W. J. am. med. inform. assoc 2020;:No page numbers.

Emergent policy changes related to telemedicine and the Emergency Medical Treatment and Labor Act (EMTALA) during the novel coronavirus pandemic (COVID-19) have created opportunities for technology-based clinical evaluation, which serves to conserve personal protective equipment (PPE) and protect emergency providers. We define electronic personal protective equipment (ePPE) as an approach using telemedicine tools to perform electronic medical screening exams while satisfying EMTALA. We discuss the safety, legal, and technical factors necessary for implementing such a pathway. This approach has the potential to conserve PPE and protect providers while maintaining safe standards for medical screening exams in the ED for low risk patients in whom COVID-19 is suspected.

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1. **Emergency cesarean section on severe acute respiratory syndrome coronavirus 2 (SARS- CoV-2) confirmed patient**  
   Lee D. H. Korean journal of anesthesiology. 2020;31:No page numbers.

Background: Since the first case of severe acute respiratory syndrome Coronavirus-2 (SARS-CoV-2) occurred in Wuhan in December 2019, the virus has spread globally. The World Health Organization declared the virus outbreak a pandemic on March 11, 2020. On January 19, 2020, a 35-year-old woman who returned from China was confirmed as the first SARS-CoV-2 infected case in Korea. Since then, it has spread all over Korea. Case: We report the first case of a SARS-CoV-2 positive woman delivering a baby through cesarean section at 37+6 weeks of pregnancy in the Republic of Korea. Conclusion(s): This case suggested that negative pressure operating room, skillful medical team, and enhanced personal protective equipment including N95 masks, surgical cap, double gown, double gloves, shoe covers, and powered air-purifying respirator are required at the hospital for safe delivery in such a case.

1. **Endonasal instrumentation and aerosolization risk in the era of COVID-19: simulation, literature review, and proposed mitigation strategies**  
   Workman A. D. International Forum of Allergy & Rhinology 2020;03:03.

INTRODUCTION: International experience with COVID-19 suggests it poses a significant risk of infectious transmission to skull base surgeons, due to high nasal viral titers and the unknown potential for aerosol generation during endonasal instrumentation. The purpose of this study was to simulate aerosolization events over a range of endoscopic procedures to gain an evidence-based aerosol risk assessment.

1. **Escalating infection control response to the rapidly evolving epidemiology of the Coronavirus disease 2019 (COVID-19) due to SARS-CoV-2 in Hong Kong**  
   Cheng V. C. C. Infection Control and Hospital Epidemiology. 2020;:No page numbers.

Background:To describe the infection control preparedness for Coronavirus Disease (COVID-19) due to SARS-CoV-2 [previously known as 2019-novel coronavirus] in the first 42 days after announcement of a cluster of pneumonia in China, on 31 December 2019 (day 1) in Hong Kong. Method(s):A bundle approach of active and enhanced laboratory surveillance, early airborne infection isolation, rapid molecular diagnostic testing, and contact tracing for healthcare workers (HCWs) with unprotected exposure in the hospitals was implemented. Epidemiological characteristics of confirmed cases, environmental and air samples were collected and analyzed. Result(s):From day 1 to day 42, forty-two (3.3%) of 1275 patients fulfilling active (n=29) and enhanced laboratory surveillance (n=13) confirmed to have SARS-CoV-2 infection. The number of locally acquired case significantly increased from 1 (7.7%) of 13 [day 22 to day 32] to 27 (93.1%) of 29 confirmed case [day 33 to day 42] (p<0.001). Twenty-eight patients (66.6%) came from 8 family clusters. Eleven (2.7%) of 413 HCWs caring these confirmed cases were found to have unprotected exposure requiring quarantine for 14 days. None of them was infected and nosocomial transmission of SARS-CoV-2 was not observed. Environmental surveillance performed in a patient with viral load of 3.3x10<sup>6</sup> copies/ml (pooled nasopharyngeal/ throat swab) and 5.9x10<sup>6</sup> copies/ml (saliva) respectively. SARS-CoV-2 revealed in 1 (7.7%) of 13 environmental samples, but not in 8 air samples collected at a distance of 10 cm from patient's chin with or without wearing a surgical mask. Conclusion(s):Appropriate hospital infection control measures could prevent nosocomial transmission of SARS-CoV-2. Copyright © 2020 by The Society for Healthcare Epidemiology of America. All rights reserved.

1. **Ethical Rationing of Personal Protective Equipment to Minimize Moral Residue During the COVID-19 Pandemic**  
   Binkley Charles E. J. Am. Coll. Surg 2020;:No page numbers.

This article proposes systems for the fair distribution of scarce resources to healthcare providers. It builds on classic ethical structures and adapts them to the equitable distribution of personal protective equipment (PPE) to clinicians at risk of contracting novel corona virus-19 (COVID-19). The article also defines systems of allocation that are generally considered unethical and are to be avoided. We emphasize that policies must be transparent, collaborative, applied equally, and have a system of accountability. It is recognized that unless the supply of PPE is quickly replenished, or viable alternatives to traditional equipment are devised in the coming days to weeks, hospitals and healthcare systems will face the difficult task of rationing PPE to at-risk clinicians. This paper suggests an ethical framework for that process.

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1. **Expert consensus from the Italian Society for Colposcopy and Cervico-Vaginal Pathology (SICPCV) for colposcopy and outpatient surgery of the lower genital tract during the COVID-19 pandemic**  
   Ciavattini A. International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics. 2020;08:No page numbers.

In the context of the COVID-19 pandemic, patients need to be evaluated within 2-4 weeks in the following cases: cytology result of "squamous cell carcinoma," "atypical glandular cells, favor neoplastic," "endocervical adenocarcinoma in situ," or "adenocarcinoma"; histopathological diagnosis of suspected invasion from cervical/vaginal biopsy, or invasive disease after a cervical excision procedure, vaginal excision, or vulvar biopsy/excision; sudden onset of strongly suggestive symptoms for malignancy. Digital imaging technologies represent an important opportunity during the COVID-19 pandemic to share colposcopic images with reference centers, with the aim of avoiding any concentration of patients. All patients must undergo screening for COVID-19 exposure and should wear a surgical mask. A high-efficiency filter smoke evacuation system is mandatory to remove surgical smoke. Electrosurgical instruments should be set at the lowest possible power and not be used for long continuous periods to reduce the amount of surgical smoke. The following personal protective equipment should be used: sterile fluid-repellant surgical gloves, an underlying pair of gloves, eye protection, FFP3 mask, surgical cap, and gown. The colposcope should be protected by a disposable transparent cover. A protective lens that must be disinfected after each use should be applied. The use of a video colposcope should be preferred. Copyright This article is protected by copyright. All rights reserved.

1. **Expert Recommendations for Tracheal Intubation in Critically ill Patients with Noval Coronavirus Disease 2019**  
   Zuo Ming-Zhang Chin. med. sci. j 2020;:No page numbers.

Coronavirus Disease 2019 (COVID-19), caused by a novel coronavirus (SARS-CoV-2), is a highly contagious disease. It firstly appeared in Wuhan, Hubei province of China in December 2019. During the next two months, it moved rapidly throughout China and spread to multiple countries through infected persons travelling by air. Most of the infected patients have mild symptoms including fever, fatigue and cough. But in severe cases, patients can progress rapidly and develop to the acute respiratory distress syndrome, septic shock, metabolic acidosis and coagulopathy. The new coronavirus was reported to spread via droplets, contact and natural aerosols from human-to-human. Therefore, high-risk aerosol-producing procedures such as endotracheal intubation may put the anesthesiologists at high risk of nosocomial infections. In fact, SARS-CoV-2 infection of anesthesiologists after endotracheal intubation for confirmed COVID-19 patients have been reported in hospitals in Wuhan. The expert panel of airway management in Chinese Society of Anaesthesiology has deliberated and drafted this recommendation, by which we hope to guide the performance of endotracheal intubation by frontline anesthesiologists and critical care physicians. During the airway management, enhanced droplet/airborne PPE should be applied to the health care providers. A good airway assessment before airway intervention is of vital importance. For patients with normal airway, awake intubation should be avoided and modified rapid sequence induction is strongly recommended. Sufficient muscle relaxant should be assured before intubation. For patients with difficult airway, good preparation of airway devices and detailed intubation plans should be made.

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1. **Getting the right PPE: five minutes with . . . Sarah Hallett**  
   Rimmer Abi BMJ 2020;368:m1287-m1287.

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1. **Guidelines for the management of surgical departments in non-uniform hospitals during the COVID-19 pandemic**  
   Mitura K. Polski Przeglad Chirurgiczny 2020;92:48-59.

In the last several weeks we have been witnessing the exponentially progressing pandemic SARS-CoV-2 coronavirus. As the number of people infected with SARS-CoV2 escalates, the problem of surgical management of patients requiring urgent surgery is increasing. Patients infected with SARS-CoV2 virus but with negative test results will appear in general hospitals and may pose a risk to other patients and hospital staff. Health care workers constitutes nearly 17% of infected population in Poland, therefore early identification of infected people becomes a priority to protect human resources and to ensure continuity of the access to a surgical care. Both surgical operations, and endoscopic procedures are considered as interventions with an increased risk of infection. Therefore, determining the algorithm becomes crucial for qualifying patients for surgical treatment, but also to stratify the risk of personnel being infected during surgery and to adequately protect staff. Each hospital should be logistically prepared for the need to perform urgent surgery on a patient with suspected or confirmed infection, including personal protective equipment. Limited availability of the equipment, working under pressure and staff shortages in addition to a highly contagious pathogen necessitate a pragmatic management of human resources in health care. Instant synchronized action is needed, and clear uniform guidelines are essential for the healthcare system to provide citizens with the necessary surgical care while protecting both patients, and staff. This document presents current recommendations regarding surgery during the COVID-19 pandemic in Poland.

1. **Head and neck oncology during the COVID-19 pandemic: Reconsidering traditional treatment paradigms in light of new surgical and other multilevel risks**  
   Day Andrew T. Oral Oncol 2020;105:104684-104684.

The COVID-19 pandemic demands reassessment of head and neck oncology treatment paradigms. Head and neck cancer (HNC) patients are generally at high-risk for COVID-19 infection and severe adverse outcomes. Further, there are new, multilevel COVID-19-specific risks to patients, surgeons, health care workers (HCWs), institutions and society. Urgent guidance in the delivery of safe, quality head and neck oncologic care is needed. Novel barriers to safe HNC surgery include: (1) imperfect presurgical screening for COVID-19; (2) prolonged SARS-CoV-2 aerosolization; (3) occurrence of multiple, potentially lengthy, aerosol generating procedures (AGPs) within a single surgery; (4) potential incompatibility of enhanced personal protective equipment (PPE) with routine operative equipment; (5) existential or anticipated PPE shortages. Additionally, novel, COVID-19-specific multilevel risks to HNC patients, HCWs and institutions, and society include: use of immunosuppressive therapy, nosocomial COVID-19 transmission, institutional COVID-19 outbreaks, and, at some locations, societal resource deficiencies requiring health care rationing. Traditional head and neck oncology doctrines require reassessment given the extraordinary COVID-19-specific risks of surgery. Emergent, comprehensive management of these novel, multilevel surgical risks are needed. Until these risks are managed, we temporarily favor nonsurgical therapy over surgery for most mucosal squamous cell carcinomas, wherein surgery and nonsurgical therapy are both first-line options. Where surgery is traditionally preferred, we recommend multidisciplinary evaluation of multilevel surgical-risks, discussion of possible alternative nonsurgical therapies and shared-decision-making with the patient. Where surgery remains indicated, we recommend judicious preoperative planning and development of COVID-19-specific perioperative protocols to maximize the safety and quality of surgical and oncologic care.

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1. **Head and neck virtual medicine in a pandemic era: lessons from COVID-19**  
   Prasad A. Head & neck. 2020;16:No page numbers.

The 2019 novel coronavirus disease (COVID-19) has presented the world and physicians with a unique public health challenge. In light of its high transmissibility and large burden on the healthcare system, many hospitals and practices have opted to cancel elective surgeries in order to mobilize resources, ration personal protective equipment and guard patients from the virus. Head and neck cancer physicians are particularly affected by these changes given their scope of practice, complex patient population, and interventional focus. In this viewpoint, we discuss some of the many challenges faced by head and neck surgeons in this climate. Additionally, we outline the utility of telemedicine as a potential strategy for allowing physicians to maintain an effective continuum of care. This article is protected by copyright. All rights reserved.

1. **Headaches Associated With Personal Protective Equipment - A Cross-Sectional Study Among Frontline Healthcare Workers During COVID-19**  
   Ong Jonathan J. Y. Headache 2020;:No page numbers.

BACKGROUND: Coronavirus disease 2019 (COVID-19) is an emerging infectious disease of pandemic proportions. Healthcare workers in Singapore working in high-risk areas were mandated to wear personal protective equipment (PPE) such as N95 face mask and protective eyewear while attending to patients. OBJECTIVES: We sought to determine the risk factors associated with the development of de novo PPE-associated headaches as well as the perceived impact of these headaches on their personal health and work performance. The impact of COVID-19 on pre-existing headache disorders was also investigated. METHODS: This is a cross-sectional study among healthcare workers at our tertiary institution who were working in high-risk hospital areas during COVID-19. All respondents completed a self-administered questionnaire. RESULTS: A total of 158 healthcare workers participated in the study. Majority [126/158 (77.8%)] were aged 21-35 years. Participants included nurses [102/158 (64.6%)], doctors [51/158 (32.3%)], and paramedical staff [5/158 (3.2%)]. Pre-existing primary headache diagnosis was present in about a third [46/158 (29.1%)] of respondents. Those based at the emergency department had higher average daily duration of combined PPE exposure compared to those working in isolation wards [7.0 (SD 2.2) vs 5.2 (SD 2.4) hours, P &lt; .0001] or medical ICU [7.0 (SD 2.2) vs 2.2 (SD 0.41) hours, P &lt; .0001]. Out of 158 respondents, 128 (81.0%) respondents developed de novo PPE-associated headaches. A pre-existing primary headache diagnosis (OR = 4.20, 95% CI 1.48-15.40; P = .030) and combined PPE usage for &gt;4 hours per day (OR 3.91, 95% CI 1.35-11.31; P = .012) were independently associated with de novo PPE-associated headaches. Since COVID-19 outbreak, 42/46 (91.3%) of respondents with pre-existing headache diagnosis either &quot;agreed&quot; or &quot;strongly agreed&quot; that the increased PPE usage had affected the control of their background headaches, which affected their level of work performance. CONCLUSION: Most healthcare workers develop de novo PPE-associated headaches or exacerbation of their pre-existing headache disorders.

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1. **Helmet Modification to PPE with 3D Printing During the COVID-19 Pandemic at Duke University Medical Center: A Novel Technique**  
   Erickson Melissa M. The Journal of Arthroplasty 2020;:No page numbers.

Care for patients during COVID-19 poses challenges that require the protection of staff with recommendations that health care workers wear at minimum, an N95 mask or equivalent while performing an aerosol-generating procedure with a face shield The United States faces shortages of personal protective equipment, and surgeons who use loupes and headlights have difficulty using these in conjunction with face shields Most arthroplasty surgeons use surgical helmet systems, but in the current pandemic, many hospitals have delayed elective arthroplasty surgeries and the helmet systems are going unused As a result, the authors have begun retrofitting these arthroplasty helmets to serve as personal protective equipment (PPE) The purpose of this paper is to outline the conception, design, donning technique, and safety testing of these arthroplasty helmets being re-purposed as PPE

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1. **Hospital biopreparedness in the Looming Presence of SARS-CoV-2/COVID-19**  
   Popescu Saskia Health Science Reports 2020;:No page numbers.

The recent analysis of 138 hospitalized patients in Wuhan, China, and their clinical characteristics, has given credence to stronger investments into hospital biopreparedness and overall infection prevention efforts 1 Within this analysis, researchers found two pieces that are particularly relevant to healthcare preparedness: first, that 26% of patients required admission to an intensive care unit, and second, that 41% of cases were related to healthcare transmission Patients requiring medical care in an intensive care unit inherently burden the system more, both in terms of supplies in personnel, but also because they typically have greater lengths of stay The volume of healthcare‐associated cases is an indicator of infection prevention breakdowns, which points to the potential for hospitals to further spread the disease This is not a unique finding, however, and similar situations have been observed in previous coronavirus outbreaks Indeed, hospitals can easily act as amplifiers for disease transmission during these events In 2003, the Severe Acute Respiratory Syndrome coronavirus (SARS‐CoV) outbreak in Toronto highlighted this very real vulnerability, where busy emergency departments, delays in isolation, and improper personal protective equipment (PPE) use fueled the spread of disease in several hospitals 2 Enhanced infection prevention measures were eventually implemented (higher level of PPE, masking when in public areas, among others), which helped bring transmission to halt After the outbreak was believed to be over, however, directives were given to discontinue those enhanced infection prevention measures As a result of this and staff no longer routinely wearing masks in general hospital areas, a second phase of the outbreak began An overwhelming majority of cases in Phase II of the Toronto SARS‐CoV were related to healthcare transmission 3

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1. **How ophthalmologists should understand and respond to the current epidemic of novel coronavirus pneumonia. [Chinese]**  
   Li Z. Zhonghua Shiyan Yanke Zazhi/Chinese Journal of Experimental Ophthalmology 2020;38:267-272.

The new coronavirus pneumonia (COVID-19)that caused by 2019 new coronavirus (2019-nCoV) and first appeared in Wuhan, China, in December 2019 has attracted great attention from both the Chinese government and the international community.The International Committee on Viral Classification named the virus "Severe Acute Respiratory Syndrome Coronavirus 2" (SARS-CoV-2), and the WHO named the pneumonia it causesCOVID-19". At present, the disease is centered in Wuhan City and is spreading rapidly to all parts of China, as well as twenty other countries.About 20% of the people infected during the SARS epidemic in 2003 were employees in hospital environments.COVID-19 has infected an even greater number of heath care workers.Therefore, ophthalmologists need to understand the disease and recognize the importance of taking preventive measures.Although ophthalmologists do not work on the front lines of the outbreak, due to their area of expertise, a variety of situations, such as infection consultations or ophthalmic emergency treatments, can lead to the exposure of ophthalmologists to high-risk environments.This risk will only increase as the number of infected patients continues to increase.When dealing with seemingly normal ophthalmic patients, the vigilance of ophthalmologists and associated staff tends to be significantly reduced.To better protect patients, families, and health care workers, it is strongly recommended that in addition to the standard precautions for the care of all patients, strict contact precautions and droplet precautions need to be taken by ophthalmologists.These measures include (1) wearing an efficient mask (an N95 mask); (2) always performing hand hygiene before and after examining a patient; (3) wearing sterile gloves when entering a patient's room and touching a patient; (4) wearing a gown when contact is expected with items and environmental surfaces surrounding a patient or when the patient is incontinent or has diarrhea or a surgical or other invasive wound with oozing fluid; (5) cleaning and disinfecting ophthalmic equipment and correctly handling medical waste after examination to prevent transmission to patients who are subsequently examined; (6) wearing goggles and a disposable mask to cover the front and sides of the face before touching a patient, as the virus could spread through the ocular surface; (7) performing the relevant screening for COVID-19 for regular patients who have conjunctivitis and respiratory symptoms at the same time; (8) prohibiting the use of infected patients as potential donors for corneal transplants and temporarily adding donor 2019-CoV screening to the medical standard of the eye bank during the outbreak; (9) for the purposes of scientific research, diagnosis, and other special needs, packing, shipping, and transporting collected specimens according to the relevant dangerous biological goods regulations. Copyright © 2020 by the Chinese Medical Association.

1. **How should front-line general practitioners use personal protective equipment (PPE)?**  
   Ambigapathy S. Malays Fam Physician 2020;:No page numbers.

The COVID-19 outbreak continues to evolve with the number of cases increasing in Malaysia, placing a significant burden on general practitioners (GPs) to assess and manage suspected cases GPs must be well equipped with knowledge to set up their clinics, use Personal Protective Equipment (PPE) appropriately, adopt standard protocols on triaging and referrals, as well as educate patients about PPE The correct use of PPE will help GPs balance between personal safety and appropriate levels of public concern

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1. **Impact of Coronavirus (COVID-19) on Otolaryngologic Surgery: A Brief Commentary**  
   Bann D. V. Head & neck. 2020;09:No page numbers.

BACKGROUND: The Coronavirus disease - 2019 (COVID-19) pandemic is a global health crisis and Otolaryngologists are at increased occupational risk of contracting COVID-19. There are currently no uniform best-practice recommendations for Otolaryngologic surgery in the setting of COVID-19. METHOD(S): We reviewed relevant publications and position statements regarding the management of Otolaryngology patients in the setting of COVID-19. Recommendations regarding clinical practice during the Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) outbreaks were also reviewed. RESULT(S): Enhanced personal protective equipment (N95 respirator and face shield or powered air-purifying respirator, disposable cap and gown, gloves) is required for any Otolaryngology patient with unknown, suspected, or positive COVID-19 status. Elective procedures should be postponed indefinitely, and clinical practice should be limited to patients with urgent or emergent needs. CONCLUSION(S): We summarize current best-practice recommendations for Otolaryngologists to ensure safety for themselves, their clinical staff, and their patients. This article is protected by copyright. All rights reserved.

1. **Impact of the COVID-19 Pandemic on the Urologist's clinical practice in Brazil: a management guideline proposal for low- and middle-income countries during the crisis period**  
   Carneiro A. International braz j urol : official journal of the Brazilian Society of Urology 2020;46:No page numbers.

This letter to the Editor aims to provide suggestions and recommendations for the management of urological conditions in times of COVID-19 crisis in Brazil and other low- and middle-income countries. It is important to highlight that one of the main characteristics of this pandemic is the oversaturation of the health system capacity, mostly due to a high demand for personal protective equipment (PPE), Hospital/ICU beds, as well as ventilators. In places with limited resources and where the health care systems are already saturated, such consideration is even more worrisome. Therefore, most worldwide authorities are recommending to avoid, as much as possible, patient's elective visits to hospitals, as well as a judicious use of the operating room in order to mitigate the strain put on the health system. While efforts should be directed to the care of COVID-19 patients, other conditions (especially urgencies and oncological cases) must continue to be assisted. Thus, through a panel of experts, we have prepared a practical guide for Thus, through a panel of experts, we have prepared a practical guide for urologists based on the recommendations from the main Urologic Associations, as well as data from the literature to support the suggested management. We will try to follow the standard guideline recommendations from the American Urological Association (AUA) and European Association of Urology (EAU), with the aim of pursuing the best outcomes possible. However, some recommendations were based on the consensus of the panel, taking into consideration the reality of developing countries and the unprecedented situation caused by the COVID-19 crisis. Most importantly, all recommendations on this manuscript are based on the expectancy of a maximum 3-month duration of the crisis. If this period shall extended, these recommendations will be revised and updated. Available at. https://www.intbrazjurol.com.br/pdf/aop/COVID\_19\_Arie\_et\_al.pdf. Copyright by the International Brazilian Journal of Urology.

1. **Infection Prevention and Control (IPC) for Novel Coronavirus (COVID-19)**  
   Who JAC-Antimicrobial Resistance 2020;:No page numbers.

Module 3 PPE

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1. **Infection Prevention Measures for Surgical Procedures during a Middle East Respiratory Syndrome Outbreak in a Tertiary Care Hospital in South Korea**  
   Park J. Scientific reports 2020;10:325.

In 2015, we experienced the largest in-hospital Middle East respiratory syndrome (MERS) outbreak outside the Arabian Peninsula. We share the infection prevention measures for surgical procedures during the unexpected outbreak at our hospital. We reviewed all forms of related documents and collected information through interviews with healthcare workers of our hospital. After the onset of outbreak, a multidisciplinary team devised institutional MERS-control guidelines. Two standard operating rooms were converted to temporary negative-pressure rooms by physically decreasing the inflow air volume (-4.7Pa in the main room and -1.2Pa in the anteroom). Healthcare workers were equipped with standard or enhanced personal protective equipment according to the MERS-related patient's profile and symptoms. Six MERS-related patients underwent emergency surgery, including four MERS-exposed and two MERS-confirmed patients. Negative conversion of MERS-CoV polymerase chain reaction tests was noticed for MERS-confirmed patients before surgery. MERS-exposed patients were also tested twice preoperatively, all of which were negative. All operative procedures in MERS-related patients were performed without specific adverse events or perioperative MERS transmission. Our experience with setting up a temporary negative-pressure operation room and our conservative approach for managing MERS-related patients can be referred in cases of future unexpected MERS outbreaks in non-endemic countries.

1. **Letter: Precautions for Endoscopic Transnasal Skull Base Surgery During the COVID-19 Pandemic**  
   Patel Z. M. Neurosurgery. 2020;15:No page numbers.

1. **Literature-guided recommendations for otolaryngologists during the COVID-19 pandemic: A contemporary review**  
   Syamal M. Laryngoscope Investigative Otolaryngology. 2020;:No page numbers.

Objective: The objective of this study was to review the current literature and guidelines on management of the novel coronavirus 2019 (COVID-19 or 2019nCoV) with respect to the field of Otolaryngology. Design(s): Contemporary literature review. Method(s): Systematic literature review of global medical literature databases and communications were queried to find all available literature recommendations, research, and guidelines applicable to otolaryngologists in the COVID-19 pandemic. Result(s): Guidance on personal protective equipment, office visits, and surgical scheduling, as well as recommendations for safe airway management and tracheotomy performance during the COVID-19 pandemic were compiled and interpreted. Conclusion(s): Little guidance exists for otolaryngologists who are among the highest risk groups during the rapidly evolving COVID-19 pandemic. This synthesis and compilation of global resources serve as a building block for further guidance during the epidemic. Level of Evidence: NA. Copyright © 2020 The Author. Laryngoscope Investigative Otolaryngology published by Wiley Periodicals, Inc. on behalf of The Triological Society.

1. **Management of Acute Myocardial Infarction During the COVID-19 Pandemic**  
   Mahmud Ehtisham Catheter. cardiovasc. interv 2020;:No page numbers.

The worldwide pandemic caused by the novel acute respiratory syndrome coronavirus 2 (SARS-CoV2) has resulted in a new and lethal disease termed coronavirus disease 2019 (COVID-19). Although there is an association between cardiovascular disease and COVID-19, the majority of patients who need cardiovascular care for the management of ischemic heart disease may not be infected with COVID-19. The objective of this document is to provide recommendations for a systematic approach for the care of patients with an acute myocardial infarction (AMI) during the COVID-19 pandemic. There is a recognition of two major challenges in providing recommendations for AMI care in the COVID-19 era. Cardiovascular manifestations of COVID-19 are complex with patients presenting with AMI, myocarditis simulating a ST-elevation MI presentation, stress cardiomyopathy, non-ischemic cardiomyopathy, coronary spasm, or nonspecific myocardial injury and the prevalence of COVID-19 disease in the US population remains unknown with risk of asymptomatic spread. This document addresses the care of these patients focusing on 1) the varied clinical presentations; 2) appropriate personal protection equipment (PPE) for health care workers; 3) role of the Emergency Department, Emergency Medical System and the Cardiac Catheterization Laboratory; and 4) Regional STEMI systems of care. During the COVID-19 pandemic, primary PCI remains the standard of care for STEMI patients at PCI capable hospitals when it can be provided in a timely fashion, with an expert team outfitted with PPE in a dedicated CCL room. A fibrinolysis-based strategy may be entertained at non-PCI capable referral hospitals or in specific situations where primary PCI cannot be executed or is not deemed the best option. This article is protected by copyright. All rights reserved.

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1. **Management of the Difficult Airway in the COVID-19 Pandemic: An Illustrative Complex Head and Neck Case Scenario**  
   Rassekh C. H. Head & neck. 2020;16:No page numbers.

BACKGROUND: This case highlights challenges in the assessment and management of the "difficult airway" patient in the SARS-CoV-2 (COVID-19) pandemic era. METHOD(S): A 60-year-old male with history of recent TORS resection, free flap reconstruction and tracheostomy for p16+ squamous cell carcinoma presented with stridor and dyspnea one month after decannulation. Careful planning by a multidisciplinary team allowed for appropriate staffing and personal protective equipment, preparations for emergency airway management, evaluation via nasopharyngolaryngoscopy, and COVID testing. The patient was found to be COVID negative and underwent imaging which revealed new pulmonary nodules and a tracheal lesion. RESULT(S): The patient was safely transorally intubated in the operating room. The tracheal lesion was removed endoscopically and tracheostomy was avoided. CONCLUSION(S): This case highlights the importance of careful and collaborative decision making for the management of head and neck cancer and other "difficult airway" patients during the COVID-19 epidemic. This article is protected by copyright. All rights reserved.

1. **Managing head and neck cancer patients with tracheostomy or laryngectomy during the COVID-19 pandemic**  
   Kligerman M. P. Head and Neck. 2020;:No page numbers.

Head and neck cancer patients with tracheostomies and laryngectomies, as well as their healthcare providers, face unique challenges in the context of the current COVID-19 pandemic. This document consolidates best available evidence to date and presents recommendations to minimize the risks of aerosolization and SARS-CoV-2 exposures in both the inpatient and outpatient settings. The cornerstones of these recommendations include the use of closed-circuit ventilation whenever possible, cuffed tracheostomy tubes, judicious use of heat moisture exchange units, appropriate personal protective equipment for providers and patients, meticulous hand hygiene, and minimal manipulation of tracheostomy tubes. Copyright © 2020 Wiley Periodicals, Inc.

1. **MH coalition asks government for needed protective gear**  
   Canady Valerie A. Mental Health Weekly 2020;:No page numbers.

A mental health coalition on April 1 in urged the federal government to provide personal protection equipment (PPE) to all behavioral health care professionals on the frontlines of the COVID-19 pandemic The letter, signed by the National Council for Behavioral Health, the National Alliance on Mental Illness, Mental Health America and the American Psychiatric Association, states that the lack of PPE is putting behavioral health care workers at risk

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1. **Novel 2019 coronavirus SARS-CoV-2 (COVID-19): An updated overview for emergency clinicians**  
   Giwa A. L. Emerg Med Pract 2020;22:1-28.

The novel coronavirus, COVID-19, has quickly become a worldwide threat to health, travel, and commerce. This overview analyzes the best information from the early research, including epidemiologic and demographic features from SARS-CoV-1 and MERS-CoV viruses; lessons learned from the experience of an emergency physician in Northern Italy, where the outbreak has devastated the healthcare system; evidence on transmission and prevention through safe use of PPE; evidence and advice on SARS-CoV-2 testing and co-infection; management options; airway management options; steps for rapid sequence intubation in the ED and managing disaster ventilation; and information on managing pediatric and pregnant patients.

1. **Novel Coronavirus 2019 (2019-nCoV) Infection: Part I - Preparedness and Management in the Pediatric Intensive Care Unit in Resource-limited Settings**  
   Ravikumar N. Indian pediatrics 2020;57:324-334.

First reported in China, the 2019 novel coronavirus has been spreading across the globe. Till 26 March, 2020, 416,686 cases have been diagnosed and 18,589 have died the world over. The coronavirus disease mainly starts with a respiratory illness and about 5-16% require intensive care management for acute respiratory distress syndrome (ARDS) and multi-organ dysfunction. Children account for about 1-2% of the total cases, and 6% of these fall under severe or critical category requiring pediatric intensive care unit (PICU) care. Diagnosis involves a combination of clinical and epidemiological features with laboratory confirmation. Preparedness strategies for managing this pandemic are the need of the hour, and involve setting up cohort ICUs with isolation rooms. Re-allocation of resources in managing this crisis involves careful planning, halting elective surgeries and training of healthcare workers. Strict adherence to infection control like personal protective equipment and disinfection is the key to contain the disease transmission. Although many therapies have been tried in various regions, there is a lack of strong evidence to recommend anti-virals or immunomodulatory drugs.

1. **OMFS and ENT surgeons issue new COVID-19 PPE guidance**  
   Anon. Br Dent J 2020;228:571-571.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=8523b18a20e8edd71d1e244b1804e442)

1. **Opinion to address a potential personal protective equipment shortage in the global community during the COVID-19 outbreak**  
   Dargaville Tim Polym Degrad Stab 2020;:109162-109162.

The current COVID-19 pandemic is stretching the global supply situation for face masks and PPE beyond production capacity. This is a call for the R&amp;D community, particularly in the polymer degradation and stability arena, to engage and collaborate with virology and bio-medical experts. We require comparative R&amp;D for extended, reuse and recyclability options, as well as large scale approaches and methods that could quickly be applied on the local level by the public who are not experts and may only have limited resources.

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1. **Optimization of the intravenous infusion workflow in the isolation ward for patients with coronavirus disease 2019**  
   Song Yan 2020;:No page numbers.

Objective: This study aimed to evaluate the effect of optimization of the intravenous infusion workflow in isolation wards for patients with coronavirus disease 2019. Methods: The infusion management group optimized the intravenous infusion workflow based on Hamer&#039;s Process Reengineering Theory and applied it to the treatment of patients with coronavirus disease 2019. The work efficiency, patients&#039; satisfaction and economic indicators before and after optimization were compared. Results: After the infusion workflow was optimized, average times for preparation drugs and intravenous admixture, and patients&#039; waiting time decreased from 4.84 min, 4.03 min, and 34.33 min to 3.50 min, 2.60 min, and 30.87 min, respectively, patients&#039; satisfaction increased from 66.7% to 93.3%, and the cost of personal protective equipment (PPE) decreased from 46.67 sets and 186.6 CNY per day to 36.17 sets and 144.6 CNY, with statistical significance. Conclusion: The optimization of the intravenous infusion workflow can effectively decrease the cost of PPE while improving the efficiency of infusion and patients&#039; satisfaction.

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1. **Orthopaedic Surgical Selection and Inpatient Paradigms During the Coronavirus COVID-19 Pandemic**  
   Massey P. A. Journal of the American Academy of Orthopaedic Surgeons 2020;15:15.

The Novel Coronavirus (COVID-19) pandemic, also known as SARS-CoV-2, has placed an immense strain on health care systems across the entire world. Consequently, multiple federal and state governments have placed restrictions on hospitals such as limiting "elective surgery" and recommending social or physical distancing. We review the literature on several areas that have been affected including surgical selection, inpatient care, and physician well-being. These areas affecting inpatient paradigms include surgical priority, physical or social distancing, file sharing for online clinical communications, and physician wellness. During this crisis, it is important that orthopaedic departments place an emphasis on personnel safety and slowing the spread of the virus, so that the department can still maintain vital functions. Physical Distancing and emerging technologies such as inpatient telemedicine and online file sharing applications can enable orthopaedic programs to still function, while attempting to protect medical staff and patients from COVID-19 spread. This literature review sought to provide evidence-based guidance to orthopaedic departments during an unprecedented time. Orthopaedic surgeons should follow the Centers for Disease Control and Prevention (CDC) guidelines, wear PPE when appropriate, have teams created utilizing physical distancing, understand the department's policy on elective surgery, and engage in routines which enhance physician wellness.

1. **Pediatric Airway Management in COVID-19 patients - Consensus Guidelines from the Society for Pediatric Anesthesia's Pediatric Difficult Intubation Collaborative and the Canadian Pediatric Anesthesia Society**  
   Matava C. T. Anesthesia and analgesia. 2020;13:No page numbers.

The severe acute respiratory syndrome coronavirus 2 (COVID-19) pandemic has challenged medical systems and clinicians globally to unforeseen levels. COVID-19's rapid spread has forced clinicians to care for patients with a highly contagious disease without evidence-based guidelines. Using a virtual modified nominal group technique, the Pediatric Difficult Intubation Collaborative (PeDI-C), which currently includes 35 hospitals from six countries, generated consensus guidelines on airway management in pediatric anesthesia based on expert opinion and early data about the disease. The PeDI-C identified overarching goals during care, including minimizing aerosolized respiratory secretions, minimizing the number of clinicians in contact with a patient, and recognizing that undiagnosed asymptomatic patients may shed the virus and infect healthcare workers. Recommendations include administering anxiolytic medications, intravenous anesthetic inductions, tracheal intubation using video laryngoscopes and cuffed tracheal tubes, use of in-line suction catheters, and modifying workflow to recover patients from anesthesia in the operating room. Importantly, the PeDI-C recommends that anesthesiologists consider using appropriate personal protective equipment when performing aerosol-generating medical procedures in asymptomatic children, in addition to known or suspected children with COVID-19. Airway procedures should be done in negative pressure rooms when available. Adequate time should be allowed for operating room cleaning and air filtration between surgical cases. Research using rigorous study designs is urgently needed to inform safe practices during the COVID-19 pandemic. Until further information is available, the PeDI-C advises that clinicians consider these guidelines to enhance the safety of health care workers during airway management when performing aerosol-generating medical procedures. These guidelines have been endorsed by the Society for Pediatric Anesthesia and the Canadian Pediatric Anesthesia Society.

1. **Pediatric Endoscopy in the Era of Coronavirus Disease 2019: A North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition Position Paper**  
   Walsh Catharine M. J. pediatr. gastroenterol. nutr 2020;:No page numbers.

The delivery of endoscopic care is changing rapidly in the era of Coronavirus Disease 2019 (COVID-19). The North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) Endoscopy and Procedures Committee has formulated this statement to offer practical guidance to help standardize endoscopy services for pediatric patients with the aim of minimizing COVID-19 transmission to staff, patients, and caregivers and to conserve personal protective equipment (PPE) during this critical time. Appropriate use of PPE is essential to minimize transmission and preserve supply. Pediatric endoscopic procedures are considered at high risk for COVID-19 transmission. We recommend that all pediatric endoscopic procedures are done in a negative pressure room with all staff using proper airborne, contact, and droplet precautions regardless of patient risk stratification. This includes appropriate use of a filtering face-piece respirator (N95, N99, FFP2/3, or PAPR), double gloves, facial protection (full visor and/or face shield), full body water-resistant disposable gown, shoe covers and a hairnet. In deciding which endoscopic procedures should proceed, it is important to weigh the risks and benefits to optimize healthcare delivery and minimize risk. To inform these decisions, we propose a framework for stratifying procedures as emergent (procedures that need to PROCEEED), urgent (PAUSE, weigh the benefits and risks in deciding whether to proceed) and elective (POSTPONE procedures). This statement was based on emerging evidence and is meant as a guide. It is important that all endoscopy facilities where pediatric procedures are performed follow current recommendations from public health agencies within their jurisdiction regarding infection prevention and control of COVID-19.

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1. **Performance of electrophysiology procedures at an academic medical center amidst the 2020 coronavirus (COVID-19) pandemic**  
   Rubin Geoffrey A. J. cardiovasc. electrophysiol 2020;:No page numbers.

A global coronavirus (COVID-19) pandemic occurred at the start of 2020 and is already responsible for more than 74 000 deaths worldwide, just over 100 years after the influenza pandemic of 1918. At the center of the crisis is the highly infectious and deadly SARS-CoV-2, which has altered everything from individual daily lives to the global economy and our collective consciousness. Aside from the pulmonary manifestations of disease, there are likely to be several electrophysiologic (EP) sequelae of COVID-19 infection and its treatment, due to consequences of myocarditis and the use of QT-prolonging drugs. Most crucially, the surge in COVID-19 positive patients that have already overwhelmed the New York City hospital system requires conservation of hospital resources including personal protective equipment (PPE), reassignment of personnel, and reorganization of institutions, including the EP laboratory. In this proposal, we detail the specific protocol changes that our EP department has adopted during the COVID-19 pandemic, including performance of only urgent/emergent procedures, after hours/7-day per week laboratory operation, single attending-only cases to preserve PPE, appropriate use of PPE, telemedicine and video chat follow-up appointments, and daily conferences to collectively manage the clinical and ethical dilemmas to come. We discuss also discuss how we perform EP procedures on presumed COVID positive and COVID tested positive patients to highlight issues that others in the EP community may soon face in their own institution as the virus continues to spread nationally and internationally.

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1. **Peri-operative Considerations in Urgent Surgical Care of Suspected and Confirmed COVID-19 Orthopedic Patients: Operating rooms protocols and recommendations in the Current COVID-19 Pandemic**  
   Awad M. E. The Journal of the American Academy of Orthopaedic Surgeons. 2020;10:No page numbers.

By April 7, 2020, SARS-CoV-2 was responsible for 1,383,436 confirmed cases of COVID-19, involving 209 countries around the world; 378,881 cases have been confirmed in the United States. During this pandemic, the urgent surgical requirements will not stop. As an example, the most recent CDC reports estimate that there are 2.8 million trauma patients hospitalized in the United States. These data illustrate an increase in the likelihood of encountering urgent surgical patients with either clinically suspected or confirmed COVID-19 in the near future. Preparation for a pandemic involves considering the different levels in the hierarchy of controls as well as the different phases of the pandemic. Apart from the fact that this pandemic certainly involves many important health, economic and community ramifications, it also requires several initiatives to mandate what measures are most appropriate to prepare for mitigating the occupational risks. This article provides evidence-based recommendations and measures for the appropriate personal protective equipment for different clinical and surgical activities in various settings. To reduce the occupational risk in treating suspected or confirmed COVID-19 urgent orthopaedic patients, recommended precautions and preventive actions (triage area, ED consultation room, induction room, operating room, and recovery room) are reviewed.

1. **Perioperative COVID-19 Defense: An Evidence-Based Approach for Optimization of Infection Control and Operating Room Management**  
   Dexter F. Anesthesia and analgesia. 2020;24:No page numbers.

We describe an evidence-based approach for optimization of infection control and operating room management during the Coronavirus Disease of 2019 (COVID-19) pandemic. Confirmed modes of viral transmission are primarily contact with contaminated environmental surfaces and aerosolization. Evidence-based improvement strategies for attenuation of residual environmental contamination involve a combination of deep cleaning with surface disinfectants and ultraviolet light (UV-C). Clinician components include placing alcohol-based hand rubs (ABHR) on the intravenous (IV) pole to the left of the provider and utilization of double glove techniques during induction. In addition, a wire basket lined with a zip closure plastic bag should be located on the IV pole to the right of the provider, and all contaminated instruments placed in the bag (i.e. laryngoscope blades and handles) and securely closed. Anesthesia professionals should designate and maintain clean and dirty areas in their work environment. After the induction of anesthesia, we recommend providers wipe down all equipment and surfaces with disinfection wipes that contain a quaternary ammonium compound and alcohol, using a top down cleaning sequence adequate to reduce the bioburden. We endorse cleaning operating rooms with use of UV-C lights. Patients should decolonize using pre-procedural chlorhexidine wipes, two doses of nasal povidone iodine within one hour of incision, and a chlorhexidine mouth rinse. All IV line ports must be closed and use vigorous hub disinfection. Lastly, end users need timely feedback of infectious data collected by surveillance of classic pathogen transmission.OR management should strive to reduce the use of surgical masks and minimize potential COVID-19 exposure by scheduling relatively long (e.g., 12-hour) staff shifts. For instance, if there are 8 essential cases to be done (each lasting 1-2 hours), the ideal solution is to have 2 teams complete the 8 cases, and to avoid 8 first case starts. The ideal schedule should accommodate one case in each operating room daily, with terminal cleaning after each case including UV-C light or equivalent. After emergence from anesthesia, it is best to have most patients recover in the room where they had surgery, a strategy quite common in Japan. This avoids having patients clustered into a large, pooled phase I post-anesthesia care unit, and minimizes the risk of contaminating more staff and the facility at large. In summary, these 8 programmatic recommendations stand on a substantial body of empirical evidence characterizing the epidemiology of perioperative transmission and infection transmission supported by grants from the Anesthesia Patient Safety Foundation (APSF).

1. **Personal protective equipment for preventing highly infectious diseases due to exposure to contaminated body fluids in healthcare staff**  
   Verbeek Jos H. Cochrane Database Syst Rev 2020;4:CD011621-CD011621.

BACKGROUND: In epidemics of highly infectious diseases, such as Ebola, severe acute respiratory syndrome (SARS), or coronavirus (COVID-19), healthcare workers (HCW) are at much greater risk of infection than the general population, due to their contact with patients&#039; contaminated body fluids. Personal protective equipment (PPE) can reduce the risk by covering exposed body parts. It is unclear which type of PPE protects best, what is the best way to put PPE on (i.e. donning) or to remove PPE (i.e. doffing), and how to train HCWs to use PPE as instructed. OBJECTIVES: To evaluate which type of full-body PPE and which method of donning or doffing PPE have the least risk of contamination or infection for HCW, and which training methods increase compliance with PPE protocols. SEARCH METHODS: We searched CENTRAL, MEDLINE, Embase and CINAHL to 20 March 2020. SELECTION CRITERIA: We included all controlled studies that evaluated the effect of full-body PPE used by HCW exposed to highly infectious diseases, on the risk of infection, contamination, or noncompliance with protocols. We also included studies that compared the effect of various ways of donning or doffing PPE, and the effects of training on the same outcomes. DATA COLLECTION AND ANALYSIS: Two review authors independently selected studies, extracted data and assessed the risk of bias in included trials. We conducted random-effects meta-analyses were appropriate. MAIN RESULTS: Earlier versions of this review were published in 2016 and 2019. In this update, we included 24 studies with 2278 participants, of which 14 were randomised controlled trials (RCT), one was a quasi-RCT and nine had a non-randomised design. Eight studies compared types of PPE. Six studies evaluated adapted PPE. Eight studies compared donning and doffing processes and three studies evaluated types of training. Eighteen studies used simulated exposure with fluorescent markers or harmless microbes. In simulation studies, median contamination rates were 25% for the intervention and 67% for the control groups. Evidence for all outcomes is of very low certainty unless otherwise stated because it is based on one or two studies, the indirectness of the evidence in simulation studies and because of risk of bias. Types of PPE The use of a powered, air-purifying respirator with coverall may protect against the risk of contamination better than a N95 mask and gown (risk ratio (RR) 0.27, 95% confidence interval (CI) 0.17 to 0.43) but was more difficult to don (non-compliance: RR 7.5, 95% CI 1.81 to 31.1). In one RCT (59 participants), people with a long gown had less contamination than those with a coverall, and coveralls were more difficult to doff (low-certainty evidence). Gowns may protect better against contamination than aprons (small patches: mean difference (MD) -10.28, 95% CI -14.77 to -5.79). PPE made of more breathable material may lead to a similar number of spots on the trunk (MD 1.60, 95% CI -0.15 to 3.35) compared to more water-repellent material but may have greater user satisfaction (MD -0.46, 95% CI -0.84 to -0.08, scale of 1 to 5). Modified PPE versus standard PPE The following modifications to PPE design may lead to less contamination compared to standard PPE: sealed gown and glove combination (RR 0.27, 95% CI 0.09 to 0.78), a better fitting gown around the neck, wrists and hands (RR 0.08, 95% CI 0.01 to 0.55), a better cover of the gown-wrist interface (RR 0.45, 95% CI 0.26 to 0.78, low-certainty evidence), added tabs to grab to facilitate doffing of masks (RR 0.33, 95% CI 0.14 to 0.80) or gloves (RR 0.22, 95% CI 0.15 to 0.31). Donning and doffing Using Centers for Disease Control and Prevention (CDC) recommendations for doffing may lead to less contamination compared to no guidance (small patches: MD -5.44, 95% CI -7.43 to -3.45). One-step removal of gloves and gown may lead to less bacterial contamination (RR 0.20, 95% CI 0.05 to 0.77) but not to less fluorescent contamination (RR 0.98, 95% CI 0.75 to 1.28) than separate removal. Double-gloving may lead to less viral or bacterial co tamination compared to single gloving (RR 0.34, 95% CI 0.17 to 0.66) but not to less fluorescent contamination (RR 0.98, 95% CI 0.75 to 1.28). Additional spoken instruction may lead to fewer errors in doffing (MD -0.9, 95% CI -1.4 to -0.4) and to fewer contamination spots (MD -5, 95% CI -8.08 to -1.92). Extra sanitation of gloves before doffing with quaternary ammonium or bleach may decrease contamination, but not alcohol-based hand rub. Training The use of additional computer simulation may lead to fewer errors in doffing (MD -1.2, 95% CI -1.6 to -0.7). A video lecture on donning PPE may lead to better skills scores (MD 30.70, 95% CI 20.14 to 41.26) than a traditional lecture. Face-to-face instruction may reduce noncompliance with doffing guidance more (odds ratio 0.45, 95% CI 0.21 to 0.98) than providing folders or videos only. AUTHORS&#039; CONCLUSIONS: We found low- to very low-certainty evidence that covering more parts of the body leads to better protection but usually comes at the cost of more difficult donning or doffing and less user comfort, and may therefore even lead to more contamination. More breathable types of PPE may lead to similar contamination but may have greater user satisfaction. Modifications to PPE design, such as tabs to grab, may decrease the risk of contamination. For donning and doffing procedures, following CDC doffing guidance, a one-step glove and gown removal, double-gloving, spoken instructions during doffing, and using glove disinfection may reduce contamination and increase compliance. Face-to-face training in PPE use may reduce errors more than folder-based training. We still need RCTs of training with long-term follow-up. We need simulation studies with more participants to find out which combinations of PPE and which doffing procedure protects best. Consensus on simulation of exposure and assessment of outcome is urgently needed. We also need more real-life evidence. Therefore, the use of PPE of HCW exposed to highly infectious diseases should be registered and the HCW should be prospectively followed for their risk of infection.

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1. **Personal Protective Equipment: Current Best Practices for Orthopaedic Teams**  
   Fillingham Yale A. The Journal of Arthroplasty 2020;:No page numbers.

The COVID-19 pandemic caused by the SARS-CoV-2 virus is challenging healthcare providers across the world Current best practices for personal protective equipment (PPE) during this time are rapidly evolving and fluid due to the novel and acute nature of the pandemic and the dearth of high-level evidence Routine infection control practices augmented by airborne precautions are paramount when treating the COVID-19 positive patient Best practices for PPE use in patients who have unknown COVID-19 status are a highly charged and emotional issue The variables to be considered include protection of patients and healthcare providers, accuracy and availability of testing, and responsible use of PPE resources This article also explores the concerns of surgeons regarding possible transmission to their own family members as a result of caring for COVID-19 patients

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1. **Personal Safety during the COVID-19 Pandemic: Realities and Perspectives of Healthcare Workers in Latin America**  
   Delgado Diego Int. j. environ. res. public health (Online) 2020;17:No page numbers.

Healthcare workers exposed to coronavirus (COVID-19) may not have adequate access to personal protective equipment (PPE), safety procedures, and diagnostic protocols. Our objective was to evaluate the reality and perceptions about personal safety among healthcare workers in Latin America. This is a cross-sectional, online survey-based study administered to 936 healthcare professionals in Latin America from 31 March 2020 to 4 April 2020. A 12-item structured questionnaire was developed. A total of 936 healthcare workers completed the online survey. Of them, 899 (95.1%) were physicians, 28 (2.9%) were nurses, and 18 (1.9%) were allied health professionals. Access to protective equipment was as follows: gel hand sanitizer (n = 889; 95%), disposable gloves (n = 853; 91.1%), disposable gowns (n = 630; 67.3%), disposable surgical masks (785; 83.9%), N95 masks (n = 516; 56.1%), and facial protective shields (n = 305; 32.6%). The vast majority (n = 707; 75.5%) had access to personal safety policies and procedures, and 699 (74.7%) participants had access to diagnostic algorithms. On a 1-to-10 Likert scale, the participants expressed limited human resources support (4.92 ± 0.2; mean ± SD), physical integrity protection in the workplace (5.5 ± 0.1; mean ± SD), and support from public health authorities (5.01 ± 0.12; mean ± SD). Healthcare workers in Latin America had limited access to essential PPE and support from healthcare authorities during the COVID-19 pandemic.

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1. **PPE and possible routes of airborne spread during the COVID-19 pandemic**  
   Brown J. Anaesthesia (Lond.) 2020;:No page numbers.

We welcomed Professor Cook&#039;s article clarifying the use of personal protective equipment (PPE) in protecting staff during the current COVID-19 pandemic [1]. There remains considerable debate about the extent to which airborne spread of SARS-CoV-2 occurs. Small droplets (&lt; 5µm) are thought to remain suspended in the air and could theoretically be inhaled into the lungs causing infection [2]. Loose fitting &quot;surgical&quot; masks will not prevent such inhalation and only a tight-fitting filtering mask is adequate. Conversely larger (&gt; 5µm) particles do not remain suspended in the air [2] and can only cause infection if they are immediately inhaled, or after contact with a surface they land on.

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1. **PPE guidance for covid-19: be honest about resource shortages**  
   Sullivan Eoin D. BMJ 2020;369:m1507-m1507.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=8bc7fdac24e096af81bdcb8eaf740328)

1. **Practical insights for paediatric otolaryngology surgical cases and performing microlaryngobronchoscopy during the COVID-19 pandemic**  
   Frauenfelder C. International Journal of Pediatric Otorhinolaryngology 2020;134 (no pagination):No page numbers.

Paediatric otolaryngology practice involves examining and operating in anatomical locations with high levels of aerosol generation and transmission of COVID-19 to treating clinicians, especially from the asymptomatic patient populations including children. During the COVID-19 pandemic all emergent otolaryngological conditions affecting the airway, oral, and nasal cavities should be managed medically where possible and any operating deferred. We present guidelines for operating on paediatric otolaryngological patients when necessary during the COVID-19 pandemic, and incorporate experience gathered during microlaryngobronchoscopy on a COVID-19 positive infant at our institution. Copyright © 2020

1. **Precautions for Operating Room Team Members During the COVID-19 Pandemic**  
   Forrester Joseph D. J. Am. Coll. Surg 2020;:No page numbers.

BACKGROUND: The novel coronavirus SARS-CoV-2 (COVID-19) can infect healthcare workers. We developed an institutional algorithm to protect operating room team members during the COVID-19 pandemic and rationally conserve personal protective equipment (PPE). STUDY DESIGN: An interventional platform (operating room, interventional suite, and endoscopy) PPE taskforce was convened by the hospital and medical school leadership and tasked with developing a common algorithm for PPE use, to be used throughout the interventional platform. In conjunction with our infectious disease experts, we developed our guidelines based on potential patterns of spread, risk of exposure, and conservation of PPE. RESULTS: A decision tree algorithm describing our institutional guidelines for precautions for operating room team members was created. This algorithm is based on urgency of operation, anticipated viral burden at the surgical site, opportunity for a procedure to aerosolize virus, and likelihood a patient could be infected based on symptoms and testing. CONCLUSIONS: Despite COVID-19 being a new threat, we have shown that by developing an easy-to-follow decision tree algorithm for the interventional platform teams, we can ensure optimal health care worker safety.

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1. **Preparing for a COVID-19 pandemic: a review of operating room outbreak response measures in a large tertiary hospital in Singapore**  
   Wong J. Canadian Journal of Anesthesia. 2020;:No page numbers.

The coronavirus disease 2019 (COVID-19) outbreak has been designated a public health emergency of international concern. To prepare for a pandemic, hospitals need a strategy to manage their space, staff, and supplies so that optimum care is provided to patients. In addition, infection prevention measures need to be implemented to reduce in-hospital transmission. In the operating room, these preparations involve multiple stakeholders and can present a significant challenge. Here, we describe the outbreak response measures of the anesthetic department staffing the largest (1,700-bed) academic tertiary level acute care hospital in Singapore (Singapore General Hospital) and a smaller regional hospital (Sengkang General Hospital). These include engineering controls such as identification and preparation of an isolation operating room, administrative measures such as modification of workflow and processes, introduction of personal protective equipment for staff, and formulation of clinical guidelines for anesthetic management. Simulation was valuable in evaluating the feasibility of new operating room set-ups or workflow. We also discuss how the hierarchy of controls can be used as a framework to plan the necessary measures during each phase of a pandemic, and review the evidence for the measures taken. These containment measures are necessary to optimize the quality of care provided to COVID-19 patients and to reduce the risk of viral transmission to other patients or healthcare workers. Copyright © 2020, Canadian Anesthesiologists' Society.

1. **Prophylactic and therapeutic remdesivir (GS-5734) treatment in the rhesus macaque model of MERS-CoV infection**  
   de Wit Emmie Proc Natl Acad Sci U S A 2020;117:6771-6776.

The continued emergence of Middle East Respiratory Syndrome (MERS) cases with a high case fatality rate stresses the need for the availability of effective antiviral treatments. Remdesivir (GS-5734) effectively inhibited MERS coronavirus (MERS-CoV) replication in vitro, and showed efficacy against Severe Acute Respiratory Syndrome (SARS)-CoV in a mouse model. Here, we tested the efficacy of prophylactic and therapeutic remdesivir treatment in a nonhuman primate model of MERS-CoV infection, the rhesus macaque. Prophylactic remdesivir treatment initiated 24 h prior to inoculation completely prevented MERS-CoV-induced clinical disease, strongly inhibited MERS-CoV replication in respiratory tissues, and prevented the formation of lung lesions. Therapeutic remdesivir treatment initiated 12 h postinoculation also provided a clear clinical benefit, with a reduction in clinical signs, reduced virus replication in the lungs, and decreased presence and severity of lung lesions. The data presented here support testing of the efficacy of remdesivir treatment in the context of a MERS clinical trial. It may also be considered for a wider range of coronaviruses, including the currently emerging novel coronavirus 2019-nCoV.

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1. **Protecting Labor and Delivery Personnel from COVID-19 during the Second Stage of Labor**  
   Palatnik Anna Am. j. perinatol 2020;:No page numbers.

· Second stage of labor exposes providers to aerosol.. · COVID-19 risk during second stage of labor is high.. · N95 should be used during second stage of labor.. The novel coronavirus disease 2019 (COVID-19) is spreading fast and is affecting the clinical workers at much higher risk than the general population. Little is known about COVID-19 effect on pregnant women; however, the emerging evidence suggests they may be at high risk of asymptomatic disease. In light of projected shortage of personal protective equipment (PPE), there is an aggressive attempt at conservation. In obstetrics, the guidelines on PPE use are controversial and differ among hospitals, globally, as well as nationally. The centers for disease control and prevention (CDC) recommend using N95 respirators, which are respirators that offer a higher level of protection instead of a facemask for when performing or present for an aerosol-generating procedures (AGP). However, the second stage of labor is not considered an AGP. The second stage of labor can last up to 4 hours. During that time, labor and delivery personnel is in close contact to patients, who are exerting extreme effort during and frequently blow out their breath, cough, shout, and vomit, all of which put the health care team at risk, considering that COVID-19 transmission occurs through aerosol generated by coughing and sneezing. The CDC and the American College of Obstetricians and Gynecologists (ACOG) do not provide clarification on the use of N95 during the second stage. We recommend that labor and delivery personnel have the utmost caution and be granted the protection they need to protect themselves and other patients. This includes providing labor and delivery personnel full PPE including N95 for the second stage of labor. This is critical to ensure the adequate protection for health care workers and to prevent spread to other health care workers and patients.

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1. **Protective measures for COVID-19 for healthcare providers and laboratory personnel**  
   Agalar Canan Turk J Med Sci 2020;50:578-584.

In the COVID-19 pandemic, which affects the whole world, healthcare professionals (HCP) are at high risk of transmission due to their direct contact with patients with COVID-19. Therefore, how to ensure the triage of the patient with acute respiratory symptoms should be determined in advance, the contact distance should be arranged to be at least 2 m, COVID-19 suspect or diagnosed patient should be instructed to wear a surgical mask. During the care of these patients, HCP should wear their personal protective equipment (PPE) in accordance with the procedure and should not neglect hand hygiene. The samples of the patient with known or suspected COVID-19, patient should also be known to be risky in terms of contamination, and a risk assessment should be performed for the procedures to be performed in laboratories. The PPE should be used in accordance with the procedure to be performed. The protection of the HCP, who sacrifice at the risk of life, is possible only by complying with infection control and precautions.

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1. **Rapid Response of an Academic Surgical Department to the COVID-19 Pandemic: Implications for Patients, Surgeons, and the Community**  
   Lancaster E. M. Journal of the American College of Surgeons. 2020;09:No page numbers.

BACKGROUND: As the COVID-19 pandemic continues to spread, swift actions and preparation are critical for ensuring the best outcomes for patients and providers. We aim to describe our hospital and Department of Surgery's experience in preparing for the COVID-19 pandemic and caring for surgical patients during this unprecedented time. STUDY DESIGN: This is a descriptive study outlining the strategy of a single academic health system for addressing 4 critical issues facing surgical departments during the COVID-19 pandemic: (1) developing a cohesive leadership team and system for frequent communication throughout the department; (2) ensuring adequate hospital capacity to care for an anticipated influx of COVID-19 patients; (3) safeguarding supplies of blood products and personal protective equipment to protect patients and providers; and (4) preparing for an unstable workforce due to illness and competing personal priorities such as childcare. RESULT(S): Through collaborative efforts within the Department of Surgery and Hospital, we provided concise and regular communication, reduced operating room volume by 80%, secured a 4-week supply of personal protective equipment, and created reduced staffing protocols with back-up staffing plans. CONCLUSION(S): By developing an enabling infrastructure, a department can nimbly respond to crises like COVID-19 by promoting trust among colleagues and emphasizing an unwavering commitment to excellent patient care. Sharing principles and practical applications of these changes is important to optimize responses across the country and world. Copyright © 2020. Published by Elsevier Inc.

1. **Recommendation of a practical guideline for safe tracheostomy during the COVID-19 pandemic**  
   Takhar A. European Archives of Oto Rhino Laryngology. 2020;:No page numbers.

Purpose: The COVID-19 pandemic is placing unprecedented demand upon critical care services for invasive mechanical ventilation. There is current uncertainty regarding the role of tracheostomy for weaning ventilated patients with COVID-19 pneumonia. This is due to a number of factors including prognosis, optimal healthcare resource utilisation, and safety of healthcare workers when performing such a high-risk aerosol-generating procedure. Method(s): Literature review and proposed practical guideline based on the experience of a tertiary healthcare institution with 195 critical care admissions for COVID-19 up until 4th April 2020. Result(s): A synthesis of the current international literature and reported experience is presented with respect to prognosis, viral load and staff safety, thus leading to a pragmatic recommendation that tracheostomy is not performed until at least 14 days after endotracheal intubation in COVID-19 patients. Practical steps to minimise aerosol generation in percutaneous tracheostomy are outlined and we describe the process and framework for setting up a dedicated tracheostomy team. Conclusion(s): In selected COVID-19 patients, there is a role for tracheostomy to aid in weaning and optimise healthcare resource utilisation. Both percutaneous and open techniques can be performed safely with careful modifications to technique and appropriate enhanced personal protective equipment. ORL-HNS surgeons can play a valuable role in forming tracheostomy teams to support critical care teams during this global pandemic. Copyright © 2020, The Author(s).

1. **Recommendations for anesthesia in patients suspected of covid-19 coronavirus infection**  
   Kim H. J. Korean Journal of Anesthesiology 2020;73:89-91.

1. **Reflections arising from the COVID-19 pandemic**  
   Raurell-Torreda M. Enfermeria Intensiva 2020;03:03.

While we were drafting the recommendations for the joint contingency plan between the Spanish Society of Intensive Care and Coronary Unit Nursing (SEEIUC) and the Spanish Society of Intensive and Critical Care Medicine and Coronary Units (SEMICYUC), predictions were overtaken by events with regard to the magnitude of the COVID-19 pandemic. Members informed us of the lack of personal protection equipment (PPE), the rapid provision of improvised ICUs in various hospital areas and the recruitment of nurses to cover shifts. The failure to recognise the specialty of critical care nursing, included in the macro-specialty of medical-surgical nursing and not yet developed, has highlighted the urgent need to learn from our mistakes: specialisation, increase the number of nurses in teams and protect the public health system.

1. **Risk factors for serious/critical COVID-19 illness in health care workers: Too many unknowns**  
   Wander Pandora L. Infection Control &amp; Hospital Epidemiology 2020;:No page numbers.

We were very interested to read the recent letter by Dr Zhou et al , “Protecting Chinese Healthcare Workers While Combating the 2019 Novel Coronavirus (1) ” We agree that everything possible should be done to protect health care workers (HCW) from developing COVID-19 infection We agree with the recommendations of Zhou and colleagues including the importance of increasing production of PPE, training health care workers in proper use, and maintaining a high clinical suspicion for COVID-19 even in patients without respiratory symptoms In addition, we call for more research into the risk factors leading to severe/critical illness, amongst HCW, defined as illness requiring hospitalization or admission to the intensive care unit (2) Research in this area is so far sorely lacking, limiting implementation of evidence-based practices Despite being younger and healthier than the general population with COVID-19, HCW have similar rates of severe/critical illness In China, the proportion of HCW severe/critical illness decreased from 45% in early January 2020 to 9% after Feb 1 (3), likely reflecting more consistent adoption of appropriate infection-control practices, including the use of personal protective equipment (PPE)

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1. **Risk of nosocomial transmission of coronavirus disease 2019: an experience in a general ward setting in Hong Kong**  
   Wong S. C. Y. The Journal of hospital infection. 2020;04:No page numbers.

BACKGROUND: Coronavirus disease 2019 (COVID-19) was first reported in Wuhan in December 2019 and has rapidly spread across different cities within and outside China. Hong Kong started to prepare for COVID-19 on 31st December 2019 and infection control measures in public hospitals were tightened to limit nosocomial transmission within healthcare facilities. However, the recommendations on the transmission-based precautions required for COVID-19 in hospital settings vary from droplet and contact precautions, to contact and airborne precautions with placement of patients in airborne infection isolation rooms. AIM: To describe an outbreak investigation of a patient with COVID-19 who was nursed in an open cubicle of a general ward before the diagnosis was made. METHOD(S): Contacts were identified and risk categorized as 'close' or 'casual' for decisions on quarantine and/or medical surveillance. Respiratory specimens were collected from contacts who developed fever, and/or respiratory symptoms during the surveillance period and were tested for SARS-CoV-2. FINDINGS: A total of 71 staff and 49 patients were identified from contact tracing, seven staff and 10 patients fulfilled the criteria of 'close contact'. At the end of 28-day surveillance, 76 tests were performed on 52 contacts and all were negative, including all patient close contacts and six of the seven staff close contacts. The remaining contacts were asymptomatic throughout the surveillance period. CONCLUSION(S): Our findings suggest that SARS-CoV-2 is not spread by an airborne route, and nosocomial transmissions can be prevented through vigilant basic infection control measures, including wearing of surgical masks, hand and environmental hygiene. Copyright © 2020. Published by Elsevier Ltd.

1. **Risk Stratification and PPE Use in Pediatric Endoscopy During the COVID-19 Outbreak: A Single-Center Protocol**  
   Say Daphne S. Journal of Pediatric Gastroenterology and Nutrition 2020;:No page numbers.

SARS-CoV-2, the novel coronavirus causing coronavirus disease 2019 (COVID-19), is now a global pandemic Human-to-human transmission has been documented to occur through respiratory secretions, feces, aerosols, and contaminated environmental surfaces Pediatric patients present a unique challenge as they may have minimal symptoms and yet transmit disease Endoscopists face risk for infection with viruses like SARS-CoV-2, as the aerosol generating nature of endoscopy diffuses respiratory disease that can be spread via an airborne and droplet route We describe our center&#039;s methodology for pediatric patient risk stratification to facilitate responsible use of endoscopic resources during this crisis We also describe our recommendations for use of personal protective equipment by endoscopists, with the goal of ensuring the safety of ourselves, our anesthesiology and endoscopy staff, and our patients Address correspondence and reprint requests to Daphne S Say, MD, Assistant Clinical Professor, Division of Gastroenterology, Hepatology, and Nutrition, Department of Pediatrics, University of California, Davis, 2516 Stockton Boulevard, Ticon II, Sacramento, CA 95817 (e-mail: dsay@ucdavis edu) Received 26 March, 2020 Accepted 30 March, 2020 Conflict of Interest Disclosure: The authors have no conflicts of interest relevant to this article to disclose Funding Source: No funding was secured for this study Financial Disclosure: The authors have no financial relationships relevant to this article to disclose © 2020 by European Society for Pediatric Gastroenterology, Hepatology, and Nutrition and North American Society for Pediatric Gastroenterology

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1. **Robot assisted surgery during the COVID-19 pandemic, especially for gynecological cancer: a statement of the Society of European Robotic Gynaecological Surgery (SERGS)**  
   Kimmig R. Journal of gynecologic oncology. 2020;03:No page numbers.

All surgery performed in an epicenter of the coronavirus disease 2019 (COVID-19) pandemic, irrespective of the known or suspected severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) status of the patient, should be regarded as high risk and protection of the surgical team at the bedside should be at the highest level. Robot assisted surgery (RAS) may help to reduce hospital stay for patients that urgently need complex-oncological-surgery, thus making room for COVID-19 patients. In comparison to open or conventional laparoscopic surgery, RAS potentially reduces not only contamination with body fluids and surgical gasses of the surgical area but also the number of directly exposed medical staff. A prerequisite is that general surgical precautions under COVID-19 circumstances must be taken, with the addition of prevention of gas leakage: \* Use highest protection level III for bedside assistant, but level II for console surgeon. \* Reduce the number of staff at the operation room. \* Ensure safe and effective gas evacuation. \* Reduce the intra-abdominal pressure to 8 mmHg or below. \* Minimize electrocautery power and avoid use of ultrasonic sealing devices. \* Surgeons should avoid contact outside theater (both in and out of the hospital). Copyright © 2020. Asian Society of Gynecologic Oncology, Korean Society of Gynecologic Oncology.

1. **SAGES and EAES recommendations for minimally invasive surgery during COVID-19 pandemic**  
   Francis N. Surgical Endoscopy 2020;22:22.

The unprecedented pandemic of COVID-19 has impacted many lives and affects the whole healthcare systems globally. In addition to the considerable workload challenges, surgeons are faced with a number of uncertainties regarding their own safety, practice, and overall patient care. This guide has been drafted at short notice to advise on specific issues related to surgical service provision and the safety of minimally invasive surgery during the COVID-19 pandemic. Although laparoscopy can theoretically lead to aerosolization of blood borne viruses, there is no evidence available to confirm this is the case with COVID-19. The ultimate decision on the approach should be made after considering the proven benefits of laparoscopic techniques versus the potential theoretical risks of aerosolization. Nevertheless, erring on the side of safety would warrant treating the coronavirus as exhibiting similar aerosolization properties and all members of the OR staff should use personal protective equipment (PPE) in all surgical procedures during the pandemic regardless of known or suspected COVID status. Pneumoperitoneum should be safely evacuated via a filtration system before closure, trocar removal, specimen extraction, or conversion to open. All emergent endoscopic procedures performed during the pandemic should be considered as high risk and PPE must be used by all endoscopy staff.

1. **SARS-CoV-2 RNA detection of hospital isolation wards hygiene monitoring during the Coronavirus Disease 2019 outbreak in a Chinese hospital**  
   Wang Jie Int. j. infect. dis 2020;:No page numbers.

OBJECTIVES: The aim of this paper was to monitor the presence of SARS-Cov-2 among hospital environment surfaces, sewage, and personal protective equipment (PPE) of staffs in isolation wards in the First Affiliated Hospital of Zhejiang University, China. METHODS: Surfaces of objects were routinely wiped with 1, 000mg/L chlorine containing disinfectant. Air and sewage disinfection was proceeded routinely and strictly. Hospital environmental surfaces and PPE of staffs in isolation wards were sampled using swabs. The sewage from various inlet and outlets were sampled. The respiratory and stool specimens of patients were collected. The respiratory specimens of staffs in the isolation wards were also sampled once a week. Quantitative real-time reverse transcription PCR (qRT-PCR) methods were used to confirm the existence of SARS-Cov-2 RNA. Viral culture was done for the samples positive for SARS-Cov-2 RNA. RESULTS: During the study period, 33 laboratory-confirmed patients were hospitalized in isolation wards in the hospital. None of SARS-Cov-2 RNA was detected among the 36 objects surface samples and 9 staffs PPE samples in isolation wards. Though the 3 sewage samples from the inlet of preprocessing disinfection pool were positive for SARS-CoV-2 RNA and the sample from the outlet of preprocessing disinfection pool was weakly positive, the sewage sample from the outlet of the last disinfection pool was negative. All of the 5 sewage samples from various points were negative by viral culture of SARS-Cov-2. None of the respiratory specimens of staffs in the isolation wards were positive. CONCLUSIONS: Though SARS-Cov-2 RNA of the sewage samples were positive from inlets of the sewage disinfection pool and negative from the outlet of the last sewage disinfection pool, no viable virus was detected by culture. The monitoring data in this study suggested that the strict disinfection and hand hygiene could decrease the hospital-associated COVID-19 infection risk of the staffs in isolation wards.

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1. **Skin Reactions to Non-glove Personal Protective Equipment: An Emerging Issue in the COVID-19 Pandemic**  
   Gheisari Mehdi J. Eur. Acad. Dermatol. Venereol 2020;:No page numbers.

Protecting healthcare workers (HCWs) is crucial during Corona Virus Disease 2019 pandemic and requires wearing personal protective equipment (PPE) [1]. While most of the studies have focused on the skin reactions caused by gloves, other PPE such as gowns, respirator masks, face shields and goggles are also worn by HCWs for long hours during the current epidemic and skin irritations caused by these equipment may cause discouragement of health workers from using them [2]. In this letter we have focused on the reaction caused by non-glove PPE.

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1. **Spinal anaesthesia for patients with coronavirus disease 2019 and possible transmission rates in anaesthetists: retrospective, single-centre, observational cohort study**  
   Zhong Qi Br. j. anaesth 2020;:No page numbers.

BACKGROUND: The safety of performing spinal anaesthesia for both patients and anaesthetists alike in the presence of active infection with the novel coronavirus disease 2019 (COVID-19) is unclear. Here, we report the clinical characteristics and outcomes for both patients with COVID-19 and the anaesthetists who provided their spinal anaesthesia. METHODS: Forty-nine patients with radiologically confirmed COVID-19 for Caesarean section or lower-limb surgery undergoing spinal anaesthesia in Zhongnan Hospital, Wuhan, China participated in this retrospective study. Clinical characteristics and perioperative outcomes were recorded. For anaesthesiologists exposed to patients with COVID-19 by providing spinal anaesthesia, the level of personal protective equipment (PPE) used, clinical outcomes (pulmonary CT scans), and confirmed COVID-19 transmission rates (polymerase chain reaction [PCR]) were reviewed. RESULTS: Forty-nine patients with COVID-19 requiring supplementary oxygen before surgery had spinal anaesthesia (ropivacaine 0.75%), chiefly for Caesarean section (45/49 [91%]). Spinal anaesthesia was not associated with cardiorespiratory compromise intraoperatively. No patients subsequently developed severe pneumonia. Of 44 anaesthetists, 37 (84.1%) provided spinal anaesthesia using Level 3 PPE. Coronavirus disease 2019 infection was subsequently confirmed by PCR in 5/44 (11.4%) anaesthetists. One (2.7%) of 37 anaesthetists who wore Level 3 PPE developed PCR-confirmed COVID-19 compared with 4/7 (57.1%) anaesthetists who had Level 1 protection in the operating theatre (relative risk reduction: 95.3% [95% confidence intervals: 63.7-99.4]; P&lt;0.01). CONCLUSIONS: Spinal anaesthesia was delivered safely in patients with active COVID-19 infection, the majority of whom had Caesarean sections. Level 3 PPE appears to reduce the risk of transmission to anaesthetists who are exposed to mildly symptomatic surgical patients.

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1. **Surgical Considerations for an Awake Tracheotomy During the COVID-19 Pandemic**  
   Crossley J. Journal of Laparoendoscopic & Advanced Surgical Techniques. Part A 2020;20:20.

<b>Background:</b> The current global COVID-19 pandemic is caused by the novel coronavirus Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2). Given that SARS-CoV-2 is highly transmissible, surgical societies have recommended that procedures with a high risk of aerosolization be avoided or delayed. However, some high-risk procedures, such as those related to head and neck malignancies, cannot always be delayed. Care must be taken during aerosol-generating procedures to minimize viral transmission as much as possible. Preoperative testing for COVID-19, limited operating room personnel, adequate personal protective equipment, and surgical technique are factors to consider for high-risk procedures. <b>Methods:</b> This article presents the case of an awake tracheotomy performed for a transglottic mass causing airway obstruction. <b>Results:</b> With detailed planning and specific techniques, the amount of aerosolization was reduced, and the procedure was performed as safely as possible. <b>Conclusion: </b> This case provides a template for future aerosol-generating procedures during respiratory pandemics.

1. **Sustainable response to the COVID-19 pandemic in the operating theatre: we need more than just personal protective equipment**  
   Cheung E. H. L. British Journal of Anaesthesia. 2020;:No page numbers.

1. **The Essential Role of Patient Blood Management in a Pandemic: A Call for Action**  
   Shander A. Anesthesia & Analgesia 2020;31:31.

The World Health Organization (WHO) has declared Coronavirus Disease 2019 (COVID-19), the disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a pandemic. Global health care now faces unprecedented challenges with widespread and rapid human-to-human transmission of SARS-CoV-2 and high morbidity and mortality with COVID-19 worldwide. Across the world, the medical care is hampered by a critical shortage of not only hand sanitizers, personal protective equipment, ventilators and hospital beds, but also impediments to the blood supply. Blood donation centers in many areas around the globe have mostly closed. Donors, practicing social distancing, some either with illness or undergoing self-quarantine, are quickly diminishing. Drastic public health initiatives have focused on containment and "flattening the curve" while invaluable resources are being depleted. In some countries, the point is reached at which demand for such resources, including donor blood outstrips supply. Questions as to the safety of blood persist. Although it does not appear very likely that the virus can be transmitted through allogeneic blood transfusion, this still remains to be fully determined. As options dwindle, we must enact regional and national shortage plans worldwide, and more vitally disseminate the knowledge of and immediately implement Patient Blood Management (PBM). PBM is an evidence-based bundle of care to optimize medical and surgical patient outcomes by clinically managing and preserving a patient's own blood. This multinational and diverse group of authors issue this "Call to Action" underscoring "The Essential Role of Patient Blood Management in the Management of Pandemics" and urging all stakeholders and providers to implement the practical and common-sense principles of PBM and its multi-professional and multimodality approaches.

1. **The prevalence, characteristics and prevention status of skin injury caused by personal protective equipment among medical staff in fighting COVID-19: A multi-center, cross-sectional study**  
   Jiang Qixia 2020;:No page numbers.

OBJECTIVE: To investigate the prevalence, characteristics and preventive status of skin injuries caused by personal protective equipment (PPE) in medical staff. APPROACH: A cross-sectional survey was conducted online for understanding skin injuries among medical staff fighting against COVID-19 in February 8-22, 2020. Participants voluntarily answered and submitted the questionnaire with cellphone. The questionnaire items included demographic data, grade of PPE and daily wearing time, skin injuries types, anatomical sites, and preventive measures. Univariable analyses and logistic regression analyses were employed to explore the risk factors associated with skin injuries. RESULTS: A total of 4,308 respondents were collected from 161 hospitals and 4,306 respondents were valid. The overall prevalence of skin injuries was 42.8% (95% CI 41.30%-44.30%) with three types of device-related pressure injuries, moist associated skin damage and skin tear. Co-skin injuries and multiple locations injuries were 27.4% and 76.8%, respectively. The logistic regression analysis indicated that sweating (95%CI for OR 87.52-163.11), daily wearing time (95% CI for OR1.61-3.21), male (95% CI for OR 1.11-2.13) and grade 3 PPE (95% CI for OR1.08-2.01) were associated with skin injuries. Only 17.7% respondents took prevention and 45.0% skin injuries were treated. INNOVATION: This the first cross-sectional survey to understand skin injuries in medical staff caused by PPE, which is expected to be a benchmark. CONCLUSION: The skin injuries among medical staff are serious, with insufficient prevention and treatment. A comprehensive program should be taken in future.

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1. **The Technique and Justification for Minimally Invasive Surgery in COVID-19 Pandemic: Laparoscopic Anterior Resection for Near Obstructed Rectal Carcinoma**  
   Pawar T. Journal of Laparoendoscopic & Advanced Surgical Techniques. Part A 2020;20:20.

<b>Introduction:</b> The recent COVID-19 pandemic outbreak has made surgeons change and take on newer strategies and safe exercises. All elective cases have been put off, but oncology cases need to be done to prevent progression of the disease. There is concern about minimally invasive surgery due to aerosol formation. Here we discuss how we have dealt with this in our colorectal surgery department taking into account current evidence about the danger of viral transmission during laparoscopic surgery. <b>Discussion:</b> We report a case of 28 years old female patient with carcinoma rectum. The patient had near total intestinal obstruction. She was operated on utilizing laparoscopic anterior resection. The air seal (CONMED, Utica, NY) and high-efficiency particulate air (HEPA) filter was utilized for safe gas evacuation. There is no evidence against laparoscopic surgery, which suggest viral transmission. One should take utmost precautions using N95 masks and personal protective equipment (PPE). Air filtration products like aerosol, HEPA filters will be of great aid in safe evacuation of gases. <b>Conclusion: </b> At present, there is no solid evidence to suggest viral transmission through surgical smoke. We believe due to effective smoke containment, less blood loss, and less postoperative stay, laparoscopy will be a non-inferior option than open surgical procedure. We advise taking all precautions for operating room staff to lessen the danger of transmission.

1. **Transmission of COVID-19 to Health Care Personnel During Exposures to a Hospitalized Patient - Solano County, California, February 2020**  
   Heinzerling Amy MMWR Morb Mortal Wkly Rep 2020;69:472-476.

On February 26, 2020, the first U.S. case of community-acquired coronavirus disease 2019 (COVID-19) was confirmed in a patient hospitalized in Solano County, California (1). The patient was initially evaluated at hospital A on February 15; at that time, COVID-19 was not suspected, as the patient denied travel or contact with symptomatic persons. During a 4-day hospitalization, the patient was managed with standard precautions and underwent multiple aerosol-generating procedures (AGPs), including nebulizer treatments, bilevel positive airway pressure (BiPAP) ventilation, endotracheal intubation, and bronchoscopy. Several days after the patient&#039;s transfer to hospital B, a real-time reverse transcription-polymerase chain reaction (real-time RT-PCR) test for SARS-CoV-2 returned positive. Among 121 hospital A health care personnel (HCP) who were exposed to the patient, 43 (35.5%) developed symptoms during the 14 days after exposure and were tested for SARS-CoV-2; three had positive test results and were among the first known cases of probable occupational transmission of SARS-CoV-2 to HCP in the United States. Little is known about specific risk factors for SARS-CoV-2 transmission in health care settings. To better characterize and compare exposures among HCP who did and did not develop COVID-19, standardized interviews were conducted with 37 hospital A HCP who were tested for SARS-CoV-2, including the three who had positive test results. Performing physical examinations and exposure to the patient during nebulizer treatments were more common among HCP with laboratory-confirmed COVID-19 than among those without COVID-19; HCP with COVID-19 also had exposures of longer duration to the patient. Because transmission-based precautions were not in use, no HCP wore personal protective equipment (PPE) recommended for COVID-19 patient care during contact with the index patient. Health care facilities should emphasize early recognition and isolation of patients with possible COVID-19 and use of recommended PPE to minimize unprotected, high-risk HCP exposures and protect the health care workforce.

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1. **Use of personal protective equipment to protect against respiratory infections in Pakistan: A systematic review**  
   Chughtai Abrar Ahmad J Infect Public Health 2020;13:385-390.

Like other low-income countries, limited data are available on the use of personal protective equipment (PPE) in Pakistan. We conducted a systematic review of studies on PPE use for respiratory infections in healthcare settings in Pakistan. MEDLINE, Embase and Goggle Scholar were searched for clinical, epidemiological and laboratory-based studies in English, and 13 studies were included; all were observational/cross-sectional studies. The studies examined PPE use in hospital (n=7), dental (n=4) or laboratory (n=2) settings. Policies and practices on PPE use were inconsistent. Face masks and gloves were the most commonly used PPE to protect from respiratory and other infections. PPE was not available in many facilities and its use was limited to high-risk situations. Compliance with PPE use was low among healthcare workers, and reuse of PPE was reported. Clear policies on the use of PPE and available PPE are needed to avoid inappropriate practices that could result in the spread of infection. Large, multimethod studies are recommended on PPE use to inform national infection-control guidelines.

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1. **What are we doing in the dermatology outpatient department amidst the raging of the 2019 novel coronavirus?**  
   Chen Y. Journal of the American Academy of Dermatology 2020;82:1034.

1. **[Analysis of bronchoscope-guided tracheal intubation in 12 cases with COVID-19 under the personal protective equipment with positive pressure protective hood]**  
   Cai S. J. Zhonghua Jie He He Hu Xi Za Zhi 2020;43:E033-E033.

Endotracheal intubation is an independent risk factor for respiratory infectious diseases. We conducted a retrospective study in 12 cases with COVID-19 who underwent endotracheal intubation at ICU of the Guangzhou eighth hospital from January 20 to February 10, 2020. The intubation procedure, anesthetic regimen, and complication were collected and analyzed. The 9 healthcare workers who involved in intubation received virus nucleic acid test and 14 days temperature monitoring. All 12 patients were successfully intubated under the guidance of bronchoscope, without any complications. Midazolam, Propofol and Morphine or fentanyl were used for sedation and analgesia, avoiding patients cough and agitated during the procedure. The 9 healthcare workers were protected under the Personal Protective Equipment(PPE) with positive pressure protective hood. The detection of oropharyngeal swab virus nucleic acid were negative in all 9 healthcare workers, none of them had fever or any respiratory symptoms. The PPE with positive pressure protective hood should be needed to perform bronchoscope-guided endotracheal intubation in patients with COVID-19, it could strengthen to protect healthcare workers from virus exposure.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=9fb9b02bca1d9d4c6c503a4dcfc5e16e)

1. **[ANMCO Position paper: Guidance for the management of suspected or confirmed COVID-19 patients requiring urgent electrophysiological procedures]**  
   Gulizia M. M. Giornale Italiano di Cardiologia 2020;21:336-340.

1. **[Clinical experience of high-flow nasal cannula oxygen therapy in severe corona virus disease 2019 (COVID-19) patients]**  
   He G. Zhejiang da Xue Xue Bao. Yi Xue Ban/Journal of Zhejiang University. Medical Sciences 2020;49:0.

Acute respiratory failure due to acute hypoxemia is the major manifestation in severe coronavirus disease 2019 (COVID-19) induced by severe acute respiratory syndrome coronavirus 2 infection. Rational and effective respiratory support is crucial in the management of COVID-19 patients. High-flow nasal cannula (HFNC) has been utilized widely due to its superiority over other non-invasive respiratory support techniques. To avoid HFNC failure and intubation delay, the key issues are proper patients, timely application and improving compliance. It should be noted that elder patients are vulnerable for failed HFNC. We applied HFNC for oxygen therapy in severe and critical COVID-19 patients and summarized the following experiences. Firstly, to select the proper size of nasal catheter, to locate it at suitable place, and to confirm the nose and the upper respiratory airway unobstructed. Secondly, an initial flow of 60 L/min and 37 should be given immediately for patients with obvious respiratory distress or weak cough ability; otherwise, low-level support should be given first and the level gradually increased. Thirdly, to avoid hypoxia or hypoxemia, the treatment goal of HFNC should be maintained the oxygen saturation (SpO<sub>2</sub>) above 95% for patients without chronic pulmonary disease. Finally, patients should wear a surgical mask during HFNC treatment to reduce the risk of virus transmission through droplets or aerosols.

1. **[Coronavirus disease 2019 (COVID-19): update for anesthesiologists and intensivists March 2020]**  
   Thomas-Ruddel D. Anaesthesist 2020;69:225-235.

The current outbreak of coronavirus disease (COVID-19) has reached Germany. The majority of people infected present with mild disease, but there are severe cases that need intensive care. Unlike other acute infectious diseases progressing to sepsis, the severe courses of COVID19 seemingly show prolonged progression from onset of first symptoms to life-threatening deterioration of (primarily) lung function. Diagnosis relies on PCR using specimens from the respiratory tract. Severe ARDS reflects the hallmark of a critical course of the disease. Preventing nosocomial infections (primarily by correct use of personal protective equipment) and maintenance of hospitals' operational capability are of utmost importance. Departments of Anaesthesia, Intensive Care and emergency medicine will envisage major challenges.

1. **[Expert consensus on preventing nosocomial transmission during respiratory care for critically ill patients infected by 2019 novel coronavirus pneumonia]**  
   Respiratory Care Committee of Chinese Thoracic Society Chung-Hua Chieh Ho Ho Hu Hsi Tsa Chih Chinese Journal of Tuberculosis & Respiratory Diseases 2020;43:288-296.

Definite evidence has shown that the novel coronavirus (COVID-19) could be transmitted from person to person, so far more than 1 700 bedside clinicians have been infected. A lot of respiratory treatments for critically ill patients are deemed as high-risk factors for nosocomial transmission, such as intubation, manual ventilation by resuscitator, noninvasive ventilation, high-flow nasal cannula, bronchoscopy examination, suction and patient transportation, etc, due to its high possibility to cause or worsen the spread of the virus. As such, we developed this consensus recommendations on all those high-risk treatments, based on the current evidence as well as the resource limitation in some areas, with the aim to reduce the nosocomial transmission and optimize the treatment for the COVID-19 pneumonia patients. Those recommendations include: (1)Standard prevention and protection, and patient isolation; (2)Patient wearing mask during HFNC treatment; (3)Using dual limb ventilator with filters placed at the ventilator outlets, or using heat-moisture exchanger (HME) instead of heated humidification in single limb ventilator with HME placed between exhalation port and mask; avoid using mask with exhalation port on the mask; (4)Placing filter between resuscitator and mask or artificial airway; (5)For spontaneous breathing patients, placing mask for patients during bronchoscopy examination; for patients receiving noninvasive ventilation, using the special mask with bronchoscopy port to perform bronchoscopy; (6)Using sedation and paralytics during intubation, cuff pressure should be maintained between 25-30 cmH(2)O(1 cmH(2)O=0.098 kPa); (7)In-line suction catheter is recommended and it can be used for one week; (8)Dual-limb heated wire circuits are recommended and only changed with visible soiled; (9)For patients who need breathing support during transportation, placing an HME between ventilator and patient; (10)PSV is recommended for implementing spontaneous breathing trial (SBT), avoid using T-piece to do SBT. When tracheotomy patients are weaned from ventilator, HME should be used, avoid using T-piece or tracheostomy mask. (11)Avoid unnecessary bronchial hygiene therapy; (12) For patients who need aerosol therapy, dry powder inhaler metered dose inhaler with spacer is recommended for spontaneous breathing patients; while vibrating mesh nebulizer is recommended for ventilated patients and additional filter is recommended to be placed at the expiratory port of ventilation during nebulization.

1. **[SARS CoV-2/COVID-19: Evidence-Based Recommendation on Diagnosis and Therapy]**  
   Bein B. Anasthesiologie, Intensivmedizin, Notfallmedizin, Schmerztherapie 2020;55:257-265.

COVID-19, a new viral disease affecting primarily the respiratory system and the lung, has caused a pandemic with serious challenges to health systems around the world. In about 20% of patients, severe symptoms occur after a mean incubation period of 5 - 6 days; 5% of patients need intensive care therapy. Morbidity is about 1 - 2%. Protecting health care workers is of paramount importance in order to prevent hospital acquired infections. Therefore, during all procedures associated with aerosol production, a personal safety equipment consisting of a FFP2/FFP3 (N95) respiratory mask, gloves, safety glasses and a waterproof overall should be used. Therapy is based on established recommendations issued for patients with acute lung injury (ARDS). Lung protective ventilation, prone position, restrictive fluid management and an adequate management of organ failures are the mainstays of therapy. In case of fulminant lung failure, veno-venous extracorporeal membrane oxygenation may be used as a rescue in experienced centres. New, experimental therapies evolve with ever increasing frequency; currently, however, there is no evidence based recommendation possible. If off-label and compassionate use of these drugs is considered, an individual benefit-risk assessment is necessary, since serious side effects have been reported.

1. **Infection control influence of Middle East respiratory syndrome coronavirus: A hospital-based analysis**  
   Al-Tawfiq J. A. American Journal of Infection Control 2019;47:431-434.

Background: Middle East respiratory syndrome coronavirus (MERS-CoV) caused multiple outbreaks. Such outbreaks increase economic and infection control burdens. We studied the infection control influence of MERS-CoV using a hospital-based analysis. Method(s): Our hospital had 17 positive and 82 negative cases of MERS-CoV between April 1, 2013, and June 3, 2013. The study evaluated the impact of these cases on the use of gloves, surgical masks, N95 respirators, alcohol-based hand sanitizer, and soap, as well as hand hygiene compliance rates. Result(s): During the study, the use of personal protective equipment during MERS-CoV compared with theperiod before MERS-CoV increased dramatically from 2,947.4 to 10,283.9 per 1,000 patient-days (P<.0000001) for surgical masks and from 22 to 232 per 1,000 patient-days (P <.0000001) for N95 masks. The use of alcohol-based hand sanitizer and soap showed a significant increase in utilized amount (P<.0000001). Hand hygiene compliance rates increased from 73% just before the occurrence of the first MERS case to 88% during MERS cases (P =.0001). The monthly added cost was $16,400 for included infection control items. Conclusion(s): There was a significant increase in the utilization of surgical masks, respirators, soap and alcohol-based hand sanitizers. Such an increase is a challenge and adds cost to the healthcare system. Copyright © 2018 Association for Professionals in Infection Control and Epidemiology, Inc.

1. **Painting the gown red: Using a colored paint quality improvement process to evaluate healthcare worker personal protective equipment for highly pathogenic infections**  
   Eiras D. Open Forum Infectious Diseases 2017;4 (Supplement 1):S412.

Background. Personal protective equipment (PPE) and strict infection control techniques are the primary methods by which healthcare workers (HCW) can avoid exposure during the treatment of patients with highly pathogenic infections such as Ebola Virus Disease (EVD) or the Middle East Respiratory Syndrome coronavirus (MERS-CoV). There is currently no consensus for the types of PPE that are recommended to be worn by HCWs, nor is there a universal process for the donning and doffing of PPE. Methods. HCWs from Bellevue Hospital participate in quarterly PPE trainings as part of the Special Pathogens Program (SPP), which consist of didactic sessions as well as an evaluation of donning and doffing techniques. A total of 50 HCWs completed the training curriculum in 2017. During the doffing process, PPE trainers applied corn start powder paint (Chameleon Colors; American Fork, UT) to the participants' gloved hands between multiple steps of PPE removal. At the end of the process, the areas where paint was found on was documented including the outer surgical gown, the powered air purifying respirator (PAPR) helmet and shroud, the inner impermeable suit, the knee-high boots and boot covers, and the extended-cuff gloves. Results. The areas of PPE that were most marked with paint were the lower shoulders and upper arms of the surgical gowns, the top sides of the PAPR shroud, the front upper chest area, and the center back of the inner impermeable suits. In a majority of cases no powder paint was noted on the knee-high boots. In a minority of cases, paint was observed on the inside upper chest area of the surgical gown. These paint markings were used to discuss potential breaches in PPE doffing technique in real-time, as well as identify areas to target in future PPE trainings. Conclusion. The powdered paint quality improvement process for donning and doffing PPE is a method to evaluate the complex PPE dressing procedure. It is particularly useful given the fact that it is incumbent on each hospital or healthcare system to develop its own processes and procedures for PPE, as well as maintain readiness through periodic trainings. Powdered paint can identify vulnerabilities in their process as well as areas that require further education.

1. **Middle east respiratory syndrome infection control and prevention guideline for healthcare facilities**  
   Kim J. Y. Infection and Chemotherapy 2015;47:278-302.

Middle East Respiratory Syndrome (MERS) is an acute viral respiratory illness with high mortality caused by a new strain of betacoronavirus (MERS-CoV). Since the report of the first patient in Saudi Arabia in 2012, large-scale outbreaks through hospital-acquired infection and inter-hospital transmission have been reported. Most of the patients reported in South Korea were also infected in hospital settings. Therefore, to eliminate the spread of MERS-CoV, infection prevention and control measures should be implemented with rigor. The present guideline has been drafted on the basis of the experiences of infection control in the South Korean hospitals involved in the recent MERS outbreak and on domestic and international infection prevention and control guidelines. To ensure efficient MERS-CoV infection prevention and control, care should be taken to provide comprehensive infection control measures including contact control, hand hygiene, personal protective equipment, disinfection, and environmental cleaning. Copyright © 2015 by The Korean Society of Infectious Diseases Korean Society for Chemotherapy.

1. **Authors' Reply. MERS-CoV, surgical mask and N95 respirators**  
   Chung J. S. Singapore medical journal 2014;55:507.

1. **Debate on MERS-CoV respiratory precautions: surgical mask or N95 respirators?**  
   Chung S. J. Singapore Medical Journal 2014;55:294-7.

Since the emergence of Middle East respiratory syndrome coronavirus (MERS-CoV) in mid-2012, there has been controversy over the respiratory precaution recommendations in different guidelines from various international bodies. Our understanding of MERS-CoV is still evolving. Current recommendations on infection control practices are heavily influenced by the lessons learnt from severe acute respiratory syndrome. A debate on respiratory precautions for MERS-CoV was organised by Infection Control Association (Singapore) and the Society of Infectious Disease (Singapore). We herein discuss and present the evidence for surgical masks for the protection of healthcare workers from MERS-CoV.

1. **MERS-CoV, Surgical mask and N95 respirators**  
   Wiwanitkit V. Singapore Medical Journal 2014;55:No page numbers.

1. **Risk factors for SARS infection among hospital healthcare workers in Beijing: A case control study**  
   Liu W. Tropical Medicine and International Health 2009;14:52-59.

Objective To evaluate possible severe acute respiratory syndrome (SARS) infection associated risk factors in a SARS affected hospital in Beijing by means of a case control study. Methods Fifty-one infected and 426 uninfected staff members were asked about risk behaviours and protective measures when attending to SARS patients. Univariate and multivariate logistic regression analyses were performed to identify the major risk and protective factors. Results Multivariate analysis confirmed the strong role of performing chest compression (or intubation, which is highly correlated), contact with respiratory secretion, and emergency care experience as risk factors to acquire SARS infection. For the studied protective measures, wearing 16-layer cotton surgical mask, wearing 12-layer cotton surgical mask, wearing multiple layers of mask, taking prophylactic medicine, taking training and nose washing turned out to be protective against infection. Conclusions This study highlighted activities associated with increased and decreased risk for SARS infection during close contact with SARS patients. These findings may help to guide recommendations for the protection of high-risk occupational groups. © 2009 Blackwell Publishing Ltd.

1. **Reply to the comments on "In vivo protective performance of N95 respirator and surgical facemask" [2]**  
   Li Y. American Journal of Industrial Medicine 2007;50:1027-1029.

1. **Precautions in ophthalmic practice in a hospital with a major acute SARS outbreak: An experience from Hong Kong**  
   Chan W. M. Eye 2006;20:283-289.

Many new infectious diseases in humans have been derived from animal sources in the past 20 years. Some are highly contagious and fatal. Vaccination may not be available and antiviral drugs are not effective enough. Infectious control is important in clinical medicine and in Ophthalmology. Severe acute respiratory syndrome (SARS), as an example, is a highly contagious respiratory disease that has recently been reported in Asia, North America, and Europe. Within a matter of weeks, the outbreak has evolved to become a global health threat and more than 30 countries have been afflicted with a novel Coronavirus strain (SARS-CoV) that is the aetiologic agent of SARS. The primary route of transmission of SARS appears involving close person-to-person contact through droplets. Ophthalmologists may be particularly susceptible to the infection as routine ophthalmic examinations like direct ophthalmoscopy and slit-lamp examination are usually performed in a setting that has close doctor-patient contact. Being the Ophthalmology Department of the only hospital in the world that has just gone through the largest outbreak of SARS, we would like to share our strategy, measures, and experiences of preventing contracting or spreading of SARS infection as an infection control model. SARS is one of the many viruses against which personnel will need protecting in an ophthalmic setting. The experiences attained and the measures established might also apply to other infectious conditions spreading by droplets such as the avian influenza with H5N1. © 2006 Nature Publishing Group. All rights reserved.

1. **Appropriate use of personal protective equipment among healthcare workers in public sector hospitals and primary healthcare polyclinics during the SARS outbreak in Singapore**  
   Chia S. E. Occupational and Environmental Medicine 2005;62:473-477.

Background: Singapore was affected by an outbreak of severe acute respiratory syndrome (SARS) from 25 February to 31 May 2003, with 238 probable cases and 33 deaths. Aim(s): To study usage of personal protective equipment (PPE) among three groups of healthcare workers (HCWs: doctors, nurses, and administrative staff), to determine if the appropriate PPE were used by the different groups and to examine the factors that may determine inappropriate use. Method(s): A self-administered questionnaire survey of 14 554 HCWs in nine healthcare settings, which included tertiary care hospitals, community hospitals, and polyclinics, was carried out in May-July 2003. Only doctors, nurses, and clerical staff were selected for subsequent analysis. Result(s): A total of 10 236 valid questionnaires were returned (70.3% response); 873 doctors, 4404 nurses, and 921 clerical staff were studied. A total of 32.5% of doctors, 48.7% of nurses, and 77.1 % of the administrative staff agreed that paper and/or surgical masks were "useful in protecting from contracting SARS". Among this group, 23.6% of doctors and 42.3% of nurses reported working with SARS patients. The view that a paper and/or surgical mask was adequate protection against SARS was held by 33.3% of doctors and 55.9% of nurses working at the A&E unit, 30.5% of doctors and 49.4% of nurses from medical wards, and 27.5% of doctors and 37.1% of nurses from intensive care units. Factors which predicted for agreement that paper and/or surgical masks were protective against SARS, included HCW's job title, reported contact with SARS patients, area of work, and Impact Events Scale scores. Conclusion(s): A variety of factors determine appropriate use of personal protective equipment by HCWs in the face of a major SARS outbreak.

1. **Elective and emergency surgery in patients with severe acute respiratory syndrome (SARS)**  
   Tien H. C. Canadian Journal of Surgery 2005;48:71-74.

1. **Protecting healthcare staff from severe acute respiratory syndrome: Filtration capacity of multiple surgical masks**  
   Derrick J. L. Journal of Hospital Infection 2005;59:365-368.

Guidelines issued by the Centers for Disease Control and Prevention and the World Health Organisation state that healthcare workers should wear N95 masks or higher-level protection during all contact with suspected severe acute respiratory syndrome (SARS). In areas where N95 masks are not available, multiple layers of surgical masks have been tried to prevent transmission of SARS. The in vivo filtration capacity of a single surgical mask is known to be poor. However, the filtration capacity of a combination of masks is unknown. This was a crossover trial of one, two, three and five surgical masks in six volunteers to determine the in vivo filtration efficiency of wearing more than one surgical mask. We used a Portacount to measure the difference in ambient particle counts inside and outside the masks. The best combination of five surgical masks scored a fit factor of 13.7, which is well below the minimum level of 100 required for a half face respirator. Multiple surgical masks filter ambient particles poorly. They should not be used as a substitute for N95 masks unless there is no alternative. © 2004 The Hospital Infection Society. Published by Elsevier Ltd. All rights reserved.

1. **Severe acute respiratory syndrome: Implications for perinatal and neonatal nurses**  
   Rebmann T. Journal of Perinatal and Neonatal Nursing 2005;19:332-347.

Severe acute respiratory syndrome (SARS) is an emerging infection that causes a potentially fatal respiratory disease. Although the SARS outbreak lasted less than 1 year, it resulted in significant morbidity and mortality and impacted nursing practices. A literature review was conducted. Only English language research articles in peer-reviewed journals, national organization publications, and book chapters were utilized. Data from 37 relevant articles were extracted, analyzed, and summarized. SARS' clinical description is presented, including its common signs/symptoms, diagnosis, and treatment. Recommended isolation practices for labor and delivery and proper procedures for donning, using, and doffing personal protective equipment are provided. Potential maternal outcomes include spontaneous miscarriage during the first trimester, preterm birth, emergency cesarean section, renal failure, secondary bacterial pneumonia, sepsis, adult respiratory distress syndrome, disseminated intravascular coagulation, surgical site infection, and maternal death. There have been no documented cases of vertical transmission; passive immunity is suspected on the basis of the presence of antibodies in some maternal body fluids. Potential neonatal outcomes include complications related to premature birth, intrauterine growth restriction, respiratory distress syndrome, and severe gastrointestinal manifestations. It is not known if or when SARS will reemerge, but perinatal and neonatal nurses should become familiar with its clinical description and proper infection control procedures to halt potential outbreaks. © 2005 Lippincott Williams & Wilkins, Inc.

1. **Theatre nursing in post-SARS Hong Kong**  
   Lipp A. British Journal of Perioperative Nursing 2005;15:253-6.

On a recent visit to Hong Kong the author visited an operating theatre in an effort to explore the differences and similarities with the U.K. She found that SARS has had a profound influence upon both public behaviour and the healthcare system. The author found the visit interesting and educational and she encourages others to make similar visits as a way of exchanging ideas and maintaining optimal practice.

1. **Effective personal protective clothing for health care workers attending patients with severe acute respiratory syndrome**  
   Wong T. K. S. American Journal of Infection Control 2004;32:90-96.

Background: Optimal usability is crucial in providing protection for health care workers who are exposed to severe acute respiratory syndrome day and night while taking care of patients with the virus. No research study has yet tested the usability of personal protective clothing (PPC). Method(s): The study was carried out in 3 stages. PPC available in Hong Kong were sorted by their physical properties in the first stage. The second stage was a single-blinded study examining the different usability aspects of the PPC. The third stage was a simulated viral load test. Result(s): Four types were identified: good water repellency and water resistance, poor air permeability (Type A PPC); good water repellency and air permeability, poor water resistance (Type B PPC); poor water repellency, poor water resistance, and fair air permeability (Type C PPC); and good water repellency, poor air permeability and fair water resistance (Type D PPC). Type D PPC had a significantly higher number of contamination sites on the subjects' dorsum and palm. Type C PPC had the highest contamination over the trunk. Findings in the viral load test showed that there was a significant difference in the contamination of the face (t = 4.69, df = 38. P <.00) between 1 and 2 strokes. Conclusion(s): Type A PPC is effective in providing a desirable protective function against droplet splash, if a disposable PPC is required. Type C PPC, the surgical gown, is also appropriate, as the cost is low, air permeability is fair, and the level of possible hand contamination is lowest among the 4 groups in the current study.

1. **Impact of a viral respiratory epidemic on the practice of medicine and rehabilitation: Severe acute respiratory syndrome**  
   Lim P. A. Archives of Physical Medicine and Rehabilitation 2004;85:1365-1370.

Lim PA, Ng YS, Tay BK. Impact of a viral respiratory epidemic on the practice of medicine and rehabilitation: severe acute respiratory syndrome. Arch Phys Med Rehabil 2004;85:1365-70. Severe acute respiratory syndrome (SARS) is a new respiratory viral epidemic that originated in China but has affected many parts of the world, with devastating impact on economies and the practice of medicine and rehabilitation. A novel coronavirus has been implicated, with transmission through respiratory droplets. Rehabilitation was significantly affected by SARS, because strict infection control measures run counter to principles such as multidisciplinary interactions, patients encouraging and learning from each other, and close physical contact during therapy. Immunocompromised patients who may silently carry SARS are common in rehabilitation and include those with renal failure, diabetes, and cancer. Routine procedures such as management of feces and respiratory secretions (eg, airway suctioning, tracheotomy care) have been classified as high risk. Personal protection equipment presented not only a physical but also a psychologic barrier to therapeutic human contact. Visitor restriction to decrease chances of disease transmission are particularly difficult for long-staying rehabilitation patients. At the height of the epidemic, curtailment of patient movement stopped all transfers for rehabilitation, and physiatrists had to function as general internists. Our experiences strongly suggest that rehabilitation institutions should have emergency preparedness plans because such epidemics may recur, whether as a result of nature or of bioterrorism. © 2004 by the American Congress of Rehabilitation Medicine and the American Academy of Physical Medicine and Rehabilitation.

1. **Measures to prevent healtcare workers from contracting severe acute respiratory syndrome during high-risk surgical procedures**  
   Wong S. F. European Journal of Clinical Microbiology and Infectious Diseases 2004;23:131-133.

1. **Outbreak of severe acute respiratory syndrome in Singapore and modifications in the anesthesia service [13]**  
   Liu E. H. Anesthesiology 2004;100:1629-1630.

1. **SARS among Critical Care Nurses, Toronto**  
   Loeb M. Emerging Infectious Diseases 2004;10:251-255.

To determine factors that predispose or protect healthcare workers from severe acute respiratory syndrome (SARS), we conducted a retrospective cohort study among 43 nurses who worked in two Toronto critical care units with SARS patients. Eight of 32 nurses who entered a SARS patient's room were infected. The probability of SARS infection was 6% per shift worked. Assisting during intubation, suctioning before intubation, and manipulating the oxygen mask were high-risk activities. Consistently wearing a mask (either surgical or particulate respirator type N95) while caring for a SARS patient was protective for the nurses, and consistent use of the N95 mask was more protective than not wearing a mask. Risk was reduced by consistent use of a surgical mask, but not significantly. Risk was lower with consistent use of a N95 mask than with consistent use of a surgical mask. We conclude that activities related to intubation increase SARS risk and use of a mask (particularly a N95 mask) is protective.

1. **SARS update: Winter, 2003 to 2004**  
   Shapiro S. E. AAOHN journal : official journal of the American Association of Occupational Health Nurses 2004;52:199-203.

Transmission of severe acute respiratory syndrome (SARS) related coronavirus (CoV) appears to be heterogeneous. Most transmission occurs through large droplets, but there is some evidence of spread through aerosol transmission. Proper use of personal protective equipment (PPE) and scrupulous attention to hand hygiene are critical to reducing transmission of SARS, especially in health care facilities. Surgical masks have been shown to be highly effective in reducing transmission when N-95 respirators are unavailable. Health care workers bore a large burden of illness during the 2002 to 2003 SARS epidemic. Occupational health nurses working in health care agencies will play a key role in preparing for a re-emergence of the disease. Occupational health nurses should "bookmark" the Centers for Disease Control and Prevention website for Public Health Guidance for Community-Level Preparedness and Response to SARS: www.cdc.gov/ncidod/sars/clinicalguidance.htm for easy retrieval and reference.

1. **Surgical Helmets and SARS Infection**  
   Derrick J. L. Emerging Infectious Diseases 2004;10:277-279.

Performance testing of two brands of surgical helmets indicated that their efficiency at in vivo filtration of sub-micrometer-sized particles is inadequate for their use as respirators. These helmets are not marketed for respiratory protection and should not be used alone for protection against severe acute respiratory syndrome when performing aerosol-generating procedures.

1. **Tracheostomy in a patient with SARS (multiple letters) [4]**  
   Morgan P. British Journal of Anaesthesia 2004;92:905-906.

1. **Tracheostomy in a patient with severe acute respiratory syndrome**  
   Kwan A. British Journal of Anaesthesia 2004;92:280-282.

The coronavirus which causes severe acute respiratory syndrome (SARS) is a virulent and highly contagious organism. Of the 1755 SARS patients in Hong Kong, over 400 were health-care workers. Meticulous attention to infection control and teamwork are essential to minimize cross-contamination and prevent staff from contracting the illness. These points are especially pertinent when anaesthetizing SARS patients for high-risk procedures such as tracheostomy. We describe the management of such a case.

1. **Editorial I. Anaesthesia and SARS**  
   Kamming D. British Journal of Anaesthesia 2003;90:715-718.

1. **Infection control and anesthesia: Lessons learned from the Toronto SARS outbreak**  
   Peng P. W. H. Canadian Journal of Anesthesia 2003;50:989-997.

Purpose: To describe the outbreak of severe acute respiratory syndrome (SARS) in Toronto, its impact on anesthesia practice and the infection control guidelines adopted to manage patients in the operating room (OR) and to provide emergency intubation outside the OR. Clinical features: The SARS outbreak in Toronto was the result of a single index patient. The causative virus, SARS-CoV, is moderately contagious, and is spread by droplets and contact. The virus gains access to host through the mucosa of the respiratory tract and the eyes. It can affect both healthy and compromised patients. The use of several precautionary measures such as goggles, gloves, gowns and facemasks and the application of various infection control strategies designed to minimize the spread of the virus are discussed. Conclusion(s): In containing the spread of SARS, vigilance and strict infection control are important. This results in the rediscovery of standards of infection control measures in daily anesthesia practice.

1. **Oral and maxillofacial surgery and dentistry after severe acute respiratory syndrome**  
   Samaranayake L. P. Asian Journal of Oral and Maxillofacial Surgery 2003;15:77-79.

1. **Protection protocol in intubation of suspected SARS patients [1]**  
   Wong D. T. Canadian Journal of Anesthesia 2003;50:747-748.

1. **Safe tracheostomy for patients with severe acute respiratory syndrome**  
   Wei W. I. Laryngoscope 2003;113:1777-1779.

Objectives/Hypothesis: Severe acute respiratory syndrome (SARS) caused by coronavirus has become an epidemic affecting many regions worldwide. Fourteen percent to 20% of patients require endotracheal intubation and ventilator support. Some of these patients may require tracheostomy subsequently. This procedure, when performed without protection, may lead to infection of the medical and nursing staff taking care of the patient. Study Design: Based on clinical information of three patients. Method(s): The authors carried out an emergency tracheostomy and changed the tracheostomy tube for one patient and performed elective tracheostomy in another two patients. Result(s): No medical or nursing staff member was infected after carrying out the procedure while taking all the precautions and wearing the appropriate protective apparel. Conclusion(s): The authors have prepared guidelines for performing a safe tracheostomy under both elective and emergency conditions. Surgeons who might be involved in performing the tracheostomy should become familiar with these guidelines and the appropriate protective apparel.

1. **HIV and AIDS in China: Attitudes of dentists towards provision of care and infection control - A pilot study**  
   Du M. International Journal of Health Promotion and Education 2002;40:36-39.

Objective: To investigate dentists' attitudes, knowledge toward HIV/AIDS and their infection control procedures in the dental surgery. Design(s): Five hundred dentists, working in Wuhan City, China, were randomly selected from the local dental register. A pre-tested self-administered questionnaire was sent to each dentist to explore their attitude to the provision of dental care for HIV and AIDS patients, their knowledge with regard to the risks and spread of HIV and basic infection control procedures undertaken in their practice. Result(s): Two hundred and sixty-seven dentists participated in the survey (response rate 53.4%). Two-thirds of respondents were willing to treat AIDS/HIV-positive patients, but almost 40% had a very poor knowledge of the infection, believing it could not be transferred by blood. It was more commonly believed that saliva was the medium for the transmission of HIV. Sixty-eight per cent (182) of dentists wore gloves routinely, but only 108 (40.3%) of them would change gloves after each patient. Use of sterilizable handpieces was unusual (14%). Conclusion(s): Continuing dental education is needed with regard to infection control, as the level of knowledge regarding HIV transmission was relatively poor. However, information will need to be supplemented by resources to ensure basic infection control materials (e.g. sterilizable handpieces) are also available.

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## C. Search History

|  | **Source** | **Criteria** | **Results** |
| --- | --- | --- | --- |
| 1. |  | exp \*betacoronavirus/ or exp \*Coronavirus infection/ | 12397 |
| 2. |  | ((corona\* or corono\*) adj1 (virus\* or viral\* or virinae\*)).ti,ab. | 519 |
| 3. |  | ((novel or new or nouveau or "2019") adj2 (coronavirus\* or "corona virus\*" or coronovirus\* or coronavirinae\*)).ti,ab. | 3059 |
| 4. |  | (Wuhan\* or Hubei\* or Huanan or "2019-nCoV" or 2019nCoV or nCoV2019 or "nCoV-2019" or "COVID-19" or COVID19 or "CORVID-19" or CORVID19 or "WN-CoV" or WNCoV or "HCoV-19" or HCoV19 or CoV or "2019 novel\*" or Ncov or "n-cov" or "SARS-CoV-2" or "SARSCoV-2" or "SARSCoV2" or "SARS-CoV2" or SARSCov19 or "SARS-Cov19" or "SARSCov-19" or "SARS-Cov-19" or Ncovor or Ncorona\* or Ncorono\* or NcovWuhan\* or NcovHubei\* or NcovChina\* or NcovChinese\*).ti,ab. | 15592 |
| 5. |  | (("seafood market\*" or "food market\*") adj10 (Wuhan\* or Hubei\* or China\* or Chinese\* or Huanan\*)).ti,ab. | 58 |
| 6. |  | ((outbreak\* or wildlife\* or pandemic\* or epidemic\*) adj1 (China\* or Chinese\* or Huanan\*)).ti,ab. | 82 |
| 7. |  | 1 or 2 or 3 or 4 or 5 or 6 | 24502 |
| 8. |  | exp Personal Protective Equipment/ | 29240 |
| 9. |  | personal protective equipment.ti,ab. | 2620 |
| 10. |  | PPE.ti,ab. | 3220 |
| 11. |  | 8 or 9 or 10 | 33440 |
| 12. |  | exp Surgeons/ | 8121 |
| 13. |  | exp Operating Room Nursing/ or exp Operating Room Technicians/ or exp Operating Rooms/ | 19271 |
| 14. |  | exp Surgical Procedures, Operative/ | 3112240 |
| 15. |  | Surgeon\*.ti,ab. | 91384 |
| 16. |  | surgery.ti,ab. | 1113665 |
| 17. |  | surgical.ti,ab. | 947809 |
| 18. |  | 12 or 13 or 14 or 15 or 16 or 17 | 3986558 |
| 19. |  | 7 and 11 and 18 | 52 |
| 1. |  | exp \*betacoronavirus/ or exp \*Coronavirus infection/ | 10695 |
| 2. |  | ((corona\* or corono\*) adj1 (virus\* or viral\* or virinae\*)).ti,ab. | 638 |
| 3. |  | ((novel or new or nouveau or "2019") adj2 (coronavirus\* or "corona virus\*" or coronovirus\* or coronavirinae\*)).ti,ab. | 3116 |
| 4. |  | (Wuhan\* or Hubei\* or Huanan or "2019-nCoV" or 2019nCoV or nCoV2019 or "nCoV-2019" or "COVID-19" or COVID19 or "CORVID-19" or CORVID19 or "WN-CoV" or WNCoV or "HCoV-19" or HCoV19 or CoV or "2019 novel\*" or Ncov or "n-cov" or "SARS-CoV-2" or "SARSCoV-2" or "SARSCoV2" or "SARS-CoV2" or SARSCov19 or "SARS-Cov19" or "SARSCov-19" or "SARS-Cov-19" or Ncovor or Ncorona\* or Ncorono\* or NcovWuhan\* or NcovHubei\* or NcovChina\* or NcovChinese\*).ti,ab. | 18349 |
| 5. |  | (("seafood market\*" or "food market\*") adj10 (Wuhan\* or Hubei\* or China\* or Chinese\* or Huanan\*)).ti,ab. | 56 |
| 6. |  | ((outbreak\* or wildlife\* or pandemic\* or epidemic\*) adj1 (China\* or Chinese\* or Huanan\*)).ti,ab. | 84 |
| 7. |  | 1 or 2 or 3 or 4 or 5 or 6 | 24514 |
| 8. |  | exp Personal Protective Equipment/ | 52994 |
| 9. |  | personal protective equipment.ti,ab. | 3303 |
| 10. |  | PPE.ti,ab. | 4395 |
| 11. |  | 8 or 9 or 10 | 57060 |
| 12. |  | exp Surgeons/ | 150115 |
| 13. |  | exp Operating Room Nursing/ or exp Operating Room Technicians/ or exp Operating Rooms/ | 43343 |
| 14. |  | exp Surgical Procedures, Operative/ | 4722399 |
| 15. |  | surgeon.ti,ab. | 129604 |
| 16. |  | surgery.ti,ab. | 1557227 |
| 17. |  | surgical.ti,ab. | 1256952 |
| 18. |  | 12 or 13 or 14 or 15 or 16 or 17 | 5336802 |
| 19. |  | 7 and 11 and 18 | 88 |

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