# Evidence Search Service Results of your search request

## The effect of PPE on verbal communication

**ID of request:** 27341  
**Date of request:** 31st January, 2021  
**Date of completion:** 4th February, 2021

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Please acknowledge this work in any resulting paper or presentation as: Evidence search: The effect of PPE on verbal communication. Kaye Bagshaw. ( 4th February, 2021). LONDON, UK: Newcomb Library Library and Information Service.

**Sources searched**  
CINAHL (8)  
EMBASE (21)  
MEDLINE (27)

**Date range used** (5 years, 10 years): All   
**Limits used** (gender, article/study type, etc.): None   
**Search terms and notes** (full search strategy for database searches below):

Relevant natural language and controlled vocabulary terms were selected and combined. Thesaurus terms were adapted for different databases. Final result sets were de-duplicated and reviewed for relevance by the searcher, irrelevant results being discarded.

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

## A. Original Research

1. **"I'm smiling back at you": Exploring the impact of mask wearing on communication in healthcare.**  
   Marler International Journal of Language & Communication Disorders 2021;56(1):205-214.

Background: Surgical and respirator masks are worn to reduce the risk of droplet and airborne transmission of viral respiratory disease. As a result of the novel coronavirus (COVID-19) pandemic, mask wearing has been designated mandatory for healthcare professionals working in UK hospitals for the foreseeable future. It is thus timely to consider the long-term implications of mask wearing on communication within healthcare settings, from both a patient and a clinician perspective. Aims: The primary objective is to identify research evidence that corresponds to the mask-wearing experiences of healthcare professionals working on the ground. By drawing together a summary of the literature illustrating the potential challenges associated with mask wearing, it is possible to make an application to various clinical cohorts and to formulate a set of preliminary, evidence-based support strategies. The paper additionally explores the role for the Speech and Language Therapist (SLT) in supporting communication in the context of mask wearing. Methods & Procedures: Through a scoping review of the relevant literature, this paper reflects holistically on the prospective challenges associated with mask wearing across a variety of healthcare settings and patient populations. The subsequent conclusions have been used to inform the proposed clinical guidelines for safe and effective practice. Outcomes & Results: There is a current research gap with regards to mask wearing in non-medical and non-clinical healthcare workers, and the impact this may have on both a professional and a personal basis. In the absence of preliminary data, the development of associated communication support strategies is hindered. This paper draws upon a variety of clinically conceivable issues faced by healthcare professionals, outlines important practical and ethical considerations, and proposes evidence-based solutions to some of the challenges identified. Future research is required to gather evidence with regards to actual clinical experiences of mask wearing to substantiate hypotheses. Conclusions & Implications: Although undoubtedly essential in protecting the health of staff and patients, there are numerous logistical, physiological, psychological, social and economic complications associated with the wearing of masks. The ability of healthcare staff to successfully communicate with patients and with colleagues is jeopardized, which may adversely affect the efficiency, effectiveness, equitability and, most notably, safety of therapeutic intervention. The SLT has a distinct role in facilitating communication in order to safeguard the provision, accessibility and efficacy of services. What this paper addsWhat is already known on the subjectExisting research explores the impact of mask wearing on medical doctors, surgeons and dentists, and upon the corresponding patient cohorts. Little is known about how mask wearing may affect Allied Health Professionals and their ability to deliver therapeutic interventions safely and effectively. With mandatory face covering potentially a long-term requirement for UK healthcare staff, it is both timely and relevant to consider the consequences of mask wearing on communication across acute and community settings.What this paper adds to existing knowledgeThis paper identifies a range of prospective key issues associated with mask wearing across a variety of clinical and non-clinical populations, with application specifically to vulnerable patient cohorts. Through evidence synthesis, this paper provides a summary of fundamental issues supported by relevant literature, and draws upon these in order to propose a preliminary set of evidence-based clinical guidelines setting out potential solutions to the challenges faced. This review additionally assists in quantifying the role of the SLT within these extraordinary circumstances, with the aim of prompting unified practice, building upon professional guidance and increasing skill recognition.What are the potential or actual clinical implications of this work?In addition to their role in facilitating the development of individualised communication strategies for patients, SLTs should actively seek to provide widely accessible multidisciplinary education opportunities focusing on supporting communication; with specific reference to mask wearing and the associated communicative challenges. At a commissioning and managerial level, leaders within healthcare should acknowledge mask wearing as just one of the complexities associated with frontline working in the context of the COVID-19 pandemic, and aim to support their workforce by delivering resources and protocols which maximize and promote staff safety, efficiency, resilience and well-being in concurrence with positive patient outcomes.

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1. **COVID-19, Personal Protective Equipment, and Human Performance.**  
   Ruskin Keith J. Anesthesiology 2021;:No page numbers.

Clinicians who care for patients infected with coronavirus disease 2019 (COVID-19) must wear a full suite of personal protective equipment, including an N95 mask or powered air purifying respirator, eye protection, a fluid-impermeable gown, and gloves. This combination of personal protective equipment may cause increased work of breathing, reduced field of vision, muffled speech, difficulty hearing, and heat stress. These effects are not caused by individual weakness; they are normal and expected reactions that any person will have when exposed to an unusual environment. The physiologic and psychologic challenges imposed by personal protective equipment may have multiple causes, but immediate countermeasures and long-term mitigation strategies can help to improve a clinician's ability to provide care. Ultimately, a systematic approach to the design and integration of personal protective equipment is needed to improve the safety of patients and clinicians.

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1. **Effect of Powered Air-Purifying Respirators on Speech Recognition Among Health Care Workers.**  
   Kempfle Judith S. Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery 2021;164(1):87-90.

Powered air-purifying respirators (PAPRs) are used as personalized protective equipment for health care personnel. PAPRs offer health care workers added protection when dealing with patients who have high-risk infectious disease such as COVID-19. Unfortunately, PAPRs can produce notable levels of background noise. We hypothesize that PAPR use may be associated with increased hearing thresholds and impaired word discrimination and may ultimately have a negative impact on effective communication. Herein, we (1) determined sound levels generated by PAPRs and (2) measured hearing thresholds and word discrimination with and without operational PAPRs. All participants had normal hearing. When the PAPR was operational, mean ± SD thresholds increased from 4.5 ± 3.6 to 38.6 ± 5.6 dB HL (P < .001). Word discrimination dropped from 100% in all participants in quiet to a mean 48% ± 14% with operational PAPR (P < .001). Thus, we find that use of PAPR hoods results in hearing impairment comparable to moderate to severe hearing loss, and we suspect that users will experience communication difficulties as a result.Level of Evidence. Prospective study.

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1. **Intelligibility of face-masked speech depends on speaking style: Comparing casual, clear, and emotional speech.**  
   Cohn Michelle Cognition 2021;210:104570.

This study investigates the impact of wearing a fabric face mask on speech comprehension, an underexplored topic that can inform theories of speech production. Speakers produced sentences in three speech styles (casual, clear, positive-emotional) while in both face-masked and non-face-masked conditions. Listeners were most accurate at word identification in multi-talker babble for sentences produced in clear speech, and less accurate for casual speech (with emotional speech accuracy numerically in between). In the clear speaking style, face-masked speech was actually more intelligible than non-face-masked speech, suggesting that speakers make clarity adjustments specifically for face masks. In contrast, in the emotional condition, face-masked speech was less intelligible than non-face-masked speech, and in the casual condition, no difference was observed, suggesting that 'emotional' and 'casual' speech are not styles produced with the explicit intent to be intelligible to listeners. These findings are discussed in terms of automatic and targeted speech adaptation accounts.

1. **Short report on the effects of SARS-CoV-2 face protective equipment on verbal communication**  
   Muzzi E. European Archives of Oto-Rhino-Laryngology 2021;:No page numbers.

Objective: To predict the impact of face personal protective equipment on verbal communication during the SARS-CoV-2 pandemic. <br/>Design(s): We assessed the effect of common types and combinations of face personal protective equipment on speech intelligibility in quiet and in a simulated noisy environment. <br/>Result(s): Wearing face personal protective equipment impairs transmission of middle-to-high voice frequencies and affects speech intelligibility. Surgical masks are responsible for up to 23.3% loss of speech intelligibility in noisy environments. The effects are larger in the condition of advanced face personal protective equipment, accounting for up to 69.0% reduction of speech intelligibility. <br/>Conclusion(s): The use of face personal protective equipment causes significant verbal communication issues. Healthcare workers, school-aged children, and people affected by voice and hearing disorders may represent specific at-risk groups for impaired speech intelligibility.<br/>Copyright &#xa9; 2021, The Author(s), under exclusive licence to Springer-Verlag GmbH, DE part of Springer Nature.

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1. **The impact of face masks on the recall of spoken sentences.**  
   Truong Thanh Lan The Journal of the Acoustical Society of America 2021;149(1):142.

The effect of face covering masks on listeners' recall of spoken sentences was investigated. Thirty-two German native listeners watched video recordings of a native speaker producing German sentences with and without a face mask, and then completed a cued-recall task. Listeners recalled significantly fewer words when the sentences had been spoken with a face mask. This might suggest that face masks increase processing demands, which in turn leaves fewer resources for encoding speech in memory. The result is also informative for policy-makers during the COVID-19 pandemic, regarding the impact of face masks on oral communication.

1. **The McGurk effect in the time of pandemic: Age-dependent adaptation to an environmental loss of visual speech cues.**  
   Chládková Kateřina Psychonomic bulletin & review 2021;:No page numbers.

Seeing a person's mouth move for [ga] while hearing [ba] often results in the perception of "da." Such audiovisual integration of speech cues, known as the McGurk effect, is stable within but variable across individuals. When the visual or auditory cues are degraded, due to signal distortion or the perceiver's sensory impairment, reliance on cues via the impoverished modality decreases. This study tested whether cue-reliance adjustments due to exposure to reduced cue availability are persistent and transfer to subsequent perception of speech with all cues fully available. A McGurk experiment was administered at the beginning and after a month of mandatory face-mask wearing (enforced in Czechia during the 2020 pandemic). Responses to audio-visually incongruent stimuli were analyzed from 292 persons (ages 16-55), representing a cross-sectional sample, and 41 students (ages 19-27), representing a longitudinal sample. The extent to which the participants relied exclusively on visual cues was affected by testing time in interaction with age. After a month of reduced access to lipreading, reliance on visual cues (present at test) somewhat lowered for younger and increased for older persons. This implies that adults adapt their speech perception faculty to an altered environmental availability of multimodal cues, and that younger adults do so more efficiently. This finding demonstrates that besides sensory impairment or signal noise, which reduce cue availability and thus affect audio-visual cue reliance, having experienced a change in environmental conditions can modulate the perceiver's (otherwise relatively stable) general bias towards different modalities during speech communication.

1. **The Silence Behind the Mask: My Journey as a Deaf Pediatric Resident Amid a Pandemic.**  
   Crume Academic Pediatrics 2021;21(1):1-2.

A personal narrative is presented which explores the author's experience of the treating a patient, who came to emergency department with respiratory failure and potential for coronavirus disease of 2019 (COVID-19).

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1. **Unmasking misunderstandings: Strategies for better communication with patients.**  
   Kilgore Bradley Nursing 2021;51(1):56-59.

ABSTRACTPositive patient outcomes depend on successful communication. Increased use of personal protective equipment such as face masks during the COVID-19 pandemic can exacerbate communication difficulties. This article describes situations in which miscommunications may occur, identifies sources of communication breakdowns, and offers strategies to prevent them in real-life scenarios.

1. **We still can't hear: Staff Perceptions of Personal Protective Equipment Impact on Speech and Communication In the Operating Theatre During Paediatric Airway Surgery**  
   Hampton T. Paediatric anaesthesia 2021;:No page numbers.

We wish to highlight the continued impact of personal protective equipment (PPE) (filtering facemask and powered respirators) as a barrier to communication when used during aerosol generating procedures such as pediatric airway surgery in the operating theatre during the endemic phase of coronavirus disease 2019 (COVID-19) and present our multi-cadre staff survey to emphasize an ongoing potential patient safety issue inherent to current guidance.<br/>Copyright This article is protected by copyright. All rights reserved.

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1. **'Theatre Comm' - optimising communication in surgical theatres during COVID-19.**  
   Mathews J. A The British journal of surgery 2020;107(10):e393.

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1. **Acoustic effects of medical, cloth, and transparent face masks on speech signals**  
   Corey R.M. The Journal of the Acoustical Society of America 2020;148(4):2371.

Face masks muffle speech and make communication more difficult, especially for people with hearing loss. This study examines the acoustic attenuation caused by different face masks, including medical, cloth, and transparent masks, using a head-shaped loudspeaker and a live human talker. The results suggest that all masks attenuate frequencies above 1kHz, that attenuation is greatest in front of the talker, and that there is substantial variation between mask types, especially cloth masks with different materials and weaves. Transparent masks have poor acoustic performance compared to both medical and cloth masks. Most masks have little effect on lapel microphones, suggesting that existing sound reinforcement and assistive listening systems may be effective for verbal communication with masks.

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1. **Can You Hear Me Now? Communicating Across the COVID-19 PPE Chasm.**  
   Fuller Gretchen Texas medicine 2020;116(10):4-5.

In the era of COVID-19, clinicians face myriad new communication challenges: muffling masks; glaring face shields; heightened anxiety and fear amongst patients, families, and clinicians; and increased use of telehealth and virtual communication.

1. **Children's experiences of personal protective equipment (PPE) during the COVID-19 pandemic**  
   Carter L. Archives of Disease in Childhood 2020;105:No page numbers.

Background The Coronavirus pandemic has affected each one of us from every part of society. From the neonate to centenarians no one is exempt. Our paediatric population has had to adapt rapidly to the huge changes arising from the pandemic, none more so than those coming into hospital and interacting with healthcare professionals. Great Ormond Street Hospital caters for many children with multiple disabilities and/or health problems and rare and congenital conditions. They may present for multiple surgeries and procedures requiring anaesthesia over many years but these interactionshave had to be very different during 2020. One aspect of the new working model, has been the requirement to wear, 'Personal Protective Equipment.' (PPE). Seeing healthcare workers in full PPE is a new experience for most children and it became obvious, early on during the pandemic, that we needed to find ways to make PPE more,' child-friendly,' to minimise anxiety as much as possible for children presenting to hospital and in particular to theatre. Methods Discussion with colleagues working in the operating theatres at Great Ormond Street Hospital revealed various adaptations to make PPE more, 'child-friendly.' Some children were asked for feedback related to this. A PubMed literature search regarding PPE use in paediatric settings and also the wearing of face masks by children was also conducted. In addition to this, an internet search provided information from other NHS Trusts. Results Inventive solutions such as cartoon characters on visors and drawing on them have been very well received. Videos about PPE were also helpful. In addition, the importance of non-verbal communication has become very apparent. Discussion Creating, 'child-friendly,' PPE has been hugely beneficial to children presenting to hospital during the pandemic. It helps to allay their fears and increases their understanding of the current, challenging world that they are living in.

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1. **Communication on the Intensive Care Unit during COVID-19: Early Experience with the Nightingale Communication Method**  
   Shurlock J. International journal for quality in health care : journal of the International Society for Quality in Health Care 2020;:No page numbers.

OBJECTIVE: To assess the utility and frequency of use of the Nightingale Communication method, during the early operational phase of the Nightingale Hospital London 4000-bed field hospital Intensive Care Unit. DESIGN: Survey based cross sectional assessment. SETTING: The intensive care unit at the Nightingale London hospital. PARTICIPANTS: Staff working in the clinical area, and therefore requiring full personal protective equipment. INTERVENTION: Survey of all staff members sampled from a single shift at the Nightingale Hospital. This investigated perceived utility and actual use of identification methods (name and role labels on visors and gowns, coloured role identification tapes) and formal hand signals as an adjunctive communication method. MAIN OUTCOME MEASURE: Self reported frequency of use and perceived utility of each communication and personnel identification adjunct. <br/>RESULT(S): 50 valid responses were received (72% response rate) covering all clinical professional groups. Prominent name/role identifications and colour-coded identification tapes were very frequently used and were perceived as being highly useful. Formal hand signals were infrequently used, and not perceived as being beneficial, with respondents citing use of single taught gestures only in specific circumstances. <br/>CONCLUSION(S): PPE is highly depersonalising and interpersonal identification aids are very useful. Despite being difficult, verbal communication is not completely prohibited, which could explain the low utility of formal hand signals. The methods developed at the Nightingale hospital have enhanced communication in the critical care, field hospital setting. There is potential for wider application to a variety of healthcare settings, in both the current situation and future pandemic scenarios.<br/>Copyright &#xa9; The Author(s) 2020. Published by Oxford University Press on behalf of International Society for Quality in Health Care. All rights reserved. For permissions, please e-mail: journals.permissions@oup.com.

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1. **Coronavirus disease 2019: Ethical implications, facial nerve palsies and the effects of personal protective equipment on speech perception among healthcare workers**  
   Fishman J. Journal of Laryngology and Otology 2020;134(10):847.

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1. **Coronavirus disease 2019: olfactory and gustatory function, negative impact of personal protective equipment on communication, and an antigen testing complication.**  
   Fishman Jonathan The Journal of laryngology and otology 2020;134(7):565.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=b85506ad3b5514009475a479a00645cb)

1. **COVID-19 and surgery: A thematic analysis of unintended consequences on performance, practice and surgical training**  
   Whelehan D.F. The surgeon : journal of the Royal Colleges of Surgeons of Edinburgh and Ireland 2020;:No page numbers.

PURPOSE: The shift in the national focus and allocation of resources to the management of COVID19 has led to significant changes to surgical practice including the delay of elective surgery. The aim of this study was to explore the implications of such changes on surgeons. <br/>METHOD(S): Using a qualitative study design, semi-structured interviews were conducted with general surgery consultants and non-consultant hospital doctors from a major tertiary hospital in the Dublin region between March-May 2020. Data collection proceeded iteratively using a thematic analysis approach with quality controls such as memoing and collaborative analysis. <br/>RESULT(S): Fourteen surgeons (8 male, 6 female) were interviewed. The majority (n = 11, 78.6%) were NCHDs. Significant themes determined included 'impacts' on a variety of constructs such as performance, self-reported fatigue and wellbeing. Training themes elucidated included the effects of the cancellation of elective admissions on reduced operative exposure for trainees. Senior surgical staff were particularly focused on increased complexity in patient management. New policy requirements such as personal protective equipment use and novel rotas have had implications for aspects of work engagement. The pandemic and subsequent national restrictions imposed has afforded opportunities for improved well-being but also resulted in greater solitude in surgeons. <br/>CONCLUSION(S): Rhetoric surrounding fatigue management and virus control dominates the conversation on the relationship between COVID-19 and surgery. Tipping the balance back to parity of fatigue management with service delivery in surgery will be key for sustainability of the surgical workforce.<br/>Copyright &#xa9; 2020 Royal College of Surgeons of Edinburgh (Scottish charity number SC005317) and Royal College of Surgeons in Ireland. Published by Elsevier Ltd. All rights reserved.

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1. **Covid-19: lack of guidance on PPE for hearing impaired doctors.**  
   Williams Isabelle J. M BMJ (Clinical research ed.) 2020;370:m2831.

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1. **Don't mask your meaning during Covid-19.**  
   Banks Lindsey Occupational Health & Wellbeing 2020;72(12):15-15.

The article discusses two visual guides launched by Clear Living to provide best practice communication tips and advice for those with hearing loss amid mask wearing and social distancing regulations due to Covid-19. Topics covered include the challenge of communicating with people with hearing loss in the healthcare setting, and strategies for speaking to a person who has hearing loss while wearing a mask.

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1. **Effect of Face Masks on Interpersonal Communication During the COVID-19 Pandemic.**  
   Mheidly Nour Frontiers in public health 2020;8:582191.

Interpersonal communication has been severely affected during the COVID-19 pandemic. Protective measures, such as social distancing and face masks, are essential to mitigate efforts against the virus, but pose challenges on daily face-to-face communication. Face masks, particularly, muffle sounds and cover facial expressions that ease comprehension during live communication. Here, we explore the role of facial expressions in communication and we highlight how the face mask can hinder interpersonal connection. In addition, we offer coping strategies and skills that can ease communication with face masks as we navigate the current and any future pandemic.

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1. **Effect of masks on speech intelligibility in auralized classrooms.**  
   Bottalico Pasquale The Journal of the Acoustical Society of America 2020;148(5):2878.

This study explored the effects of wearing face masks on classroom communication. The effects of three different types of face masks (fabric, surgical, and N95 masks) on speech intelligibility (SI) presented to college students in auralized classrooms were evaluated. To simulate realistic classroom conditions, speech stimuli were presented in the presence of speech-shaped noise with a signal-to-noise ratio of +3 dB under two different reverberation times (0.4 s and 3.1 s). The use of fabric masks yielded a significantly greater reduction in SI compared to the other masks. Therefore, surgical masks or N95 masks are recommended in teaching environments.

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1. **Effect of Wearing a Face Mask on Vocal Self-Perception during a Pandemic.**  
   Ribeiro Vanessa Veis Journal of voice : official journal of the Voice Foundation 2020;:No page numbers.

OBJECTIVETo analyze the vocal self-perception of individuals who wore face masks for essential activities and those who wore them for professional and essential activities during the coronavirus disease pandemic.MATERIALS AND METHODSThis was an observational, descriptive, cross-sectional study. The study included 468 individuals who were stratified into two groups: the Working Group, comprising individuals who wore face masks for professional and essential activities during the pandemic; and the Essential Activities Group, with individuals who wore face masks only for essential activities during the pandemic. The outcome measures tested were self-perception of vocal fatigue, vocal tract discomfort, vocal effort, speech intelligibility, auditory feedback, and coordination between speech and breathing. Descriptive and inferential statistics were performed.RESULTSFace masks increased the perception of vocal effort, difficulty in speech intelligibility, auditory feedback, and difficulty in coordinating speech and breathing, irrespective of usage. Individuals who wore face masks for professional and essential activities had a greater perception of symptoms of vocal fatigue and discomfort, vocal effort, difficulties in speech intelligibility, and in coordinating speech and breathing.CONCLUSIONUse of face masks increases the perception of vocal symptoms and discomfort, especially in individuals who wore it for professional and essential activities.

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1. **Effective surgical communication during the COVID-19 pandemic: sign language**  
   Leyva-Moraga F.A. British Journal of Surgery 2020;107(10):No page numbers.

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1. **Effects of face masks on acoustic analysis and speech perception: Implications for peri-pandemic protocols**  
   Magee M. The Journal of the Acoustical Society of America 2020;148(6):3562.

Wearing face masks (alongside physical distancing) provides some protection against infection from COVID-19. Face masks can also change how people communicate and subsequently affect speech signal quality. This study investigated how three common face mask types (N95, surgical, and cloth) affected acoustic analysis of speech and perceived intelligibility in healthy subjects. Acoustic measures of timing, frequency, perturbation, and power spectral density were measured. Speech intelligibility and word and sentence accuracy were also examined using the Assessment of Intelligibility of Dysarthric Speech. Mask type impacted the power distribution in frequencies above 3kHz for the N95 mask, and above 5kHz in surgical and cloth masks. Measures of timing and spectral tilt mainly differed with N95 mask use. Cepstral and harmonics to noise ratios remained unchanged across mask type. No differences were observed across conditions for word or sentence intelligibility measures; however, accuracy of word and sentence translations were affected by all masks. Data presented in this study show that face masks change the speech signal, but some specific acoustic features remain largely unaffected (e.g., measures of voice quality) irrespective of mask type. Outcomes have bearing on how future speech studies are run when personal protective equipment is worn.

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1. **Face masks can be devastating for people with hearing loss.**  
   Chodosh Joshua BMJ (Clinical research ed.) 2020;370:m2683.

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1. **For Speech Sounds, 6 Feet With a Mask Is Like 12 Feet Without.**  
   GIULIANI ASHA Leader 2020;25(8):26-27.

The article examines the challenges to audiologists in treating patients with hearing impairment amid COVID-19 pandemic. It states that six-foot physical distancing and face masks block speech intelligibility and obscure visual cue. Suggestions include wearing a procedure mask, adding a manual hearing aid program and exploring remote programming options.

[Speech Sounds, 6 Feet With a Mask Is Like 12 Feet Without this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=10156ce94294e04594ceb59eabd1d52a)

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1. **Health Care Team Training and Simulation-Based Education in Obstetrics During the COVID-19 Pandemic**  
   Kiely D.J. Journal of Obstetrics and Gynaecology Canada 2020;42(8):1017-1020.

Health care team training and simulation-based education are important for preparing obstetrical services to meet the challenges of the COVID-19 pandemic. Priorities for training are identified in two key areas. First, the impact of infection prevention and control protocols on processes of care (e.g., appropriate and correct use of personal protective equipment, patient transport, preparation for emergency cesarean delivery with the potential for emergency intubation, management of simultaneous obstetric emergencies, delivery in alternate locations in the hospital, potential for increased decision-to-delivery intervals, and communication with patients). And second, the effects of COVID-19 pathophysiology on obstetrical patients (e.g., testing and diagnosis, best use of modified obstetric early warning systems, approach to maternal respiratory compromise, collaboration with critical care teams, and potential need for cardiopulmonary resuscitation). However, such training is more challenging during the COVID-19 pandemic because of the requirements for social distancing. This article outlines strategies (spatial, temporal, video-recording, video-conferencing, and virtual) to effectively engage in health care team training and simulation-based education while maintaining social distancing during the COVID-19 pandemic.<br/>Copyright &#xa9; 2020 The Society of Obstetricians and Gynaecologists of Canada/La Societe des obstetriciens et gynecologues du Canada.

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1. **How to communicate effectively while wearing face masks.**  
   Mitchell Practice Nursing 2020;31(12):508-510.

The COVID-19 pandemic has radically changed communication in nursing. Aby Mitchell and Barry Hill provide recommendations for improving communication when wearing a face covering Communication is an essential part of nursing care and practice. The COVID-19 pandemic has radically changed communication in healthcare. The 2 metre social distancing rule combined with the need to wear face masks has made communication more challenging. Wearing masks reduces the ability to access the non-verbal facial expressions and cues, such as lip movements, that are so vital to daily communication. Practice nurses rely on non-verbal communication as part of a complete holistic assessment and to build therapeutic relationships. This article provides some recommendations for improving communication when wearing a face covering.

1. **Human factor considerations in using personal protective equipment in the COVID-19 pandemic context: Binational survey study**  
   Parush A. Journal of Medical Internet Research 2020;22(6):No page numbers.

Background: Full level 1 personal protective equipment (PPE) is used in various domains and contexts. Prior research has shown influences of such equipment on performance, comfort, and contamination levels. The coronavirus disease (COVID-19) pandemic forced a pervasive requirement of PPE, with little preparation, rushed deployment, inadequate time for training, and massive use by personnel who are inexperienced or not qualified in its effective use. <br/>Objective(s): This study aims to examine the key human factors (physical and ergonomic, perceptual and cognitive) that influence the use of level 1 PPE when attending to patients with suspected or confirmed COVID-19. <br/>Method(s): The research approach consisted of a short survey disseminated to health care professionals in two countries, Israel and Portugal, with similar demographics and health care systems. The survey included 10 items with a 5-point Likert scale regarding the key human factors involved in level 1 PPE, as identified in prior research. <br/>Result(s): A total of 722 respondents from Israel and 301 respondents from Portugal were included in the analysis. All the respondents reported using level 1 PPE with patients with COVID-19 in the range of several hours daily to several hours weekly. The Cronbach alpha was.73 for Israel and.75 for Portugal. Responses showed high levels of difficulty, with medians of 4 for items related to discomfort (n=539/688, 78% in Israel; n=328/377, 87% in Portugal), hearing (n=236/370, 64% in Portugal; n=321/642, 50% in Israel), seeing (n=697/763, 89% in Israel; n=317/376, 84% in Portugal), and doffing (n=290/374, 77% in Portugal; n=315/713, 44% in Israel). A factor analysis showed a set of strongly related variables consisting of hearing, understanding speech, and understanding the situation. This suggests that degradation in communication was strongly associated with degradation in situational awareness. A subsequent mediation analysis showed a direct effect of PPE discomfort on situational awareness (P&lt;.001); this was also influenced (mediated) by difficulties in communicating, namely in hearing and understanding speech. <br/>Conclusion(s): In 2020, the COVID-19 pandemic is paving the way for updating PPE design. The use of already deployed technology affords ample opportunities to improve, adapt, and overcome caveats. The findings here suggest that the use of level 1 PPE with patients with COVID-19 has perceptual and cognitive effects, in addition to physical and ergonomic influences. Efforts should be taken to mitigate the harmful effects of such influences, both regarding the performance of medical actions and the risk of contamination to health care workers. Such efforts involve the design of PPE; the introduction of technologies to enhance vision, hearing, and communicating during the use of PPE; and training staff in using the equipment and in effective communication and teamwork protocols.<br/>Copyright &#xa9; 2020 Journal of Medical Internet Research. All rights reserved.

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1. **Impact of face masks on voice radiation.**  
   Pörschmann Christoph The Journal of the Acoustical Society of America 2020;148(6):3663.

With the COVID-19 pandemic, the wearing of face masks covering mouth and nose has become ubiquitous all around the world. This study investigates the impact of typical face masks on voice radiation. To analyze the transmission loss caused by masks and the influence of masks on directivity, this study measured the full-spherical voice directivity of a dummy head with a mouth simulator covered with six masks of different types, i.e., medical masks, filtering facepiece respirator masks, and cloth face coverings. The results show a significant frequency-dependent transmission loss, which varies depending on the mask, especially above 2 kHz. Furthermore, the two facepiece respirator masks also significantly affect speech directivity, as determined by the directivity index (DI). Compared to the measurements without a mask, the DI deviates by up to 7 dB at frequencies above 3 kHz. For all other masks, the deviations are below 2 dB in all third-octave frequency bands.

1. **Impact of Hearing Loss and Universal Face Masking in the COVID-19 Era**  
   Ten Hulzen R.D. Mayo Clinic Proceedings 2020;95(10):2069-2072.

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1. **Maintaining Our Humanity Through the Mask: Mindful Communication During COVID-19.**  
   Schlögl Mathias Journal of the American Geriatrics Society 2020;68(5):E12.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=c34bebe2381802b47e388170ce870a05)

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1. **Masked education? The benefits and burdens of wearing face masks in schools during the current Corona pandemic**  
   Spitzer M. Trends in Neuroscience and Education 2020;20:No page numbers.

Face masks can prevent the spread of the virus SARS-CoV-2, in particular as this spread can occur from people with no symptoms. However, covering the lower half of the face reduces the ability to communicate, interpret, and mimic the expressions of those with whom we interact. Positive emotions become less recognizable, and negative emotions are amplified. Emotional mimicry, contagion, and emotionality in general are reduced and (thereby) bonding between teachers and learners, group cohesion, and learning - of which emotions are a major driver. The benefits and burdens of face masks in schools should be seriously considered and made obvious and clear to teachers and students. The school's specific situation must also inform any decision regarding face mask use.<br/>Copyright &#xa9; 2020

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1. **Masked paediatricians during the COVID-19 pandemic and communication with children.**  
   Shack Avram R. Journal of paediatrics and child health 2020;56(9):1475-1476.

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1. **Motivations and Barriers for the Use of Face Coverings during the COVID-19 Pandemic: Messaging Insights from Focus Groups.**  
   Shelus Victoria S. International journal of environmental research and public health 2020;17(24):No page numbers.

Widespread use of face coverings is a key public health strategy to prevent the spread of COVID-19. However, few studies have examined why Americans use or do not use face coverings, and little is known about the most effective messaging strategies. This study explored perceptions of face coverings, including motivations and barriers for use, and examined reactions to messaging promoting the use of face coverings. Six virtual focus groups were conducted with 34 North Carolina residents in July 2020. Participants reported high compliance with face covering recommendations but often did not wear them around family, friends, and colleagues. The most prevalent motivation for the use of face coverings was to protect or respect other people, including high-risk populations and individuals. Other motivators were self-protection, responsibility, desire for control, requirements, and expert advice. Barriers included physical and social discomfort, confusion or misinformation, low perceived susceptibility to COVID-19, and perceptions of identity and autonomy. Even among individuals who frequently wear face coverings, there are opportunities to improve compliance. Messaging should highlight how face coverings protect the wearer and others around them, normalize the use of face coverings in social settings, and emphasize requirements. Positive messages that focus on unity, personal experiences and the rationale for face coverings are recommended.

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1. **Muffling of healthcare: Assessing the impact of personal protective equipment on speaking volume in an Endoscopy Centre.**  
   Koh Calvin J. Digestive endoscopy : official journal of the Japan Gastroenterological Endoscopy Society 2020;32(6):997.

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1. **Optimizing Effective Communication While Wearing a Mask During the COVID-19 Pandemic.**  
   Knollman-Porter Kelly Journal of Gerontological Nursing 2020;46(11):7-11.

Mandated face mask use for health care providers, secondary to COVID-19, creates an additional communication barrier for older adults with cognitive, communication, and/or hearing challenges. Face masks can soften a speaker's voice, conceal vocal tone, and hide facial expressions that relay essential non-verbal information. An inability to understand health care information or words of support can lead to frustration, anxiety, and decreased quality of life. Therefore, the purpose of this article is to review the current research, provide clinical examples, and highlight communication strategies, supports (i.e., written, gestural, and picture supports), and modifications to personal protective equipment that health care providers can implement, in isolation or combined, to improve communication with older adults. [Mandated face mask use for health care providers, secondary to COVID-19, creates an additional communication barrier for older adults with cognitive, communication, and/or hearing challenges. Face masks can soften a speaker's voice, conceal vocal tone, and hide facial expressions that relay essential non-verbal information. An inability to understand health care information or words of support can lead to frustration, anxiety, and decreased quality of life. Therefore, the purpose of this article is to review the current research, provide clinical examples, and highlight communication strategies, supports (i.e., written, gestural, and picture supports), and modifications to personal protective equipment that health care providers can implement, in isolation or combined, to improve communication with older adults. [Journal of Gerontological Nursing, 46(11), 7–11.]

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1. **Prevalence of Voice Disorders in Healthcare Workers in the Universal Masking COVID-19 Era**  
   Heider C.A. Laryngoscope 2020;:No page numbers.

Objectives/Hypothesis: To determine the prevalence and associated risk factors of voice disorders in healthcare workers of high-risk hospital care units during the 2019 coronavirus disease (COVID-19) pandemic. <br/>Study Design: Cross-sectional study. <br/>Method(s): Questionnaire survey to healthcare personnel of COVID-19 high-risk hospital units was conducted, regarding demographic data, clinical activity, the pattern of usage of personal protective equipment, medical and vocal history, vocal symptoms, and Spanish validated Voice Handicap Index (VHI)-10 questionnaire. <br/>Result(s): A total of 221 healthcare workers answered the survey. Nearly 33% of them reported having trouble with their voice during the last month, and 26.24% had an abnormal score in the Spanish validated VHI-10 questionnaire. The mean VHI-10 score was 7.92 (95% confidence interval 6.98-8.85). The number of working hours, the number of hours of mask daily use, simultaneous surgical and self-filtering mask use, and working in intermediate or intensive care units were independent variables significantly associated with a higher VHI-10 score. <br/>Conclusion(s): Healthcare workers of high-risk hospital care units during the universal masking COVID-19 pandemic are at risk of voice disorders. <br/>Level of Evidence: 3 Laryngoscope, 2020.<br/>Copyright &#xa9; 2020 American Laryngological, Rhinological and Otological Society Inc, "The Triological Society" and American Laryngological Association (ALA)

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1. **Sign language in anesthesiology in times of novel corona virus pandemic**  
   Singh M. Journal of Anaesthesiology Clinical Pharmacology 2020;36(5):No page numbers.

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1. **Speech intelligibility in respiratory protective equipment - Implications for verbal communication in critical care**  
   Round M. Trends in Anaesthesia and Critical Care 2020;:No page numbers.

Respiratory protective equipment (RPE) such as filtering facepiece respirators, elastomeric respirators and powered air-purifying respirators are routinely worn in the critical care unit as a component of personal protective equipment (PPE) when caring for patients with coronavirus disease 2019 (COVID-19). It is the authors' anecdotal experience that RPE may, however, inadvertently interfere with verbal communication between critical care staff. The literature pertaining to the effects of RPE wear on verbal communication was therefore reviewed. A literature search returned 98 articles, and 4 records were identified from other sources; after screening for content relevancy, 15 experimental studies were included in the narrative synthesis. Previous studies in both healthcare and other occupational settings suggest a detrimental impact on speech intelligibility, varying according to RPE type and test conditions. The effects of background noise and potential for increased cognitive load through compensatory behaviours are also identified. The clinical significance of these effects remains uncertain though, as evidence measuring clinical outcomes or errors is lacking. Mitigating strategies include increasing speech intelligibility through environmental changes and technology; modifying verbal communication strategies; and decreasing reliance on verbal communication where possible.<br/>Copyright &#xa9; 2020 Elsevier Ltd

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1. **The "mind" behind the "mask": Assessing mental states and creating therapeutic alliance amidst COVID-19.**  
   Mehta Urvakhsh Meherwan Schizophrenia research 2020;222:503-504.

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1. **The effects of N95 mask and face shield on speech perception among healthcare workers in the coronavirus disease 2019 pandemic scenario.**  
   Bandaru Journal of Laryngology & Otology 2020;134(10):895-898.

Objective: The current circumstances of the coronavirus disease 2019 pandemic necessitate the use of personal protective equipment in hospitals. N95 masks and face shields are being used as personal protective equipment to protect from aerosol-related spread of infection. Personal protective equipment, however, hampers communication. This study aimed to assess the effect of using an N95 mask and face shield on speech perception among healthcare workers with normal hearing. Methods: Twenty healthcare workers were recruited for the study. Pure tone audiometry was conducted to ensure normal hearing. Speech reception threshold and speech discrimination score were obtained, first without using personal protective equipment and then repeated with the audiologist wearing an N95 mask and face shield. Results: A statistically significant increase in speech reception threshold (mean of 12.4 dB) and decrease in speech discrimination score (mean of 7 per cent) was found while using the personal protective equipment. Conclusion: Use of personal protective equipment significantly impairs speech perception. Alternate communication strategies should be developed for effective communication.

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1. **The negative impact of wearing personal protective equipment on communication during coronavirus disease 2019.**  
   Hampton T. The Journal of laryngology and otology 2020;134(7):577-581.

BACKGROUNDCoronavirus disease 2019 personal protective equipment has been reported to affect communication in healthcare settings. This study sought to identify those challenges experimentally.METHODBamford-Kowal-Bench speech discrimination in noise performance of healthcare workers was tested under simulated background noise conditions from a variety of hospital environments. Candidates were assessed for ability to interpret speech with and without personal protective equipment, with both normal speech and raised voice.RESULTSThere was a significant difference in speech discrimination scores between normal and personal protective equipment wearing subjects in operating theatre simulated background noise levels (70 dB).CONCLUSIONWearing personal protective equipment can impact communication in healthcare environments. Efforts should be made to remind staff about this burden and to seek alternative communication paradigms, particularly in operating theatre environments.

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1. **The New Normal: Patient-Physician Relationships During COVID-19**  
   Simpson K.J. Methodist DeBakey cardiovascular journal 2020;16(2):181-182.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=9c2b41636b5adc180047ee6e4bad13da)

1. **Wearing Face Masks Strongly Confuses Counterparts in Reading Emotions.**  
   Carbon Claus-Christian Frontiers in psychology 2020;11:566886.

Wearing face masks is one of the essential means to prevent the transmission of certain respiratory diseases such as coronavirus disease 2019 (COVID-19). Although acceptance of such masks is increasing in the Western hemisphere, many people feel that social interaction is affected by wearing a mask. In the present experiment, we tested the impact of face masks on the readability of emotions. The participants (N = 41, calculated by an a priori power test; random sample; healthy persons of different ages, 18-87 years) assessed the emotional expressions displayed by 12 different faces. Each face was randomly presented with six different expressions (angry, disgusted, fearful, happy, neutral, and sad) while being fully visible or partly covered by a face mask. Lower accuracy and lower confidence in one's own assessment of the displayed emotions indicate that emotional reading was strongly irritated by the presence of a mask. We further detected specific confusion patterns, mostly pronounced in the case of misinterpreting disgusted faces as being angry plus assessing many other emotions (e.g., happy, sad, and angry) as neutral. We discuss compensatory actions that can keep social interaction effective (e.g., body language, gesture, and verbal communication), even when relevant visual information is crucially reduced.

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1. **Will Covid-19 affect the delivery of compassionate nursing care?**  
   Brown Nursing Times 2020;116(10):32-35.

Perceptions of compassion in nursing care vary among both patients and nurses. Therapeutic touch and facial expression are powerful non-verbal communication tools used to convey compassion, but both have been negatively affected by social distancing and the use of personal protective equipment during the coronavirus pandemic. Being unable to relieve people's suffering using these instinctive methods may result in nurses having low levels of compassion satisfaction and, ultimately, compassion fatigue. This poses a challenge to the profession: it must develop alternative ways of conveying compassion.

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1. **Experiences of Speaking With Noninvasive Positive Pressure Ventilation: A Qualitative Investigation.**  
   Britton Deanna American journal of speech-language pathology 2019;28(2S):784-792.

Purpose The aim of this study was to describe experiences of speaking with 2 forms of noninvasive positive pressure ventilation (NPPV)-mouthpiece NPPV (M-NPPV) and nasal bilevel positive airway pressure (BPAP)-in people with neuromuscular disorders who depend on NPPV for survival. Method Twelve participants (ages 22-68 years; 10 men, 2 women) with neuromuscular disorders (9 Duchenne muscular dystrophy, 1 Becker muscular dystrophy, 1 postpolio syndrome, and 1 spinal cord injury) took part in semistructured interviews about their speech. All subjects used M-NPPV during the day, and all but 1 used BPAP at night for their ventilation needs. Interviews were audio-recorded, transcribed, and verified. A qualitative descriptive phenomenological approach was used to code and develop themes. Results Three major themes emerged from the interview data: (a) M-NPPV aids speaking (by increasing loudness, utterance duration, clarity, and speaking endurance), (b) M-NPPV interferes with the flow of speaking (due to the need to pause to take a breath, problems with mouthpiece placement, and difficulty in using speech recognition software), and (c) nasal BPAP interferes with speaking (by causing abnormal nasal resonance, muffled speech, mask discomfort, and difficulty in coordinating speaking with ventilator-delivered inspirations). Conclusion These qualitative data from chronic NPPV users suggest that both M-NPPV and nasal BPAP may interfere with speaking but that speech is usually better and speaking is usually easier with M-NPPV. These findings can be explained primarily by the nature of the 2 ventilator delivery systems and their interfaces.

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1. **"The effect of conventional and transparent surgical masks on speech understanding in individuals with and without hearing loss" by Atcherson et al**  
   Jacobson G.P. Journal of the American Academy of Audiology 2017;28(1):4.

1. **The effect of conventional and transparent surgical masks on speech understanding in individuals with and without hearing loss**  
   Atcherson S.R. Journal of the American Academy of Audiology 2017;28(1):58-67.

Background: It is generally well known that speech perception is often improved with integrated audiovisual input whether in quiet or in noise. In many health-care environments, however, conventional surgical masks block visual access to the mouth and obscure other potential facial cues. In addition, these environments can be noisy. Although these masks may not alter the acoustic properties, the presence of noise in addition to the lack of visual input can have a deleterious effect on speech understanding. A transparent ("see-Through") surgical mask may help to overcome this issue. <br/>Purpose(s): To compare the effect of noise and various visual input conditions on speech understanding for listeners with normal hearing (NH) and hearing impairment using different surgical masks. Research Design: Participants were assigned to one of three groups based on hearing sensitivity in this quasi-experimental, cross-sectional study. Study Sample: A total of 31 adults participated in this study: one talker, ten listeners with NH, ten listeners with moderate sensorineural hearing loss, and ten listeners with severe-To-profound hearing loss. <br/>Data Collection and Analysis: Selected lists from the Connected Speech Test were digitally recorded with and without surgical masks and then presented to the listeners at 65 dB HL in five conditions against a background of four-Talker babble (+10 dB SNR): Without a mask (auditory only), without a mask (auditory and visual), with a transparent mask (auditory only), with a transparent mask (auditory and visual), and with a paper mask (auditory only). <br/>Result(s): A significant difference was found in the spectral analyses of the speech stimuli with and without the masks; however, no more than ~2 dB root mean square. Listeners with NH performed consistently well across all conditions. Both groups of listeners with hearing impairment benefitted from visual input from the transparent mask. The magnitude of improvement in speech perception in noise was greatest for the severe-To-profound group. <br/>Conclusion(s): Findings confirm improved speech perception performance in noise for listeners with hearing impairment when visual input is provided using a transparent surgical mask. Most importantly, the use of the transparent mask did not negatively affect speech perception performance in noise.

1. **Speech intelligibility assessment of protective facemasks and air-purifying respirators.**  
   Palmiero Andrew J. Journal of occupational and environmental hygiene 2016;13(12):960-968.

Speech Intelligibility (SI) is the perceived quality of sound transmission. In healthcare settings, the ability to communicate clearly with coworkers, patients, etc., is crucial to quality patient care and safety. The objectives of this study were to: (1) assess the suitability of the Speech Transmission Index (STI) methods for testing reusable and disposable facial and respiratory personal protective equipment (protective facemasks [PF], N95 filtering facepiece respirators [N95 FFR], and elastomeric half-mask air-purifying respirators [EAPR]) commonly worn by healthcare workers; (2) quantify STI levels of these devices; and (3) contribute to the scientific body of knowledge in the area of SI. SI was assessed using the STI under two experimental conditions: (1) a modified version of the National Fire Protection Association 1981 Supplementary Voice Communications System Performance Test at a Signal to Noise Ratio (SNR) of -15 (66 dBA) and (2) STI measurements utilizing a range of modified pink noise levels (52.5 dBA (-2 SNR) - 72.5 dBA (+7 SNR)) in 5.0 dBA increments. The PF models (Kimberly Clark 49214 and 3 M 1818) had the least effect on SI interference, typically deviating from the STI baseline (no-mask condition) by 3% and 4% STI, respectively. The N95FFR (3 M 1870, 3 M 1860) had more effect on SI interference, typically differing from baseline by 13% and 17%, respectively, for models tested. The EAPR models (Scott Xcel and North 5500) had the most significant impact on SI, differing from baseline by 42% for models tested. This data offers insight into the performance of these apparatus with respect to STI and may serve as a reference point for future respirator design considerations, standards development, testing and certification activities.

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1. **Carbon dioxide rebreathing in respiratory protective devices: influence of speech and work rate in full-face masks**  
   Smith C.L. Ergonomics 2013;56(5):781-790.

UNLABELLED: Carbon dioxide (CO2) rebreathing has been recognised as a concern regarding respirator use and is related to symptoms of discomfort, fatigue, dizziness, headache, muscular weakness and drowsiness. Previous investigations are limited by small sample size and have not evaluated the relationship between CO2 inhalation and phonic respiration (breathing during speech) in respiratory protective devices (RPDs). A total of 40 workers trained in the use of RPDs performed a graded exercise test on a cycle ergonometer that increased in workload every 5 min. During the third minute of each stage, participants read aloud a prepared text. Measures of mixed expired CO2 (PECO2), mixed inspired CO2 (PICO2) and respiration were monitored. The results showed that phonic respiration and low work rates contributed to significantly higher levels of CO2 rebreathing. Aiming to reduce CO2 exposure may result in improved wear time of RPDs. It is recommended that these findings be incorporated in technical specifications regarding human factors for RPDs.PRACTITIONER SUMMARY: Carbon dioxide (CO2) rebreathing in respiratory protective devices (RPDs) has been highlighted as a key concern regarding respirator use. However, the problem is relatively under researched. This paper presents novel findings on the impact of phonic respiration (breathing during speech) and CO2 concentrations in RPDs.

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1. **Effect of facemasks on empathy and relational continuity: a randomised controlled trial in primary care.**  
   Wong Carmen Ka Man BMC family practice 2013;14:200.

BACKGROUNDThere is limited evidence to support the use of facemasks in preventing infection for primary care professionals. Negative effects on communication has been suggested when the physician wears a facemask. As communication skills and doctor patient relationship are essential to primary care consultations, the effects of doctor's facemask wearing were explored.METHODA randomised controlled study was conducted in primary care to explore the effects of doctors wearing facemasks on patients' perception of doctors' empathy, patient enablement and patient satisfaction. Primary care doctors were randomized to mask wearing and non mask wearing clinical consultations in public primary care clinics in Hong Kong. Patients' views were gathered using the Consultation and Relational Empathy (CARE) Measure, Patient Enablement Instrument (PEI) and an overall satisfaction rating scale. The effects of face mask wearing were investigated using multilevel (hierarchical) modelling.RESULTS1,030 patients were randomised to doctor-mask wearing consultations (n = 514) and non mask wearing consultations (n = 516). A significant and negative effect was found in the patients' perception of the doctors' empathy (CARE score reduction -0.98, p-value = 0.04). In the more established doctor-patient relationship, the effect of doctors' mask wearing was more pronounced (CARE score reduction -5.67, p-value = 0.03).CONCLUSIONThis study demonstrates that when doctors wearing a facemask during consultations, this has a significant negative impact on the patient's perceived empathy and diminish the positive effects of relational continuity. Consideration should be taken in planning appropriate use of facemasks in infectious disease policy for primary care and other healthcare professionals at a national, local or practice level.CLINICAL TRIAL REGISTRATIONThis trial was registered on Chinese Clinical Trial Register (ChiCTR). Registration no.: ChiCTR-TTRCC-12002519. URL: http://www.chictr.org/en/proj/show.aspx?proj=3486. Due to administrative error, registration of trial did not take place until after the trial started on 1st August 2011 and registration number was released on 21st September 2012.

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1. **Diminished speech intelligibility associated with certain types of respirators worn by healthcare workers**  
   Radonovich Jr. L.J. Journal of Occupational and Environmental Hygiene 2009;7(1):63-70.

This study sought to determine the level of communication interference associated with commonly used disposable and reusable respirators and surgical masks worn by healthcare workers. Speech intelligibility was assessed using the modified rhyme test in an intensive care unit environment. Respirators decreased speech intelligibility by a range of 1% to 17%, although not all were statistically significant. Differences in speech intelligibility associated with surgical masks and disposable filtering facepiece respirators (without exhalation valves) were not statistically significant compared with controls. Wearing half-face elastomeric respirators with voice augmentation equipment was associated with higher speech intelligibility than models without this equipment (OR = 2.81). Hearing clarity while wearing a powered air-purifying respirator (PAPR) was 79% compared with 90% with no PAPR (OR = 0.40). While some respirators appear to have little or no effect on speech intelligibility, interference with speech intelligibility associated with certain types of respirators commonly worn by U.S. healthcare workers may be substantial.

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1. **Speech understanding using surgical masks: a problem in health care?**  
   Mendel Lisa Lucks Journal of the American Academy of Audiology 2008;19(9):686-695.

BACKGROUNDSuccessful communication is necessary in health-care environments. Yet the presence of noise in hospitals, operating rooms, and dental offices may have a deleterious effect on health-care personnel and patients understanding messages accurately. The presence of a surgical mask and hearing loss may further affect speech perception.PURPOSETo evaluate whether a surgical mask had an effect on speech understanding for listeners with normal hearing and hearing impairment when speech stimuli were administered in the presence or absence of dental office noise.RESEARCH DESIGNParticipants were assigned to one of two groups based on hearing sensitivity in this quasi-experimental, cross-sectional study.STUDY SAMPLEA total of 31 adults participated in this study (1 talker, 15 listeners with normal hearing, and 15 with hearing impairment). The normal hearing group had thresholds of 25 dB HL or better at the octave frequencies from 250 through 8000 Hz while the hearing loss group had varying degrees and configurations of hearing loss with thresholds equal to or poorer than 25 dB HL for the same octave frequencies.DATA COLLECTION AND ANALYSISSelected lists from the Connected Speech Test (CST) were digitally recorded with and without a surgical mask present and then presented to the listeners in four conditions: without a mask in quiet, without a mask in noise, with a mask in quiet, and with a mask in noise.RESULTSA significant difference was found in the spectral analyses of the speech stimuli with and without the mask. The presence of a surgical mask, however, did not have a detrimental effect on speech understanding in either the normal-hearing or hearing-impaired groups. The dental office noise did have a significant effect on speech understanding for both groups.CONCLUSIONSThese findings suggest that the presence of a surgical mask did not negatively affect speech understanding. However, the presence of noise did have a deleterious effect on speech perception and warrants further attention in health-care environments.

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1. **Factors contributing to discomfort or dissatisfaction as a result of wearing personal protective equipment.**  
   Akbar-Khanzadeh F. Journal of human ergology 1998;27(1-2):70-75.

In a metal refining plant, 366 workers were interviewed to investigate factors contributing to the discomfort or dissatisfaction of wearing personal protective equipment (PPE). Up to 97.8% of these individuals used one or more types of PPE. The percentages of employees who reported their hard hats and cooling vests as comfortable were 17% and 19%, respectively. Twenty-five percent of workers felt their respirators and safety harnesses were comfortable. Safety glasses ranked at 50%, gloves 53%, and safety shoes 54% for comfort factor. The percentage of employees who tolerated their PPE (just acceptable) ranged from 27% to 52%. The most frequently cited factors contributing to discomfort or dissatisfaction of wearing PPE were related to the workers' beliefs that the PPE was not needed, created a new hazard, interfered with work, was too heavy, was hard to wear, prohibited breathing or communicating, irritated skin, put pressure on the body, and was of an undesirable type or model.

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|  | **Source** | **Criteria** | **Results** |
| --- | --- | --- | --- |
| 1. | CINAHL | (PPE).ti,ab | 1940 |
| 2. | CINAHL | ("personal protective equipment").ti,ab | 2599 |
| 3. | CINAHL | "PERSONAL PROTECTIVE EQUIPMENT"/ OR MASKS/ | 4316 |
| 4. | CINAHL | ("face mask\*").ti,ab | 1223 |
| 5. | CINAHL | ("surgical mask\*").ti,ab | 339 |
| 6. | CINAHL | ("ffp3 mask\*").ti,ab | 10 |
| 7. | CINAHL | (1 OR 2 OR 3 OR 4 OR 5 OR 6) | 7969 |
| 8. | CINAHL | ("verbal communication").ti,ab | 1283 |
| 9. | CINAHL | (speech OR speaking OR speak OR voice OR vocal).ti,ab | 82569 |
| 10. | CINAHL | "VERBAL BEHAVIOR"/ OR "COMMUNICATION BARRIERS"/ | 8910 |
| 11. | CINAHL | (8 OR 9 OR 10) | 91091 |
| 12. | CINAHL | (7 AND 11) | 121 |
| 13. | EMBASE | (PPE).ti,ab | 5692 |
| 14. | EMBASE | ("personal protective equipment").ti,ab | 5449 |
| 15. | EMBASE | ("face mask\*").ti,ab | 4899 |
| 16. | EMBASE | ("surgical mask\*").ti,ab | 780 |
| 17. | EMBASE | ("ffp3 mask\*").ti,ab | 32 |
| 18. | EMBASE | "PROTECTIVE EQUIPMENT"/ OR "PROTECTIVE CLOTHING"/ OR "SURGICAL MASK"/ OR "SURGICAL HOOD"/ | 29887 |
| 19. | EMBASE | (13 OR 14 OR 15 OR 16 OR 17 OR 18) | 39683 |
| 20. | EMBASE | ("verbal communication").ti,ab | 3014 |
| 21. | EMBASE | (speech OR speaking OR speak OR voice OR vocal).ti,ab | 208146 |
| 22. | EMBASE | "VERBAL COMMUNICATION"/ OR CONVERSATION/ OR "ORAL COMMUNICATION"/ OR "VERBAL INTERACTION"/ | 40954 |
| 23. | EMBASE | (20 OR 21 OR 22) | 245026 |
| 24. | EMBASE | (19 AND 23) | 371 |
| 25. | Medline | (PPE).ti,ab | 4468 |
| 26. | Medline | ("personal protective equipment").ti,ab | 4810 |
| 27. | Medline | ("face mask\*").ti,ab | 3834 |
| 28. | Medline | ("surgical mask\*").ti,ab | 679 |
| 29. | Medline | ("ffp3 mask\*").ti,ab | 27 |
| 30. | Medline | "PERSONAL PROTECTIVE EQUIPMENT"/ OR "HEAD PROTECTIVE DEVICES"/ OR MASKS/ OR "PROTECTIVE CLOTHING"/ | 16502 |
| 31. | Medline | (25 OR 26 OR 27 OR 28 OR 29 OR 30) | 25431 |
| 32. | Medline | ("verbal communication").ti,ab | 2118 |
| 33. | Medline | (speech OR speaking OR speak OR voice OR vocal).ti,ab | 162723 |
| 34. | Medline | COMMUNICATION/ OR "COMMUNICATION BARRIERS"/ OR "VERBAL BEHAVIOR"/ | 108137 |
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