

## Original Research Article

# The use of protective face masks in hearing-impaired children during the severe acute respiratory syndrome coronavirus 2 pandemic: a new consideration

Tanvir Hussain<sup>1\*</sup>, Khalid Munir<sup>1</sup>, Aishan Patil<sup>2</sup>, Javed Munir<sup>1</sup>

<sup>1</sup>Department of Otolaryngology, Sligo University Hospital, Ireland

<sup>2</sup>Department of Vascular Surgery, Ninewells Hospital, Scotland, United Kingdom

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### \*Correspondence:

Tanvir Hussain,

E-mail: [tanvir\\_hussain14@yahoo.com](mailto:tanvir_hussain14@yahoo.com)

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## ABSTRACT

**Background:** The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic has led a variety of changes in healthcare delivery. Personal protective equipment (PPE) such as the use of face masks has become a new norm in daily life. While this has helped to reduce the transmission of SARS-CoV-2, challenges in social interaction and communication have been identified, especially in those with hearing impairment. This study aimed to identify some of the challenges faced by this COHORT and provided some practical solutions to support these patients.

**Methods:** An observational study was conducted by inviting speech and language therapists (SALTs) to provide their observations on the implications of face masks for children with hearing impairment in Sligo university hospital, Ireland from August 2021 to September 2022. Thirty-three SALTs were invited to participate via the Irish association of speech and language therapists (IASLT) website.

**Results:** Twenty-five responses were received. Common observations include distress amongst parents and children due to difficulties in communication, delays in accessing hearing-aid assessments and cochlear implantation referral and poor compliance with speech and language rehabilitation.

**Conclusions:** This study identifies a number of challenges faced by children with hearing impairment during the current pandemic. A number of practical recommendations have been provided to alleviate and reduce the consequences of these.

**Keywords:** Protective, Face masks, Hearing impaired, Children, SARS-CoV-2 pandemic

## INTRODUCTION

In March 2020, SARS-CoV-2 was declared a global pandemic. This has had significant implications for healthcare systems largely due to its very high transmission rate.<sup>1,2</sup> This has resulted in changes in daily practice within healthcare institutions and services.<sup>2</sup> Nations have focused on reducing viral transmission and avoiding hospitalizations and SARS-CoV-2-related

deaths.<sup>1</sup> This has led to several societal restrictions and protective measures to limit transmission amongst the public.<sup>1</sup> PPE has gained widespread popularity with daily use of face-masks, face shields and gloves becoming part of daily life.<sup>1</sup> As well as this, social and physical distancing has become widely accepted and appreciated.<sup>1</sup> The use of face masks in public areas has also been necessary to avoid the spread of SARS-CoV-2 in other countries.<sup>1</sup> While this has been an invaluable aspect of

reducing viral transmission, there have been a number of challenges in social interaction and communication, especially in people with hearing impairment.<sup>2,3</sup>

Hearing impairment affects people of all ages with some reports suggesting that up to 15% of adults experience noticeable hearing impairment in daily life.<sup>2</sup> Hearing impairment can have significant consequences for those affected.<sup>4</sup> It can lead to issues with psychosocial wellbeing, communication, language development and quality of life.<sup>4-6</sup> In turn, this can result in adverse effects on the mental health of the deaf community.<sup>5</sup> As well as demonstrating concern about the spread of SARS-CoV-2, those with hearing impairment highlighted worries about communication barriers associated with the use of face masks.<sup>7</sup> It is not uncommon for health inequities to exist in those with hearing impairment.<sup>6</sup> A lack of tailored communication skills and approaches to interacting with this COHORT can further reduced access to healthcare amongst these individuals.<sup>6</sup>

The SARS-CoV-2 pandemic has led to an increase in the burden of mental health issues within the general population including depression, anxiety disorders and social isolation.<sup>2</sup> This is even more apparent amongst those with hearing impairment, which can further exacerbate the challenges they face in accessing health services.<sup>2</sup> Challenges with communication were further enhanced amongst those using hearing aid devices as regular appointments that otherwise may have occurred were adjusted and may have consisted of virtual consultations or indeed, may have been postponed.<sup>2</sup> Communication challenges that already existed amongst individuals with hearing impairment were also exacerbated by the use of face masks, which have been shown to create challenges with intelligibility of speech while also removing the ability to read facial expressions and lip movements.

The purpose of this paper was to outline some of the challenges faced by hearing-impaired persons using face masks during the SARS-CoV-2 pandemic and to provide some simple, practical and valuable remedies to these issues.

**METHODS**

An observational study was conducted at Sligo university hospital, Ireland from August 2021 to September 2022 relating to challenges facing children with hearing impairment in the SARS-CoV-2 era.

SALTs were invited to participate using the IASLT website. SALTs were invited to respond via email and a four-question email-based survey was distributed to voluntary participants. The questions related to difficulties associated with face masks in hearing-impaired children and the impact of COVID-19 on children with hearing impairment.

**Inclusion criteria**

Participants who had SALTs must have served in their current facility for at least three years. Children under assessment were between the ages of four and eighteen were included in this study.

**Exclusion criteria**

The study excluded children with additional comorbidities due to their more complicated prescription regimens, which runs the risk of higher levels of non-adherence.

The questionnaire used in this study was a four-question study including the following four questions and observations. Describe the nature of difficulties caused by masks among hearing-impaired children. Describe the consequences of SARS-CoV-2 on children with hearing impairment. What was the relationship between frustration and fears developed by children with hearing impairment as a result of wearing masks and other facial coverings? And do face-masks make life harder for children with hearing impairment? Response to the email invitation was considered consent to participate in this study.

**Sample size**

Thirty-three SALTs were invited to participate and twenty-five responses were received.

**Statistical analysis**

The data was collected, stored and analysed on a single laptop and analyzed using SPSS. No participant-related data was identifiable at any point during the study.

**RESULTS**

Twenty-five responses to the questionnaire were obtained. All responses were included for analysis.

**Table 1: Questionnaire.**

Variables	N (%)
<b>Frustrated children with hearing impairment</b>	18 (72)
<b>Parental anxiety</b>	7 (28)
<b>Total</b>	25 (100)

100% (n=25) of respondents felt that the use of face masks made life more challenging for children with hearing impairment. 72% (n=18) of SALTs reported a direct link between frustration developed by children with hearing impairment as a result of the use of face masks and other facial coverings. The other 7 respondents described a number of consequences observed in their practice with an increase in parental anxiety and an increase in child stress and frustration due to a difficulty understanding others.

**Table 2: Difficulties described by SALTs associated with face-masks in children with hearing impairment.**

Difficulties	Hearing impairment
Poor response to speech understanding	Repeated manipulation of hearing aids
Lack of interest in others due to poor understanding of speech	Poor use of visual cues
Difficulty in hearing	Delay in response times
Delay in hearing-aid response	Poor compliance with speech therapy sessions
Poor lip reading	Delays in hearing-aid trials
Poor education due to inadequate hearing	Delays in surgical referrals for cochlear implantation due hearing-aid trials being inadequate
Poor use of facial expressions	Poor communication
Increased time for history-taking	Lack of interest in play activity due to poor hearing
Poor speech discrimination	

**Table 3: Consequences of SARS-CoV-2 on children with hearing impairment.**

Consequences	Hearing impairment
Increased consultation time	Delays in speech therapy
Cochlear implant referrals affected	Delays in speech development
Communication challenges	Issues with hearing aids
Poor lip reading	Poor hearing aid compliance
	Poor interaction with healthcare staff

**DISCUSSION**

To our knowledge, this was the first study conducted in Ireland in relation to this subject matter. While much of the focus of SARS-CoV-2 had been related to transmissibility and hospitalisations, the psychological and social consequences were gradually becoming apparent.<sup>2,3,7</sup> The lack of face-to-face interaction, social engagements and interactions with healthcare providers have led to a significant rise in mental health issues and challenges accessing healthcare.<sup>2,7</sup> Certain vulnerable populations such as those with visual and hearing impairments were at an increased risk of social isolation at baseline and this had only compounded since the pandemic began.<sup>3,7</sup> Lockdowns, travel restriction and PPE have led to enhanced challenges with communication.<sup>2</sup> The United Nations reported serious concerns about the psychological impact of SARS-CoV-2 with an emphasis increasing vulnerability amongst those with pre-existing health issues.<sup>8</sup> Child and adolescent development was also partly reliant on social interaction,

however, stress and social isolation were prevalent during the pandemic resulting in greater challenges amongst the young.<sup>8</sup> It was clear from our responses that SALTs identified a decrease in interest in play and social interaction amongst children with hearing impairment. Face masks were identified as one of the challenging components amongst these children as both children and parents reported enhanced difficulties in following speech.

Chodosh et al emphasised the importance of facial expressions and lip movements in daily communication and highlighted how face masks can undermine speech communication amongst those with hearing impairment, especially in healthcare settings.<sup>9</sup> This was clear from our responses as SALTs identified an increase in consultation time required during the pandemic and felt that consultations were increasingly challenging due to social distancing measures and the wearing of face-masks. Goldin et al describe how face-masks attenuate high frequencies and affect speech quality and this associated with the loss of visual cues from facial expressions and lip movements can mean that speech can be effectively unintelligible for many patients with hearing loss.<sup>10</sup> This fitted with some our responses that described children with hearing impairment finding it challenging to interact with healthcare providers and those around them who were wearing face-masks. As well as this, hearing-aids required increased manipulation due to the discomfort of wearing these with face masks and this further exacerbated some of the challenges faced.

Parents and children both emphasized the lack of lip movements and facial expressions being an increasing problem for the children on a daily basis. History-taking was a key component of the healthcare interaction and this was important when those with hearing impairment were undergoing speech therapy. Our study demonstrated that this was requiring an increased amount of time during the pandemic which in turn reduced the amount of time available for speech therapy sessions to take place. Taylor-Coleman reported on the potential for transparent face masks that enabled visibility of facial expressions and lip movements to aid in improving these challenges.<sup>11</sup> Our study also highlighted the challenges faced in this COHORT when trying to attain appointments for hearing aid assessments and referrals for further rehabilitation or treatment such as cochlear implantation. Pineault reported similar findings amongst their survey respondents with patients expressing dissatisfaction about access to and delivery of healthcare services.<sup>3</sup> This was further worsened amongst those who could access services but found communication extremely challenging due to the use of mandatory face masks.<sup>3</sup> Education and schooling was a key component of the daily lives of children and adolescents. Social interaction and communication was further developed in these settings. This was significantly impacted during the pandemic due to the closure of schools for a significant period of time. Pineault also reported that patients found remote services for education and interaction with schoolmates unsatisfactory.<sup>3</sup> Our study also highlighted this problem

with parents noting a lack of interest in play and interaction with other children. Lockdowns made this increasingly challenging with limitations on social contacts and travel distances also imposed.

Chodosh et al advised a number of recommendations including being mindful that patients will struggle to follow masked speech.<sup>9</sup> Utilisation of simple technology and communication aid were also recommended as methods of improving the interaction between the patient and the healthcare worker.<sup>9</sup> The use of transparent face masks had also been touted as potentially beneficial aid for those with hearing impairment with some healthcare workers recommending that these should be the norm in the healthcare setting, especially when interacting with patients.<sup>11</sup> Pineault also found this to be one of the most frequently highlighted recommendations with patients feeling that this could significantly improve communication barriers.<sup>3</sup> As patients with hearing impairment often required an advocate to help them communicate, it was important to bear this in mind and consider development of patient-centered health care protocols on the basis of clinical need.<sup>3</sup> This was less of a problem in the paediatric community who will mostly have a parent or guardian as an advocate. Virtual consultations were complimented by patients, especially with regards to maintaining rehabilitation sessions during the pandemic.<sup>3</sup> This should be considered as an ongoing measure and will also have the additional benefits of reducing travel needs amongst patients, especially those from vulnerable groups.

### Limitations

This study demonstrated some limitations. Our survey was only made available to SALTs registered with the IASLT and so was isolated to an Irish COHORT. A set number of questions were asked and were largely open in nature to allow SALTs to expand on their perspectives. We also focused on children with hearing impairment, whereas much of the work already done focused on vulnerable adult groups which we have used for comparison.

### CONCLUSION

This study was conducted to identify the challenges faced by children with hearing impairment during the SARS-CoV-2 pandemic, especially in relation to the use of face masks. Many of these challenges were similar to those faced by other vulnerable groups including adults with hearing impairment. While this study has some limitations, it identifies challenges faced and we have aimed to provide some practical advice for addressing some of these challenges. With the high likelihood that face-masks will be required for the foreseeable future in healthcare settings, it will be important that further

research is conducted to identify further challenges and potential practical solutions to this problem.

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