

## SHORT REPORT

# We still cannot hear: Staff perceptions of personal protective equipment impact on speech and communication in the operating theater during pediatric airway surgery

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Despite the Royal College of Paediatrics and Child Health's relaxation of personal protective equipment (PPE) requirements for pediatric surgery,<sup>1</sup> we believe the routine use of Aerosol Generating Procedure PPE (PPE for AGPs) for pediatric airway or oral surgery procedures will continue and persist well into 2021 or beyond.

During the COVID-19 era, studies have demonstrated objective PPE-impaired communication,<sup>2</sup> increased intubation time, and more frequent failed airway management during simulated in-theater intubation.<sup>3</sup> Unless there is increased multisector and multi-specialty collaboration between national systems and their healthcare partners to develop communication solutions in acute healthcare settings, this could present yet another challenge faced by children and professionals involved in children's care around the world.

Personal protective equipment for AGPs (including filtering face-piece respirators or hoods, and eye protection) represents a significant deviation in standard pediatric anesthetic practice. It has been estimated that communication breakdowns among personnel contribute to 43% of surgical adverse events,<sup>4</sup> with 60% of incidents occurring in the operating theater.<sup>4</sup> At our tertiary pediatric center, we sought to appreciate the extent of communication difficulties experienced by multiple cadres of clinicians wearing PPE for AGPs during pediatric airway surgery.

## 1 | METHODS

We surveyed theater staff routinely involved in pediatric airway surgery at Alder Hey Children's NHS Foundation Trust during July 2020. The UK Health Research Authority's research decision tool ([hra-decisiontools.org.uk/research](http://hra-decisiontools.org.uk/research)) was consulted to determine

that ethical approval was not required to conduct this survey. This project was registered prospectively with our institutional clinical governance department (ID-6131). A mixed-methods approach combining semi-quantitative and qualitative analysis was utilized to evaluate the survey responses.

## 2 | RESULTS

Twenty-five responses were returned (see Table 1). All respondents (100%) felt that the use of PPE for AGPs could impact on patient safety. Thirteen (52%) respondents were men.

In our center, 25/25 (100%) of staff surveyed had been appropriately fit tested for their PPE for AGPs. As a result, there was a combination of responses from staff who wear Filtering Face Piece 3 masks (FFP3) or equivalent reusable half-mask respirators (European standard which requires particle filtration efficiency of 99%) (N95 masks confer 95% filtration)<sup>5</sup> and staff wearing powered air-purifying respirators (PAPRs). All comments were related to surgery wearing PPE for AGPs but not limited to experiences in pediatric airway cases. Overall, whenever they wear PPE for AGPs, 25/25 (100%) of our staff had difficulty understanding others and 25/25 (100%) had difficulty being understood by others. Eight staff members explicitly identified PAPR hoods as having a worse impact on communication than mask and visors.

3/3 (100%) of ODPs raised concerns regarding impaired communication and awareness in emergency situations, highlighting airway/ENT, neonatal and cardiac cases as particular concerns. There were no explicit reports of near-misses. Additional concerns from anesthetists included difficulty hearing breath sounds or air leak, and repeated missed messages. The increased frequency of

TABLE 1 Communication issues wearing AGP PPE

Staff type	Sex	No.	Understanding others wearing PPE			Being understood wearing PPE		
			Always difficult	Sometimes difficult	Never a problem	Always difficult	Sometimes difficult	Never a problem
Combined Total (% of total for sex)	F	12	10 (83%)	2 (16%)	0	10 (83%)	2 (16%)	0
	M	13	9 (69%)	5 (38%)	0	4 (30%)	9 (69%)	0
Pediatric Anesthetists	F	6	5	1	0	5	1	0
	M	3	1	2	0	1	2	0
Pediatric Airway Surgeons	F	2	2	0	0	1	1	0
	M	5	3	2	0	1	4	0
Nurses/ Anesthetic operating department practitioner (ODP)/ Theatre support workers	F	4	3	1	0	4	0	0
	M	5	4	1	0	2	3	0

repeated requests or misheard communications occurred particularly between anesthetist and surgeon, and surgeon and scrub nurse.

### 3 | DISCUSSION

Our survey subjectively demonstrates a negative impact on communication in the pediatric operating theater while wearing PPE for AGPs. This supports our group's experimental findings that speech discrimination scores were significantly different between normal and PPE for AGP wearing staff in operating theaters.<sup>2</sup> This has implications for patient safety, during pediatric airway surgery and other procedures with periods of moderate to high-risk aerosol generation. The intraoperative communication issues highlighted are generalizable to other commonly occurring instances outside of airway surgery, for example, potential safety issues related to intubation and ventilation assessment in neonates and other complex pediatric patient groups. Some staff felt that communication aids might improve speech discrimination in particular. Although wireless communication devices have been tested in the pre-COVID era<sup>6</sup> and multiple improvised devices have been recently proposed, there are still no widely available purpose-built solutions that provide multi-directional speech interaction in the surgical and operating theatre setting which have been adapted to PPE for AGPs and COVID-19 infection control standards. Speech-to-text apps and software are now widely accessible and free, but healthcare validation, reliability, and acceptability assessments are rare in scientific literature. Remote video sign-language interpreters are also available, but none of these solutions are likely to be suitable for clinicians making complex acute decisions in airway cases in pediatrics. Although none of our surveyed staff had hearing difficulty, further specific solutions including FFP3-grade transparent masks may be required for staff who are D/deaf if PAPR hoods are not available ("D/deaf" is used throughout higher education and healthcare in the UK to refer to both Deaf (people who are culturally Deaf who actively use sign language; and see themselves as being culturally Deaf) and deaf (medically hearing impaired people who have English as their first language and may lip-read or use hearing aids)). This study is limited

by the number of participants and the use of a novel questionnaire. Structured interviews and intraoperative recording of communication errors could provide us with additional relevant information.

While acute COVID-19 appears to be milder in children than adults, much has been written about the long-term effects for educational, emotional, nutritional, and financial impact<sup>7</sup> and modeling predicts increases in pediatric mortality due to routine healthcare disruptions.<sup>7</sup> We hope this article will keep the concept of second victims (children who may come to harm from COVID-19 without being directly infected by it) at the forefront of the minds of those who are caring for children, particularly in centers where pediatric airway procedures occur. We welcome the opportunity to collaborate with other centers and specialists nationally and internationally who hear this call for communication innovation to keep airway procedures as safe as possible particularly for our children.

#### CONFLICT OF INTEREST

TH is supported by a Wellcome Trust grant (unrelated to this research), but no authors have any potential or actual competing interests, financial, or otherwise.

#### AUTHOR CONTRIBUTIONS

TH is the principal investigator, and he takes responsibility for the integrity of the content of the manuscript and the declaration of contributions.

#### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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