COVID-19: the need to redesign head coverings of personal protective equipment for manual stethoscopes

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COVID-19 is primarily a respiratory disease characterised by features of respiratory tract infection, among other non-specific symptoms. A stethoscope is required for complete clinical evaluation of COVID-19 patients, especially to auscultate the lungs to identify features of pneumonia and other associated lung pathologies. To prevent exposure to potentially infectious body fluids and secretions, clinicians often wear full personal protective equipment (PPE) during the examination and care of COVID-19 patients. Unfortunately, the head covering of the PPE worn by clinicians is not designed to accommodate the earpiece of a manual stethoscope. Placing the earpiece of the stethoscope on the surface of the head covering close to the ears is not helpful, as little or no sound is heard through the fabric of the PPE. When the earpiece of a manual stethoscope is introduced directly into the ears, the ear tubes of the stethoscope displace the hood of the coverall, exposing most parts of the face and increasing the risk of contamination of the face. As a result of these risks and difficulties, clinicians managing COVID-19 patients are forced to abandon the use of manual stethoscopes in favour of alternative technologies such as wireless stethoscopes, portable ultrasounds and x-ray machines to define the lung pathologies of their patients. However, when these alternative technologies are not available or affordable, especially in developing countries such as Nigeria, the chest signs of COVID-19 patients may remain undefined. The Niger Delta University Teaching Hospital (NDUTH), Okolobiri, is one of the designated treatment centres for COVID-19 patients in Bayelsa State, Nigeria. In light of the absence of alternative technologies, and the need to define the chest signs of severe COVID-19 cases upon admission to our isolation ward, we explored redesigning the head covering of some of our PPE to enable auscultation of the lungs and hearts of COVID-19 patients using manual stethoscopes.

We used the fabric obtained from surgical masks to create ear pouches on both sides of the PPE hood. The mask’s fabric was neatly sown on the hood, creating a complete seal both inside and outside the PPE (Figure 1). These procedures were undertaken while observing strict hygiene and infection prevention and control measures.

The redesigned head covering is worn by a clinician, who can easily place the earpiece of the manual stethoscope into both ears through the refashioned ear pouches of the hood (Figure 1). This way, the clinician can listen to the auscultatory sounds of a patient and identify any abnormal sounds indicative of lung disease. In our facility, the chest piece and tubing of the stethoscope are decontaminated with spirit swab between examinations of different patients.

In resource-limited settings where alternative technologies may be lacking, clinicians managing COVID-19 patients should consider redesigning the head covering of PPE to make provisions for the use of manual stethoscopes. However, this suggested modification of PPE must be undertaken while adopting strict hygiene and standard infection prevention and control measures, to avoid contamination of the PPE and the face masks.

Manual stethoscopes are readily available, affordable and easy to use and can be used for repeated examinations of patients, as well as to identify evolving bedside clinical presentations before further definitive imaging studies. Manufacturers of PPE should also consider creating ear pouches as part of the product design of head coverings to allow for the routine use of manual stethoscopes during the care of contagious infectious diseases such as COVID-19.

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Figure 1. Head covering of PPE redesigned for manual stethoscopes: Outside (A) and inside (B) of the redesigned head covering showing how the fabric of surgical masks was used to create ear pouches for manual stethoscopes; redesigned head covering worn by a healthcare worker before (C) and after (D) inserting a manual stethoscope into ear pouches.

Competing interests: We declare no competing interests.

Ethical approval: 

References

1 World Health Organization. Clinical Management of Severe Acute Respiratory Infection when COVID-19 is Suspected. 2020. https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-(ncov)-infection-is-suspected. Accessed May 23, 2020).

2 Buonsenso D, Pata D, Chiaretti A. COVID-19 outbreak: less stethoscope, more ultrasound. Lancet Respir Med. 2020;8:e27.

3 Smith MJ, Hayward SA, Innes SM, et al. Point-of-care lung ultrasound in patients with COVID-19 – a narrative review. Anaesthesia. 2020;75(8):1096–104.