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Infection Prevention in Practice

journal homepage: www.elsevier.com/locate/ijip

Hand hygiene perceptions, preferences, and practices among hospital staff in the Dominican Republic in the context of COVID-19: a qualitative study

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ARTICLE INFO

Article history:

Received 2 October 2023

Accepted 10 April 2024

Keywords:

Qualitative

Hand hygiene

Infection control

Hospital

Perceptions of hand hygiene



SUMMARY

Background: Proper hand hygiene (HH), which includes sanitizing with alcohol-based hand rub (ABHR) (or handwashing with soap and water if ABHR is unavailable), is key for preventing healthcare-associated infections (HCAI), including COVID-19. Understanding drivers of HH is key to improving adherence.

Aim: This study aims to explore drivers and barriers to HH practice at two hospitals in the Dominican Republic in the context of the COVID-19 pandemic to inform development of HH behaviour change interventions.

Methods: We conducted in-depth interviews with 20 hospital staff during September 2021. We used the COM-B (capability, opportunity, motivation, behaviour) model to explore HH experiences and preferences. Interviews were recorded, transcribed, coded, and analysed using a thematic approach.

Results: A total of 11 parent codes and 27 sub-codes were identified, and 1145 coded segments were analysed. Use of handwashing with soap and water and/or sanitizing with ABHR was reported by all participants; handwashing was generally preferred. Participants expressed knowledge of proper HH methods (capability), but inconsistent supplies and lack of time presented HH challenges (opportunity). Interviewees described practicing HH to protect themselves and their families from COVID-19 and other infections (reflective motivation) or out of habit (automatic motivation).

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Discussion: By understanding and addressing underlying factors affecting HH, hospitals can decrease the risk of HCAs. Our findings suggest that interventions implemented to improve HH in these hospitals should target motivation and opportunity. These findings informed a multimodal intervention to increase ABHR access and implement message-tested communications campaigns; end-point assessments will provide insights into the intervention's impact.

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Introduction

Proper hand hygiene (HH) has long been recognized by the World Health Organization (WHO) as an important practice for the prevention of healthcare associated infections (HCAI), which increase costs and risk of negative outcomes for hospitalized patients [1,2]. In healthcare facility settings, HH adherence is defined as using alcohol-based hand rub (ABHR) with at least 60% alcohol (or washing hands with soap and water for 20+ seconds if ABHR is unavailable) at five moments: before touching a patient, before aseptic procedures, after body fluid exposure or risk, after touching a patient, and after touching a patient's surroundings [2].

During the COVID-19 pandemic, HH was identified as an important prevention measure, especially in healthcare facility settings where risk of disease transmission may be elevated due to repeated exposure to the virus [3].

Trends in HCAs and hand hygiene

By removing or inactivating pathogens from hands at the five moments, healthcare facility staff can decrease the risk of HCAs [4,5]. In high-income countries (HICs), strong infection control systems and effective interventions have helped to lower patients' risk of HCAs [6]. In low- and middle-income countries (LMICs), risks of HCAs among hospitalized patients may be as high as 25% [7]. Poor hygiene and sanitation infrastructure, limited laboratory capacity, lack of basic equipment, overcrowding of facilities and understaffing increase the risk of HCAs in these settings [2]. As a low cost and effective measure, the WHO considers HH as the primary method for decreasing the risk of HCAs [4]. However, adherence to HH in LMIC healthcare facilities remains significantly lower than HIC settings [7].

Interventions to improve hand hygiene during COVID-19

In the context of COVID-19, interventions to improve HH were introduced in healthcare settings globally. In Germany, a messaging and self-efficacy HH behaviour change intervention introduced in healthcare facilities during the COVID-19 pandemic led to increased HH practice [8]. In South India, a HH audit and feedback intervention for staff working in COVID-19 intensive care units led to a significant increase in adherence [9]. A quasi-experimental hospital-based study in Thailand reported increased HH adherence during the COVID-19 pandemic following an intervention that increased access to alcohol-based hand rub (ABHR) and nudged passers-by to use it [10]. Multimodal interventions that address both infrastructure

access issues and behavioural aspects of HH have been shown to be the most effective approach to improve HH among healthcare facility staff [2]. Yet, effective interventions appear to be context-specific and, therefore, understanding local cultural and behavioural drivers is important [11,12].

Hand hygiene in healthcare facilities in the Dominican Republic

The Dominican Republic has faced ongoing challenges in prevention and control of HCAs [13,14]. An assessment of two of the largest hospitals in 2022 found HH resources present at fewer than 75% of patient care areas, with providers practicing HH 9% of the time before patient contact and 37% of the time after patient contact [15]. These findings suggest the need for further research to explore behavioural drivers and barriers to HH practice. To further explore these concepts, this study uses qualitative methods to assess drivers and barriers to HH practice among healthcare facility staff at two hospitals in the Dominican Republic, which will be used to inform design and implementation of HH interventions.

Methods

Setting

The study was conducted within two large hospitals in the Dominican Republic: Hospital Dr. Toribio Bencosme in Moca and Hospital Dr. Antonio Musa in San Pedro de Macorís, which have 93 and 250 beds, respectively. Both hospitals were selected because of their participation in an ongoing acute febrile illness surveillance program, as well as their observed need for HH strengthening in the context of the COVID-19 pandemic. This qualitative study was part of a larger project to assess water and HH infrastructure, increase access to HH resources, and assess HH practices among healthcare workers during the COVID-19 pandemic. Facility assessments, HH observations, and qualitative data were then used to inform interventions targeting HH infrastructure and practices [15].

Participants and sampling

Study participants were selected from hospital staff for in-depth interviews. Purposive sampling was used to select 10 participants from each site: facilities staff, administrators, and inpatient and outpatient clinicians. Participants were intentionally recruited from varied levels of seniority at the hospital and care was taken to ensure that no staff were interviewed by a direct supervisor to minimize self-reporting and social

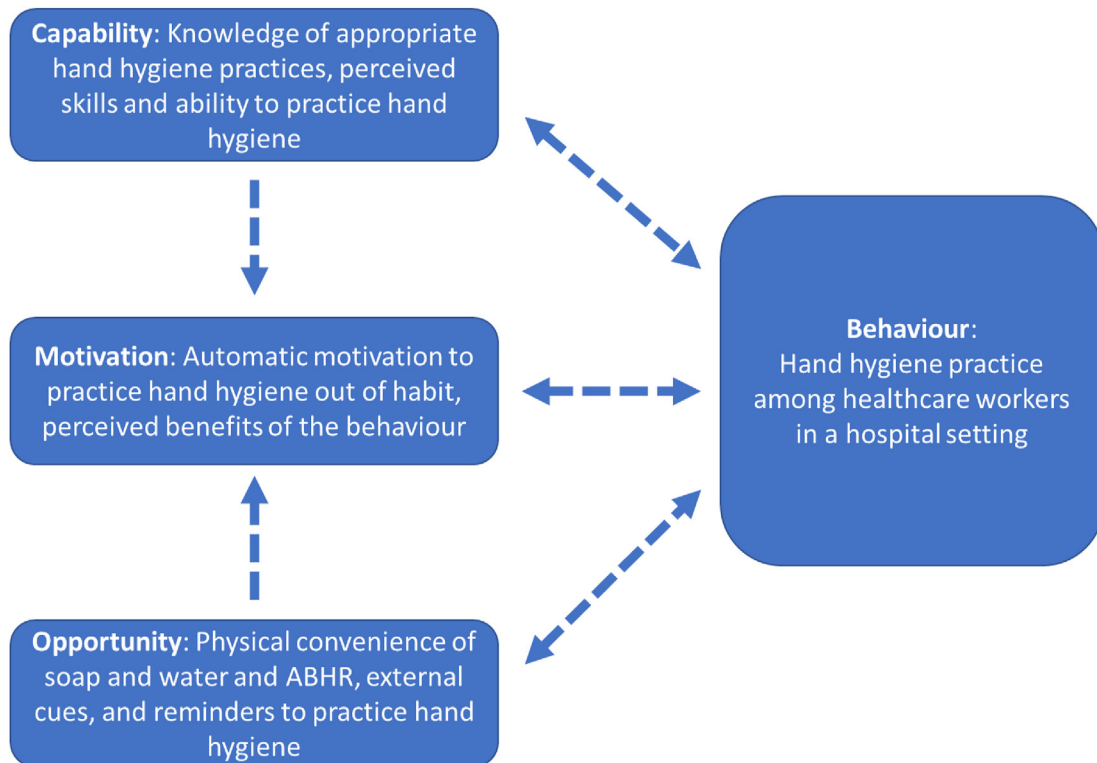


Figure 1. COM-B behavior change model.

desirability bias. Participants were approached in person to be invited to participate. The sample size was determined to gather diverse perspectives and reach saturation without overburdening staff in the midst of a COVID-19 wave.

Interview guide

The interview guide was developed using the COM-B behaviour change model (Figure 1). The COM-B model identifies the Capability (C), Opportunity (O), and Motivation (M) that influence a certain health behaviour (B). This model was selected as it nests sources of behaviour within potential intervention functions and the broader policy context [16], and thus could be used to help us develop interventions. Using this model, questions in the interview guide for hospital staff explored their capability (knowledge), opportunity (physical and social), and motivation (reflective and automatic) for practicing proper HH at work. Current practices of handwashing with soap and use of ABHR, perceived social norms around HH, and suggestions for improvement were also explored.

The interview guide was developed in English and translated and localized in Spanish. One female hospital epidemiologist at each hospital site, who was familiar to study participants, completed qualitative data collection training with study team members. Due to human resource constraints caused by the COVID-19 wave in June 2021 affecting participating hospitals, a full pilot was not conducted, but the interviewers reviewed and validated the guide before study launch. The guide was revised to integrate this feedback. While most questions applied to all staff, questions regarding clinical patient care were asked only of clinicians. The interview guide is included as Supplementary Material.

Data collection

Semi-structured interviews were conducted in-person by hospital epidemiologists (Dra. Payano, Dra. Martinez) in a private space at each hospital during September 2021. Written informed consent to be interviewed and audio-recorded was obtained from each participant prior to the interview. Interviews followed the guide and interviewers were encouraged to ask additional follow-up questions and probes (this skill was practiced in interviewer training). Each interview lasted 30–45 minutes, was conducted in Spanish and was recorded using a digital audio recorder. Recordings were transcribed by TranscribeMe (TranscribeMe Services, Oakland, CA, USA) and translated verbatim into English by Landmark Associates (Landmark Associates Transcription, Phoenix, AZ, USA). Quality control was conducted by a bilingual study team member who reviewed English and Spanish transcripts to ensure consistency across translations. Audio recordings and transcripts were uploaded to Brigham and Women's Hospital's secure server, which adhered to data security specifications of the institution, with transcripts de-identified to ensure confidentiality.

Data coding and analysis

Interview transcripts were coded independently by two U.S.-based qualitative analysts on the study team using MAXQDA qualitative analysis software (VerbiSoftware, Berlin, Germany). The initial codebook was developed from the research question and theoretical concepts from the interview guide. After analysts read and discussed the transcripts, additional codes were added for themes that emerged. The analysts met to discuss codebook definitions and code application to ensure

consistent usage and interpretation of codes. The codebook used a parent and sub-code system to organize broader concepts and more specific findings; for example: Hand Hygiene Experiences → Hand Hygiene Drivers: Convenience. A total of 11 parent codes and 27 sub-codes were identified; 1145 coded segments were analysed. To identify and interpret themes that emerged in the transcripts, analysts used a thematic analysis approach, integrating both deductive and inductive reasoning [17]. Themes were extracted from the data by thorough review and grouping of coded segments, and findings organized using the COM-B model. Analysts ensured inter-coder reliability through ongoing discussion and review of codes and themes.

Ethical considerations

The study protocol was approved by the National Council of Bioethics in Health, Santo Domingo (014–2021), the Institutional Review Board of Pedro Henríquez Ureña National University, Santo Domingo (2021, no judgement number), the Mass General Brigham Human Research Committee, Boston, USA (2020P003646), and the Centers for Disease Control and Prevention, Atlanta, USA (0900f3eb81cd22d8).

Results

Participant characteristics

We conducted 20 in-depth interviews, 10 at each hospital. Of these, 16 were clinical staff (eight per hospital), two were administrators (both at Moca, none at San Pedro Macoris were available), and two were facilities staff (one per hospital). No staff invited to interview declined to participate. Clinician roles included physician, nurse, nurse assistant and educator, laboratory analyst, and pharmacist. Responses reached thematic saturation, suggesting that this sample size was appropriate for the questions and themes explored.

Findings can be grouped into the three components of the COM-B model which influence behaviour: Capability, Opportunity, Motivation (see Figure 1).

Capability

Knowledge and skill for appropriate hand hygiene

Across roles and hospitals, interviewees demonstrated psychological (knowledge) and physical (ability) capability to practice HH based on their descriptions of appropriate HH methods and self-reporting of handwashing with soap and water and disinfecting with ABHR to clean their hands at work. However, some staff acknowledged that in situations where time is limited, they opt to change gloves without practicing HH, which highlights a potential knowledge gap.

Opportunity

Interviewees also described how their HH practices were influenced by both social and physical opportunity.

Social opportunity

Social cues in the workplace. Among the external cues cited were encouraging or being encouraged by colleagues to clean their hands at work:

All of them know what to do and when we see someone who doesn't do it, then we tell them. (Participant 1, Moca)

Most interviewees believed their colleagues practiced good HH, although there were staff at both hospitals who perceived that their colleagues did not consistently practice HH at work, suggesting mixed social norms to promote hand hygiene practice:

It's so-so. Some comply, and others don't. (Participant 9, San Pedro de Macoris)

Physical opportunity

Convenient placement. The convenient placement of handwashing areas or accessibility of ABHR was another commonly noted facilitator of HH practice. For some, one method or the other was more accessible in their work area at the hospital, which made it the convenient choice:

What makes it easy for me is to always have running water, soap, soap dispenser and a towel to dry your hands. (Participant 7, San Pedro de Macoris)

Supply and infrastructure. Inversely, disruptions to water and soap supply and lack of ABHR or handwashing stations nearby were described by many interviewees as decreasing HH opportunity. Among staff in Moca, supply or infrastructure issues were mentioned by about half of interviewees as a reason for skipping HH practice, most commonly citing a disruption of water supply in the facility. In San Pedro de Macoris, lack of water and of soap were commonly noted as barriers to HH practice. Staff at both facilities also noted stock-outs of ABHR.

I might skip washing my hands if I don't have the product—the [ABHR]—or if there's no soap and water in the areas. (Participant 1, Moca)

Time. Both clinical and non-clinical staff at both hospitals described a lack of time to wash or sanitize hands as a barrier to consistent HH practice at work. This lack of time often occurred in the context of daily overall workload being too high to have time to practice HH between patients.

Sometimes, you can't always wash your hands with soap and water because of the influx of patients, but you can change gloves and use [ABHR]. (Participant 4, San Pedro de Macoris)

Among clinical staff, lack of time was especially described as a challenge in emergency situations, such as after the arrival of a trauma patient with an acute need for care and no opportunity to clean hands before tending to the patient. A few staff noted that when short on time, they would use ABHR and change gloves, noting that ABHR is faster than handwashing. However, this was mentioned infrequently by interviewees.

Motivation

Hospital staff described factors that motivated them to practice this behaviour at work. Key themes that emerged among responses in both hospitals included the perceived benefits of HH and habit.

Reflective motivation: perceived benefits

The perceived benefits of preventing disease transmission, avoiding contamination, and preserving health were frequently described drivers for HH practice at work. Hospital staff shared

that they practice HH “to take care of myself, my family, the patients,” “to guarantee my safety, my family’s,” and “to prevent the spread of infections from the patient to us or from us to the patient.” Few interviewees specifically noted practicing HH to prevent the spread of COVID-19. Although a desire to protect their patients and other staff at the hospital was raised in several interviews. Staff members’ desire to protect themselves and their families were more common motivators.

Automatic motivation: habit

Another motivator mentioned less frequently in interviews was a sense of habit or automatic impulse to practice HH at work. As described in the COM-B model, habit (automatic motivation) is an important driver of behaviour; without this, it may be difficult to see lasting behaviour change [16].

There’s the dispenser, if you enter, when you come out— I use [ABHR], it’s a habit already. (Participant 2, Moca)

Additional findings on context, practices, and preferences

Though informational materials about HH were rarely mentioned by interviewees, when asked directly about this clinical and non-clinical staff from both hospitals acknowledged that there were informational materials including signs, diagrams, posters, and brochures about HH at their hospitals. No messages from these signs were cited as cues for HH practice.

Staff noted that they use different HH methods depending on their location within the hospital, the situation, and personal preference. Whether a procedure was invasive or non-invasive did not affect methods used by most interviewees, though some noted a requirement to wear gloves in invasive procedures. While glove use is recommended as an additional precaution for hand cleanliness, it is not considered a HH method. Accessibility and time were cited as reasons for using ABHR, but there was a preference across sites and staff roles for washing hands with soap and water:

I would use [handwashing] because I feel more comfortable using water. I rub soap on my hands, and I wash them thoroughly, then I rinse them. This makes me feel more comfortable than using ABHR. (Participant 6, Moca)

When asked about their experiences at the hospital, all staff shared positive feelings associated with practicing proper HH. These included feeling “safer, more comfortable, more relaxed,” “more at ease physically and mentally,” and “clean and protected.” Correspondingly, staff reported experiencing negative feelings (such as “worried”, “dirty”, and “uncomfortable”) when they skipped an opportunity to practice HH.

Recommendations from staff

Interviewees offered several recommendations for improving HH infrastructure and practice at their facilities. At both hospitals, interviewees recommended staff education or training to promote proper handwashing and explain benefits of and appropriate use of ABHR, including workshops or courses. Many recognized their own role in encouraging HH among their peers and suggested that staff and management help to promote practice proper HH. Some staff suggested extending training to patients and non-clinical staff.

I can teach the people I work with about this. Each time I have the opportunity, I can ... [help by] keeping people in my department up to date on this practice and reminding them of handwashing so we can all be part of this. (Participant 5, Moca)

Additionally, staff recognized that the provision of more visually engaging visual reminders might provide a helpful nudge towards this behaviour, suggesting posters, brochures, flip boards, or instructions about where to find dispensers and handwashing stations. They also suggested that the presence of additional sinks would nudge hospital staff to wash hands.

Promote to people hand hygiene and the benefit it provides for him and the patient ... if it’s necessary, post notices, posters, and brochures ... When you talk to them about it today, many people remember to do it, but by tomorrow, they’ve forgotten about it, so it’s necessary to promote it. (Participant 6, San Pedro de Macorís)

Regarding supplies and infrastructure, over half of the interviewees at San Pedro de Macorís recommended installation of additional sinks, reiterating the concern that lack of physical opportunity is a significant barrier to HH adherence. The recommendation to install more soap and ABHR dispensers also came up in multiple interviews in San Pedro de Macorís, and once in Moca. Other suggestions from both sites were to provide more paper towels and to establish back-up water sources.

Discussion

Using these findings, we can gain insights into HH experiences and perceptions among hospital staff in the Dominican Republic. Though the two hospitals included in this study serve different populations and have different capacities, barriers to practicing HH were similar. Furthermore, challenges were also similar across staff roles within hospitals, suggesting that approaches used to promote HH in the context of the COVID-19 pandemic could be similar.

When contextualizing findings within the COM-B model, interviewee responses suggest that they generally have a sufficient level of capability—knowledge of appropriate methods and skills needed—to practice HH at work. Some studies have found capability to be a significant predictor of HH behaviour, which has led to the development and implementation of multimodal interventions for HH that are focused on training and teaching [18,19]. An integrative review of multimodal interventions found that focusing only on knowledge and awareness of HH was unsuccessful in changing behaviour; interventions were more effective when they addressed multiple drivers of behaviour including self-efficacy and social influences, among others [18].

In our study, interviewees described several barriers including lack of time, resources, and external cues prompting them, that impact reflective and automatic motivation as well as physical and social opportunity to consistently practice HH at work. A study of self-reported HH behaviours in hospitals in Ireland found that motivation was a predictor for HH compliance [20]. A systematic review of qualitative studies on HH adherence conducted among hospital staff in high-income countries (HICs) similarly found that motivation was one of two main factors impacting workers’ HH adherence [21].

Unlike studies conducted in HICs, those conducted in LMICs consistently also describe opportunity as a barrier, which may be linked to limited infrastructure for HH available in these

contexts [4,11,19]. In a recent study in China, motivation and opportunity were both significant predictors of self-reported HH practice, and it was noted that addressing both is crucial for successful behaviour change interventions [19], which aligns with suggestions made by participants in our study. The COVID-19 pandemic and associated supply and staff shortages further exacerbated physical opportunity challenges for HH in this study setting.

In our study, motivation to practice HH was largely driven by staff's desire to protect themselves and their households, with few describing the importance of protecting patients. While transmission of pathogens from hospital staff to their households is a concern, the primary consequence of poor HH is for hospitalized patients. Effectively communicating this message to staff as part of a multimodal intervention will be imperative to increase adherence, particularly HH before patient contact, which is consistently lower than after patient contact in the Dominican Republic and other LMICs [15,22]. Until staff become aware of the impact of their HH on patients' health, the risk of HCAs in their facilities will remain high. This concept should be prioritized when considering behavioural interventions.

Despite high levels of self-reported interest in practicing HH at work and belief that it protects self and others from germs and illness, interviewees in our study reported that lack of time and access to HH supplies were obstacles, similar to what was described by Zheng *et al.* in China [19]. Some of our interviewees also reported that HH practices of their peers were inconsistent. These findings suggest the need for interventions that target social norms among healthcare workers toward more acceptance and practice of HH, as well as provide resources to ensure consistent access to HH. They also suggest that interventions involving ABHR may be beneficial, as ABHR use is faster than handwashing.

As described in a systematic review of multimodal HH interventions, the success of interventions in these hospitals may depend on our ability to target both *opportunity* and *motivation* [18]. Potential interventions to address physical opportunity would be to increase access to HH resources throughout the hospitals, in areas where hospital staff can easily and quickly practice HH before and after patient contacts. Of the COM-B framework's nine intervention functions, modelling behaviour, providing training, educating staff, persuasive communications, and improving infrastructure present ways to address challenges identified by this study [16].

Limitations

Given the nature of qualitative data, findings from these interviews cannot be interpreted as representative of views and experiences of all staff or generalized to other hospitals. While interviewees were trained in interview techniques and were not direct supervisors of any study participants, social desirability bias may have influenced responses. Data were collected and analysed in the context of the COVID-19 pandemic, which may not be reflective of everyday circumstances—resources, constraints, and staff's risk perceptions—in participating hospitals.

Conclusions

This study contributes to our understanding of the underlying factors which influence HH behaviour of staff in two

hospitals in the Dominican Republic. By identifying the gaps in motivation and opportunity using the COM-B model, we are better able to develop interventions to effectively change HH behaviour, and in turn, lower the risk of HCAs. The importance of HH and challenges associated with HH supply shortages were highlighted by the COVID-19 pandemic, but consistent HH practice is crucial regardless of infectious disease outbreak circumstances to minimize HCAs.

Using findings from this study and infrastructure assessments, together with the Ministry of Health and Social Assistance, we designed and implemented a multimodal HH intervention in these facilities. The intervention integrated a staff-led HH champions initiative (training, education, modelling), message-tested materials posted throughout the facilities and shared by text message to nudge behaviour (education, persuasion), and increased ABHR access (infrastructure). End-point evaluations will assess the longer-term outcomes and impact of the intervention.

Further research is needed to explore experiences and perceptions of healthcare facility staff across cultural, socio-economic, and healthcare level settings to tailor interventions appropriately.

Acknowledgements

We extend our thanks to the hospital staff who volunteered their time to participate.

Funding statement

This work was supported by the US Centers for Disease Control and Prevention (Cooperative Agreement #U01GH002238).

Conflict of interest

Carrie Ripkey is a contractor funded by the Hilton Foundation and Wallace Foundation. No other conflicts of interest were declared.

Disclaimer

The findings and conclusions of this paper are those of the authors and do not necessarily represent the official position of the US Centers for Disease Control and Prevention (CDC).

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 Investigation, E.C.P. and P.M.G.
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 Project administration, D.D. and K.W.R.
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All authors have read and agreed to the published version of the manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.infpip.2024.100367>.

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