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Short Communication

Five core areas to focus infection prevention and transmission risk breaches training based on quarantine staff orientation sessions: A qualitative study

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ABSTRACT

Background & Aim: Breach awareness in relation to types, mitigation, and reporting should be a routine part of infection prevention training. Understanding breaches can reduce risk of disease transmission to staff and communities when contextualized to the infectious disease, environment, and situation. At a large-scale Australian COVID-19 quarantine facility, this study examined the core personal protective equipment and infection prevention breaches new quarantine workers identified during their site orientation to inform future breach training.
Methods & Materials: Through the application of a qualitative approach, the project implemented a descriptive thematic analysis to identify the different types of breaches staff presented. An additional summative content analysis method was applied to determine if the breaches staff identified were breaching and if the risk level staff allocated to the breach was mapped to the risk of disease transmission. Data were collected from 30 orientation sessions and included 603 breach risk responses for analysis.
Results: There were five core breach areas identified: donning and doffing of personal protective equipment, failure of personal protective equipment or lack of equipment, environmental factors, staff behaviors, and resident behaviors. The breach allocations by staff demonstrated knowledge deficits across health and non-health staff in disease transmission, particularly in the actual level of the risk for transmission.
Conclusion: Breaches awareness in relation to types, mitigation and reporting should be a routine part of infection prevention training. The five areas of breaches present an adaptable foundation to base infection prevention breach training for any health facility. When contextualised to the communicable disease, environment and situation, understanding breaches can reduce the risk of disease transmission to staff and communities.

Introduction

As the COVID-19 pandemic infiltrated communities worldwide, the need for competent use of personal protective equipment (PPE) and infection prevention control (IPC) processes became a priority for quarantine and isolation services. A new approach to developing staff competency with PPE and IPC was required as people with little to no experience in health and IPC practices were recruited to build capacity in the health response.

This project focussed on IPC breaches education and training of new staff in the quarantine setting. The project was undertaken at the Center for National Resilience (CNR), Howard Springs Quarantine Facility (HSQF) in the Northern Territory, Australia. The CNR was a large-scale quarantine and isolation facility that accommodated over 33,000 humanitarian, domestic, international, and repatriation residents during its operational time (1). The service required a strong IPC training approach to ensure processes were carried out safely to protect staff from COVID-19-infected residents and to reciprocally ensure the protection of

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residents in quarantine (2). Now used as the model to replicate quarantine facilities across Australia, the service had no record of COVID-19 transmission from residents to staff on its closure in June 2022 (3).

Across Australia, there was a high risk of disease transmission experienced in many quarantine facilities, with the spread of COVID-19 occurring reciprocally between staff and residents (4,5). Within a year of the pandemic, reports indicated there had been 16 notable COVID-19 case leaks from Australia's hotel quarantine. These were variably attributed to a lack of staff comprehension and practice of infection prevention measures or environments conducive to disease transmission (6,7). Most importantly, these events could be viewed as preventable given some quarantine facilities, such as CNR, operated for over two years with no record of COVID-19 disease transmission between residents and staff (8).

For this project, IPC is adapted in alignment with the World Health Organisation's definition of being an evidence-based approach to protect quarantine center workers and their residents from preventable infections (9). At CNR, IPC measures primarily included using PPE, hand hygiene, physical distancing, working in accordance with zoning of contaminated and potentially contaminated areas, and cleaning surfaces and equipment. It is acknowledged that PPE is cited as the least effective protective measure in the Hierarchy of Control for the prevention of transmission of COVID-19, with the most effective method being COVID-19 vaccination (10).

Research into the effectiveness of skills training of new staff (including those new to health) in COVID-specific practices highlighted that effective evidence-based training responsive to change increased staff compliance and vigilance with infection prevention practices (11). At CNR, all new staff were required to undertake a structured 2-day orientation focussed on COVID-19 disease transmission, viral screening, zones implemented in the quarantine facility to segregate residents in quarantine and isolation, IPC and PPE (as well as other standard orientation requirements for commencing with a new employer). These were adapted to suit the unique quarantine environment at CNR and were reactive to COVID-19 disease trends and management recommendations. The staff leading the education and training sessions were all registered nurses with post-graduate qualifications in IPC or who had received additional training from IPC experts.

New quarantine staff were required first to attend theoretical and practical sessions presenting IPC practices onsite, types of PPE, and donning and doffing methods. By the time staff participated in a breaches training session, they had the opportunity to wear PPE and tour the quarantine facility to understand their work environment. The breaches session commenced with an overview of what constitutes a PPE and IPC breach, presented site requirements, staff actions, and reporting in the case of a breach occurring, and then asked staff to suggest and allocate an IPC breach as being low, medium or high risk for COVID-19 disease transmission.

The breaches presented by staff were appraised in the same way they would be in practice by putting the disease characteristics and breach circumstances into context. Each breach was addressed with the staff group following this method in every training session. For example, a breach presented of a child pulling off a staff member's face mask and shield whilst they are being swabbed is assessed as a high risk in relation to exposing the staff to airway transmission, in comparison to a staff member adjusting their mask in the zone when they have had no direct contact with residents or zone surfaces which is comparably low risk. This session followed a risk management approach and was mapped to the IPC hierarchy presented by the Australian Commission of Safety and Quality in Healthcare (12). This project explored the breaches identified and rated in terms of risk by new quarantine staff to inform future IPC and PPE training.

Methods

The project team implemented the qualitative approach of descriptive thematic analysis and summative content analysis to identify the areas staff nominated as breaches

and their perceived level of risk (13). Staff responses (data) were collected from 30 orientation sessions conducted across April 2021- March 2022 in which staff placed handwritten breach examples on a poster in accordance with their interpretation of the breach as high, medium, or low risk for COVID-19 transmission. The posters were collected after each of the 30 sessions, and in total, 699 participants provided 603 breach risk responses/data for analysis.

A descriptive thematic analysis was firstly undertaken to identify the different types of breaches staff were presenting during their orientation session and identify those they were most focussed on/were most presented by staff. It was anticipated this would highlight specific areas to direct future education and training. This involved thematically analyzing all the breach examples staff had presented, identifying those most commonly cited, and creating themes for how these were represented in IPC practice. For example, donning and doffing PPE became one common theme, and interaction with residents was another.

A summative content analysis was then undertaken with the breach data to determine if the breaches staff identified were actually breached (and could lead to disease transmission) and if the level of risk staff allocated to the breach (high, medium, and low risk for disease transmission) was mapped to the actual risk of disease transmission. The researcher's analysis of the risk of transmission was based on the COVID-19 Series of National Guidelines, the hierarchy of controls in infection prevention and control, and other national COVID-19 guidelines (14). These evidence-based guidelines are prepared by the Communicable Diseases Network Australia and were considered the core guides to direct all practices (in clinical, quarantine, and primary health care settings) in relation to COVID-19. They clearly presented the transmission risks for COVID-19 in relation to the use of PPE and IPC practices and permitted the researchers to review the breaches presented by staff in their allocation of high, medium, and low risk for COVID-19 and determine if the breach was actually at this level of risk.

The 699 (N) participants in this project included experienced health staff (466n), defined as those who had formal health training, such as nurses, medical officers, and physiotherapists, and non-health staff (233n) commencing work as administration officers who, in the CNR workforce model would be working alongside the health workers with residents in quarantine and isolation. This latter cohort had no formal health training and was required to follow all site IPC directions and wear PPE. Each orientation session included between 20 to 70 participants with a mix of both experienced health staff and non-health staff training together. The allocation of staff to orientation sessions was random in relation to the numbers and experience of staff, reliant on the quarantine service staff number requirements and attrition levels. For example, initial site orientation sessions contained high numbers of around 70 participants, and this number decreased as staff levels were met.

Table 1. Participant numbers and role allocation in orientation breaches session

Health/Non-health staff	n (%)	Staff role	Total (n)
Non-health staff (Background of no formal health training)	233 (33.33)	Administration Officers (AO)	233
Health staff (Background of formal health training)	466 (66.66)	Registered Nurses (RN)	323
		Health Students (HS)	50
		Assistant in Nursing (AINs)	41
		Aboriginal Engagement Team (AET)	15
		Enrolled Nurses (ENs)	14
		Medical Officers (MO)	13
		Physiotherapists (PT)	7
		Pharmacists (P)	1
		Occupational Therapists (OT)	1
		Social Workers	1
Total			699

This project received ethical clearance, being deemed as a negligible risk by the Human Research Ethics Committee of the Northern Territory Department of Health and Menzies School of Health Research (HREC 2022-4412). Participant consent was not required as all staff responses on the posters were anonymous, and no information that could be linked to any individual was collected at any time in the project. The qualitative data analysis process was aligned and reviewed with the Consolidated dated criteria for Reporting Qualitative Research (COREQ) checklist and Standards for Reporting Qualitative Research (15, 16).

Results

The descriptive thematic analysis demonstrated there were a number of common areas continually identified for breach risks, and these were organized in alignment with their representation in practice. The most common breach staff were focused on was those associated with donning and/or doffing of PPE. The next common theme to emerge was breaches resulting from PPE resource malfunction. Less commonly cited by staff but still presenting as core themes for breaches in practice were those due to environmental factors such as impairment by weather elements, staff behaviors such as touching their face while donned, and resident behaviors including sneezing on or touching staff (Table 2).

Table 2. Five core areas staff identified as breach concerns with examples in practice

Breach area and number of times	Examples provided by quarantine staff
Donning and doffing of PPE (Total 314)	Unsafe or incomplete donning & doffing Incorrect or missed hand hygiene Failure of buddy(partnership) system Poor waste disposal of used PPE Inadequate or lack of cleaning of equipment when exiting the resident zone
Personal protective equipment (Total 148)	Failure or breakage of PPE Lack of PPE equipment Inappropriate PPE provided
Staff behaviours (Total 87)	Touching face in PPE Using phones in PPE (Raising phone to the face) Lack of awareness of zones (Entering an orange zone with no PPE)
Environmental factors (Total 31)	Weather- rain, humidity, extreme heat, and sweating compromising PPE integrity and IPC practices Site accidents or hazards
Resident behaviours (Total 23)	Touching staff Cough or sneezing on staff Young children's unpredictable behaviors

With the implementation of a content analysis to review the breaches staff identified in the orientation sessions, it became evident that new quarantine staff tended to rate all PPE breaches as high to medium risk for COVID-19 disease transmission. Content analysis results also demonstrated that the majority of high, medium, and low-risk allocations did not map to the actual risk of COVID-19 disease transmission; however, all entries were considered a breach (Table 3). For example, torn gloves were considered a high risk by staff in the sessions; however, contact transmission of COVID-19 is not identified as a high risk if the hands are not soiled and hand hygiene can be performed (13,14). Whereas a breach that exposes the staff to airborne disease transmission, such as a lost mask during viral screening (COVID-19 swabbing of residents), is a much higher risk (13, 14). Results have been sorted in alignment with their representation as occurring due to donning and/or doffing of PPE, due to PPE resource malfunction, due to environmental factors, staff behaviors, or resident behaviors.

Table 3. Core breach concerns cited by new quarantine staff demonstrating their allocation sessions as a high, medium, or low risk for transmission of COVID-19

Breach focus areas (5)	High	Medium	Low	Total
Donning and doffing of PPE	193	96	25	314
PPE resources	79	53	16	148
Staff behaviours	37	35	15	87
Environmental factors	18	8	5	31
Resident behaviors	17	3	3	23
Total	151	195	64	603

Discussion

As seen with COVID-19, an ineffective understanding of implementing IPC measures and PPE puts staff at risk of breaches, leading to disease transmission and community outbreaks. The five core areas identified by CNR staff during their orientation present a coherent foundation to base all breach IPC and PPE training. For example, in other health settings, patients' behavior can substitute resident behaviors, and breaches for this category can then be identified specifically to the patient type and risks encountered. The environmental factors can be adapted to include risks encountered at the health facility, including poorly ventilated rooms or the risk of overcrowded spaces. Those breaches aligned with PPE would primarily remain the same, as would the donning and doffing of PPE.

By definition, medium and high-level breaches are more likely to lead to COVID-19 transmission. Contact transmission is identified as medium to low risk, with any breach facilitating airborne transmission as the highest risk (17). However, it is deemed important that even low-level breaches are addressed, as any unmitigated IPC breaches can very quickly escalate to a high probability of transmission. Therefore, ensuring staff not only understand what constitutes a breach but what to do if a breach occurs can also influence the likelihood of transmission of COVID-19, irrespective of the level of risk.

Even though two-thirds of staff were trained in health, the majority of breaches identified by CNR staff were allocated to a high-level risk of COVID-19 transmission, which may indicate they had both a high level of anxiety associated with working in a COVID-19 quarantine facility and contracting COVID-19. Anxiety associated with being frontline workers during COVID-19 was well documented and experienced by many across the world, and it would, therefore, be reasonably applicable for this to affect staff at CNR (18, 19). The other aspect of many high-risk breach allocations could demonstrate a misunderstanding of risk analysis with disease transmission and indicate a knowledge gap. As the breach's allocation was anonymous, it is unable to be determined if these factors were linked to entries made by non-health workers as opposed to health workers, which presents a limitation in the findings. All breaches identified by staff were actual breaches, and this supports the education and training being effective in ensuring staff understood what constitutes an IPC breach.

Overall, the results from examining the breaches identified by new quarantine staff present the following considerations for IPC and PPE breach training: There are five core areas to focus breach training with new staff- donning and doffing PPE, PPE equipment, resident behaviors, environmental factors, and staff behaviors. Educators should anticipate knowledge deficits in relation to the actual risk of disease transmission from an IPC/PPE breach with both health and non-health staff.

Conclusion

Breaches of IPC and PPE are generally not focussed on in the literature, yet it is often breaches in practice, which leads to disease transmission and community cases (5). Examination of CNR's new staff's IPC concerns and knowledge deficits within the five core areas presented in this article offers a focus on IPC and PPE breaches training. This is particularly helpful in addressing factors new staff may perceive to be the biggest threats to themselves

in relation to disease transmission. It can help to reduce anxiety associated with working with communicable diseases. These outcomes can be transferable to other IPC and PPE training of staff required to work in spaces where there is a risk of communicable disease transmission.

Identifying IPC and PPE breaches relevant to the workplace directs where training should be focussed to increase staff confidence and safety in working with infectious diseases. It can also not be assumed that health staff will understand the actual level of risk a breach may present for disease transmission, and this should form a core part of breach education and training for infectious diseases. In any context, IPC and the use of PPE are required; it is proposed addressing potential breaches, inclusive of types, level of risk of transmission, mitigation, reporting, and consequences, forms a routine part of education and training. Staff will then understand more about a breach's significance and responsibilities.

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Conflicts of interest

The authors have no conflicts to declare.

References

1. Charles Darwin University. Section 1 Processes, infrastructure and communication: Work Health and Safety. Top End Academic Health Partners; 2023. Available at: https://quarantine-guide.cdu.edu.au/wp-content/uploads/2023/04/Section-1-Work-Health-and-Safety.pdf
2. Curtis SJ, Trewin A, McDermott K, Were K, Walczynski T, Notaras L, Walsh N. An outdoor hotel quarantine facility model in Australia: best practice with optimal outcomes. Australian and New Zealand Journal of Public Health. 2022 Oct 1;46(5):633-9.
3. Department of Finance. Centers For National Resilience. Australian Government; 2022. Available at: https://www.finance.gov.au/government/property-and-construction/centres-national-resilience
4. Batista B, Dickenson D, Gurski K, Kebe M, Rankin N. Minimizing disease spread on a quarantined cruise ship: A model of COVID-19 with asymptomatic infections. Mathematical Biosciences. 2020 Nov 1;329:108442.
5. COVID-19 Hotel Quarantine Inquiry. Final Report and Recommendations, Volume I Parl paper no. 191 (2018–2020). Australian Government; 2022. Available at: https://www.quarantineinquiry.vic.gov.au
6. Haire B, Gilbert GL, Kaldor JM, Hendrickx D, Dawson A, Williams JH. Experiences of risk in Australian hotel quarantine: A qualitative study. BMC Public Health. 2022 Dec;22(1):1-8.
7. Grout L, Katar A, Ouakrim DA, Summers JA, Kvalsvig A, Baker MG, Blakely T, Wilson N. Estimating the failure risk of hotel-based quarantine for preventing COVID-19 outbreaks in Australia and New Zealand. medRxiv. 2021 Feb 19:2021-02....
8. Harris H, Vermeulen L, Shaw K. Mandatory, supervised quarantine of international travellers: Experience from the Centre for National Resilience, Australia. RACMA Quarterly Journal. Q1 2022.
9. World Health Organization (WHO). Infection prevention and control. Health Topics; 2022. Available at: https://www.who.int/health-topics/infection-prevention-and-control#tab=tab
10. Clinical Excellence Commission. COVID-19 Infection Prevention and Control Manual Version 2.5, 2022 Sept 20. New South Wales Government (NSW); 2022. Available at: https://www.cec.health.nsw.gov.au/__data/assets/pdf_file/0018/644004/COVID-19-IPAC-manual.pdf
11. Liow MH, Lee LC, Tan NC, Tan HK, Chow W, Wee GL, Wong SH, Paramasivam J, Tan K, Ling ML. Personal protective equipment training for non-healthcare workers in the Covid-19 pandemic: Effectiveness of an evidence-based skills training framework. Infection, Disease & Health. 2022 Feb 1;27(1):38-48.
12. Australian Commission of Safety and Quality in Healthcare. Use of the hierarchy of controls in infection prevention and control–Factsheet; 2022. Available at: https://www.safetyandquality.gov.au/publications-and-resources/resource-library/use-hierarchy-controls-infection-prevention-and-control-factsheet
13. Vaismoradi M, Turunen H, Bondas T. Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study.

Nursing & Health Sciences. 2013 Sep;15(3):398-405.
14. Communicable Diseases Network Australia (CDNA). Coronavirus Disease Series of National Guidelines, 2022. Australian Government, Department of Health; 2022. Available at: https://www1.health.gov.au/internet/main/publishing.nsf/Content/cdna-song-novel-coronavirus.htm
15. O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. Academic Medicine. 2014 Sep 1;89(9):1245-51.
16. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. International journal for quality in health care. 2007 Dec 1;19(6):349-57.
17. Australian Government. Minimising the risk of infectious respiratory disease transmission in the context of COVID-19: The hierarchy of controls; 2022. Available at: https://www.health.gov.au/sites/default/files/documents/2021/07/minimising-the-risk-of-infectious-respiratory-disease-transmission-in-the-context-of-covid-19-the-hierarchy-of-controls.pdf.
18. Bagcchi S. Stigma during the COVID-19 pandemic. The Lancet Infectious Diseases. 2020 Jul 1;20(7):782.
Molina-Mula J, González-Trujillo A, Perelló-Campaner C, Tortosa-Espínola S, Tera-Donoso J, De la Rosa LO, Romero-Franco N. The emotional impact of COVID-19 on Spanish nurses and potential strategies to reduce it. Collegian. 2022 Jun 1;29(3):296-310.