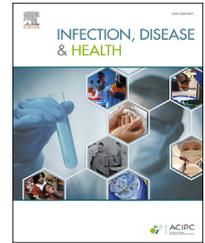


Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

journal homepage: <http://www.journals.elsevier.com/infection-disease-and-health/>

## Review

# Religious influences on infection prevention and control practices in healthcare settings: A scoping review

Matt Mason <sup>a,b,\*</sup>, Jacinta Wakefield <sup>a</sup>, Vanessa Sparke <sup>c</sup>,  
Jocelyne M. Basseal <sup>d</sup>, Peta-Anne Zimmerman <sup>e,b,f</sup>

<sup>a</sup> School of Health, University of the Sunshine Coast, Queensland, Australia

<sup>b</sup> Collaborative for the Advancement of Infection Prevention and Control, Queensland, Australia

<sup>c</sup> College of Healthcare Sciences, James Cook University, Queensland, Australia

<sup>d</sup> Sydney Infectious Diseases Institute, Faculty of Medicine and Health, University of Sydney, Sydney, Australia

<sup>e</sup> School of Nursing and Midwifery, Griffith University, Gold Coast, Queensland, Australia

<sup>f</sup> Infection Control Department, Gold Coast Health, Gold Coast, Queensland, Australia

Received 9 December 2024; received in revised form 20 February 2025; accepted 20 February 2025

Available online 12 March 2025

## KEYWORDS

Infection prevention and control (IPC);  
Religion;  
Healthcare-associated infections;  
Hand hygiene;  
Bare below the elbow

**Abstract** *Background:* Healthcare-associated infections pose a significant global health challenge. While evidence-based infection prevention and control (IPC) interventions are widely implemented, their implementation may be influenced by religious factors. This scoping review aimed to examine the religious factors that influence IPC practices among healthcare providers.

*Method:* A systematic search was conducted in CINAHL, Emcare, Scopus, and Web of Science databases. Given the anticipated paucity of literature, there were no date limiters. Articles demonstrating a direct relationship between religion and IPC practices in healthcare settings were included. Data extraction and quality appraisal were performed independently by multiple researchers.

*Results:* Thirteen articles met the inclusion criteria. Three main themes emerged: 1) religious rituals and influence, 2) use of alcohol, and 3) “bare below the elbows” principle. Religious practices were found to act as both enablers and barriers to IPC compliance. The use of alcohol-based hand rubs presented challenges for some religious groups, while religious dress codes conflicted with the “bare below the elbows” principle.

*Conclusion:* This review highlights the complex interplay between religion and IPC practices. Findings suggest the need for culturally sensitive IPC strategies that respect religious beliefs while maintaining effective IPC measures. Further research is needed to develop inclusive policies and educational programs that address these religious factors in healthcare settings.

\* Corresponding author. School of Health, University of the Sunshine Coast, Sippy Downs, Queensland, 4556, Australia.

E-mail addresses: [mmason1@usc.edu.au](mailto:mmason1@usc.edu.au) (M. Mason), [j\\_w216@student.usc.edu.au](mailto:j_w216@student.usc.edu.au) (J. Wakefield), [vanessa.sparke1@jcu.edu.au](mailto:vanessa.sparke1@jcu.edu.au) (V. Sparke), [jocelyne.basseal@sydney.edu.au](mailto:jocelyne.basseal@sydney.edu.au) (J.M. Basseal), [p.zimmerman@griffith.edu.au](mailto:p.zimmerman@griffith.edu.au) (P.-A. Zimmerman).

© 2025 The Author(s). Published by Elsevier B.V. on behalf of Australasian College for Infection Prevention and Control. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

### Highlights

- Religious practices can enable or hinder IPC compliance, with cleanliness rituals potentially supporting hand hygiene.
- Alcohol-based hand rubs challenge some religious groups despite approval from religious leaders for medical use.
- "Bare below elbows" conflicts with religious dress codes, particularly for Muslim women in surgical roles.
- Religious hand washing rituals may reinforce hygiene compliance among healthcare workers.
- Familiarity with coverings in Muslim cultures may facilitate PPE adoption among Muslim healthcare workers.

## Introduction

Healthcare-associated infections (HAIs) pose a significant global health challenge, resulting in increased morbidity, mortality, and healthcare costs [1]. Effective infection prevention and control (IPC) practices are crucial to mitigating this burden [2]. While evidence-based IPC interventions have been widely implemented, their efficacy can be influenced by a complex interplay of factors, including religious and cultural beliefs and practices [3].

Religion and culture shape individuals' perceptions of health, illness, and the body, which in turn influence their attitudes towards healthcare and disease prevention [4]. These beliefs can act as both barriers and enablers to IPC practices. Certain religious rituals or associated cultural practices may increase the risk of infection transmission, while others may promote hygiene and cleanliness. Understanding these dynamics is essential for developing culturally sensitive IPC strategies that are effective in diverse healthcare settings.

Previous research has highlighted the importance of considering cultural factors in IPC interventions [3]. However, the specific role of religion in shaping IPC behaviours remains under-explored. By identifying both barriers and enablers, this research seeks to contribute to the development of culturally appropriate IPC interventions that can improve patient outcomes and reduce the incidence of HAIs.

This study aims to address this gap by examining the religious factors that influence IPC practices among healthcare providers in currently published literature.

## Methodology

### Design

A systematic scoping review was designed to answer the research aim using the methodology of Arksey and O'Malley [5] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [6]. For this

review we operationally defined religion in accordance with the definition of the Australian Bureau of Statistics (ABS) 'a set of beliefs and practices involving the acknowledgement of a divine or higher being or power, where people practically and morally conduct their lives' [7] and as such, focussed on five religions that are most representative of the population (Christianity, Buddhism, Hinduism, Islam and Judaism).

### Search strategy and data collection

We conducted a comprehensive search of four databases from June 2024 until August 2024: CINAHL, Emcare, Scopus, and Web of Science with no date limiters. The search utilised terms such as 'infection prevention', 'infection control', 'healthcare', 'religion', combined with the Boolean operator AND, shown in Table 1. The selection of religions in the search were guided by the literature including the use of "Christian" to cover all denominations therein. After duplicate removal the title and abstract screening, along with the full-text review, were conducted independently by two researchers (MM and JW) using Covidence (<https://www.covidence.org/>). In instances of conflict, a third researcher (PZ) provided the final determination. Citation and reference checking was undertaken of the articles identified for extraction. This was undertaken manually and through the ResearchRabbit (<https://researchrabbitapp.com/home>) and citationchaser (<https://estech.shinyapps.io/citationchaser/>) platforms.

### Inclusion and exclusion criteria

Articles published in the English language and peer-reviewed were included in the initial title and abstract screening. Articles demonstrating a direct relationship between religion and IPC practices were selected, encompassing all methodologies in the initial screening. Excluded materials included abstract-only articles, unpublished dissertations and theses, grey literature, book chapters, and articles not set in healthcare contexts (Table 2).

**Table 1** Search term exemplars.

Infection prevention AND relig*
Infection prevention AND relig* AND barriers
Infection prevention AND relig* AND enablers
Infection prevention AND relig* AND healthcare
Infection prevention AND Christian* AND healthcare
Infection prevention AND Buddhism AND healthcare
Infection prevention AND Judaism AND healthcare
Infection prevention AND Hinduism AND healthcare
Infection prevention AND Islam AND healthcare
Infection prevention AND Muslim AND healthcare
Infection control AND relig*
Infection control AND relig* AND barriers
Infection control AND relig* AND enablers
Infection control AND relig* AND healthcare
Infection control AND Christian* AND healthcare
Infection control AND Buddhism AND healthcare
Infection control AND Judaism AND healthcare
Infection control AND Hinduism AND healthcare
Infection control AND Islam AND healthcare
Infection control AND Muslim AND healthcare

## Data extraction and synthesis

Our data extraction followed the data charting process described by Arksey and O'Malley [5] with specific content sought, particularly concepts surrounding the effect of religion on IPC in healthcare. Information extracted from each paper included: author(s), year of publication, study location, study aim/purpose, methodology, population/sample size, religious barriers/enablers, and study findings. One researcher (JW) performed the data extraction in Covidence (<https://www.covidence.org/>) and confirmed by another (JB), with results presented in the data extraction table, Table 3. These concepts were then synthesised to provide a narrative of the findings across all included articles.

Quality appraisal of the included articles was conducted using the Mixed Methods Assessment Tool (MMAT) [8] as it allows for a variety of study types to be included in its assessment. The MMAT is reported to have high interrater reliability with scores ranging from moderate to perfect [8]. The included studies were appraised independently (JW & PZ) with discussion amongst the full research team in the event of disagreement. Results of the quality appraisal are included in Table 3.

## Results

Thirteen articles met inclusion criteria for the final review, one qualitative, 10 quantitative, and two literature reviews (Fig. 1). All included articles were published between 2009 and 2024, with most published between 2019 and 2023. Approximately half of the articles were from predominantly Muslim countries: United Arab Emirates  $n = 3$ , Iran  $n = 2$ , Libya and Lebanon (one each). Other origins of the articles were The United Kingdom  $n = 2$ , and one each for Switzerland, Brazil, Uganda, and Zambia.

A total of seven articles focused on IPC practices such as hand hygiene (HH), which includes hand washing and the use of alcohol-based handrub (ABHR). Other articles focused on the principle of "bare below the elbows", COVID-19 personal protective equipment (PPE) usage, and vaccine uptake with two articles each. Most of the articles were cross sectional questionnaires that relied on self-reports from the participants ( $n = 10$ ). There was a primary focus on Islam with four comparing the practices of Christian and Muslim healthcare workers (HCWs).

The articles were predominately hospital based with most articles ( $n = 9$ ) focusing on nurses and physicians working in private and public healthcare. Medical staff (including surgeons), allied health staff, and lab technicians were featured, with pharmacology students, pharmacists, paramedics, and dentists being focused on once.

The themes emerging from the literature that identify the religious and cultural factors that influence IPC practices among healthcare providers included: 1) religious rituals and influence, 2) use of alcohol, and 3) "bare below the elbows".

### Religious rituals and influence

Several studies have identified religious practices as potential enablers of HH compliance among adherents of various faiths. In Judaism, hand washing is an established ritual practice [9–11]. Islamic teachings, as outlined in the Quran, mandate hand washing before prayer and emphasize general cleanliness [11]. Christianity similarly incorporates HH into religious practices, requiring hand washing before the consecration of bread and wine and prior to handling holy oil [11]. Christianity was reported to also have a positive influence on knowledge, attitude, and practice in one study of Zambian undergraduate pharmacy students, though the sample of religions other than Christian were very small [12]. In Buddhist traditions, hand washing is a ritual practice [10]. These religiously

**Table 2** Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
Language: English	Duplicates
Year/s: No limiters	Abstract only articles
Setting: Healthcare delivery	Unpublished dissertations and theses
Participants: Healthcare workers	Grey literature
Types of evidence: All types of evidence with title, abstract, and full text returned by the databases (Fig. 1)	Book chapters
Context: Impact of religious influence on IPC practice	

**Table 3** Data extraction table.

Author (Year) Country	Aim/purpose	Methodology/ methods	Population/ sample size	IPC Religious Barrier/Enablers	Outcomes	Key findings/ recommendations as it relates to the review question	Limitations/MMAT
<b>Allegranzi et al. (2009) Switzerland</b>	Explore potential influence of cultural and religious factors on attitudes towards HH practices	Literature review followed by consultation with religious leaders Formal consensus process with experts prior to publication	27 articles included in review	Barrier: Concept of 'visibly dirty' and feeling unclean may promote hand washing instead of use of ABHR. Enabler: Hand washing promoted in some religions for ritualistic reasons and cleanliness (does not necessarily correlate with IPC purposes however).	Hand washing versus ABHR appeared to be the major differentiation. Whilst some religions prohibit alcohol use, most take a pragmatic approach and can see the greater good in healthcare. Individuals within these religions still may choose not to use ABHR as it is against their beliefs.	In HH promotion campaigns in health care settings in which religions prohibiting the use of alcohol are represented, educational strategies should allow health Care workers to openly raise their concerns regarding the use of alcohol-based hand rubs, help them understand the scientific evidence underlying this recommendation, and identify possible solutions to overcome obstacles	Only the most widely represented religions were considered in the review MMAT not used: Literature review
<b>Abufeddeh et al. (2023) United Arab Emirates</b>	To explore the predictors of COVID-19 pandemic practices among HCPs	Descriptive, cross sectional design survey Cohen's table to calculate sample size Demographics data questionnaire and knowledge, attitudes and practices (KAP) towards COVID-19 survey	HCPs at Abu Dhabi hospitals who provide direct patient care including physicians, nurses, and paramedics. 290 participants	Barrier: traditional and cultural practices may result in religious individuals (Muslims) undertaking COVID-19 practices at lower levels	Statistically significant difference in practices based on participant's religion. Findings consistent with other similar studies	Christians outperformed Muslims, 14 % variance, with higher levels of compliance to COVID -19 practices including HH, physical distancing, and PPE use	Convenience sample – generalisability Self-reported data Criteria 4.2 and 4.4 for quantitative descriptive studies not met

*(continued on next page)*

Table 3 (continued)

Author (Year) Country	Aim/purpose	Methodology/ methods	Population/ sample size	IPC Religious Barrier/Enablers	Outcomes	Key findings/ recommendations as it relates to the review question	Limitations/MMAT
<b>de Oliveira (2014) Brazil</b>	Conduct a reflection about possible factors, documented in several regions of the world, related to the low adherence to the HH in healthcare	Reflexive study on published articles written in English, Spanish, and Portuguese	HCWs and HCPs in healthcare	Enabler: Jewish HH ritual enables HH Barrier: Buddhism, Hinduism, Islamism there is the prohibition of alcohol use. Islamic people allowed use of alcohol in medicinal products in 2002, however some still refuse, fear of absorption into skin or inhalation	Jewish have better HH Buddhism, Hinduism, Islamism refuse to use alcohol, however further research is required	Factors that lead to low HH adherence fall under categories of materials, behavioural and institutional. Health facilities must work on material and institutional factors and also consider the HCW behavioural habits when conducting interventions to improve HH.	Reflexive study MMAT not used: Literature review
<b>Hwisa (2013) Libya</b>	Analyse the incidence of 2009-10 pandemic influenza A vaccination among Libyan HCPs	Cross sectional retrospective study Questionnaire	HCP from four tertiary care hospitals of Al-Zawia, Libya, including physicians, surgeons, nurses, technicians, pharmacists, cleaning personnel 268 participants	Barrier: Religious beliefs resulted in not getting the vaccine	Of 268 respondents, only 107 agreed to receive vaccination. Of those, 10 % (7 respondents) of physicians and 15 % (13 respondents) of other staff cited religious beliefs for avoiding influenza vaccine	Religious beliefs influence decisions about vaccination. Campaigns to address knowledge gaps and promote the uptake of vaccination should commence immediately though mass media to overcome religious obstacles.	Small sample size and low response rate may have resulted in some bias Religious beliefs not described Criteria 4.2 and 4.4 for quantitative descriptive studies not met
<b>Jones (2013) UK</b>	Examine how reasons and challenges of implementing changes to NHS uniform policy, were discussed in	Language analysis using concordance lines.	78 comments from the nursing times and 27 rapid responses from the BMJ	Barrier: Clothing (the BBE policy)	Islamic beliefs conflict with expected IPC regulations	Infection control should adapt workwear for individual requirements Muslim nurses can't wear long	More research needed – only on 2 studies Evidence is comments Web based All criteria for

<p><b>Limenyande (2023) Uganda</b></p>	<p>online commentary within a medical and a nursing journal. To identify the factors associated with IPC compliance among HCW's while providing care to patients during the COVID-19 pandemic</p>	<p>Cross sectional study. Purposive sampling of HCF located in Nakawa division, Kampala city. Randomised selection of HCW participants from all departments within facilities.</p>	<p>Healthcare facilities, only government and private not for profit were considered. Excl. Private for profit, police investigation and justice related facilities, and ones serving military 240 respondents nurses, doctors, clinical officers, lab techs, interns</p>	<p>Enabler: Being Muslim and female enables mask wearing as are already used to wearing coverings</p>	<p>Muslims were more compliant 82.6 % reported mask wearing while interacting with patients and 45 % with gloves, 50 % with HH compliance, and 32 % with overall IPC 58 % Catholics were compliant with use of mask and 32 % compliant with gloves, 48 % with HH compliance, 20 % overall IPC 69 % 'other' were compliant with masks and 29 % compliant with gloves, 58 % HH and 12 % overall compliance</p>	<p>sleeves yet nurses can wear cardigans when not engaging in clinical care Muslims were more compliant with mask wearing when caring for COVID-19 patients than other religions. However this was not significantly seen for HH or glove use.</p>	<p>qualitative studies met  Self reported compliance. Didn't include support staff such as cleaners. Limited to one area therefore results may not be generalisable. Doesn't define what 'other' religion is. Criteria 4.2 and 4.4 for quantitative descriptive studies not met</p>
<p><b>Malik et al. (2019) United Kingdom</b></p>	<p>Explore impact of workplace dress code policies and guidance that may influence inclusivity and opportunities in the workplace</p>	<p>Quantitative self-comparison cross-sectional survey Survey focused on experiences of Muslim women wearing the headscarf in theatre, and views on BBE policy</p>	<p>Pilot study of 5 participants to test survey followed by 84 female Muslim medical professionals who attended the Muslim women excelling in Islam and medicine conference in 2016</p>	<p>Enabler: Disposable sleeves</p>	<p>The majority of participants agreed that wearing the headscarf was important for themselves and their Religious beliefs (94.1 %), yet over half (51.5 %) experienced problems trying to</p>	<p>The women felt embarrassed while wearing a head covering, many weren't happy with their BBE policy Participants avoided compromising on religious belief and deterring negative feelings</p>	<p>Small opportunistic sample size. Not all questions were responded to. Unvalidated instrument used. Criteria 4.4 for quantitative descriptive studies not met.</p>

(continued on next page)

Table 3 (continued)

Author (Year) Country	Aim/purpose	Methodology/ methods	Population/ sample size	IPC Religious Barrier/Enablers	Outcomes	Key findings/ recommendations as it relates to the review question	Limitations/MMAT
					wear a headscarf in theatre; some women felt embarrassed (23.4 %), anxious (37.1 %) and bullied (36.5 %). The majority of respondents (56.3 %) felt their religious requirement to cover their arms was not respected by their trust, with nearly three-quarters (74.1 %) of respondents not happy with their trust's BBE uniform policy alternative.	by evading attending theatre and choosing not to pursue a surgical career. Other findings indicated that some Muslim women considered leaving their post over these issues All staff should be trained in strategies to reduce conscious and unconscious biases, stereotypes and discriminatory behaviour. Theatre managers need to be made aware of the importance of headscarf provision for Muslim women.	
<b>Mudenda (2023) Zambia</b>	To assess knowledge, attitudes and practices of IPC among undergraduate pharmacy students in Zambia	Cross sectional study Structured KAP questionnaire	Random sample across second, third, fourth and fifth year students at university of Zambia enrolled in the Bachelor of pharmacy 290 students	Enabler: Being Christian may be associated with higher levels of knowledgeable	p-value of 0.04 shows great significance between knowledge of Christians and other religions (Muslims and other) Attitude is similar and the practice is the same	Christians were more likely to be knowledgeable in IPC than Muslims or other religions. There is a need to provide awareness programs to students with an emphasis on areas where gaps are found.	Self reported questionnaire Only conducted on one university in Zambia Criteria 4.4 for quantitative descriptive studies not met

<b>Nematian (2017) Iran</b>	Compare knowledge of nurses HH, and self-reporting of HH with observation of HH in a hospital in Iran	Direct observation of HH compliance according to WHO methodology followed by HH knowledge survey and self-reported practice questionnaire	Nurses in the Shiraz Nemazee Hospital, Iran 1150 HH observations were made and 116 nurses were surveyed	Barrier: Muslim concept of <i>Najis</i> (using ABHR being impure) is a barrier to HH	Overall compliance was poor (39.16 %). 16 % of nurses believed using alcohol-based hand rub would make their hands <i>Najis</i> 23.6 % cited religious conflict through inhalation or absorption Almost 25 % said it conflicted with religion but most still complied	Despite religious conflict with ABHR, many nurses stated that neither inhalation nor skin absorption of alcohol posed a religious concern for Muslims. Majority said that products would cause skin dryness and damage. Acceptability by religion needed	Self-report and observations are accurate All criteria for quantitative descriptive studies met
<b>Khuan et al. (2018) United Arab Emirates</b>	1) Explore the TPB variables and religious and cultural beliefs on HCWs and Islamic scholars that influence their HH behaviours 2) Determine whether religious and cultural beliefs and TPB variables predict HH behaviours amongst HCW	Mix methods design Phase 1 – Interviews with key informants and stakeholders which informed Phase 2 - Cross sectional on-line survey using modified TBP survey instrument	Tertiary healthcare facility in Abu Dhabi Phase 1–10 participants incl. HCW and scholars. Phase 2 -349 respondents (nurses, medical staff, allied health staff)	Enablers:- HH was a fundamental tenant of Islam – Islam and Christian bible mention cleanliness - ABHR are permitted as its halal - According to Islamic Authority HH is encouraged b/c it protects others from harm and is a virtuous deed	More cultural belief to not use ABHR – Muslim League has permitted the use	HH is important to maintain cleanliness. HCWs compliance with ABHR relies largely on cultural beliefs, religious belief not a significant predictor. Main barrier for HH was non-accessibility of sinks and ABHR	Convenience sampling Low allied health response rate Socially desirable responding All criteria for quantitative descriptive studies met
<b>Ng (2019) United Arab Emirates</b>	Examine the extent to which religion-relevant culturally specific interventions influenced HCW's HH beliefs about and compliance with ABHR use	Cohort study design (intervention and control group) Cross sectional survey and audit	Tertiary healthcare facility in Abu Dhabi 199 HCW respondents – nursing, medical and allied health staff	Barrier: some Muslims aren't willing to use ABHR Enabler: Muslim world league permits medical use of alcohol	Mean overt ABHR compliance was significantly higher in the intervention group than in the control group. Intervention group has 7.5 % higher religious belief score. 25 % nurses	Introducing religion-relevant interventions positively influences compliance with ABHR use	Doesn't represent population HH compliance Overt observation may increase risk of error selection bias Criteria 3.4 for non-randomised studies not met

(continued on next page)

Table 3 (continued)

Author (Year) Country	Aim/purpose	Methodology/ methods	Population/ sample size	IPC Religious Barrier/Enablers	Outcomes	Key findings/ recommendations as it relates to the review question	Limitations/MMAT
<b>Shiraly et al. (2021) Iran</b>	Aimed to assess Iranian Muslim nurses' beliefs and self-reported practices with regard to alcohol-based hand rubs.	Cross-sectional study Self-reported questionnaire	374 Muslim nurses with minimum of one year work experience in Namazi hospital, Southern Iran	Enabler: most Muslim nurses believe ABHRs are permitted and using it will not go against religious beliefs	concerned about inhalation, 27 % concerned about absorption A minority of Muslim nurses thought that the use of ABHR is religiously forbidden due to cutaneous (14.7 %) and respiratory (15.8 %) absorption. One-third of nurses were concerned about skin irritation. More than half used ABHR always or most of the time during their practice.	The practice of HH with alcohol-containing hand rubs is common among Iranian Muslim nurses and is not influenced by their religious beliefs toward alcohol. HH training courses might have a positive impact on nurses' practice in regard to ABHR. Consistent with other studies.	Single-centre cross-sectional study, therefore difficult to generalise across all Iranian Muslim nurses. Criteria 4.4 for quantitative descriptive studies not met
<b>Youssef et al. (2023) Lebanon</b>	Explore the COVID-19 vaccine acceptance and refusal among HCW in Lebanon	Selective sampling Cross-sectional survey using Qualtrics distributed via digital communication forums across 9 different hospitals	Target population were all HCW including physicians, residents, fellows, medical students, nurses (practical and registered nurses), dietitians, dentists, optometrists, psychologists, respiratory therapists,	Neither barrier or enabler discussed	No difference in religion willingness to take vaccine	Vaccine acceptance: Christian: 90 % Muslim 84 % None: 92 % Other: 90 % Prefer not to say: 83 % no significant findings concerning the impact of religion on willingness to take the vaccine, refusal mainly lack	Wasn't able to calculate response rate Results may not be generalisable Examined intent to vaccine Lebanon mainly French spoken and survey in English or Arabic May have social desirability bias Criteria 3.4 for

physical therapists, occupational therapists, behavioural therapists, social workers, infection control workers, pharmacists, laboratory and radiology technicians, research assistants and coordinators, and administrative personnel.  
879 respondents

of trust in vaccine and vaccine developers. Christians are mainly Catholics in Lebanon

non-randomised studies not met

ABHR – Alcohol based hand rub.  
BBE – Bare Below the Elbows.  
HCF – Healthcare Facilities.  
HCP – Healthcare Professionals.  
HCW – Healthcare workers.  
HH – Hand Hygiene.  
IPC – Infection prevention and control.  
KAP – Knowledge, attitudes and practices.  
TBP – Theory of Planned Behaviour.

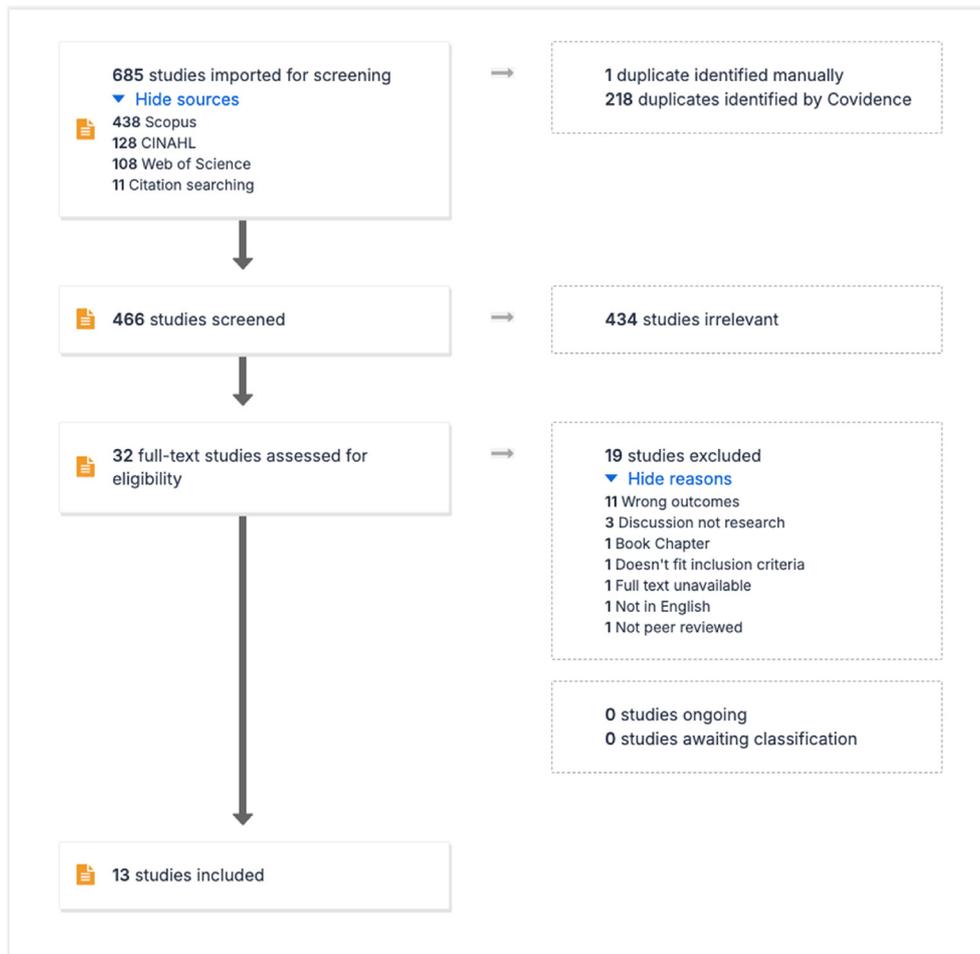


Fig. 1 PRISMA (Page et al., 2021).

motivated hygiene practices, integrated into daily routines, may serve to promote and reinforce HH compliance among religious individuals.

Similarly, the wearing of PPE, such as masks, was found to be something that was enabled by the frequent use of face and head coverings, particularly in the Muslim HCW population [13,14]. From the sourced articles only two addressed vaccine hesitancy, specific to H1N1 influenza and COVID-19, with both indicating religion was either a small or insignificant factor to uptake in the healthcare workforce [15,16]. Hwisa and colleagues' (2013) [15] study in Libya reported a small number (20/161, 12.42 %) of HCWs who claimed religious beliefs as a barrier to pandemic H1N1 vaccination, similar to the number who identified no reason at all (19/161, 11.8 %) with no statistical significance identified.

### Use of alcohol

Religions such as Islam (Quran Surah Al-Ma'idah, verse 90) and Hinduism (Manusmriti, verse 11.90) prohibit the use of alcohol believing alcohol reduces self-awareness and poor behaviour. Alcohol is prohibited recreationally; however, is allowed in medical situations involving therapies and general medical situations. Buddhism, Hinduism, and Islamism all prohibit the recreational use of alcohol, yet have permitted alcohol in medical products since 2002 [9,10]. Although

alcohol has been permitted for medical use, not all HCW who practise these faiths are comfortable with using alcohol as they fear inhalation or any absorption that may occur via their skin [10,17]. Najis, an Islamic concept, views ABHRs as impure, reportedly reducing the compliance of Muslim HCWs [11,18], although the Muslim World League permits medical alcohol use making it halal and its use is encouraged [11,19,20]. Generally, the use of ABHRs conflict with certain religious individuals; however, they continue to support ABHRs for medical use. This religious barrier conflicts with IPC practices as ABHRs are used less due to fear of breaching their own religious beliefs. This is a reoccurring barrier as it has been a topic of discussion in many articles with emphasis on the Islamic community.

### "Bare below the elbows"

The principle of "bare below the elbows" is implemented to reduce the risk of infection associated with HCWs wearing items below the elbow [21]. However, this principle may conflict with Islamic dress codes for women who choose to cover their arms and wear modest attire [21]. To adhere to their religious beliefs while following correct IPC practice, some HCWs use single-use sleeves or oversleeves [13]. This practice has been perceived to be a barrier to IPC due to concerns that such sleeves could facilitate pathogen

transmission. Consequently, “bare below the elbows” practice has reportedly led to a decrease in the number of Islamic women in surgical roles as women cite feelings of discomfort, anxiety, or embarrassment due to their choice to dress according to their beliefs [13].

## Discussion

The influence that religion and culture have on healthcare practices and beliefs is documented broadly in the literature, however this review examined the under-explored concept of religious influences on IPC practice. This review identified only 13 articles which specifically reported religious influences on IPC practice which, despite the broad search criteria, suggests that within the scope of available evidence religion may not be as influential as commonly perceived. Three recurring themes were identified: 1) religious rituals and influence, 2) use of alcohol for healthcare practice, and 3) clothing practices which impact on the principle of ‘bare below the elbows’. Despite the common rhetoric around religious beliefs being a barrier to IPC practice, this review found that religious beliefs could act as both enablers and barriers.

The focus on HH awareness in contemporary healthcare came to the fore when the WHO launched their ‘Save Lives: Clean your Hands’ annual global campaign in 2009. The annual event aims to raise HH awareness and improve HH compliance across healthcare organisations, moving HH to point of care use, elevating the profile of ABHR [22]. Since then, the prohibition of the consumption of alcohol in some religions, such as Islam, Buddhism, and Hinduism, has fuelled the rhetoric around its use in healthcare [9]. However, despite alcohol being prohibited recreationally, leaders of these religious groups allow it to be used for medical purposes and it is only some individual HCW themselves who have conflict with its use [10]. Many religions endorse HH to promote cleanliness prior to religious rituals which can positively influence practice in broader daily activities, including the role of HCW [9].

The principle of “bare below the elbows” is linked with good HH practices, with the notion that long sleeves hinder effective HH practices and act as a potential mode of microbial transmission [23]. Yet this practice can be at odds with religious observances. Many countries around the world have implemented “bare below the elbows” as part of their HH guidelines without consideration for HCWs who observe religious clothing practices. Mandating “bare below the elbows” in health facilities prevents some female HCWs from entering specialty fields such as surgery due to embarrassment and uneasiness about not following their beliefs, despite the availability of single-use oversleeves [13]. Conversely, familiarity with facial and head coverings in the form of Hijabs, enables the use of PPE in many Muslim HCWs.

## Implications

This study effectively identifies both barriers and enablers to IPC compliance. It highlights the challenges posed by religious beliefs, such as perceived restrictions on alcohol use and dress codes, while also recognizing enablers like religious rituals that promote cleanliness. This balanced

perspective is crucial for developing effective, culturally sensitive IPC strategies. The findings have direct implications for healthcare practice and policy, enabling healthcare institutions to design more inclusive policies and educational programs that respect religious and cultural beliefs while promoting effective IPC measures. By focusing on an underexplored area, the research contributes to a deeper understanding of the complex interplay between religion and healthcare delivery practices.

The findings regarding the use of ABHR in IPC highlight significant implications for practice, policy, and research, particularly in Muslim-majority contexts. Firstly, the acceptance of ABHR by Muslim leaders for IPC purposes can serve as a powerful teaching tool within healthcare settings. This understanding can be leveraged to educate HCWs and the broader community about the importance of HH in preventing transmission of infectious pathogens. By integrating this knowledge into training programs, hospitals in Muslim countries can reinforce the message that adherence to IPC practices, including the use of ABHR, aligns with both religious teachings and public health goals. Consequently, this could lead to more robust IPC policies that explicitly include ABHR as a standard practice, thereby enhancing overall patient safety and care quality.

Secondly, the misalignment between operating theatre dress codes and the religious dress observances of Muslim female doctors poses a significant barrier to their participation in surgical careers. The requirement for “bare below the elbows” conflicts with the cultural and religious practices of many Muslim women, who may feel uncomfortable or excluded from surgical roles due to these dress codes. This situation not only limits their professional opportunities but also affects the diversity and inclusivity of the surgical workforce. Addressing this issue requires a reevaluation of dress policies in healthcare settings to accommodate religious attire while maintaining IPC standards. By fostering an inclusive environment that respects religious beliefs, healthcare institutions can encourage more Muslim women to pursue surgical careers, ultimately enriching the field with diverse perspectives and experiences. Similarly, establishing culturally responsive institutional protocols to raise awareness of cultural norms have been suggested for Muslim women in the field of Australian physiotherapy [24].

Lastly, the need for tailored IPC education for various religious groups is paramount. The findings suggest that different religious beliefs can influence compliance with IPC practices, indicating a gap in understanding and acceptance. Whilst there have been advances recently in the design of personal protective equipment to accommodate religious and cultural practices of healthcare workers [25], there also is a need for developing culturally sensitive educational programs to address the specific concerns of different faith communities that enhance compliance with IPC measures. Such initiatives should focus on clarifying misconceptions about practices like ABHR and promoting the religious significance of hygiene and cleanliness. By fostering dialogue between healthcare providers and religious leaders, these educational efforts can bridge the gap between religious beliefs and effective IPC practices, leading to improved health outcomes across diverse populations.

In summary, these implications underscore the importance of integrating cultural and religious considerations into IPC practices, policies, and educational frameworks to enhance compliance and promote a more inclusive healthcare environment.

### Strengths and limitations

This scoping review demonstrates several strengths. It employs a comprehensive scoping review methodology, which is thorough and inclusive, allowing for a broad examination of existing literature and ensuring the reliability and validity of the findings. This enhances the credibility and relevance of the research, providing valuable insights for improving IPC practices in diverse healthcare settings.

One of the primary limitations of the scoping review is the limited number of studies included, with only thirteen articles meeting the inclusion criteria. This small sample size restricts the generalizability of the findings and highlights the need for more extensive research on the impact of religious beliefs on IPC practices. Additionally, the studies included in the review were geographically confined to specific regions, such as the United Arab Emirates, Iran, and the United Kingdom, which may not represent the experiences of HCWs in other parts of the world. The potential for geographic and cultural biases in the findings suggests that further research is needed to capture a more comprehensive and diverse range of experiences.

Another limitation is the reliance on self-reported data from HCWs, which introduces the possibility of response bias. Participants may have underreported or overreported their compliance with IPC practices due to social desirability or fear of judgment. The review also acknowledges the potential for selection bias, as the studies included may not fully represent the broader population of HCWs such as cleaners or maintenance staff, or in significant sample sizes. Additionally, the focus on English-language articles may have excluded relevant studies published in other languages, limiting the scope of the review.

These limitations underscore the importance of conducting more inclusive and methodologically rigorous research to better understand and address the religious barriers and enablers of IPC practices.

### Recommendations for future research

This paper identifies several implications for future research. Firstly, there is a need for more extensive research on the impact of various religious beliefs on IPC practices beyond the most widely represented religions. The current study primarily focuses on Islam, Christianity, Buddhism, Hinduism, and Judaism, but other religious faiths also need to be explored to provide a more comprehensive understanding of the global landscape.

Additionally, further research is required to deepen the understanding of the use of ABHRs and HH practices. Specifically, studies should investigate the differences between religious prohibitions of alcohol and the religious significance of HH to inform future educational programs. This will help

in developing targeted interventions that respect religious beliefs while promoting effective IPC measures.

Moreover, the paper highlights the importance of exploring the experiences of HCWs in diverse settings, including those not well-represented in the current literature, such as hospital facility services staff, cleaners, maintenance workers, etc. This broader inclusion will ensure that IPC strategies are inclusive and effective across all levels of healthcare provision.

Overall, the paper calls for more inclusive and methodologically rigorous research to better understand and address the religious barriers and enablers of IPC practices. This will ultimately contribute to the development of culturally sensitive IPC strategies and revised policies that can improve compliance and reduce healthcare-associated infections.

### Conclusion

This scoping review has illuminated the complex interplay between religious beliefs and IPC practices among HCWs. By identifying both barriers and enablers, the review underscores the necessity of culturally sensitive approaches to IPC that respect religious practices while promoting effective IPC practices. The findings highlight the importance of educational initiatives that leverage religious teachings to enhance compliance with IPC protocols, such as the use of ABHRs. Additionally, the review calls for policy adjustments to accommodate religious dress codes, particularly for female Muslim HCWs, to foster inclusivity and diversity in healthcare professions. Future research should continue to explore the diverse religious contexts and their impact on IPC, ensuring that healthcare strategies are both effective and culturally respectful. This comprehensive understanding will ultimately contribute to better healthcare outcomes and a more inclusive healthcare environment.

### Author contributions

MM: conceptualisation, methodology, writing – original draft, writing – review and editing, supervision, project administration. JW: investigation, formal analysis, validation, data curation, writing – original draft, writing – review and editing. VS: conceptualisation, methodology, formal analysis, writing – original draft, writing – review and editing, supervision. JB: conceptualisation, methodology, formal analysis, writing – original draft, writing – review and editing. PZ: conceptualisation, methodology, investigation, formal analysis, validation, data curation, writing – original draft, writing – review and editing, supervision.

### Declaration of competing interest

The authors declare no conflict of interests related to this work.

### Funding

This review was supported by an undergraduate student scholarship from the University of the Sunshine Coast.

## Provenance and peer review

Not commissioned; externally peer reviewed.

## Ethics

As a literature review this paper is not subject to ethics approval.

## References

- [1] World Health Organization. Report on the burden of endemic health care-associated infection worldwide. World Health Organization; Jan 2011. <https://www.who.int/publications/i/item/report-on-the-burden-of-endemic-health-care-associated-infection-worldwide>.
- [2] Storr J, Twyman A, Zingg W, Damani N, Kilpatrick C, Reilly J, et al. Core components for effective infection prevention and control programmes: new WHO evidence-based recommendations. *Antimicrob Resist Infect Control* 2017;6(6). <https://doi.org/10.1186/s13756-016-0149-9>.
- [3] Sparke VL, MacLaren D, Esau D, West C. Exploring infection prevention and control knowledge and beliefs in the Solomon Islands using photovoice. *PLOS Glob Public Health* 2022;2(11):e0000680. <https://doi.org/10.1371/journal.pgph.0000680>.
- [4] Dillard V, Moss J, Padgett N, Tan X, Kennedy AB. Attitudes, beliefs and behaviors of religiosity, spirituality, and cultural competence in the medical profession: a cross-sectional survey study. *PLoS One* 2021;16(6):e0252750. <https://doi.org/10.1371/journal.pone.0252750>.
- [5] Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol* 2005;8(1):19–32. <https://doi.org/10.1080/1364557032000119616>.
- [6] Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Br Med J* 2021;372:n71. <https://doi.org/10.1136/bmj.n71>.
- [7] Australian Bureau of Statistics. "Australian standard classification of religious groups." ABS. <https://www.abs.gov.au/statistics/classifications/australian-standard-classification-religious-groups/latest-release>; March 2024.
- [8] Hong QN, Pluye P, Fàbregues S, Bartlett G, Boardman F, Cargo M, et al. Mixed methods appraisal tool (MMAT), version 2018. Registration of copyright (#1148552), Canadian Intellectual Property Office, Industry Canada.
- [9] Allegranzi B, Memish ZA, Donaldson L, Pittet D. World health organization global patient safety challenge task force on religious and cultural aspects of hand hygiene (lead, D. Pittet), world alliance for patient safety. Religion and culture: potential undercurrents influencing hand hygiene promotion in health care. *Am J Infect Control* 2009;37(1):28–34. <https://doi.org/10.1016/j.ajic.2008.01.014>.
- [10] Oliveira AC, Paula AO. Factors related to poor adherence to hand hygiene in healthcare delivery: a reflection. *Ciência Cuid Saúde* 2014;13(1):185–9.
- [11] Khuan NW, Shaban RZ, van de Mortel T. The influence of religious and cultural beliefs on hand hygiene behaviour in the United Arab Emirates. *Infect Dis Health* 2018;23(4):225–36. <https://doi.org/10.1016/j.idh.2018.07.004>.
- [12] Mudenda S, Chizimu J, Chabalenge B, Kasanga M, Matafwali SK, Daka V, et al. Knowledge, attitude, and practices toward infection prevention and control among undergraduate pharmacy students in Zambia: findings and implications. *Antimicrob Stewardship Healthcare Epidemiol* 2023;3(1):e154. <https://doi.org/10.1017/ash.2023.428>.
- [13] Malik A, Qureshi H, Abdul-Razakq H, Yaqoob Z, Javaid FZ, Esmail F, et al. 'I decided not to go into surgery due to dress code': a cross-sectional study within the UK investigating experiences of female Muslim medical health professionals on bare below the elbows (BBE) policy and wearing headscarves (hijabs) in theatre. *BMJ Open* 2019;9(3):e019954. <https://doi.org/10.1136/bmjopen-2017-019954>.
- [14] Limenyande MJ, Kobusingye JO, Tindyebwa T, Akongo D, Isunju JB, Musoke D. Factors associated with compliance with infection prevention and control measures during the COVID-19 pandemic among healthcare workers in Kampala City, Uganda. *PLoS One* 2023;18(11):e0293732. <https://doi.org/10.1371/journal.pone.0293732>.
- [15] Hwisa NT, Katakam P, Chandu BR, Ismael MH, Bader A. Pandemic influenza A (H1N1) vaccination among Libyan health care personnel: a cross-sectional retrospective study. *J Pharm BioAllied Sci* 2014;1(3):192–7. <https://doi.org/10.4103/0975-7406.130958>.
- [16] Youssef NJ, Tfaily NK, Moumneh MB, Boutros CF, Elharake JA, Malik AA, et al. COVID-19 vaccine acceptance and hesitancy among health care workers in Lebanon. *J Epidemiol Global Health* 2023;13(1):55–66. <https://doi.org/10.1007/s44197-023-00086-4>.
- [17] Abufeddeh S, Hamdan-Mansour A, Abu Raddaha A, Nofal B, Darawad M. Predictors of COVID-19 prevention practices among Abu Dhabi healthcare professionals. *Open Nurs J* 2023;17(1). <https://doi.org/10.2174/18744346-v17-230717-2023-8>.
- [18] Nematian SS, Palenik CJ, Mirmasoudi SK, Hatam N, Askarian M. Comparing knowledge and self-reported hand hygiene practices with direct observation among Iranian hospital nurses. *Am J Infect Control* 2017;45(6):e65–7. <https://doi.org/10.1016/j.ajic.2017.03.007>.
- [19] Ng WK, Shaban RZ, van de Mortel T. The effect of a hand hygiene program featuring tailored religion-relevant interventions on healthcare workers' hand rubbing compliance and beliefs in the United Arab Emirates: a cohort study. *Infect Dis Health* 2019;24(3):115–23. <https://doi.org/10.1016/j.idh.2019.01.002>.
- [20] Shiraly R, Askarian M, Longtin Y, Nematian SS. Alcohol-containing hand rubs: a survey on beliefs and self-reported practices of Muslim nurses. *Africa J Nurs Midwifery* 2021;23(2):15. <https://hdl.handle.net/10520/ejc-ajnm-v23-n2-a2>.
- [21] Jones J, Shanks A. Laid bare: religious intolerance within online commentary about 'bare below the elbows' guidance in professional journals. *Health Care Anal* 2013;21:271–81. <https://doi.org/10.1007/s10728-013-0248-1>.
- [22] World Health Organization. Sign up for SAVE LIVES: clean your hands campaign. World Health Organization; 2024. <https://www.who.int/campaigns/world-hand-hygiene-day/sign-up>.
- [23] Szumska E, Czajkowski P, Zablocki M, Rozkiewicz D. The association between hand disinfection techniques and their barriers, as well as the "bare below the elbows" concept, among healthcare professionals—a study based on a polish population. *Int J Environ Res Publ Health* 2022;19(18):11781. <https://doi.org/10.3390/ijerph191811781>.
- [24] Jang Sarah, Costa Nathalia, Rusinga Adelaide, Setchell Jenny. Exploring physiotherapy education in Australia from the perspective of Muslim women physiotherapy students. *Physiother Theory Pract* 2023;40(9):2150–9. <https://doi.org/10.1080/09593985.2023.2230597>.
- [25] Williams DL, Kave B, Bodas C, Begg F, Roberts M, Ng I. Prospective comprehensive evaluation of an elastic-band beard cover for filtering facepiece respirators in healthcare workers. *Infect Control Hosp Epidemiol* 2024;45(1):89–95. <https://doi.org/10.1017/ice.2023.141>.