

Hospital Healthcare Worker Clothes Uses Compared to the Infection Control Guidelines

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ORIGINAL STUDY

Hospital Healthcare Worker Clothes Uses Compared to the Infection Control Guidelines

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Abstract

Background: Hospital clothing can inadvertently be a vector for harmful microbes, spreading pathogens through direct contact or airborne particles when clothes are touched or disturbed. Contaminated linens and clothing not only place patients at risk but also threaten the safety of healthcare workers. The current study compares the daily use of healthcare workers' hospital clothes according to the infection prevention and control guidelines.

Method: A descriptive cross-sectional study was conducted on 450 healthcare staff providing medical care to patients in Raparin province, Iraq healthcare settings. The study was carried out from 4th November 2023 to 20th January 2024. Participants were selected using a non-probability convenience sampling method. Data were collected through interviews using a structured questionnaire. The collected data were analyzed using SPSS version 25 to generate descriptive statistics.

Results: The results indicated that, among the participants, just 27 (6%) did not utilize a designated work attire, whereas 287 (63.8%) donned scrubs and 136 (30.2%) wore a white coat. Utilized clothes were stored at home by 194 (43.1%) people, while 230 (56.9%) utilized a dedicated cabinet. The healthcare workers who changed clothes at home before going to work were (252, 56%) and after work (198 (44%).

Conclusion: The study determined that the majority of healthcare professionals in the Raparin province utilize special clothes for their hospital duties, possessing multiple sets in various colors for everyday use. Contrary to established guidelines, many healthcare workers change their hospital wear at home.

Keywords: Hospital clothing, Infection control, Healthcare workers, Infection prevention and control guidelines, Contaminated linens

1. Introduction

Healthcare-associated infections (HAIs) are a persistent and serious issue in hospitals, with approximately one in every twenty-one patients affected daily [1]. Hence, infections extend hospitalisations and elevate healthcare expenses while also presenting considerable threats to patient safety. Among the various factors contributing to the spread of HAIs, hospital clothing and linens play a critical yet often overlooked role. While healthcare professionals prioritise comfort and a professional appearance when selecting attire, the paramount concern must be minimising the potential for infection transmission.

Research has shown that hospital clothing, such as scrubs, lab coats, and gowns, can inadvertently serve as vectors for harmful microbes, spreading pathogens through direct contact or via airborne particles when clothing is touched or disturbed [2].

Numerous studies have highlighted that hospital textiles including linen, polyester, silk, and wool, can harbour diverse and often dangerous microorganisms, including antibiotic-resistant strains[3]. Contaminated linens and clothing not only place patients at risk but also threaten the safety of healthcare workers by exposing them to infectious agents. These pathogens can be transmitted in several ways, such

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as when individuals share towels or bedding, handle soiled clothing without proper precautions, or fail to adopt adequate washing practices [4]. Even during the laundering process, germs can transfer from one item to another if appropriate disinfection and handling protocols are not followed.

The danger of contaminated hospital textiles highlights the critical need for strict infection control practices. Infection prevention and control standards have provided extensive methods for the appropriate handling, cleaning, and storage of hospital linens to mitigate these hazards. Key recommendations emphasise washing soiled textiles at high temperatures (above 60°C) with approved detergents, avoiding excessive agitation to prevent cross-contamination, and using designated carts or containers for clean linens to ensure separation from soiled materials [5]. Proper labelling and colour-coded systems help distinguish clean from contaminated textiles, reducing the likelihood of inadvertent exposure.

Traditional fabrics used in hospital attire are similar to those found in street clothes; advancements in textile engineering have led to the development of materials with antimicrobial properties. These innovative textiles can significantly reduce microbial retention and transfer, acting as an engineering control to lower bioburden and the risk of pathogen spread [6]. However, widespread adoption of these materials remains limited, with most scrubs, lab coats, and jackets still laundered at home under conditions that may be insufficient for effective decontamination [7].

Laundering hospital attire at home introduces additional risks, as household washing machines generally operate at lower temperatures that fail to eliminate hospital-associated pathogens. In contrast, specialised commercial laundry facilities are equipped to meet the rigorous standards required for healthcare textiles, ensuring that clothes are adequately disinfected. [8] High-temperature drying and agitation during the washing process are crucial for lowering microbial viability and the danger of re-infection [6].

Beyond laundering, healthcare professionals must adopt proper practices to minimise the spread of pathogens. This includes wearing designated hospital attire for all patient interactions, particularly in high-risk areas such as acute wards, where exposure to bodily fluids and contaminated surfaces is common [9]. Additionally, staff must ensure that work uniforms are never laundered at home or worn outside hospital premises to prevent microbes from being transported into the community.

The current study compares the daily use of the healthcare worker's hospital clothes according to the infection prevention and control guidelines.

2. Materials and methods

A descriptive cross-sectional study compared the daily use of healthcare workers' hospital clothes according to the infection prevention and control guidelines in Raparin province, Iraq healthcare settings from 4th November 2023 to 20th January 2024. The ethical approval was obtained from the Ethical Committee of the College of Health and Medical Technology, Sulaimani Polytechnic University, and a management agreement was obtained from the Directorate of Health in Raparin province to conduct this study. The study participants are given the choice to participate or not in the study, and they can withdraw from the study at any stage of data collection. Confidence is given that the healthcare data will only be used for academic research, and their data will be nameless.

The study's target sample was healthcare staff who provided medical care to patients in governmental and private hospitals inside Raparin province. Participants were selected using the non-probability convenience sampling method.

The study included 450 healthcare staff in direct contact with patients, while staff in administrative roles without patient contact were excluded. To meet the purposes of the study, a questionnaire was constructed based on literature reviews and previous studies on the same topic. The questionnaire consisted of two sections, the first section included questions about healthcare staff demographics and workplace characteristics, and the second section included questions about hospital clothes.

The validity of the questionnaire tool was established through a panel of six experts of different specialties related to the field of the present study. They were asked to review the questionnaire for clarity and adequacy to achieve the study objective, and based on their responses, some changes were made according to their suggestions. Data were collected from healthcare staff through face to face interviews. The collected data were analyzed using SPSS version 25 to generate descriptive statistics such as mean, standard deviation, frequency, and percentage.

3. Results

The current study included 450 HCWs in 10 health settings in the Raparin province. The age of the participants ranged from equal to or less than 25 to more than 55 years old, with mean \pm standard deviation (SD) (33.25 \pm 11), most of them {206 (45.8%)} were between 26-40 years old followed by 41-55 years old 71 (15.8%), or more than 55 years old, 28 (6.2%), and equal to or less than 25 years old, 145 (32.2%), respectively.

The majority of respondents were female, comprising 256 (57.3%), compared to male respondents at 192 (42.7%). Additionally, most respondents were married, totaling 214 (47.6%), while 188 (41.8%) were unmarried and 48 (10.7%) were divorced. Regarding the presence of children residing with them, 180 individuals (40%) do not have children living with them, whereas 270 individuals (60%) do have children living with them. Regarding older people with particular needs living with them, 296 (56.8%) do not have an elderly person, while 154 (34.2%) do.

The majority of HCWs (325, 72.2%) worked in the government health sector, while 62 (13.8%) worked in the private sector and 63 (14.0%) in both. In terms of the type of job contract, the majority (289, 64.2%) were permanent, while 161, 35.8%, were temporary. The majority of respondents were nurses 245(54.4%), 71(15.8%) were physicians, some were laboratory workers 95 (21.1%) and 39 (8.7%) had other specialities. The higher number of HCWs had experience equal or less than 10 years 269 (59.8%), between 11 – 20 years group 109 (24.2%) and between 21-30 years 39 (8.7%), between 31-40 years 31 (6.9%) while only 2(4%) of HCWs not responded.

Regarding the level of education, a higher number of HCWs hold technical diploma 218(48.4%), followed by bachelor's degrees 176 (39.1%), postgraduate degrees 25 (5.6%), and high school or lower degrees 31 (6.9%). For the unit of the HCWs, most of them worked in the Emergency department 143 (31.8%), followed by wards 126 (28%), laboratory 95 (21.1%), ICU and CCU Ward 16 (3.6%), surgery 32 (7.1%), and 38 (8.4%) of them worked in other units in the hospitals [Table 1](#).

3.1. Hospital clothes

Regarding the type of hospital dresses used for work, 27 (6%) reported none, 287 (63.8%) indicated the use of scrubs, and 136 (30.2%) wore a white coat. In terms of the number of clothes, 278 (61.8%) reported having 1–2 items, while 172 (38.2%) stated having more than 2. Regarding if their hospital dresses are different in colour; 283 (62.9%) responded positively.

Regarding storing used hospital clothes at home, 194 (43.1%) mentioned keeping them with other clothes, and 256 (56.9%) reported storing them in a special cabinet. For changing their clothes, 252 (56%) stated changing at home, while 198 (44%) mentioned changing at the hospital. After work, 253 (56.2%) reported changing at home, and 197 (43.8%) mentioned changing at work.

In regard to the presence of an infection control unit, 149 participants (33.1%) indicated positively, 160 participants (35.6%) indicated negatively, and 141

participants (31.3%) responded with "don't know. Regarding training or orientation on hospital clothes infection prevention and control, 245 (54.4%) reported not receiving any form of training, while 205 (45.6%) stated that they had received training or orientation [Table 2](#).

4. Discussion

Hospital clothes serve both functional and symbolic roles in healthcare settings. Also adherence to hospital uniforms is crucial for minimizing the risk of healthcare-associated infections (HCAIs) and maintaining professional standards. The current study demonstrated that most of the healthcare staff use hospital clothes, in contrast, only 27 (6%) healthcare workers did not wear hospital clothes, which is a very low number and this is related to the improvement of infection control in the area; because non-compliance with dress codes among healthcare workers has been linked to factors such as lack of knowledge, inadequate facilities, and negative attitudes [10]. The non-compliance to standardised hospital attire (i.e., not wearing hospital clothing) increases the risk of cross-contamination. Clothing exposed to both hospital and non-hospital environments facilitates the spread of pathogens such as *Staphylococcus aureus* and multidrug-resistant organisms (MDROs) [11].

Regarding the attire worn by healthcare staff, the study found that the majority, 287 participants (63.8%), wear scrubs, while 136 participants (30.2%) utilize white clothing for their work. Staff who contact directly with patients or handle clean, soiled equipment, and textiles should always wear the hospital's work attire. During activities such as caring, treating, examining, or transporting patients, the work clothes inevitably come into contact with the patient's clothing, bedding, or skin [9].

The type of clothing worn by HCWs should align strictly with the requirements of their specific roles and infection control guidelines. However, the scrubs, commonly worn by nurses and surgical staff, are practical for use in high-risk environments due to their durability and ease of laundering, at the same time, white coats are traditionally associated with physicians. Both types of clothes scrubs and white coats can become vectors for pathogens if not appropriately managed [6]. A systematic review by Goyal [12] who compared scrubs and white coat, demonstrated that white coats are washed less often than scrubs, which may raise the risk of bacterial transmission in healthcare environments. Furthermore, Healthcare professionals often wear white coats for temporary tasks in medical settings and frequently use them outside these environments. This practice increases the

Table 1. Distribution of the demographic and hospital characteristics.

Variables & Groups		Frequency	(%)
Age	Equal or lower than 25	145	32.2
	26–40	206	45.8
	41–55	71	15.8
	More than 55	28	6.2
	Total	450	100
Sex	Female	258	57.3
	Male	192	42.7
	Total	450	100
Marital state	Married	214	47.6
	Unmarried	188	41.8
	Divorce	48	10.6
	Total	450	100
Are there any children living with you?	No	180	40
	Yes	270	60
	Total	450	100
Are there any elders with special care living with you?	Yes	154	34.2
	No	296	65.8
	Total	450	100
Working hospitals type	Governmental	325	72.2
	Private	62	13.8
	Both	63	14
	Total	450	100
Type of work contract	Permanent	289	64.2
	Temporary	161	35.8
	Total	450	100
Specialty	Physician	71	15.8
	Nurse (medical assistant)	245	54.4
	Laboratory worker	95	21.1
	Other	39	8.7
	Total	450	100
Experiences Groups	Equal or less than 10	269	59.8
	11–20	109	24.2
	21–30	39	8.7
	31–40	31	6.9
	Total	448	99.6
	Missing System	2	0.4
Certificate	Total	450	100
	High school or lower	31	6.9
	Diploma	218	48.4
	Bachelors	176	39.1
	Postgraduate	25	5.6
The working unit in the hospital	Total	450	100
	Wards	126	28
	Emergency	143	31.8
	Laboratory	95	21.1
	ICU and CCU	16	3.6
	Surgery	32	7.1
	Other	38	8.4
	Total	450	100

risk of exposure to pathogens and multidrug-resistant microorganisms compared to scrubs [13].

The quantity of hospital garments possessed by healthcare workers directly influences their capacity to uphold sanitary standards. The current study showed that 278 (61.8%) of the participants had 1-2 items, while 172 (38.2%) stated having more than two. Ideally, Healthcare workers should have sufficient clothing to change daily or more often if exposed to

contaminants to minimize the risk of cross-infection. Bacteria, viruses, and fungi can survive on textiles for several days, posing a significant infection risk. Frequent clothing changes help lower the microbial load, as contamination can occur within few hours of wear [14]. Most of the study participants 283 (62.9%) had different color-coded hospital clothes. Color-coding hospital attire has practical implications for infection control. Different colours can differentiate roles and

Table 2. Distribution of HCWs hospital clothes.

Variables & Groups		Frequency	(%)
Usually wearing types of hospital clothes.	None	27	6
	Scrub	287	63.8
	Whitecoat	136	30.2
Number of clothes	1-2	278	61.8
	More than 2	172	38.2
	Total	450	100
Are your hospital dresses different in colour	Yes	283	62.8
	No	167	37.2
	Total	450	100
Where do you store used hospital clothes at home?	With other clothes	194	43.1
	Special cabinet	256	56.9
	Total	450	100
Where do you change for work?	In-home	252	56
	In hospital	198	44
	Total	450	100
Where do you change after work?	In-home	253	56.2
	In hospital	197	43.8
	Total	450	100
Do you have an infection control unit in your institution	Yes	149	33.1
	No	160	35.6
	I don't know	141	31.3
	Total	450	100
Have you received some form of training or orientation about hospital clothes infection prevention and control	Yes	205	45.6
	No	245	54.4
	Total	450	100

units, reducing the potential for cross-contamination by limiting clothing to specific areas. Furthermore, the use of differently colored clothing helps healthcare staff distinguish between soiled and clean garments, preventing inadvertent mixing. Mixing hospital and home clothes is a major infection control concern.

Although a smaller proportion of healthcare staff, 194 participants (43.1%), reported mixing their hospital attire with their personal clothing compared to 256 participants (56.9%) who did not engage in this practice, the overall number remains significant. This suggests that a notable portion of healthcare workers may be inadvertently increasing the risk of cross-contamination by wearing hospital clothes outside of the healthcare setting, underscoring the need for improved adherence to infection control practices. Hospital garments, contaminated with pathogens like MRSA and *Acinetobacter* spp., can act as vectors when laundered or stored alongside home clothes[15]. Home laundering is generally inadequate for removing resilient pathogens due to lower water temperatures and the absence of industrial-grade disinfectants [7]. This practice risks introducing hospital pathogens into community settings and compromising HCW and family safety.

Most of the healthcare workers changed clothes at home, 252 (56%). This result aligns with the Potter study [16] on 399 healthcare staff found that 40.8% of the study sample responded to changing

at home. Changing hospital clothes at home or after work exacerbates contamination risks. The infection prevention and control guidelines recommend that hospital clothes not be taken home, and HCWs should be trained to change into designated hospital clothing at the workplace and ensure proper laundering in approved facilities [9]. Microbes from hospitals should not be brought into the home environment [17].

Finally, one third of the study participants were unaware of the infection control unit in their healthcare settings. Additionally, more than half of them had not received training or orientation on proper hospital infection control attire. Infection control plays a crucial role in adherence to attire guidelines by ensuring that healthcare workers use appropriate uniforms to prevent cross-contamination, protect against infectious agents, and maintain personal hygiene, safeguarding staff and patients in hospital environments [9]. It is responsible for developing protocols that ensure compliance with international infection control standards to reduce the risk of cross-infection [10]. The absence of the infection control role in healthcare settings demonstrates the medical staff's low adherence to the hospital attire guidelines regarding infection control.

Multiple studies have shown that continual training is the most effective technique for improving healthcare personnel adherence to infection control guidelines regarding apparel [18]. These programs

should include practical demonstrations on wearing, removing, and disposing of protective clothing; laundering protocols; and the segregation of clean and contaminated garments. Adherence to such training reduces the risks of cross-contamination and improves overall compliance with infection control measures [19].

5. Limitations

This study has several limitations. First, it employed a non-probability convenience sampling method, which may introduce selection bias and limit the generalizability of the findings. Second, the cross-sectional design restricts our ability to establish causality between hospital clothing practices and healthcare-associated infection rates. Third, the reliance on self-reported data introduces the possibility of social desirability bias, where participants may report perceived correct behaviours rather than their actual practices. Finally, while non-adherence was discussed in relation to gaps in education or orientation, our data cannot directly confirm causal explanations. Future studies using longitudinal designs, observational data, or probability-based sampling are recommended to strengthen the evidence base.

6. Recommendations

1. Design and implement a comprehensive training program that covers infection control guidelines related to clothing.
2. Develop clear and concise dress code policies that outline the appropriate attire for different healthcare settings.
3. Establish a mechanism for conducting regular audits and assessments of healthcare workers' adherence to clothing competence guidelines.
4. Foster collaboration between healthcare workers and infection control practitioners to ensure alignment with the latest evidence-based practices.

7. Conclusion

The study concluded that most healthcare workers in the Raparin province use specialized clothing in hospitals, with multiple sets in different colors for daily use. Ideally, hospital clothing should only be worn and removed within the hospital premises to minimize risks to the community. However, the study found that many healthcare workers wear and remove their hospital attire at home. This behaviour is may be related to gaps in education or orientation, but

further research is needed to confirm this regarding infection prevention and control guidelines related to hospital clothing.

Conflict of interest

The authors declare that they have no competing interests.

Ethics approval and consent to participate

The current study was approved by the research council at the College of Health and Medical Technology/ Sulaimani Polytechnic University, also approved by the Directorate of Health in the Raparin district and the hospital administrations. All methods were carried out according to their relevant guidelines and regulations.

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