

An observational study of hand hygiene behaviours among healthcare workers in four peri-urban health facilities in Zambia

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Abstract

Objective: Hand washing with soap and regular application of hand sanitising gel are simple and effective methods for reducing transmission of hospital acquired infections (HAIs) in health settings. However, such practices are generally poor amongst health care workers (HCW) globally. This study documents hand hygiene practices and their determinants amongst HCWs in four peri-urban health facilities in Zambia.

Methods: Eighteen observation sessions, nine semi-structured interviews and three focus group discussions with health care providers in four high patient-load public health facilities were conducted. Framework analysis helped identify predominant themes which were pre-categorised using the determinants provided by the Behaviour Centred Design (BCD) framework.

Results: Of the 780 hand hygiene opportunities observed across all four health facilities, HCWs washed their hands with soap only 8 times (1%). Hand washing was especially motivated by the fear of infection with apparently, or potentially, infectious patients and especially of more deadly conditions like cholera. Barriers included the large patient load which heightened HCWs' sense of urgency and fairness in seeing clients quickly rather than spending time washing hands and, the discomfort of standing up to reach the hand washing station. Limited, inconveniently located or broken sinks and the absence of soap were additional barriers to hand washing with soap.

Conclusions: A holistic approach including communication on risk to patients, provision of hardware, resource allocation for hand hygiene and regular monitoring of hand hygiene practices are all needed to address barriers to good practice.

Keywords: Hand hygiene, hospital acquired infections, behaviour centred design, health care workers, health facilities.

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Background

Hospital acquired infections (HAIs) are a major and growing concern for health care workers (HCWs) and the patients they treat [1]. HAIs affect 5% to 15% of inpatients of regular wards, and up to 50% in intensive care units in developed countries [1]. A systematic review reported the prevalence of HAIs in developing countries at 15.5 per 100 patients, a higher proportion than in developed countries [2]. The presence of pathogenic bacteria in health settings puts both the patient and HCW at risk of serious illness and even possible death [3]. The World Health Organisation (WHO) has produced universal guidelines on HAI reduction which emphasise the practice of hand hygiene among others [4,5]. However, due to insufficient financing, overcrowding and shortage of HCWs, urban health facilities in lower income countries face challenges in operationalising these guidelines, and Zambia is not an exception [6,7].

Hand hygiene (HH) involves the use of water and soap or alcohol-based hand rub or any other product, to prevent the transmission of infections from one person to the other [8]. HAIs among HCWs and patients. The WHO encourages HCWs to practice hand hygiene at five key times, including before

touching a patient, after body fluid exposure and after touching the patient [5]. While complete compliance with hand hygiene guidelines is the ideal, actual rates remain low [9]. For example, at a teaching hospital in Ghana, a cross sectional observational study across 15 service provision points was performed for a period of three weeks to explore HH compliance amongst HCW. The study reported 9-54% HH compliance among doctors and 10-57% among nurses [10]. Barriers to HH practices in developing countries often include limited availability of soap and water, busy work schedule, forgetfulness and the continuous use of gloves [11,12]. In Zambia, little is known about HH practice among HCW in hospital/clinic settings. However, this is important as other studies have shown that microbiological contamination is high [13] and there is relatively limited awareness on infection prevention [14]. Understanding HH determinant factors in a low-income country like Zambia, provides a basis for intervention development in similar health care settings globally.

This study quantified HH practice and explored its determinants qualitatively using the framework provided by Behaviour Centred Design (BCD). The BCD framework explains

behaviour as a function of the environment (social, physical and biological), the brain (reactive, motivated and executive), the body, and the behavioural setting in which behaviour takes place [15]. Breaking behaviour patterns requires a change in the most pertinent areas of the four domains of the environment, brain, body, and behavioural settings. The BCD framework differs from other behaviour change frameworks by designing interventions across the four domains in a manner that promotes the target behaviour as the most optimal for the target audience [16-18].

This paper describes the factors in the brain, body, environment and behavioural setting that influence HH behaviours amongst HCWs as observed in four peri-urban health facilities in Zambia.

Methods

Study setting and population

The study was conducted in four health facilities in Lusaka and Ndola cities in Zambia. Data was collected for three days in each health facility between February and March 2015. Each of the four facilities were in densely populated, sprawling peri-urban areas, typically characterised by poor WASH infrastructure and basic amenities.

Recruitment

HCWs employed by the Ministry of Health in the four facilities were eligible for the study if they were in regular direct contact with patients or with patient samples as laboratory staff. The study team identified one eligible HCW per department through the overall clinic manager titled “in-charge”, and sought written informed consent before enrolling them.

Observations

The hand hygiene practices of eighteen HCWs during health service provision to clients were observed for 30-60 minutes per ward, by one of two observers conducting the study. Observations were ideal for the research question in order to see, understand and reflect on whether and how HCWs performed hand hygiene behaviours [19]. Observations took place in the paediatric and adult screening rooms, the injection and vaccination rooms, the delivery ward and the prevention of mother to child transmission room (PMTCT). Permission to observe clinic sessions were obtained from the clients. HCWs were told that the study concerned the challenges busy health facilities faced in implementing infection prevention guidelines. The number of patients seen by the HCWs, the number of hand hygiene opportunities and the number of times hands were washed were recorded. We defined a hand hygiene opportunity as the number of patients seen multiplied by two opportunities - one before and one after seeing a patient.

Semi-structured interviews

Interviews were conducted with nine HCWs that had been observed using a semi-structured questionnaire. In-depth interviews were particularly important to listen and understand how each HCW perceived HH and their observed HH behaviours [20]. The interview guide addressed current behaviour, the feasibility of hand hygiene, access to facilities and knowledge of hand washing policy and its consequences for infection control.

Focus group discussions

Focus group discussions (FGDs) were held at three of the four clinics, with participants that had been observed and included the in-charges and other relevant staff. As HCWs operate in a social setting with other HCWs performing similar roles, FGDs were relevant in seeing and hearing how they spoke about HH with one another and to identify points of disagreement and consensus [20]. Each discussion had between six to eight participants and lasted between 30 and 45 minutes. Topics to guide the FGDs were developed and adapted based on themes that emerged from interviews.

Data handling and analysis

Research notes were taken during observation of the healthcare providers and, interviews and FGDs were recorded using a handheld voice recording device. These were transcribed, coded and analysed using framework analysis in QSR International’s Nvivo 11 qualitative data analysis software platform [21]. Themes were identified according to the BCD framework’s pre-specified categories of determinants which include the brain, body, environment and behaviour settings (Table 1) [15,22].

Ethical approval

Ethical approval was obtained from the Zambian ERES Converge Independent Ethics Review Committee. Written consent was gathered from all interview, observation and FGD participants; participants were given feedback on the study findings.

Findings

A total of 780 hand opportunities occurred from interactions of 18 HCWs with 390 patients. Hand hygiene was practiced only eight times (1%) by the 18 HCWs observed (Table 2). Hand washing with soap was the only type of HH observed and no alcohol-based hand rub was observed. The proportion of times hands were washed were low in health facilities 2, 3 and 4 at 2.6%, 1.1%, and 1.3% respectively. No hand washing was observed in health facility 1.

Below we present the determinants of hand hygiene behaviour using the BCD framework. Table 1 provides a summary of the findings within this framework.

Brain

Executive

Each of the HCWs could state the guidelines regarding HH best practice. Of the five key moments for hand washing with soap recommended by the WHO in health facilities, the two that were consistently identified were hand washing with soap before and after touching a patient. Furthermore, each HCW mentioned that they were aware of the biomedical cause of HAIs, and that hand washing with soap can play a role in the removal of harmful pathogens.

“As a health worker, there is a rule that always states that everybody should be considered infectious. So a patient can contract an infection from the clinic, or from a health care facility. These are also called nosocomial infections, which are transmitted within health care units. At the same time, a health

Table 1. Summary of findings in the BCD Framework.

Factor	Sub-factor	Findings
Brain	Executive	HCWs are knowledgeable about the HH guidelines and the transmission of HAIs.
	Motivated	Comfort: washing hands with soap is a tedious experience
		Justice: HCWs felt hand washing with soap between each patient was time wasting (punishment to the patients).
		Fear: HCWs feared infectious diseases such as cholera or scabies and were moved to wash their hands after attending to a patient with such infections.
		Disgust: hands soiled in blood or dirt were a cue for hand washing with soap
Nurture: HCWs readily acknowledged the importance of maintaining good hand hygiene around neonates and mothers. However, this behaviour was not observed.		
Reactive	Hand washing is a reaction to dirt/blood or fear of infection from an infectious patient	
Environment	Physical	Typical health facility structure i.e. various screening rooms with an open door, a table, chair, hospital bed and window inside.
	Social	Hierarchal structure, insufficient human resource and an accepted norm for poor hand hygiene practices among HCWs.
	Biological	HCWs are aware that harmful microorganisms are present on surfaces, utensils and among patients.
Body	Physiology	Handwashing with soap was uncomfortable because hand washing facilities were inconveniently located.
		No traits identified
	Traits	
Behaviour Settings	Stage	Huge patient loads, long queues limited space and a shortage of health care workers
	Infrastructure	Limited and inconveniently located broken sinks
	Props	Inconsistent supply of soap
	Roles	Defined roles: clinical officers, registered nurse and lab technicians.
	Routines	HCWs have more than one shift in a day
	Competencies	Unknown
	Norms	Non-washing of hands is a social norm

Table 2: Summary of Observed Hand Hygiene Behaviour at Each Health Facility by HCWs.

	Department	Room	Presence of Running Water	Presence of Running Soap	# of HCWs	Total # of patients screened	# Total of hand hygiene opportunities	# of times hand hygiene practiced
Health Facility 1	OPD	Paediatric Screening	Yes	No	1	18	36	0
		Adult Screening	Yes	No	1	36	72	0
		Injection	Yes	Yes	1	9	18	0
	MCH	Vaccination	No	No	1	85	170	0
Health Facility 2	OPD	Adult Screening	No	No	1	9	18	0
		Injection	Yes	Yes	1	11	22	2
	MCH	Vaccination	No	No	1	55	110	2
Health Facility 3	OPD	Adult Screening	Yes	No	1	27	54	0
		Injection	Yes	No	1	3	6	2
	MCH	Vaccination	No	No	1	35	70	0
		HIV Testing PMTCT	No	No	1	8	16	0
	Maternity	Delivery	No	No	1	1	2	0
	Lab	Lab	Yes	No	1	13	26	0
Health Facility 4	OPD	Adult Screening 1	No	No	1	12	24	0
		Adult Screening 2	No	No	1	13	26	0
		Injection	No	No	1	8	16	0
	MCH	Vaccination	Yes	Yes	1	45	90	1
	Lab	Lab	Yes	Yes	1	2	4	1
					18	390	780	8

worker can contract an infection from the patient. So it is a two-way thing.” - IDI Health Facility 4.

Only one interviewed participant believed hand washing with water alone to be sufficient to remove pathogens from hands.

Motives

Comfort: All HCWs thought that washing hands with soap was tedious as they would have to leave their seats and wash their hands for each patient they see.

“In MCH, I was injecting babies. So after injecting each baby, I am supposed to wash, and then attend to another baby. So in

that situation, it means that I have to walk to the hand wash station, wash my hands, come back and inject another baby... this takes up our time...it is not possible due to the work overload. You inject one baby, you stop, wash hands etc., it is so inconvenient...you also get tired, getting up from your chair to wash hands.” FGD Health Facility 4.

Justice: HCWs felt that washing their hands between every patient was being unfair to the patient because it would only waste their time. Hence, the justification they gave for not washing their hands was ensuring they attended to as many patients as possible in a short space of time.

"If we had to wash hands before and after each patient, the patients outside will think that you are just wasting time. So because of the pressure that is outside, you also want to make sure that you clear the patient line very quickly." - FGD Health Facility 3.

Fear: There was an apparent feeling of fear of deadly infectious diseases such as cholera, which moved HCWs to practice hand hygiene religiously during a cholera outbreak.

"...if there is a cholera outbreak, no member of staff would work without washing hands frequently with soap because they are afraid of contracting cholera." - FGD Health Facility 1.

Disgust: HCWs are also motivated to wash their hands with soap if they are sticky from dirt or blood following a procedure, or from using hand sanitiser (which leaves a sticky residue).

"... there are times when your hands are really dirty and you just need to use running water to get rid of the dirt" - IDI Health Facility 4.

Nurture: HCWs from the labour ward readily acknowledged the importance of hand washing with soap along with the use of gloves around neonates and mothers in labour. However, there were some that admitted that this is not practiced consistently, instead they use gloves alone between patients without washing their hands.

"... when you are tending to one patient, another one walks in, like in the labour ward. Sometimes you can even assess a person by looking at them and seeing that they need immediate attention. So you just remove your gloves and put on a new pair before you even wash your hands." - FGD Health Facility 4.

Reactive

HCWs report that the non-washing of hands with soap over a period of time has developed into a habit. Even in situations where HCWs only have a few patients to see, they would still not wash their hands with soap because it's a habit.

"...since we do not do it [handwashing with soap] on a regular basis, it has become a habit even if we are not seeing a lot of patients. Instead of washing hands you just sit there wait and attend to the next." - IDI Health Facility 3.

Body

Physiological

HCWs find hand washing with soap a time consuming and physically tedious experience as it requires them to repeatedly stand up from their stations to wash their hands.

"...For every patient, you want to stand, wash hands, and sit, that's another exercise. It exerts physical strain on you. And in between these patients, you might need to stand for longer periods. Often you have to run to the next room, because the instrument you want to use is in the next room." - IDI Health Facility 1.

Environment

Physical

All health facilities were built with concrete and had several

screening rooms where HCWs operated. The floors were concrete and the walls were painted. Each room was well lit and had a table, chair, window and hospital bed.

Social

Participants from one FGD reported that fear of the District Health Office staff would motivate them to practice hand hygiene. They stated that they fear being interrogated for not following standard guidelines:

"...when it is someone from the district or the ministry watching...I would be very careful because at the end of the day they would want to see how we handle patients, and whether I have washed my hands, so they will question me. So because of that fear in me, it will make me go and wash my hands." FGD Health Facility 1.

Roles: HCWs had different roles including screening adults and children (clinical officers), injecting patients (registered nurses), delivering babies (registered midwives), testing of specimen (laboratory technicians) and vaccinating children (registered nurse). HCWs complained that there was a shortage of staff and this was a hindrance to hand hygiene because a few of them had to see a large number of patients simultaneously.

Routine: HCWs focused entirely on providing services to their clients and doing so as quickly as possible. Observations showed HCWs seeing patients in the same routine and style. This involved writing in the client's book while asking questions, taking body temperature, examining the eyes or mouth (for paediatrics) and sending them to the pharmacy for drugs. Extremely severe cases of illness, for example convulsions or bleeding would disrupt this routine and additional care would be provided.

Scripts: HCWs were observed to report in the morning and work for half a day and hand over to their colleagues at 13:00hrs. During hand overs patients were told to wait outside for the clinic to be cleaned and come back to queue at 14:00 hours.

Norms: The predominant norm, or habit, relating to hand hygiene is that it is seldom practiced by HCWs at all, let alone before and after seeing a patient.

Biological

HCWs are aware of the harmful organisms that are present in the clinics on the surfaces, utensils and among patients.

Behaviour Setting

Stage: The study sites were typical public health care facilities located in densely populated peri-urban areas, characterised by long queues and a few health care providers attending to clients in limited space.

Infrastructure: Only half of the 18 rooms observed had running water either from a handwashing station or wash basin connected to the main water supply. The one maternity ward had a sink connected to the main water supply, but was non-functional with no running water. In health facility 1, three of the four rooms observed had running water and only one of these had soap. In health facility 2, only one of the three rooms observed had running water with soap. In health facility 3, of the

six rooms observed, only three had running water present and no soap. In health facility 4, two of the five rooms observed had running water with soap.

Props: Overall four of the 18 rooms (22%) observed had soap and running water. The interviews reveal that soap is not consistently available in the clinics:

“There should be a constant supply of soap, because sometimes we do not have the soap, and we depend on the imprest to buy the soap. At times, you find that for 2, 3 months we are not receiving the imprest, meaning that as a centre we cannot manage to buy the soap consistently” - IDI Health Facility 1.

HCWs were also seen to use gloves often when attending to clients. They were used in the laboratory, delivery room and injection room. Gloves were only changed occasionally and not after each patient because there were reportedly not enough in stock and therefore had to be rationed.

“You see, we are supposed to change gloves on every patient, when you see a patient sweating, you are supposed to put on gloves and when another one comes you are supposed to change the gloves and put on other ones, but what happens is that because they are not enough gloves I’ll use the same gloves on another patient to protect myself”- IDI Health Facility 2.

HCWs also reported that the lack of hand drying facilities to use after hand washing hindered hand washing. Participants described how some HCWs kept their personal hand towels dirty and therefore, created a potential source of infection.

Discussion

This study sought to quantify HH practice and explore its determinants amongst HCWs in four busy health facilities in Lusaka and Ndola cities. The results identified that although HCWs were generally aware of the importance of hand hygiene for infection prevention, actual hand hygiene before and after attending to a patient was not or very rarely practiced in the study sites during the period of observation. The unavailability of the ‘props’, such as soap and gloves, as well as the high patient loads influence more heavily the behaviour practices necessary than static knowledge does.

HCWs from this study were not motivated to practice hand washing with soap because it was impractical, time consuming and tedious. Additionally, the absence of water and soap, hand rub and hand drying facilities in their physical environment makes it challenging to practice hand hygiene effectively. The social conditions in which HCWs operate, such as the existing insufficient human resource and an accepted norm for poor hand hygiene practices, exacerbate the problem. Due to long queues and a shortage in work force, HCWs believe that they would be providing a disservice to their clients if they practiced hand washing consistently as patients expect is to be attended too quickly. The issue of a disproportionate workload per HCW was cited by multiple HCWs, during both the focus group discussions and the in-depth interviews, indicating that this is one of the larger constraints and barriers to appropriate HH perceived by the facility work forces that requires addressing.

Participants saw the use of gloves as protection from infection

and an alternative to hand washing with soap. Other studies have shown that the use of gloves deter hand washing with soap [23,24]. Part of the reason that gloves are preferred could be due to the fact that changing gloves is a more expedient process than is proper hand washing, and thus HCWs prefer to invest in the former practice, which allows for better addressing large patient loads. Furthermore, HCWs only chose to wash their hands when they perceive risk of infection. The motive of fear is the strongest in cases where HCWs chose to wash their hands [25].

Some studies have demonstrated improved HH among HCWs when under observation [26,27]. One study assessed hand rub use among medical personnel who were being observed for HH compliance and found 45% compliance to hand rub compares to 29% compliance when not being observed [26]. In our findings, HCWs report that they would improve their HH behaviour if they were being observed by the IPC committee members and District staff. For institutions such as health facilities, the combination of unannounced visits and structured visits by District staff, coupled with rewards and reminders can be a potential motivator for compliance to hand hygiene [28].

Compliance to hand washing with soap before and after each client is impractical because of huge patient loads and the limited and inconveniently located sinks for hand washing. Strategies focused on behaviour change interventions around fear of infection, increasing the number of conveniently located water points, prioritization of health funds related to HH and regular monitoring exercises for HH are required.

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JC designed the study methods and data collection tools and drafted the protocol to which all the authors contributed input. JC led the data collection process. JC conducted the analysis and was assisted by VC and IM. JC drafted the manuscript which has been reviewed and approved by all authors.

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