

ORIGINAL ARTICLE

Improving hand hygiene in a low-resource setting: A nurse-led quality improvement project

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Abstract

Hand hygiene is a simple but often ignored practice in health care systems worldwide, but it is integral for nosocomial infection prevention, with many hospital-acquired infections being linked to inadequate hand hygiene practice. At the burns unit in Kamuzu Central Hospital, 50% of patients were found to have acquired pseudomonas infections: one of the contributing factors being inadequate hand hygiene. This quality improvement project was part of a course for nurses to introduce change for patient benefit, with the aim of increasing the baseline figures for hand hygiene practices and hand hygiene facilities from 37% and 22%, respectively (baseline collected in November 2019). Using robust, standard quality improvement processes, measures were put in place such as checklists to observe hand hygiene compliance and facilities, appointment of a hand hygiene committee who monitored and sustained activities of the project, procurement and distribution of handrub and placement of hand-washing buckets and soap at strategic points. The project saw an increase in availability of hand-washing facilities to 95.6% and hand hygiene practices increase to >80% within 6 months. The project demonstrates that low cost interventions, led by nurses, can make a real difference to practice in resource poor countries.

KEYWORDS

burns, hand hygiene, health workers, Malawi, nursing

Key Messages

- the aim of the project was to increase hand hygiene (HH) practices and HH facilities
- checklists were developed to observe HH compliance during the moments of HH and another checklist was to assess the availability of hand-washing facilities, that is, sinks hand-washing buckets, water soap and hand rub and HH posters

Abbreviations: HAI, hospital associated infections; HCW, health care worker; HH, hand hygiene; IP, infection prevention; IPC, infection prevention and control; KCH, Kamuzu Central Hospital; MRSA, methicillin-resistant *Staphylococcus aureus*; QI, quality improvement; QIST, quality improvement support team; UNC, University of North Carolina; WHO, World Health Organization; WIT, Work Improvement Team.

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- at the baseline for HH facilities availability was 22%, and HH practice at 37%. In the follow-up phase, HH facilities increased to 95.6%, with HH practice reaching >80%
- low cost, quality improvement projects led by nurses can change routine practice for patient benefit

1 | INTRODUCTION

In low-resource settings, the health outcomes of patients are often sub-optimal because of over-stretched, limited resources within health care facilities.¹ In each case, the specific factors that need to be addressed also need to be fully understood within the local and national context, so that context-specific interventions can be implemented. Consequently, the important role played by health care professionals in undertaking quality improvement (QI) projects cannot be underestimated, as the staff who are working in these settings are best placed to fully understand the relevant health system and how it works in practice. The engagement of such staff ensures that local knowledge and expertise in the social, cultural and political climate of the health care setting can help to drive meaningful, sustainable change.²

In 2019 to 2020, the Centre for Global Burn Injury Policy and Research (CGBIPR) delivered a 12-month, part-time course in Malawi for burn-care nurses who were interested in learning about QI, providing them with the opportunity to undertake a small-scale project with support from the staff based at the CGBIPR (manuscript in preparation). The course targeted nurses as part of the CGBIPR's aim to build capacity in implementation science skills and leadership in burn services in LMICs. Nurses have historically been disempowered in many health settings³ despite their obvious role in enabling improved patient care because of their direct involvement with patients.

The course used an implementation science approach, emphasising the importance of undertaking a QI course using a robust methodology. This included finding the specific barriers to the uptake of recommended evidence-based practices and then developing appropriate interventions to change practice. The project detailed in this paper presents the QI project undertaken in Kamuzu Central Hospital (KCH) in Malawi, which aimed to improve HH among health workers.

The project was designed and led by a nurse (P. K.) who believed empowered through the QI course to undertake a change-based project in a key area, with the aim of delivering a meaningful, significant, positive impact on health service delivery.

Nosocomial infections are a problem in health facilities worldwide.⁴ There are a multitude of factors leading to such infections, but one simple and very effective way of limiting such infections is through ensuring optimum HH practices. There is global recognition that hand-washing and proper HH are very effective methods to minimise hospital-acquired infections (HAIs) and improve health outcome, as demonstrated by the WHO initiative “clean care is safer care,” which is an international effort to reduce infection and practice proper HH.⁴

Hundreds of millions of patients are affected by HAIs every year, leading to significant morbidity and mortality, prolonged hospital stays, and economic losses for health systems.⁴ However, they can pose a disproportionate burden for low-income countries. A report by the WHO found hospital-wide HAI to range from 2.5% to as high as 14.8% across three African-based studies, with the upper rates being up to twice the European rate of 7.1% reported by the CDC.⁵

At the start of this project in KCH burn unit, roughly 50% of burn patients contracted hospital-acquired *pseudomonas* infections. In the same unit, an internal survey also found just over 50% of patients had contracted MRSA. The high HAI in the burn unit provided the impetus for this QI project, focusing on improving HH practice and facilities to facilitate better treatment outcomes for burn patients. The project aimed to identify the specific reasons underlying poor HH practice and address the issue through a robust QI project appropriate for the setting, that is, not too costly and achievable within the limited resources available.

The WHO highlights the importance of a participatory approach to QI in low-resource settings involving health care professionals and patients directly,² this ensures that QI projects are designed for, and effective in, specific contexts where the appropriate sociocultural factors have been considered. The team worked hard to ensure that there was full participation of the wider health care team, using a “bottom-up” approach. In LMICs, the context can have a significant influence on the extent to which a QI project can be implemented, in a way that cannot often be appreciated by researchers in HICs.⁶

2 | METHODS

2.1 | Aim

The aim of this HH project was to develop strategies and find solutions/measures to improve HH, with the aim of assisting in the reduction of HAIs in the burn unit KCH. The aim was to ensure that all health workers should meet the best practice recommendations for undertaking HH before and after touching each patient, after touching body fluids and after touching patient surrounding.⁷

The overall objective was to improve HH practice among health care workers (HCWs) in the burn unit from 37% and increase hand-washing facilities from 22%, between November 2019 and April 2020.

2.2 | Specific objectives

- To identify factors contributing to poor HH in burns unit
- To develop measures to improve HH in burns unit
- To develop a sustainability plan for HH in burns unit

2.3 | Research questions

- Why do health workers avoid hand-washing during service delivery?
- How best can HH be improved in burns unit?
- How best can HH be sustained among health workers?

2.4 | Setting

KCH was established in 1977. It is a major tertiary referral hospital with a bed capacity of 1300, serving about 5 million people. It has several departments including surgery where the burns unit is based. The burns unit was established in 2011 as a referral unit for patients with burn injuries in the central and northern regions of Malawi. It provides both in- and out-patient services. Annually it serves, on average, 380 in-patients, with the peak season of patient presentations being between May and July. It has a bed capacity of 30 (28 are general patient beds with 2 additional High Dependency beds), with 10 nurses, 2 doctors and 7 hospital attendants. Out of 19 health workers, 9 have received specific training in burns. The burns unit is mainly funded by the Malawi government, although it also has development partners who assist with other resources and capacity building (eg, University of North Carolina via the UNC project).

2.5 | Design

The project used an 8-step approach to implementation science and QIs, which was used as the basis for the implementation science course (now available as an e-book at <https://online.flippingbook.com/view/792687/>).⁸ These eight steps take the project plan through a detailed identification of the problem, creation of SMART aims, building your team and finally developing an audit cycle that ensures ongoing monitoring of the situation over time to ensure that the changes implemented are sustained.

This project was an implementation science/QI study consisting of two main phases. The initial phase was sensitisation to the context, to understand how best to implement a relevant QI project. A HH committee was assembled to monitor, influence and sustain the activities of the project. The committee mainly included health workers in the burns unit covering the roles of project lead, QI manager, IT coordinator, ward in-charge, team leader and members. The committee was involved in HH resource mobilisation or stocking, education on HH, coordinating with hospital management and assessing and reminding staff about HH. For the purposes of the project, 'HH' was defined as the act of cleaning hands for the purpose of removing dirt, soil and micro-organisms.

Previously, a HH audit was used to assess HH techniques being performed in the hospital, so staff were already aware of this audit process. The previous hygiene audit showed HH practices to be less than 20%. In response, the hospital conducted in-service trainings on infection prevention and control (IPC); however, the low rates of HH practices found at the baseline of this study suggest these previous trainings did not have a significant impact. This previous audit was not used as a baseline for this study, as it was an audit for the whole hospital, and this study was specific to the KCH burns unit.

A SWOT analysis and root cause analysis were undertaken through group discussion of all key burn staff members, with the aim of analysing the environment and the underlying mechanisms behind poor HH (Figures 1 and 2). The analysis helped uncover factors such as a resistance to change within the unit, and threat to sustainability of the project from poor staff retention in the unit. The second phase was implementing activities to address weak areas and then monitoring the project. The utilisation of these analysis tools allowed the author to thoroughly and systematically work through the local environment and its relationship to HH. This therefore helped ensure that the consequent plan was congruent with the local reality and had the potential to impact the specific barriers and utilise the existing strengths. For example, the analysis helped uncover factors such as a

resistance to change within the unit, and threat to sustainability of the project from poor staff retention in the unit.

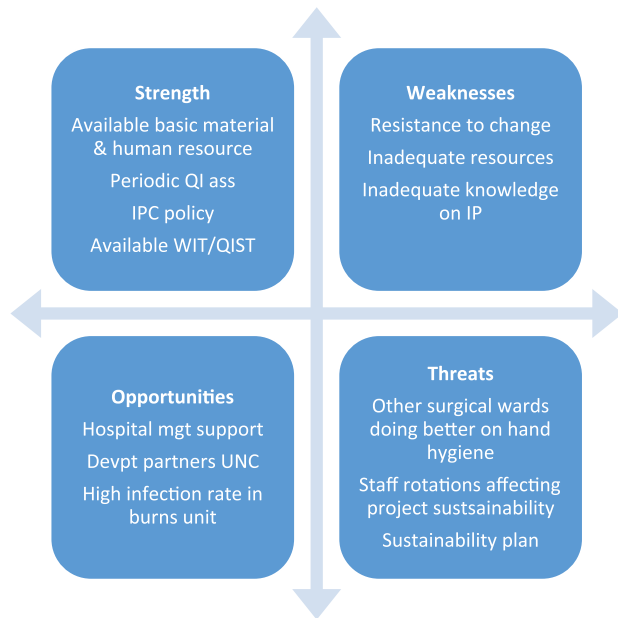


FIGURE 1 SWOT analysis undertaken to support the quality improvement (QI) project

Through an iterative process involving the Hospital Infection Prevention Committee, checklists were developed to monitor hand-washing practice and availability of hand-washing facilities. The first checklist (Figure 3) was used to observe HH compliance by health workers and to ensure compliance to hand-washing in five key moments of HH. All health workers were monitored including doctors, nurses and support staff. There were one Doctor, four nurses and one support staff per observation. The number of nurses observed was higher than other professional groups as they represent the largest group of staff used in the unit. Participants were randomly observed, to prevent them knowing when/if they would be observed, to minimise reactivity bias/Hawthorne effect.⁹

The second checklist (Figure 4) was used to assess the availability of HH resources, that is, hand-washing sinks/buckets, soap/alcohol hand rub and HH posters. This was an important element for collecting baseline data as it was used to establish the strategic points for hand bucket placement to ensure there was the opportunity for appropriate hand-washing at all times. The baseline data were collected in August 2019 by a team leader (nurse) each day, selecting six people to observe each day. The overall HH practice was 37%, and the availability of the HH facilities was at 22% at baseline. The follow-up

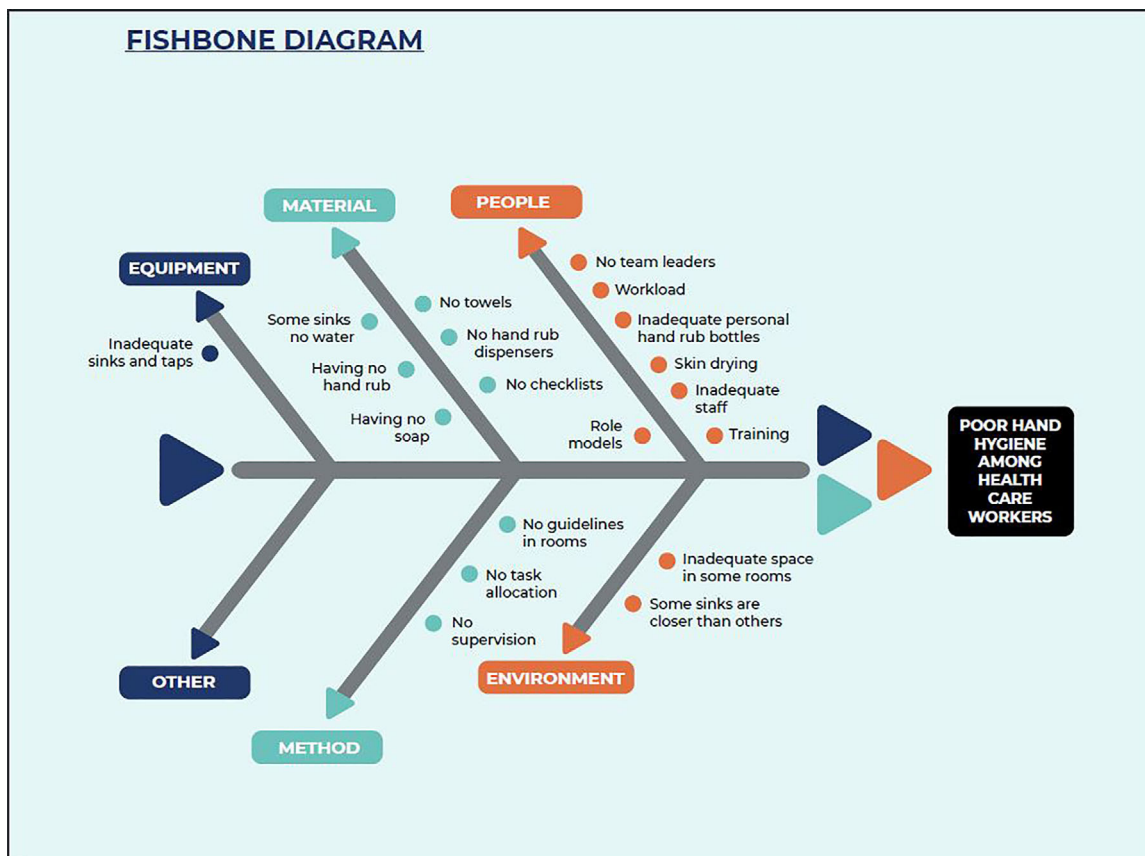


FIGURE 2 A fishbone diagram was used to support a detailed root cause analysis

Key for cadre**Nurse – NS****Clinician –C****Support Staff –SS**

Please tick in the box

Staff Member Observed	1		2		3		4		5		6	
Cadre	C		NS		NS		NS		NS		SS	
Moment	YES	N	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
Before touching a patient												
Before a procedure												
After procedure or body fluid exposure												
After touching a patient												
After touching patient surroundings												
Additional Item												
After removing gloves												
Unpainted nails												

FIGURE 3 Hand hygiene observation checklist

data were collected 2 months after the changes were introduced, from January to February 2020.

3 | THE QI INTERVENTION

The QI coordinator for the hospital was involved in every step of the project to ensure consistent management and monitoring methods. The first goal of the project was to orientate the staff to the project and help them understand the importance of the topic, as well as provide updated training on IPC.

Posters on HH (hand-washing steps and importance of hand-washing) were developed (Figure 5) and placed strategically to act as reminders and encouragement for the staff to wash their hands and reinforce the importance of proper HH.

Each day a team leader was appointed, on a rota basis, to ensure there were enough HH resources available in the burns unit. The HH committee was involved in lobbying for the financing of the hand-washing buckets, posters and alcohol hand rub.

The team lead then checked the availability of hand rubs, soap, buckets, water and ensured that they were placed in the right location (see Figures 6 and 7). The team leader observed to check if health workers were sanitising their hands when delivering a service to the patient, be it during wound care or any other procedure, and then recorded the HH practices for each health worker available on duty.

There were weekly educational activities such as hand-washing briefings and health talks held with patients and their guardians on HH, to improve their hand-washing practice, and so they could act as extra

FIGURE 4 Hand hygiene checklist

Date _____ Ward _____ Assessor _____

Hand Hygiene Audit
Hand hygiene is the act of cleaning hands for the purpose of removing dirt, soil and micro-organisms. Hand hygiene audit is used to assess hand hygiene techniques being performed in the hospital or healthcare settings. It aims to prevent the spread of infection between healthcare workers and patients through observational inspection

Hand hygiene checklist

item	Yes	No	Comments
Sinks/buckets are available in all areas as need			
Tap water is available in all sinks or buckets			
Hand washing steps poster is available			
Hand washing soap is available in all stations			
Alcohol hand rubs are available			
Alcohol hand rubs are well stock			
Placement of alcohol hand rub is compliant with safety			
Hand hygiene reminder poster is present			
Hand hygiene is performed between patients			

“reminders” about hand-washing for health staff. It is important to remember that family members are often present within the burn unit and form an important part of the care team. There was additional messaging on HH on the staff WhatsApp group and on the notice boards.

The same checklist used at baseline was then used to monitor HH behaviour throughout the project to monitor the progress of the intervention, and capture any changes seen in HH behaviour. After the baseline, the checklist data collection occurred twice a week.

To maintain motivation throughout the project, there were orientation meetings for all new staff on the project as they joined the team, consistent supportive supervision, monitoring of all activities/records of the project, monthly reports presented to the team and ensuring

continuous supply of HH resources. These staff motivation activities also acted to facilitate local project ownership.

4 | DATA COLLECTION

Data were collected using a checklist for baseline data collection, and then twice a week for the rest of the project. The checklist collected information surrounding HH practice among HCWs, and availability of hand-washing facilities. The baseline data were collected in August 2019, before implementation of any activities. Then, the follow-up data were collected from January 2020 through February 2020 after the changes had been made.

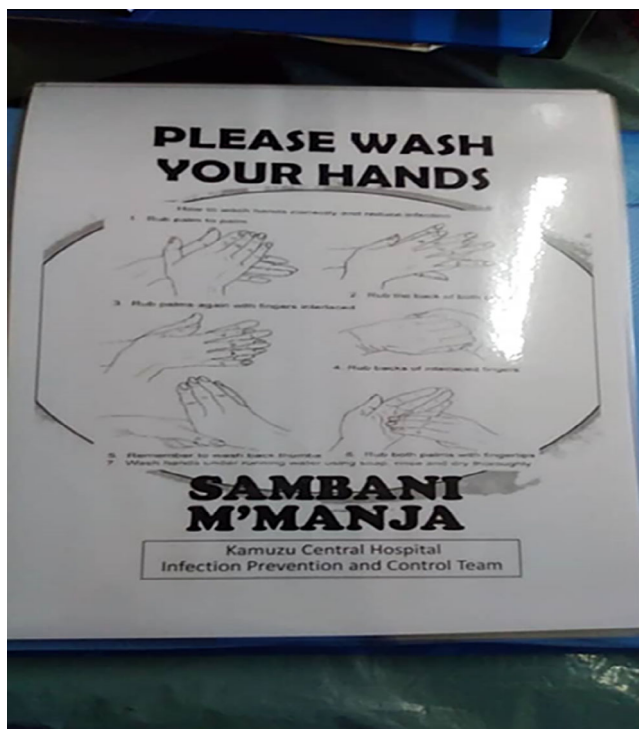


FIGURE 5 An example of a poster in situ



FIGURE 7 Newly purchased washing facilities in situ



FIGURE 6 Newly purchased washing facilities in situ

5 | PERMISSIONS AND DATA ANALYSIS

Permission was granted prior to commencement of the project by the hospital, including permission to publish the project and use the hospital name. None of the

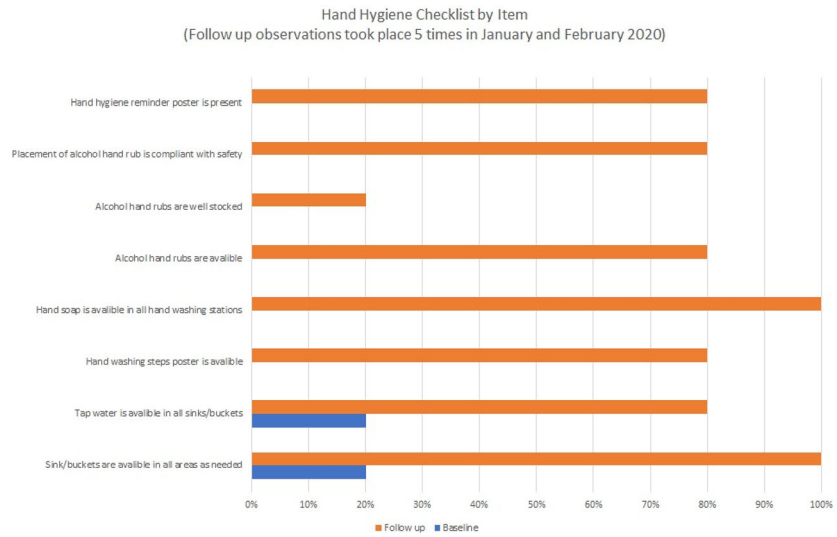
checklists identified individual members of staff and all data were presented to the group anonymously. The data were kept confidential by the lead author who analysed the data manually. The QI team were informed before initiating the project and health workers in the ward were informed before collecting data.

6 | RESULTS

At baseline, it was found that the availability of HH facilities was 22%, and that HH practice was at 37% (Figure 8). There were important improvements in the availability of resources to encourage correct HH. In the follow-up phase, the availability of HH facilities increased to 95.6%. Each item reached availability >80% of the time, with the exception of the alcohol gel, which was out of stock at the end of January and early February.

Figure 9 outlines the changes in HH practice from baseline over six further audits, including the follow-up check. While certain behaviours were seen to rise to at least 80% of the time, some areas of work did not show the same level of improvement. HH behaviours before and after touching a patient, before and after a procedure, as well as ensuring the staff did not have painted nails, were observed 100% at the follow-up observation

FIGURE 8 Changes in the availability of resources for hand hygiene



Kamuzu Central Hospital

Date _____ Ward _____ Assessor _____

Hand Hygiene Audit

Hand hygiene is the act of cleaning hands for the purpose of removing dirt, soil and micro-organisms. Hand hygiene audit is used to assess hand hygiene techniques being performed in the hospital or healthcare settings. It aims to prevent the spread of infection between healthcare workers and patients through observational inspection

Hand hygiene checklist

Item	Yes	No	Comments
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Alcohol hand rubs are well stocked			
Placement of alcohol hand rub is compliant with safety			
Hand hygiene reminder poster is present			
Hand hygiene is performed between patients			

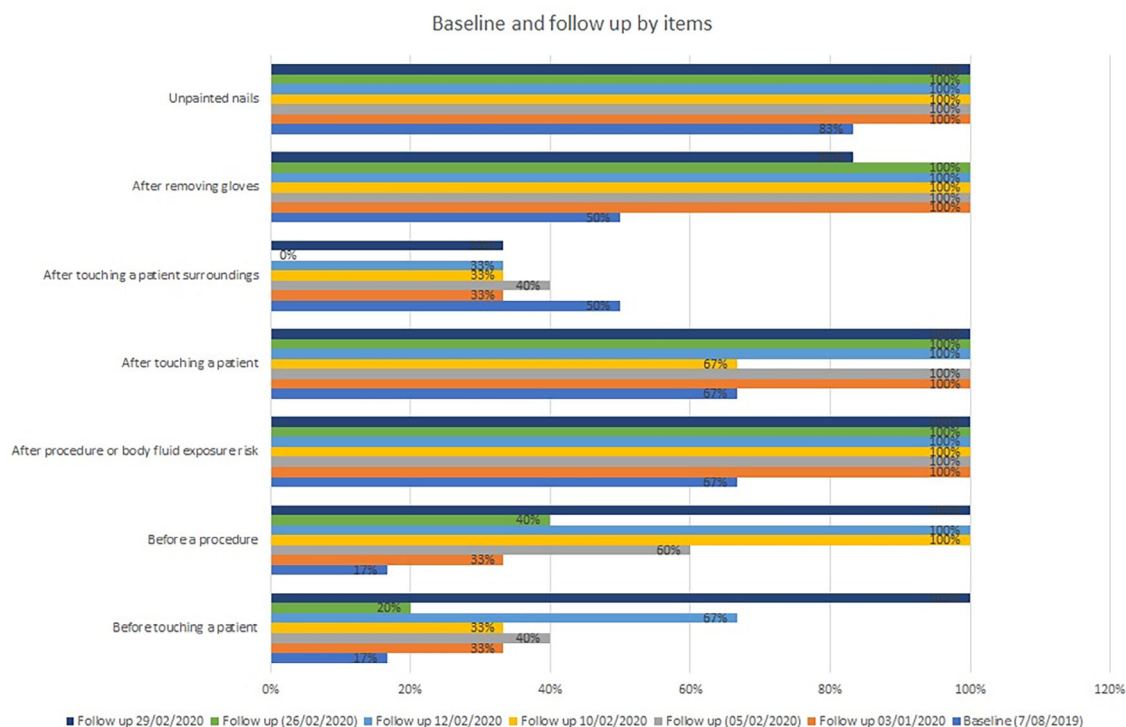


FIGURE 9 Changes in hand hygiene activities

period. However, HH after removing gloves (which reached 80%), and “after touching the patient’s surrounding area” did not reach 100%; the lack of an alcohol gel is partly responsible for this lack of consistency in behaviour.

7 | DISCUSSION

In low-income settings, there can be a perceived difficulty in creating change because of lack of resources; however, this QI project demonstrated that positive change can be made without the need for substantial additional funding and can be led by any member of a multi-professional health team.

Implementation of proper HH by all health care staff is vital in the fight against HAIs. In this study, more than half of the patients had nosocomial infections, which was partly because of low adherence to proper HH among HCWs. The low adherence was compounded by the infrastructure at KCH burn unit, which did not provide adequate and sufficient facilities for hand-washing; often there was poor or no stock of hand rub for the health workers and no reminders for the practice of HH. This prompted the need for an intervention to improve HH practice among health workers in burns through a range of changes. Here, the use of QI analysis tools (fishbone and SWOT) was important to establish what exactly the

barriers and facilitators were in this specific environment. In any QI project, it is paramount to utilise the use of QI tools such as, but not limited to, these. The use of QI strategies facilitate identification of aspects of a process, which may be contributing to diminished treatment outcomes.¹⁰ This is a crucial first step if practitioners wish to change the approach to a process, with the specific, local context in mind.

HH is a behaviour that must be learned and the intervention described provided a positive environment to increase uptake of proper HH practices among health workers. However, there were substantial challenges to overcome during the implementation of the QI activities. These included inadequate supply of hand rub, soap and dispensers as well as inadequate water supply to existing sinks, and varying availability of sinks depending on the location in the hospital. There were also time delays in procuring hand rub, which led to a fall in HH practice. Maintaining a good stock of hand rub was often a challenge, but health workers were encouraged to replace this with hand-washing. Additionally, there was a lack of team leaders to give direction on hand-washing, paired with inadequate training on proper HH and a resistance to change among health workers. This was compounded by a high workload, meaning staff had less time to put towards improving and sustaining good HH practices. Additionally, myths about HH proved a barrier to adequate hand-washing. For example, some pre-existing

beliefs were that hand gloving can substitute hand-washing, which resulted in poor compliance. This was addressed by sharing knowledge on HH practice in regular staff meetings.

One of the main facets of the intervention was the development of checklists, which allowed HH compliance and availability of hand-washing facilities to be recorded, using criteria relevant for the local context. The checklists were central to the monitoring and evaluation of the project's progress, resulting in substantial improvements in HH practice in the unit by the end of the project.

The intervention also aimed to create a sense of ownership in both the staff and the patients. This was achieved by staff sensitization through meetings and posters and involving patients by asking them to remind health workers to wash their hands if they had forgotten and giving ongoing feedback about the progress of the change. Additionally, appointing a HH committee to monitor the project was important in influencing and sustaining these activities. Ensuring adequate washing facilities through procuring and distributing hand rub to all staff and placing hand-washing buckets and soap at strategic points was vital to the success of the project; strategic placement of posters was also important as a reminder to staff to wash their hands.

This HH QI project in the KCH burns unit was a success, despite the challenges. The overall availability of HH facilities went from 37% to 96.5%, and the HH practice itself rose from 22% to above 80%—meaning the initial aims of the project were met. However, it should be noted in consideration that these results may have been affected by the staff knowing there was a QI project underway, meaning they knew that their HH practices could be observed at any given time. The Hawthorne effect is a well-recognised phenomenon, which describes changes in behaviour when people are aware that they are being observed.⁹ Although this may have had an impact on the accuracy of the observed increased hand-washing result, by looking at the patient files on the burn ward after the QI project had been implemented, it could be seen that the HAI rate had reduced to 13.8%. This suggests that the project led to a sustained improvement in HH practices and supports the validity of the findings from this study. This reduction in HAIs is an important indication of the usefulness of the project and demonstrates the clear benefit of implementing a QI project to increase HH practices.

The study found that success was dependent on a multidisciplinary team effort, a positive attitude, local ownership and effective and efficient use of available resources. The impact of undertaking small-scale QI

projects should not be underestimated, and it is important to acknowledge that nurses can play a key role in working towards improvements in care that lead to direct patient benefit.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data for this quality improvement project are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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