The impact of the Hand Hygiene New Zealand programme on hand hygiene practices in New Zealand’s public hospitals

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ABSTRACT

AIM: To detail the progress made by Hand Hygiene New Zealand (HHNZ) since 2011 and also describe the challenges experienced along the way and the factors required for delivery of a successful hand hygiene programme at a national level.

METHOD: HHNZ is a multimodal culture-change programme based on the WHO ‘5 moments for hand hygiene’ approach. The key components of the programme include clinical leadership, auditing of hand hygiene compliance with thrice yearly reporting of improvement in hand hygiene practice, biannual reporting of the outcome marker, healthcare-associated Staphylococcus aureus bacteraemia (HA-SAB), effective communication with key stakeholders and the use of the front-line ownership (FLO) principles for quality improvement.

RESULTS: The nationally aggregated hand hygiene compliance has increased from 62% in June 2012 to 81% in March 2016. There has been improvement across all ‘moments’, all healthcare worker groups and a range of different clinical specialties. The rate of HA-SAB has remained stable.

CONCLUSION: The HHNZ programme has led to significant improvements in hand hygiene practice in DHBs throughout New Zealand. The principles of FLO are now widely used to drive hand hygiene improvement in New Zealand DHBs.

Background

Healthcare associated infections (HAIs) are a significant problem worldwide, with up to 10% of patients admitted to modern hospitals acquiring one or more HAIs during their hospital stay.1-2 HAIs result in longer hospital stays; cause pain and distress; lead to increased mortality and can have long term physical, social and financial repercussions for both patients and families.3,4

While in New Zealand hospitals, serious infections caused by methicillin-resistant Staphylococcus aureus (MRSA) are relatively uncommon by international standards; HAI with MRSA and other multiple antibiotic resistant organisms (MROs—such as extended-spectrum beta lactamase-producing Enterobacteriaceae) continue to increase.5,6

As MROs become more common as a cause of HAI, treatment will become more difficult, making prevention even more important.

Direct contact between patients and healthcare workers (HCWs) is an important mechanism for transmitting MROs between patients and contaminating indwelling medical devices and surgical wounds.7 Despite this knowledge, a systematic review published in 2010 found that the overall median compliance of HCW with best hand hygiene practice was just 40%.8

Multimodal programmes to improve hand hygiene practice among healthcare workers can result in sustained improvements in hand hygiene practice and reductions in infections with MRSA and other nosocomial pathogens.9-12
Hand Hygiene New Zealand (HHNZ) is a multimodal programme developed with the aim of improving hand hygiene practice within the 20 district health boards (DHBs) in New Zealand.

**Context**

In 2007 the Ministry of Health’s Quality Improvement Committee (QIC) initiated a number of National Quality Improvement Projects (NQIPs). The Infection Prevention and Control projects included the delivery of a national hand hygiene improvement programme based on the World Health Organization ‘5 moments for hand hygiene’ approach. This was implemented and delivered by the Auckland District Health Board (ADHB). ADHB, in conjunction with Waikato and Tairawhiti District Health Boards (DHBs), piloted the national rollout of HHNZ.

In 2010 the Minister of Health established the Health Quality & Safety Commission (the “Commission”) which inherited the NQIP IPC programmes including HHNZ. In 2011 ADHB was awarded the lead agency role to reinvigorate HHNZ on behalf of the Commission. This provided the opportunity to build on achievements made in the first few years of the programme.

A cornerstone of the HHNZ programme from the outset was a nationally standardised process for auditing and monitoring hand hygiene performance according to WHO's ‘5 moments for hand hygiene’ (WHO-5). That is: moment 1, before patient contact; moment 2, before a procedure; moment 3, after a procedure or body fluid exposure risk; moment 4, after patient contact and moment 5, after contact with patient surroundings. HHNZ aligned with the modified WHO-5 as adopted and adapted by the Hand Hygiene Australia (HHA) initiative.

This report details the progress made by HHNZ since 2011, along with challenges experienced along the way and the factors required for delivery of a successful hand hygiene programme at a national level.

**Method**

**Stakeholders**

In 2011 the HHNZ steering group was established. This included a national clinical lead, a national HHNZ coordinator, a project manager, a project coordinator, an infection prevention and control nurse specialist and a communications adviser. Each participating DHB had a HH coordinator (from the earlier NQIP) and one (or more) gold auditors.

The clinical lead engaged directly with key DHB stakeholders (including chief executives, chief medical officers, directors of nursing and quality managers) and presented at a number of DHB grand rounds.

**Measurement**

The HHNZ programme recorded improvement against a process measure and an outcome measure.

- **Process measures**—the total number of appropriately performed hand hygiene moments. This is reported thrice yearly as a percentage of the total number of moments captured by the auditors for an audit period.
- **Outcome marker**—the rate of healthcare-associated S. aureus bacteraemia (HA-SAB) per 1,000 inpatient days. The denominator (inpatient bed days) is calculated on the midnight census method (the number of inpatients present on the last day of the previous quarter plus the number of inpatient admissions during the present quarter). Well babies, mental health patients and boarders are excluded from the midnight census count. The HA-SAB rate is reported biannually.

**Data collection**

The auditing was undertaken by individuals trained as gold auditors. Interactive workshops were provided by the HHNZ team to deliver gold auditor training. The gold auditor training process was aligned with the approach used by HHHNZ's Australian counterpart, HHA. All gold auditors have to pass a HHNZ pre-auditor
online test with a score of 100%, pass the workshop test with a score of >90% and demonstrate the ability to audit appropriately on the wards. All gold auditors and gold auditor trainers are required to complete an online auditing skills validation test on an annual basis and are also required to collect a minimum of 100 moments each year. Inter-auditor and intra-auditor reliability are assessed during training.

The aim was to support a transparent auditing process; the nurse manager of each unit was informed when hand hygiene auditing was to take place and they, in turn, inform their staff. Advice was sought from the Office of the Health and Disability Commissioner to ensure that the auditing process took into account the Code of Rights. They recommended that a common sense approach be applied; identifying themselves to patients, talking with patients about the process if asked and moving on if the patient raised any concerns.

Each participating DHB audits and submits data to HHNZ three times per year through a trained and certified auditor. The number of moments required is determined by the number of beds in the DHB; the more beds the more observations required.15

There were a number of options for choosing auditing wards.15 Wards were categorised into two groups: high risk wards containing patients who may be at higher risk of developing a HAI and standard risk wards. High risk wards typically included intensive care, haematology/oncology, transplant, renal dialysis units and wards with immunocompromised patients. The options suggested were as follows:

- Option A – high risk wards with rotation of standard risk wards.
- Option B – high risk wards in addition to all standard risk wards.
- Option C – intensive care units with auditing of all other wards in the hospital.

It was up to the DHB Hand Hygiene Steering Group and the Hand Hygiene coordinator to determine which option to take. Regardless of which option was taken by each DHB, all auditing was performed by trained gold auditors. HHNZ auditors were encouraged to audit using an electronic application developed by HHA that can be downloaded to a smart phone. This helped improve data quality and made the auditing process easier and quicker. This data can subsequently be accessed by the National and DHB coordinators for reporting purposes.

Communications and promotional activities

A communications plan was developed in 2011 and new communication channels developed. These included the development of the HHNZ website (handhygiene.org.nz) which provides a central hub for sharing promotional materials, auditing results, journal articles, videos, newsletters and guidelines.

Regular electronic newsletters were sent out on a bimonthly basis targeted at hand hygiene coordinators, auditors, IPC specialists, quality managers and others involved in implementing the programme. These provided a platform for sharing ideas, showcasing achievements and profiling innovative approaches taken to improve hand hygiene practice.

A range of promotional activities were conducted to generate interest in the programme. This included the Hand Hygiene Video Competition, in which healthcare teams were invited to film and submit a video that highlighted the importance of hand hygiene and demonstrate the WHO-5 moments. (The prize of $1,000 was given to a charity of the winning team’s choice.) This initiative received an enthusiastic response, with 11 video entries from DHBs around the country.

Considerable efforts were put into helping DHBs promote World Hand Hygiene Day, held on 5th May every year. Hand Hygiene promotional material was made available and information sent out to Hand Hygiene Coordinators with a number of suggestions on how the day could be promoted within their DHB. (ADHB marked the day in 2013 with a large ‘Flash Mob’ in the hospital’s atrium).

Quality and Safety Markers

In 2013 HHNZ and the Commission in the setting of the ‘Open for better care’ campaign developed a set of Quality and Safety Markers (QSMs) to help drive improvement, with an annual national performance target being set each year.
That same year, hand hygiene performance rates were no longer reported anonymously. This meant DHBs could see how their results compared with other DHBs around the country, as well as how different categories of healthcare workers compared to others. These results were made publicly available on the HHNZ website.

Quality improvement methodology

While this is a national programme, there is wide variation in the clinical settings in which hand hygiene is being promoted and monitored. Intensive Care, for instance, has a different set of pressures and priorities than a general ward. In recognition of this, the programme worked to promote the principles of Front-Line Ownership (FLO) within the overall multimodal framework. The primary principle of FLO is to empower healthcare workers to develop their own local approaches to improving hand hygiene practices according to their unique local circumstances. Although the various components of the multimodal programme are not optional, exactly how those components are realised in the local context is left as much as possible to front line staff.

This approach has been promoted in various ways, in workshops, through e-newsletters and on the website. The Commission hosted two workshops with guest speaker Dr Michael Gardam, an international expert in using FLO as a quality improvement tool for infection control.

Building resilience and sustainability

In 2014 the Commission, at the directive of the DHB chief executives, led a move from national to regional delivery of the Commission's IPC programmes. To facilitate this transition, the Commission (with representatives from the HHNZ team) hosted multidisciplinary IPC meetings around the country for each of the four regions; Northern, Midland, Central and South Island.

The first round of meetings included discussion about what is required at a regional level to further improve and sustain hand hygiene. Each region was presented with its hand hygiene performance data and how this compared to national hand hygiene averages. These interactive sessions gave attendees an opportunity for reflective learning with colleagues working in infection prevention and control in DHBs in their region. The second round of meetings, also interactive, supported sharing of ideas but had a strong focus on creating sustainable network structures to support DHBs with HHNZ work at a local and regional level.

Results

The HHNZ programme has led to significant improvements in hand hygiene practice in DHBs throughout New Zealand. The results of the November 2015 to March 2016 auditing period showed a nationally aggregated compliance rate of 81% (63,483 observations).

All 20 DHBs now participate in the programme and regularly submit hand hygiene data. Compliance against the WHO-5 moments has increased annually throughout the duration of HHNZ, as evidenced in the March 2016 National Audit Report (Figures 1 and 2).

Figure 1: Trends in national aggregate and average hand hygiene performance: October 2012 to March 2016.
In 2013, the QSM target for hand hygiene compliance was set at 70% which was met in June that year. The QSM target of 75% for 2014 was achieved in October that year and the QSM target of 80% for 2015 was achieved in June 2015. In this latter auditing period, 19 DHBs achieved 75% or more compliance and of those 19 DHBs, 12 achieved 80% or more.

The results show considerable improvements in compliance with all the 5 moments (Figure 3). This is particularly apparent for moments 3 and 4 (the ‘after’ moments) which in the November 2015 to March 2016 auditing period were 88.8% (7,909 observations) and 86.2% (19,464 observations), respectively. Consistent improvements have also been made in relation to moments 1 and 2 (the ‘before’ moments) although compliance here was 76.1% (19,192 observations) and 80.5% (5,925 observations) in the November 2015 to March 2016 period which is not as

![Figure 2: Trends over time by DHB: June 2013 to March 2016.](image)

![Figure 3: Change over time by moment: October 2012 to March 2016.](image)
high as for moments 3 and 4. Significant improvements in hand hygiene practice are evident across all healthcare worker categories and across a range of different clinical services (Figures 4 and 5).

The outcome measure—the rate of healthcare-associated S. aureus bacteraemia (HA-SAB)—has remained stable at approximately 0.13 events/1,000 inpatient days.

Discussion

The HHNZ programme has led to significant improvements in hand hygiene practice in DHB hospitals throughout New Zealand. At the end of 2009, the first year of the NQIPs, the nationally aggregated measured compliance with hand hygiene was 47% (25,148 observations over 12 months from 12 participating DHB). In the November 2015 to March 2016 audit period, the nationally aggregated measured compliance rate was 81% (63,483 observations over five months from 20 DHB). All DHBs now actively participate in the programme and national QSM targets have been met in the three years since they were introduced in 2013. Improvements have been made among all healthcare worker categories and against all of the WHO-5 moments. Nursing staff have achieved a measured compliance rate of 84.4% but however, medical staff perform less well at 74.2%. The highest rates are seen in the “after” moments; moments 3 and 4. Overall, the results suggest that a culture of good hand hygiene practice is becoming embedded within DHBs.

There has been no improvement so far in the outcome marker, however, there may be a number of reasons for this. Firstly, the definition used to determine the rate of HA-SAB includes all events regardless of whether the event was hospital-onset or community onset. It is unlikely that hospital hand hygiene practices have any impact on community-onset HA-SAB. Secondly, healthcare-associated bacteraemia most likely reflects the worst outcome for an episode of healthcare-associated infection. The incidence of other healthcare-associated infections such as peripheral intravascular access device-related phlebitis, catheter-associated urinary tract infections and non-surgical site skin infections may have been impacted upon by improvement in hand hygiene practices. However, defining such events and then ensuring consistency with reporting is considerably more difficult than capturing episodes of bacteraemia. Thirdly, measuring laboratory data such as rates of patients newly identified as being colonised or infected with a multiple antimicrobial resistant organisms (MDRO) such as...
MRSA or extended spectrum beta lactamase producing strains of *Klebsiella pneumonia* is also fraught with difficulty as the distribution of these MDRO varies significantly across the country and in the absence of entry and exit screening it is difficult to assign the place of acquisition. Finally, the HHNZ programme was first rolled out in 2008 in a limited, non-sustainable way and not all DHBs actively participated in the programme. The reinvigoration of the programme in 2011 led to increasing participation by all 20 DHBs and the development of a more sustainable programme with a strong focus on locally owned quality improvement strategies. By 2012 the national aggregated hand hygiene compliance rate for June was 62%: diminishing returns in disease reduction may occur when hand hygiene compliance rates improve to 50 to 70%. It is possible that most of the impact on HA-SAB rates coincided with the earlier work and preceded HA-SAB data collection. Reduction in the HA-SAB rate was reported with the ADHB programme, following an increase in compliance with hand hygiene from 35% to 60% over a 36-month period. Regardless, our findings are comparable to those of HHA which has reported reductions in MRSA bacteraemia but not hospital-onset *S. aureus* bacteraemia rates.

It seems likely that the development of the QSMs and corresponding targets were a key contributor to this success. The results for each DHB are no longer anonymized, which allows DHBs to benchmark their performance against other DHBs and to publicly demonstrate their improvement in measured hand hygiene performance over time. It has also helped motivate senior management to give greater priority to their local programmes and to provide them with greater support and resourcing. There has been criticism associated with the public reporting of the DHB hand hygiene performance. Critics have suggested that the current approach of DHB choosing which wards to audit and report allows for an element of ‘gaming’. However, more recently a number of DHB have taken to reporting the results of auditing across their entire DHB or have shifted from auditing high performing areas to more challenging areas within the DHB such as emergency departments. While the DHB hand hygiene performance may have reduced following these changes, HHNZ favours this approach and is working to acknowledge these changes in the quarterly report.

While public reporting has resulted in at least one DHB being singled out for negative media attention, this was used as an opportunity by local proponents of the programme to generate greater support from staff and senior management. Ultimately this helped to drive considerable improvement in that DHB.

Figure 5: Change over time by ward type: October 2012 to March 2016.
The principles of FLO are now widely used to drive hand hygiene improvement in New Zealand DHBs. Many healthcare workers involved in the implementation of the programme in their DHB have reported that using the principles of FLO has been an effective way to engage teams and overcome the specific barriers that may be present in local settings.

Surveys among those involved in the programme have also pointed to the value of effective communications, which has helped ensure that people working in different DHBs around the country feel part of a unified and collaborative national programme.

While many achievements have been made, it remains to be seen how improvements will be sustained after 2015 when the nationally-led improvement programme will be transitioned to regional patient safety and IPC networks. It is expected that the series of multi-disciplinary meetings hosted by the Commission’s IPC team will have laid the groundwork for the sustainability of these regional networks. Despite some HHNZ champions and coordinators expressing concerns early on about the withdrawal of support and assistance at a national level, the results from a recent HHNZ survey suggest that these networks are already providing support at a regional level to sustain the programme (unpublished data, HHNZ). We believe that even once regional networks become more established ongoing leadership at a national level will still be beneficial.

Challenges and Limitations

Rolling out a national programme such as HHNZ has not been without challenges. Healthcare workers within some DHBs resisted the idea of a national monitoring programme being imposed on them. Initially there was also some resistance and/or lack of interest in the programme amongst senior management. This has improved substantially over the last three years however; a development probably linked to the establishment of QSMs and the national results being made public, as well as the use of FLO.

In many DHBs the hand hygiene co-ordinator role has been given to an IPC staff member to manage over and above their usual workload, which in some cases has limited the ability of co-ordinators to co-ordinate local programmes effectively. This issue has been repeatedly raised in surveys conducted by the programme, and has also been highlighted in the New Zealand Nurses Organisation’s journal, Kai Tiaki.

The results of an attitudinal survey conducted in 2014 indicated that while an overwhelming majority of healthcare workers believed hand hygiene is important to patient safety, just over half believed that practicing the ‘5 moments’ had become the social norm at their place of work. The most commonly identified barriers to improvements were “bad habits” and being “too busy” (unpublished data, HHNZ).

It appears therefore that higher standards of hand hygiene practices are becoming embedded as standard practice in DHBs but there is still concern about whether these practices will be sustained.

There are some limitations to the manner in which the auditing was undertaken. It is carried out by direct observation of staff working in a clinical area. The distribution of moments observed is uneven and with the most number of moments observed occurring for moments 1 and 4, before and after touching a patient. This is not surprising as these moments are the most common HCW and patient interactions. Also it is likely that multiple moments may have been observed during the same HCW and patient interaction and multiple observations on the same HCW. In reality the short observation periods used by the auditors and the pace of work in a busy ward may have compensated for both these issues.

Key to success

We have identified seven key factors that have contributed to the success of the HHNZ programme.

1. Strong international evidence and leadership shown by the WHO ‘Clean care is safer care’ programme.
2. Collaboration with the Hand Hygiene Australia team, including the sharing of expertise, ideas and resources.
3. A strong commitment to the programme by the Commission, which increased the credibility of HHNZ as a national quality improvement programme.
4. The establishment of a standardised auditing and reporting process that allowed DHBs to monitor their own progress over time.

5. An effective communication strategy. This generated interest in programme and kept those involved up-to-date with its aims and achievements.

6. The introduction of QSMs, which increased accountability among senior leadership teams and therefore encouraged engagement with the programme.

7. Increased quality improvement capability within the IPC sector with the emphasis on local ownership.

Conclusion

Core components of the HHNZ programme have been education of frontline staff, universal placement of alcohol based hand rub at the point of care and nationally standardised performance monitoring along with public reporting. Good communications with the sector have been central to establishing the programme. Within this broad national framework, HHNZ has encouraged frontline staff to innovate and devise specific approaches to improving practice according to local needs. Over the last three years, this has resulted in substantial improvements in hand hygiene practice. Sustaining these improvements, however, will require ongoing national reporting along with effective regional networks comprised of both clinical and managerial staff.

The success of the approach used by HHNZ over the last three years suggests that it may provide a useful model for national quality improvement programmes in other areas of clinical practice.

Competing interests:
Auckland DHB was funded by the Health Quality and Safety Commission to deliver the HHNZ programme. Dr Freeman reports that he was Clinical Lead of the HHNZ programme between 2011 and 2015.

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