



**HEALTH  
PARTNERS**  
CONSULTING GROUP LIMITED

TOMORROW'S HEALTH TODAY

Health Partners Consulting Group  
Ph: +64 9 379 8620  
Courier: Unit 3.1, 8a Cleveland Rd, Parnell  
Post: PO Box 147209, Ponsonby, Auckland

Contact: Dr Gary Jackson: [gary@healthpartnersconsulting.com](mailto:gary@healthpartnersconsulting.com)

Suggested citation: Health Partners Consulting Group. Hand Hygiene Evaluation: Report prepared for the Health Quality and Safety Commission. HPCG 2014.

#### Acknowledgements

Thanks to all respondents who were very accommodating, and were free and frank in their assessments; in particular to the HHNZ team, who were very open to exploring and explaining their work to date. We have tried to capture the main points made by all involved, and apologise in advance if everything has not been covered, or the points are not well conveyed.

#### Disclaimer

Data analysis has been carried out in good faith, assuming all data provided is as stated. Statements made by participants have been taken in good faith; we have not attempted to audit or verify statements made, or any omissions leading to misleading conclusions. No responsibility can be taken for any errors resulting, or actions taken as a result of those errors.

## Table of contents

Executive Summary.....	5
1. Background .....	8
WHO 5 moments .....	9
2. Approach to the evaluation .....	10
3. Impact on clinical practice .....	11
Hand hygiene compliance .....	11
By DHB .....	12
By Moment.....	13
By practitioner type .....	14
By unit .....	14
Overall.....	15
4. Impact on health outcomes .....	16
Results .....	16
5. Value for money .....	19
Costs .....	19
Infections averted.....	20
Cost-benefit.....	21
6. Programme assessment .....	22
National programme .....	22
Relationship to DHBs.....	22
Commission role .....	23
Audit role.....	23
Audit accuracy .....	24
Hand gel.....	24
Workforce motivation .....	25
Attitude change .....	25
IT/Audit.....	26
7. Approaches to improving hand hygiene.....	27
National target for hand hygiene.....	30
Alternatives to Audit.....	31
5 Moments? .....	32
8. Future sustainability .....	33
9. Conclusion.....	35
Appendix 1 – List of people interviewed, Interview questions. ....	37
Appendix 2 – Hand hygiene programme documentation reviewed. ....	39
Glossary .....	40



## Executive summary

Hand Hygiene New Zealand (HHNZ) has contracted with the Health Quality and Safety Commission (HQSC) for 3 years 2011/12, 2012/13 and 2013/14 to improve hand hygiene in New Zealand public hospitals. This builds on work dating back to 2008. The WHO 5 Moments approach was adopted, and was in place at each DHB by 2012. A 'gold audit' process was established to provide a rigorous clearly defined method to estimate hand hygiene rates compared to that expected by the 5 Moments method. The rate of healthcare-associated *S. aureus* bacteraemia was established as an outcome measure, with a clear definition and monthly reporting from DHBs.

This rapid evaluation aimed to assess the impact the programme has had to date, and whether it had affected clinical outcomes. The evaluation included:

- analysing documents created by HHNZ – including monitoring reports, reviews and resources
- a quantitative analysis of the audit results and infection measures by DHB
- a qualitative analysis involving key informant interviews with semi-structured questions and a thematic analysis
- a brief literature review and synthesis of approaches suggested from the interviews to take hand hygiene forward into the future.

Over the past three years there has been a clear improvement in hand hygiene measures, with audit results suggesting most DHBs are able to manage over 70% adherence with hand hygiene opportunities. The improvement is linked with, and likely to have been the result of the HHNZ work. However the audit process does not necessarily cover all areas of hospitals, with ED, theatres, mental health, maternity, AT&R and day and community units being less likely to be included in the audits. Results may not be able to be generalised to all public hospital settings.

Staff attitudes towards hand hygiene have improved, but there is some way to go before it becomes a 'social norm' in our hospitals. More than one in four hand washing opportunities are being missed across New Zealand public hospitals, even assuming that rates in the non-audited wards are as good as those on audited wards. At this level of performance the chance of infection transmission from staff to patients, or from patients to staff remains considerable. A simple behaviour has proved to be more resistant to change than expected.

The public health system is estimated to be spending \$3m a year on the hand hygiene programme as it currently stands. From the data available it has not proved possible to estimate clinical outcomes linked to hand hygiene practice, or to determine programme cost-effectiveness. Programme data suggests there may have been a reduction in healthcare-associated *S. aureus* bacteraemia in public hospitals in New Zealand from 2012 to 2014. This possible reduction may or may not be associated with the likely improving hand hygiene over that time, but rates were not well correlated at the DHB level. If the infection reduction is considered real it is estimated that 10 deaths will be averted in 2014. Measures of wider changes in healthcare-associated infection that would be able to be affected by hand hygiene practices were not possible to derive.

Given the difficulties in establishing clear measures of reduced infections it is not possible to calculate the actual value for money for the HHNZ programme. Theoretical calculations based on New Zealand data would suggest avoided costs upward of \$13m a year are possible through improved hand hygiene in New Zealand public hospitals.

Key informants were generally positive about the national programme on hand hygiene in general, and HHNZ in particular. There was some criticism of the initial approach taken in the programme, drawing on infection prevention and control principles, and an apparent concentration on audit and "thou shalt" messages. The relatively poor results for doctor response compared with other groups

were attributed to this approach by some. Authoritarian attempts to change health care behaviours are generally less effective in creating positive change than those paying more attention to quality improvement science and behavioural change theories. Recent work has moved this latter approach more to the fore, with the recent national workshop (June 2014) strongly featuring front-line ownership. Local system improvement processes will be needed to move results to a more desirable level (eg >80% compliance) and to embed the practice of hand hygiene in a more sustainable manner.

The change process undertaken for hand hygiene is incomplete. It would be easy for results to stop improving or even regress if continued pressure is not applied. This is not an area that can be considered a candidate for a one-off campaign; rather it needs continued emphasis to embed it into the fabric of our health system. It also cannot be seen in isolation, or to be overly prioritised compared to other aspects of infection control or quality and safety in the hospital setting. Intense and focused effort will continue to be required as drug resistance increases, hospital capacity is more utilised, and the inpatient cohort becomes older and more vulnerable to infection.

The signalled emphasis for the programme for 2014/15 on front-line ownership and continuous quality improvement - pdsa cycles, feedback, peer support and leadership - has wide support. Further investment is likely to be needed to accomplish the end goals of the programme. Until results are more sustainable in the hospital setting it would be premature for attention to switch to hand hygiene improvement in primary and community care settings, aged residential care or private facilities.

Based on the analysis undertaken and the feedback received from stakeholders, we would suggest the following considerations for future hand hygiene planning in New Zealand:

1. A national approach supporting hand hygiene will be needed for at least the next three years. Elements of this approach will include:
  - a. strategic oversight and leadership functions
  - b. maintaining IT infrastructure for data collection
  - c. maintaining links with Australian programme
  - d. audit data management and reporting
  - e. ensuring maintenance of gold auditor training capacity
  - f. continued resource refreshment, refinement and development
  - g. website maintenance, development and promotion
- Also useful would be:
  - h. continued proactive support for DHBs
  - i. engagement with practitioner organisations and educational institutions
  - j. assistance for hospitals to expand practice to all areas of clinical care
  - k. annual national workshop/shared learnings
  - l. publicity and social marketing re hand hygiene, including publications
2. Embed the changes to a quality improvement science mode of working, ie front-line ownership, pdsa cycles, feedback, peer support and leadership
3. Consideration of increased national investment in infection prevention and control, including hand hygiene
4. Progress a more collaborative approach to the commissioning and monitoring of quality initiatives
5. Ensuring stronger clinical oversight – eg establishment of a single, high level multi-agency governance group for all the national infection prevention quality improvement programmes including HHNZ

6. Review the *S. aureus* bacteraemia results collection and reporting process, including how each DHB identifies and collates cases. Exploration of other key infection indicators – norovirus, multi-resistant Gram-negative bacteria
7. Moving formal national audit reporting to twice-yearly from thrice-yearly and continuing publication and publicity around DHB-specific results
8. Starting a conversation around seeking hand hygiene rates higher than 80%
9. Areas that may be useful to assess in the future:
  - a. current practice and measures being taken to reduce patient-to-patient infection transmission within hospitals
  - b. current practice in maintaining environmental cleanliness in hospital settings to prevent cross-infection.

## 1. Background

Hand hygiene has long been recognised as an infection control issue, with increasing attention being paid to it throughout the 2000s.<sup>1</sup> Auckland DHB assisted the National Quality Improvement Programme (NQIP) to create, the first national programme to improve hand hygiene beginning in 2008. An initial roll-out to the Auckland, Tairāwhiti and Waikato DHBs was followed by nationwide roll-out to other DHBs in 2009. This was then transitioned to the Health Quality and Safety Commission (HQSC) in 2011, remaining as Hand Hygiene New Zealand (HHNZ). The contract has run for 3 years 2011/12, 2012/13 and 2013/14.

The HHNZ programme is one of three infection prevention and control initiatives overseen by the HQSC, the others being Surgical Site Infection and Central Line Associated Bacteraemia programme. These programmes are quality improvement initiatives aiming to improve patient safety and patient outcomes during their stay in healthcare facilities.

The HHNZ programme's overall goal is to improve hand hygiene practice among healthcare workers as a way to reduce healthcare associated infections (HAIs) and, therefore, improve patient safety. Healthcare associated infections are a significant problem worldwide. Up to 10 per cent of patients admitted to modern hospitals acquire one or more HAIs during their stay.<sup>2</sup> These infections can prolong the stay, complicate the patient's journey of care and contribute to poor outcomes, including death and disability. It can also promote resistance to antibiotics, and inter alia additional cost to healthcare provision. Many HAIs are likely to be preventable through simple interventions such as the performance of appropriate hand hygiene by healthcare workers. It is a key patient safety issue within New Zealand hospitals.

The HHNZ programme has been well documented, with regular progress reports, newsletters, audit reports, project plans and sustainability reports. These have been reviewed and are noted in Appendix 2. The programme website (<http://www.handhygiene.org.nz>) is very lively and full of information and resources. The recent workshop is well documented, with many of the presentations being available online.<sup>3</sup>

---

<sup>1</sup> Roberts S, Upton A, Morris A, Woodhouse A. Hand-hygiene practices of medical staff: room for improvement. *NZ Med J* 2005; 118 (11 Feb).

<sup>2</sup> Graves N, Nicholls TM, Wong GS, Morris A. The prevalence and estimates of the cumulative incidence of Hospital-Acquired Infections among patients admitted to Auckland District Health Board hospitals in New Zealand *Infect Control Hosp Epidemiol* 2003; 24(Jan):56-61

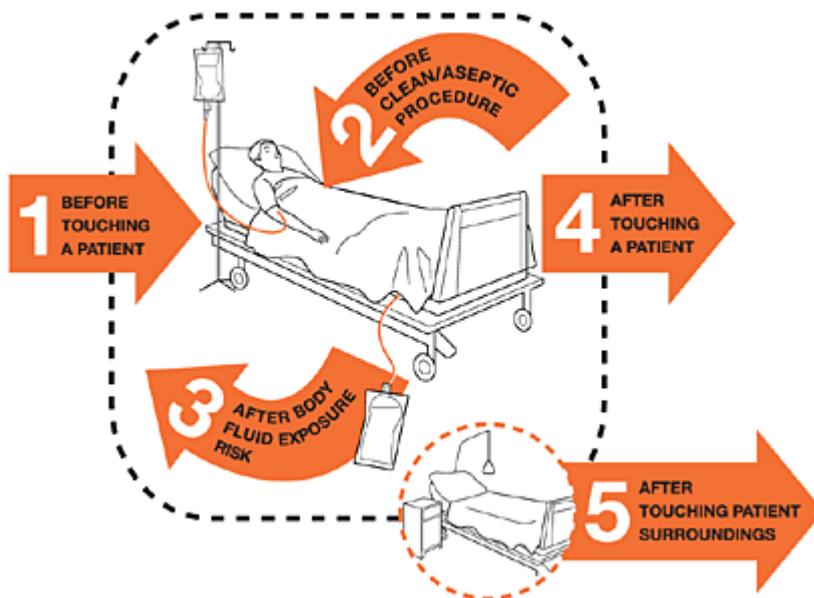
<sup>3</sup> [http://www.handhygiene.org.nz/index.php?option=com\\_content&view=article&id=16&Itemid=129](http://www.handhygiene.org.nz/index.php?option=com_content&view=article&id=16&Itemid=129) Accessed 7 July 2014.

## WHO 5 moments

The WHO Guidelines on hand hygiene in healthcare were published in 2009 and introduced the concept of the “5 Moments for Hand Hygiene.”<sup>4</sup>

The WHO 5 Moments for Hand Hygiene approach defined the key moments when health-care workers should perform hand hygiene. This approach recommends health-care workers to clean their hands:

1. **before touching a patient**
2. **before clean/aseptic procedures**
3. **after body fluid exposure/risk**
4. **after touching a patient**
5. **after touching patient surroundings.**



This evaluation of the Hand Hygiene NZ Programme comes at an opportune time. Led by WHO hand hygiene has become well established as a key safety measure in healthcare. However despite the attention paid to it outcomes have not been as good as desired,<sup>5 6</sup> changing such a fundamental behaviour and maintaining that change has proved difficult, and there have been calls for a re-think in approach.<sup>7 8</sup> The New Zealand programme is relatively recently established. It has had a multi-modal approach with a strong emphasis on regular audits and collection of monitoring information. Audit results improved initially, but are tending to plateau. What next steps are indicated?

<sup>4</sup> WHO Guidelines on Hand Hygiene in Health Care: a Summary. Geneva: World Health Organization 2009. 2009WHO/IER/PSP/2009.07

<sup>5</sup> Gould DJ, Moralejo D, Drey N, Chudleigh JH. Interventions to improve hand hygiene compliance in patient care. *Cochrane Database Syst Rev.* 2010;CD005186

<sup>6</sup> Huis A, van Achterberg T, de Bruin M et al. Systematic review of hand hygiene improvement strategies: a behavioural approach. *Implementation Science* 2012, 7:92

<sup>7</sup> Huis A, Holleman G, van Achterberg T et al. Explaining the effects of two different strategies for promoting hand hygiene in hospital nurses: a process evaluation alongside a cluster randomised controlled trial. *Implementation Science* 2013;8:41

<sup>8</sup> Larson E. Monitoring hand hygiene: Meaningless, harmful, or helpful? *Am J Infect Control* 2013, 41:S42-S45.

## 2. Approach to the evaluation

### Scope

This rapid evaluation aims to consider the following research questions:

1. Did the New Zealand Hand Hygiene Programme impact on clinical practice?
2. Did the New Zealand Hand Hygiene Programme impact on staff attitudes?
3. Was there a change in patient outcomes?
4. Is there any evidence of the Programme positively or negatively affecting other programmes or opportunities for quality improvement?
5. What is the cost of the Hand Hygiene Programme?
6. Are any changes to the current approach suggested?

The evaluation uses the data collected by the Hand Hygiene Programme and HQSC. It is beyond the scope of this report to audit this data as to its accuracy or validity. All data and comments by interviewees are taken in good faith, and are reported on at face value. Issues of data quality, and importantly data fitness for purpose, are discussed throughout the report.

### Methodology

Four streams of analysis have been combined to assess the impact of the programme, and suggest future paths:

1. Document analysis. The monitoring reports, reviews and literature from the Commission and the Hand Hygiene Programme were examined, and a storyline constructed. Identified barriers were extracted and grouped thematically.
2. Quantitative analysis. Audit data from the programme was examined for evidence of change. We then attempted to correlate this with hospital acquired infection (HAI) data held by HQSC, and compared programme costs with likely benefits.
3. Key informant interviews with a semi-structured set of questions (see Appendix 1). A purposive sample was used, covering people involved in the programme, quality managers, different staff types and levels, and with a geographic spread. Themes were analysed, with issues raised being tested back with the Hand Hygiene team and Commission staff. Further details were sought by email if necessary.
4. Literature review (brief) and synthesis of approaches suggested from the interviews to take hand hygiene forward into the future.

### 3. Impact on clinical practice

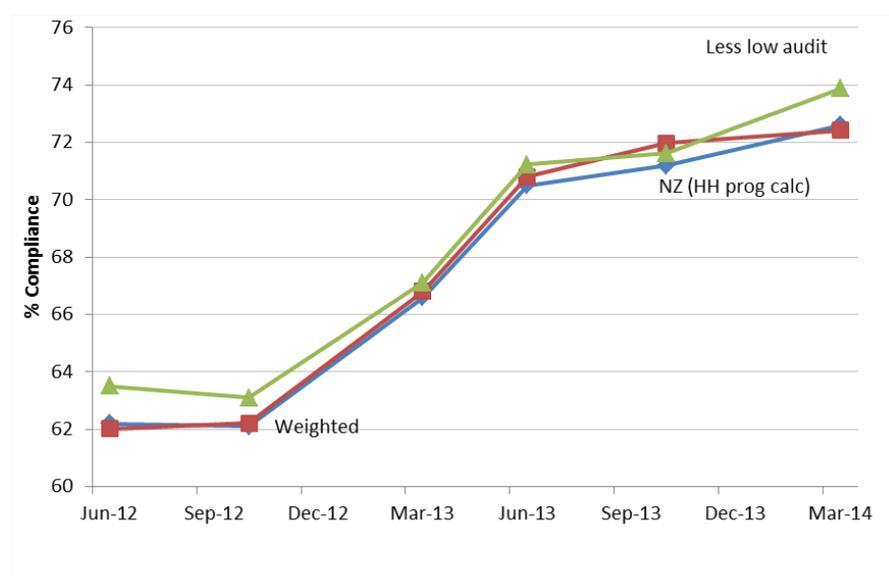
This section examines the directly measured impact on clinical practice associated with the increased hand hygiene emphasis in New Zealand. The gold audit data is used as the primary measure. Further discussion on the wider impacts and more qualitative measures are in Section 6. The HHNZ programme's stated aim is to get DHBs over 70% compliant – comment on this 'target' level is included in Section 7.

#### Hand hygiene compliance

The gold audit involves trained auditors monitoring a clinical workspace noting moments of hand hygiene based on the WHO 5 Moments. A minimum range and number of areas to be audited and moments to be collected are required, based on the size of the hospital. From 2011 to June 2013 the programme had trained a total of 189 gold auditors. By 2014 this had risen to 360. They are represented at every DHB, and every DHB has carried out audits over the past 3 years. There are a small number of DHBs that have consistently struggled to reach the recommended numbers of audit moments – this is discussed further in Section 6.

Audits were required every 3 months, with the first cycle of (close to national) reporting in Jun 2012, which saw 17 DHBs completing the audit. Compliance results from then through to March 2014 are shown in Figure 1.<sup>9</sup> These have been calculated in three different ways. The first (in blue) shows the HHNZ calculated figure, based on the moments collected. The second (in red) is similar, but weights the results of each DHB on its bed size. The third method (in green) drops the DHBs that did not complete the minimum required moments. As can be seen each method gives very similar results, showing a rise from the low 60s to the low 70s over the two year period. To the extent that DHBs with low audit numbers also have slightly lower hand hygiene compliance the latter method gives slightly higher results.

Figure 1 Hand hygiene compliance audit results, all New Zealand



Source: HHNZ; Health Partners calculation. See text for detail.

<sup>9</sup> Update: Since this report was prepared the results for the June quarter for 2014 were released. The overall hand hygiene rate reached 73% (weighted 74%), a 12% increase on the June 2012 rate.

## By DHB

Since 2013 audits have been reported openly, allowing DHBs to be compared – this was viewed both positively and negatively by stakeholders – briefly discussed in Section 6. Overall almost all DHBs have improved in terms of audited compliance (Table 1) – the sole exception being Northland which appeared to start with a relatively high compliance. For some of the DHBs inadequate audit samples (shaded orange) preclude trend analysis. Seventeen out of 20 DHBs have consistently reached the recommended number of audit moments – which can be considered a marker of programme progress. Importantly there are remedial plans in place to improve those with low results.

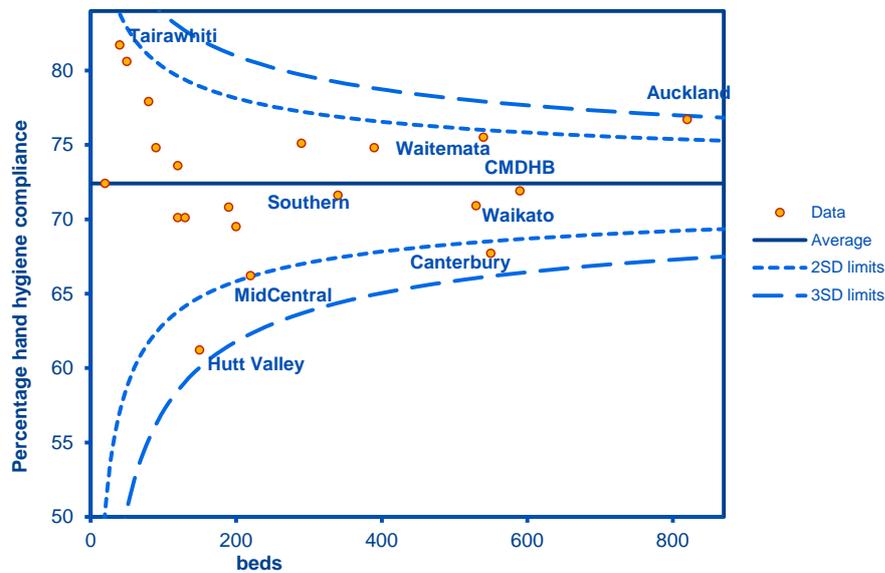
**Table 1 Hand hygiene compliance audit results by DHB**

DHB	Jun-12	Oct-12	Mar-13	Jun-13	Oct-13	Mar-14	Trend % increase
Auckland	67.3	70.2	74.8	75.1	76.1	76.7	10
BOP	46.8	43.4	59.3	66.7	64.7	75.1	31
Canterbury		59.5	65	66.8	68.2	67.7	
CCDHB	68.4	59.9	62	74.7	70.9	74.8	11
CMDHB		59.1	69.5	71.6	74.9	71.9	13
Hawkes Bay	67.7	54.4	64.8	73.2	72.5	70.1	
Hutt Valley	38.4	46.5	62.3	73.1	81.5	61.2	
Lakes	50.3	62.4	64.2	70.8	68.1	73.6	20
Mid Central	54.7	64.7	71.7	69.8	71.7	66.2	11
Nelson-							
Marlborough	55	50.1	54.5	64.4	67.1	70.1	20
Northland DHB	73.6	77	72.8	68.1	76	69.5	-4
South Canterbury		60.4	54.2	62.7	72.3	74.8	
Southern	53.2	62.9	61.5	59.5	69.1	71.6	16
Tairāwhiti	71.3	73.6	73.5	79.2	78.2	80.6	9
Taranaki	57.9	64.8	64.2		83.3	70.8	
Waikato	67.3	66.7	60.3	71.8	65.6	70.9	3
Wairarapa	70.4	70.5	68.1	76.8	78.2	81.7	13
Waitemata	65.5	62.2	73.1	74.1	71.3	75.5	12
West Coast	46.8	65.7	65.5	73.1	70.6	72.4	22
Whanganui	70.9	69.6	73.8	75.9	76.6	77.9	8

Source: HHNZ. Orange shading = below audit recommended size. Green shading in March indicates adequate audit showing results above 70%. Final column shows, for those DHBs with adequate data, the percentage point change from Jun 2012 to March 2014, if the data is assumed to have a linear trend.

Hand hygiene success does not appear to relate to size of DHB. Figure 2 shows a funnel plot based on the size of DHB (estimated acute bed numbers) – no apparent pattern is shown.

Figure 2 Hand hygiene compliance by DHB by size of DHB, Mar 2014

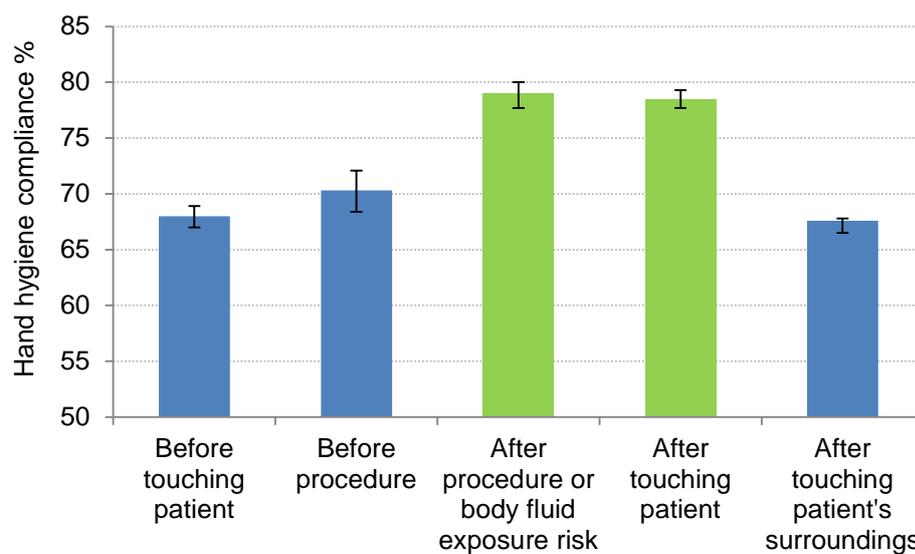


Source: HHNZ; Health Partners analysis, based on medical-surgical bed numbers.

### By Moment

Compliance audit results have consistently shown higher compliance for hand cleaning ‘after’ rather than ‘before’ – Moments 3 and 4 (Figure 3). The differences are statistically significant. The ‘before procedure’ rate might have been expected to be higher, but issues with glove hygiene are noted. One commentator noted this difference, wondering if it related to wider social conditioning re washing hands after toileting, making the ‘after’ moments more easily brought to mind. To the extent that the health care practitioner does not touch anything else before touching the next patient then Moments 3-5 can also act as Moment 1 and 2, but this is likely to require special attention to workflow practice.

Figure 3 Hand hygiene compliance by moment, all New Zealand Mar 2014



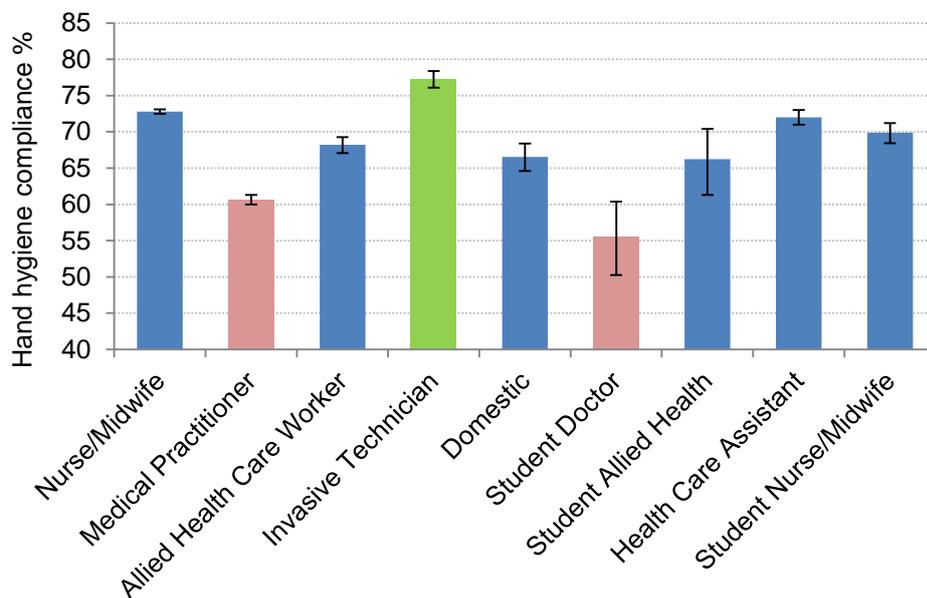
Source: HHNZ

Many patients will not have procedures, making moments 2 or 3 harder to audit. In some DHBs auditors go 'behind the curtain', in some they don't, again affecting the mix of moments being audited. Overall about 30% of the moments collected were moment 1, 30% moment 4 and only 8-10% Moments 2 and 3. Moment 5 made up 20% of the overall moments observed.

### By practitioner type

Invasive technicians, nurses and health care assistants have consistently achieved the better results in hand hygiene audits (Figure 4). Medical practitioners and student doctors score significantly lower than other occupational groups. It was noted that they are less likely to be seen on an individual ward, so are captured less in the audit process, potentially leading to low number bias. However many respondents noted doctors as a specific group requiring intervention. Thoughts on this and possible approaches to improve are discussed in Sections 6 and 7.

Figure 4 Hand hygiene compliance by practitioner type, all New Zealand 2013/14

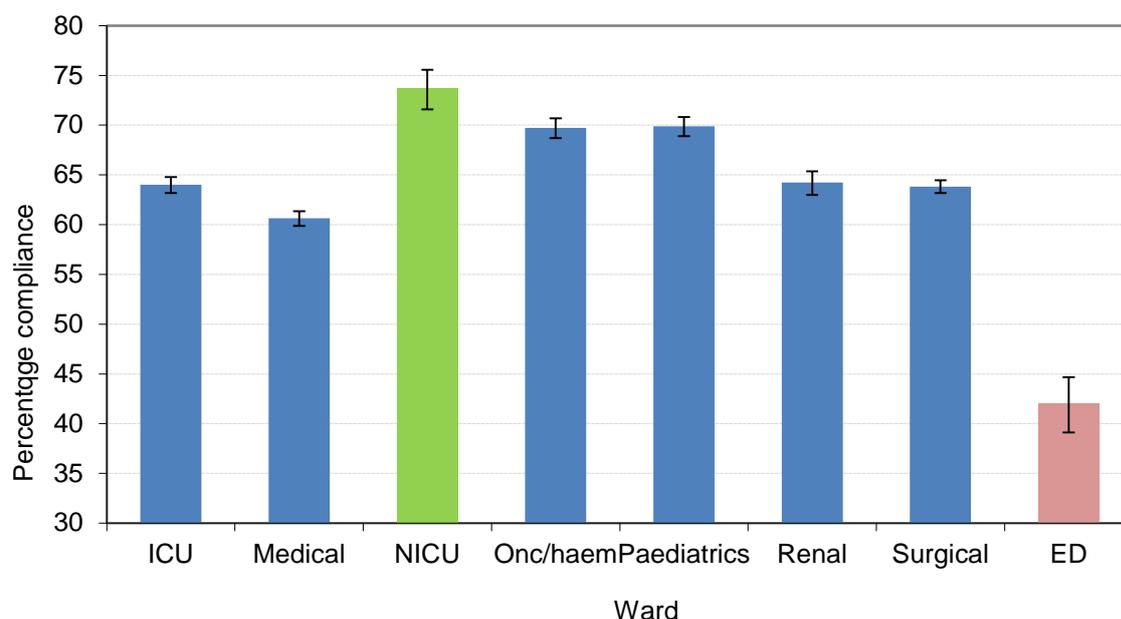


Source: HHNZ – average of last 4 audits

### By unit

Different types of services have produced different audit results. The neonatal intensive care unit (NICU) shows a statistically significantly higher rate of hand hygiene, while the emergency department (ED) shows a lower rate (Figure 5). The mix of services that DHBs have in their audit may vary from DHB to DHB, or at the same DHB over time. To the extent that DHBs choose to audit emergency departments their overall results will be affected. For some it was the fact that it was easy to audit in ED – there are more moments per staff member, and they are more visible – however only 2% of the moments collected overall were from ED. Around half the moments observed in the audits were on the medical (20%) or surgical wards (33%), with ICU representing 16% of the moments. Several of the DHBs spoken to said that they deliberately chose new wards, and included ED in their audits as the audits were seen as part of the intervention to improve hand hygiene rates – the very visible auditors are a distinct reminder re hand hygiene.

Figure 5 Hand hygiene compliance by type of service, all New Zealand 2013/14



Source: HHNZ – average of last 4 audits

### Overall

A formal baseline for New Zealand hospitals for adherence to hand hygiene practices prior to HHNZ starting was not available. By the time the programme was able to have enough gold auditors to derive a national estimate the work was well underway (with some DHBs having had significant programmes for some years by then). Earlier work would suggest that in an unmodified hospital environment hand hygiene opportunities might be taken only 30-50% of the time.<sup>10</sup> **The climb to around 70% adherence over a two year period, with all DHBs participating is associated with the full roll-out of the HHNZ programme, and is likely to be attributable to the programme to some degree.**

The meaning of the absolute percentage given by the audit was questioned by some stakeholders. While the methodology and gold audit training was not in dispute, people noted:

1. DHBs could choose more/less compliant areas of their facilities to audit
2. The obvious presence of the auditors would have an impact on those being observed to raise their awareness and thence compliance
3. Only a small portion of each hospital is being audited.

It is difficult to quantify these points – on further questioning people suggested maybe a 10-20 percentage point range – but does mean that comparisons should be made with care. Individual hospitals will be aware of their local factors and be able to compare like-for-like over time – it is perhaps at this level the data has the most impact for motivated staff. A short discussion on the impact this has on programme targets is provided in Section 7.

<sup>10</sup> Roberts S, Upton A, Morris A, Woodhouse A. Hand-hygiene practices of medical staff: room for improvement. NZ Med J 2005; 118 (11 Feb).

## 4. Impact on health outcomes

The expected outcome for improved hand hygiene in healthcare settings is a reduction of healthcare-associated infections (HAIs), and thus reduction of harm (mortality, morbidity, increased hospital stay) and cost. However hand hygiene is only one of very many factors which make up an organisation's final infection rate, and the actual definition and measurement of what is classified as a HAI can be problematical, and may vary from facility to facility. Attempts to measure HAI often limit the definition to specific illnesses – for example Kirkland et al used all bloodstream infections and clinical infection at any site of *Staphylococcus aureus* or *Clostridium difficile*.<sup>11</sup> Others have concentrated on *S. aureus* bacteraemia<sup>12</sup> or methicillin-resistant *S. aureus* infection rates.<sup>13 14</sup>

Hand Hygiene NZ adopted healthcare-associated *S. aureus* bacteraemia per 1000 patient days (HASAB) as its outcome measure. *S. aureus* bacteraemia causes significant morbidity and mortality; the all-cause mortality at 30 days in New Zealand and Australia was estimated at 20%.<sup>15</sup> Since it is a relatively common healthcare-associated infection in New Zealand and has clear serious consequences it seems a reasonable measure to choose. However defining the degree of association with healthcare can be difficult and differing community rates of disease can skew individual hospital figures quite apart from apparent differences in hygiene practices. The ability to capture and define infections, and the will to do so accurately, will vary from DHB to DHB. Rates over time in a single institution with a consistent measuring method should give meaningful results. The studies quoted above suggest that improvements in hand hygiene are associated with a reduction in infection rates, perhaps up to half.

### Results

Monthly HASAB rates per 1000 bed days as reported to HHNZ were available monthly from Jan 2012 to March 2014. Many of the smaller DHBs would have no cases in a given month, so results were aggregated to 6-monthly. With the raw figures there was no apparent correlation ( $r^2 = 0.04$ ) with compliance audit figures at a DHB level. Five DHB figures appeared inconsistent; either with their audit (discussed in Section 4) or with their HASAB returns. Removing those improved the correlation slightly ( $r^2 = 0.12$ ), with the (very weak) relationship in the expected direction of increased hand hygiene adherence having lower HASAB rates. Results summed nationally as a rate of change from 2012-2014 from a base of 100 are compared with compliance audit figures in a similar fashion in Figure 6. A weak correlation is present ( $r^2 = 0.15$ ), with a drop in reported HASAB from 0.164/1000 patient days to 0.135 over the 21 month period.

---

<sup>11</sup> Kirkland KB, Homa KA, Lasky RA et al. Impact of a hospital-wide hand hygiene initiative on healthcare-associated infections: results of an interrupted time series. *BMJ Qual Saf* 2012; doi:10.1136.

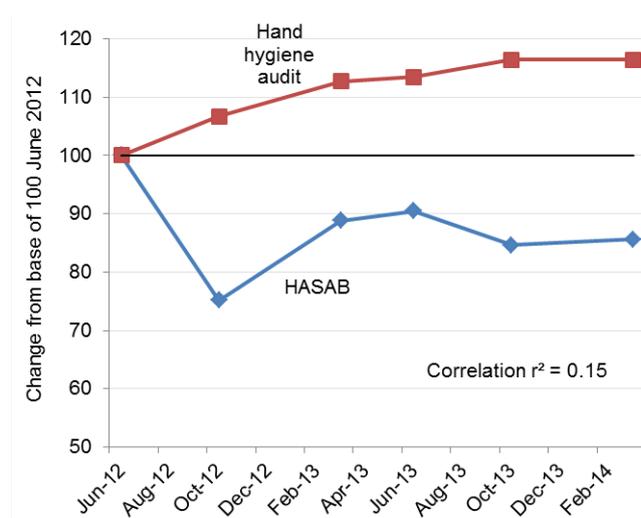
<sup>12</sup> Roberts SA, Sieczkowski C, Campbell T et al. Implementing and sustaining a hand hygiene culture change programme at Auckland District Health Board. *NZ Med J* 2012 (11 May).

<sup>13</sup> Grayson ML, Jarvie LJ, Martin R, et al. Significant reductions in methicillin-resistant *Staphylococcus aureus* bacteraemia and clinical isolates associated with a multisite, hand hygiene culture-change program and subsequent successful statewide roll-out. *Med J Aust* 2008 (2 Jun);188:633-640.

<sup>14</sup> Grayson ML, Russo PL, Cruickshank M et al. Outcomes from the first 2 years of the Australian National Hand Hygiene Initiative. *Med J Aust* 2011 (21 Nov);195: 615-619.

<sup>15</sup> Turnidge JD, Kotsanas D, Munckhof W, et al *Staphylococcus aureus* bacteraemia: a major cause of mortality in Australia and New Zealand. *Med J Aust* 2009;191:368-373

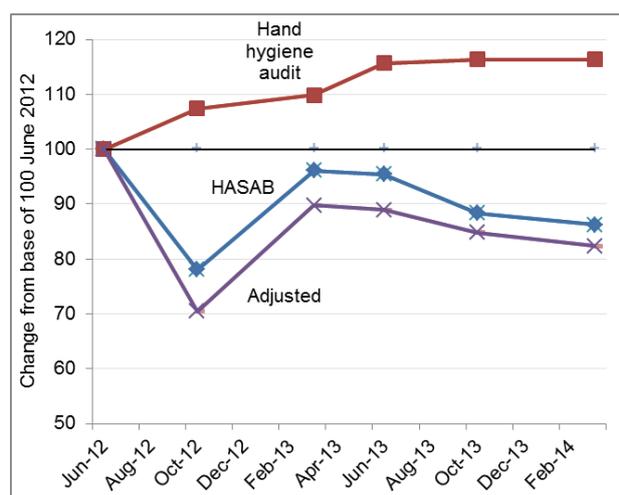
**Figure 6 Healthcare-associated *S. aureus* bacteraemia compared to hand hygiene audit results, all New Zealand 2012- 2014**



Source: HHNZ; Health Partners analysis. Change from Jun 2012 plotted as a base of 100, HASAB rates averaged 3-6 monthly to match audit periods. Five DHBs with anomalous audit/HASAB figures excluded.

The analysis on HASAB is based on a relatively low number of cases, and is sensitive to measurement changes. Auckland DHB investigated a special cause variation in HASAB numbers at the end of 2013/beginning of 2014. An increase in cases was noted, and traced to an equipment change for people with indwelling cannulas in the community (Dr Sally Roberts, personal communication). Auckland has now supplied new HASAB results to HQSC with community-acquired cases removed – that is unlikely to have been affected by in-hospital hand hygiene.<sup>16</sup> Auckland Hospital is the largest in New Zealand, with a complex casemix, so materially affects the national rate (Figure 7). There may need to be an audit of cases in other DHBs, and for earlier periods to ensure that any community-acquired cases in the baseline period are also excluded to allow comparing like-with-like.

**Figure 7 Healthcare-associated *S. aureus* bacteraemia compared to hand hygiene audit results, all New Zealand 2012- 2014 – with modified Auckland DHB figures**



Source: HQSC; Health Partners analysis. Analysis as for Figure 6 but Auckland DHB results adjusted to exclude community-acquired infections (see text).

<sup>16</sup> This distinction can be problematic. Some hospitals classify any infection occurring up to 30 days after hospital discharge as healthcare-related.

With around 1.8m medical/surgical bed days in 2012/13 in New Zealand public hospitals, if the reduction from 0.164 to 0.135 HASAB/1000 days is considered a real drop, then this would be equivalent to around 50 *S. aureus* bacteraemia cases being averted in 2014. At 20% mortality that is ~10 deaths being prevented per year. If excess costs are considered to be \$20,000-40,000 per case then the cost to the system might be \$1m-\$2m. Other safety measures have been in place over this time period which might have affected HASAB rates, so it is not possible to attribute this potential drop specifically to the hand hygiene programme.

## Conclusion

Healthcare-associated *S. aureus* bacteraemia is only one part of the infections expected to be reduced through better hand hygiene in hospitals. Even with the relatively narrow definition considerable variability can still exist in the capturing and recording of such infections outside a study setting. It is not possible to use the current HASAB measure to derive a clear outcome measure linked to hand hygiene practice, or to determine programme cost-effectiveness. However, **within the limitations noted above in measuring hand hygiene compliance and HASAB, it is possible that there may be a reduction in healthcare-associated *S. aureus* bacteraemia in public hospitals in New Zealand associated with improving hand hygiene compliance.**

### Case Study from Counties Manukau DHB (used for hand hygiene awareness)

- Local case of an 80 year old woman
  - 2-stage revision of THJR for infection
- Whilst inpatient, became newly colonised with MRSA
  - Almost certainly transmitted by healthcare workers' hands
- Developed MRSA infection of her THJR
  - Required multiple operations, prolonged admission
  - Outpatient treatment with 6 weeks IV vancomycin (\$200/day)
  - Relapse due to same organism
  - Treated with 8 weeks of IV daptomycin (\$1000/day) followed by oral treatment
  - Developed probable severe drug reaction
- Treatment also complicated by depression, loss of independence

*Courtesy of Dr Stephen McBride*

## 5. Value for money

Given the difficulties in establishing clear measures of reduced infections it is not possible to calculate the actual value for money for the HHNZ programme. However one can estimate the order of magnitude of the expected costs and expected benefits for a typical DHB setup to illustrate the potential for investment.

### Costs

Costs to the health system relate to the programme itself, direct expenses by DHBs, and opportunity costs of staff time that would otherwise have been able to be spent on other matters are estimated in Table 2. Some detail on the derivation of the figures is noted below the table. For the audit line, three audits are carried out per year. The time taken to undertake an audit may vary depending on how busy the area is that is being audited and how experienced the auditor is. An experienced auditor in an average acute ward would expect to collect around 40-50 moments per hour on average. A larger DHB collecting 2000+ moments would thus have about 50 hours of staff time collecting data for each audit period.

**Table 2 Hand hygiene programme estimated costs, New Zealand 2012/13**

Cost Item	Unit cost	Units	Total cost	Notes
Project Coordinator salary and overheads including training time	\$100,000	11	\$1,100,000	1
Gold Auditor training time (3 days)	\$1,200	31	\$37,200	2
Gold Auditor compliance monitoring time	\$400	160	\$64,000	3
Travel and expenses for coordinator and auditor to attend introductory seminar (1x) and training workshops	\$1,500	40	\$60,000	4
Promotion and education materials and expenses	\$25	5,400	\$135,000	5
Alcohol-based hand rub - 10 litres per bed per year	\$200	5,400	\$1,080,000	6
Installation and maintenance costs for new rub dispensers and removal of old	\$30	5,400	\$162,000	7
Data analysis and reporting of HASAB	\$2,500	20	\$50,000	8
HHNZ Programme costs	\$300,000	1	\$300,000	9
<b>Total overall cost</b>			<b>\$2,988,200</b>	

Notes: Exclusive of GST. No HQSC costs included.

1. Larger DHBs assumed 1 FTE, smaller 0.3-0.5 FTE
2. 1 auditor trained for smaller DHBs, others in proportion to bed days up to 3 auditors for larger DHBs
3. Assuming auditors can manage 40 moments/hour (allows for walking/travel time, preparation, data entry, organisation), 8 hrs/day. Assumed \$400/day
4. Assume 2 people travel from each DHB each year
5. Nominal \$25 per acute bed - ~\$10,000 for a large DHB

6. 10l/bed/year estimate from HHNZ. UK estimate was 60ml/bed day,<sup>17</sup> or ~18l per bed per year – this may be conservative. \$20/l estimate from Auckland DHB procurement
7. Estimate from HHNZ at \$30 per bed per year
8. Assumed average cost of maintaining system to capture, verify and report HASAB per DHB
9. Being \$130,000 programme management, \$70,000 technical, \$70,000 education and promotion, \$30,000 monitoring and evaluation.

### Infections averted

The counterfactual for the programme is the amount of infections that would have occurred had the programme not been in existence. This goes beyond HASAB to cover all HAI. New Zealand work estimates 6-10% patients get a HAI.<sup>18</sup> While preventing an infection is a benefit in and of itself in mortality and morbidity terms, there is also potential for cost savings to the system, as costs extend due to length of stay increases.<sup>19</sup> Single cause savings such as central line-associated bacteraemia<sup>20 21</sup> or poststernotomy mediastinitis<sup>22</sup> show excess costs of \$20-\$50,000 per case. Running a range of figures across the current New Zealand inpatient numbers gives a wide range of potential estimates (Table 3). The true averted number will likely lie between these estimates.

**Table 3 Estimated potential for infections averted, New Zealand 2012/13**

Estimated 'low' infections averted			Estimated 'high' infections averted	
Medical/surgical admits per year	750,000		Medical/surgical admits per year	750,000
Assumed number (6%) of patients that currently acquire an infection	45,000	6-10% get HAI	Assumed number (10%) of patients that currently acquire an infection	75,000
Assume 30% could have been prevented through infection control measures	13,500	30-70% considered preventable	Assume 60% could have been prevented through infection control measures	45,000
Assumed minimum number (10%) of infections averted through improved hand hygiene	<b>1,350</b>	10-30% of the prevention via hand hygiene	Assumed 20% of infections averted through improved hand hygiene	<b>9,000</b>
Assumed average cost per infection averted	\$10,000	up to \$40,000 per infection averted	Assumed average cost per infection averted	\$10,000
<b>Total cost averted</b>	<b>\$13.5m</b>		<b>Total cost averted</b>	<b>\$90m</b>

Notes: Health Partners indicative estimates based on papers cited in text above.

<sup>17</sup> Stone SP, Jeanes A, Roberts J, et al. Evaluation of the national Cleanyourhands campaign to reduce Staphylococcus aureus bacteraemia and Clostridium difficile infection in hospitals in England and Wales by improved hand hygiene: four year, prospective, ecological, interrupted time series study. *BMJ* 2012;3:e3005

<sup>18</sup> Graves N, Nicholls TM, Wong GS, Morris A. The prevalence and estimates of the cumulative incidence of hospital-acquired infections among patients admitted to Auckland District Health Board hospitals in New Zealand *Infect Control Hosp Epidemiol* 2003; 24(Jan):56-61

<sup>19</sup> Graves N, Nicholls TM, Wong GS, Morris A. Modeling the costs of hospital-acquired infections in New Zealand. *Infect Control Hosp Epidemiol* 2003; 24(Mar):214-223

<sup>20</sup> Burns A, Bowers L, Pak N, Wignall J, Roberts S. The excess cost associated with healthcare-associated bloodstream infections at Auckland City Hospital *NZ Med J* 2010;123(15 Oct)

<sup>21</sup> Seddon ME, Hocking CJ, Mead P, Simpson C. Aiming for zero: decreasing central line associated bacteraemia in the intensive care unit. *NZ Med J* 2011;124(1339):9-21.

<sup>22</sup> Upton A, Smith P, Roberts S. Excess cost associated with Staphylococcus aureus poststernotomy mediastinitis. *NZ Med J* 2005: 118 (25 Feb)

Note that the indicative costs would not represent clear savings for DHBs, as they are likely to use the freed up resource in treating other patients, but it still represents a significant improvement in system efficiency and health gain for those additional people able to be treated.

### Cost-benefit

Based on these rough calculations it is apparent that even taking very conservative assumptions the benefits of the hand hygiene programme will outweigh the costs of running the programme. Taking the low estimates in Table 3 and the costs in Table 2 would represent a 4-fold return on current investment – every dollar invested returning four dollars of value. That is, if the current programme is considered to be enough ‘investment’ to achieve these results. If for example doubling the expenditure was needed the return would reduce to 2-fold. The true value could be higher than that, though possibly not to the high estimate presented.

Other factors have not attempted to be quantified, but could be taken into consideration.

**Staff illness.** One might expect a reduction in staff sickness days with high levels of hand hygiene. Campaigns around influenza season often feature hand hygiene, but as one stakeholder noted, you only have to prevent one staff member getting norovirus or EBSL and spreading it to others to realise the significant benefits that can accrue to staff.

**Drug resistance.** There is a potential for adequate hand hygiene to reduce drug resistance.<sup>23 24</sup> Hospitals foster drug-resistant organisms; the less chance these organisms have to propagate the better.

**Other programmes.** Stakeholders also noted the synergies with other programmes. Hand hygiene is an integral part of other infection control programmes – CLAB and surgical site infections being specifically noted. Some of the infrastructure put in place was applicable to other areas – and vice versa; quality team members were able to apply their skills to hand hygiene implementation. Having a workforce of quality improvement training staff enables change management more broadly.

**Other harms.** Also noted as not being included in cost-benefit analyses are factors such as the avoidance of emotional and financial stress placed on patients and their families through the prolonged illness, employment/schooling disruption, travel costs etc.

---

<sup>23</sup> Ministry of Health. *Guidelines for the control of methicillin-resistant Staphylococcus aureus in New Zealand*. Wellington: Ministry of Health; 2002

<sup>24</sup> Evidence of hand hygiene to reduce transmission and infections by multi-drug resistant organisms in health-care settings. WHO. [www.who.int/gpsc/5may/MDRO\\_literature-review.pdf](http://www.who.int/gpsc/5may/MDRO_literature-review.pdf) Accessed 19/06/2014

## 6. Programme assessment

This section covers further feedback from the interviews not otherwise covered earlier. Respondents were very frank and open in their assessments, and were able to paint a clear picture of the response of their institution to hand hygiene in general, and the HHNZ programme in particular. We have tried to capture the main points made, and apologise in advance if everything has not been covered, or the points are not well conveyed.

### National programme

Respondents were generally positive about the use of a national programme as a change agent. Features cited included economies of resource creation, concentration of expertise, 'do it once, do it well', having common messages across facilities as staff change sites frequently, having training materials organised, common measures and comparisons. There was no issue with having a specific DHB managing the programme, or with ADHB in particular. The fact they had real-life knowledge of the issues being faced and the problems encountered was a strong positive. The main issues centred around the relationship between the programme and the DHBs, and the ability of a national programme to facilitate the appropriate change settings at each DHB. This is further discussed in the next section.

The positive effect that regional/national campaigns can have is seen in the UK<sup>17</sup> and Australia<sup>13</sup> and is supported in the literature.<sup>25 26</sup> People did note the size of the issue, the magnitude of the change required and the relatively small investment by the Commission to make this happen. While there has been some investment by DHBs this has been variable, and lack of resource and staff to effect change was noted at several DHBs.

All respondents felt that hand hygiene was something that needed to be part of any hospital's quality and safety programme, whether or not there was a national programme explicitly supporting it. It should be one part of each DHBs infection control strategy.

### Relationship to DHBs

An issue raised by several respondents was the recognition that sustained change in a hospital setting must be bottom-up; that a change as fundamental and ubiquitous in work practices as hand hygiene could not be imposed from outside. This was well recognised by HHNZ at its inception and subsequently; however the combination of the audit 'imposition', the 'rigidity' of the 5 moments and the general perceived autocratic approach upset some. However, even those critical of the programme's original setup and approach did note that the programme had modified its approach in later years, and that the current front-line ownership (FLO) approaches were heading in the right direction. For some it characterised the difference between a rules-based infection control "thou-shalt" approach, versus a quality science-based approach, building motivation from ground up. One respondent compared it to the smoking cessation target in hospitals, and how that had fared better as an organisation-wide problem to be solved, rather than something that was perceived to be an issue for one team only (that is the infection control team).

In discussing this with the HHNZ team they felt that in hindsight there were some parts they would have approached differently, but that this was part of the learning process from the Team, the Commission and the DHBs. A significant amount of establishment work was required – getting hand gel into the right places, setting up auditor training, organising, the audit structure, linking with the

---

<sup>25</sup> Mathai E, Allegranzi B, Kilpatrick C, et al. Promoting hand hygiene in healthcare through national/subnational campaigns. *J Hosp Infect* 2011;77:294–8

<sup>26</sup> Stewardson A, Pittet, D. Anatomy of a successful multimodal hand hygiene campaign. *BMJ Qual Saf* 2012;21:973–975

Australian programme, etc. It was also noted that it took time to build trust – going both ways. Personal relationships were often key in ‘opening up’ a DHB to the expertise and influence of the HHNZ team. As the programme matured, and team members time freed up it was in a better position to help DHB teams work on the best approach for their organisations, and in different parts of their hospitals. They could offer a wider suite of different approaches, and suggestions for those grappling with the issues that other DHBs had encountered. The recent workshop 12-13 June 2014 in Wellington highlighted the shift in emphasis.<sup>27</sup>

### Commission role

The conundrum of providing national leadership and influencing change within the system while gaining support and ownership from the ‘shop floor’ is a major challenge for all health systems. Respondents were clear that the main factors in determining how well hand hygiene was taken up by each DHB was due to the work undertaken at that DHB, geared to the workforce and personalities on a ward by ward basis. However they were also looking for national leadership and direction to support and potentiate this work. Within the criticism of the audit and league table approach (discussed below) was the comment about how motivating this could be for Boards and senior management. Having the top-down as well as the bottom-up created a ‘pincer movement’, as one person put it. Some felt the Commission could have been stronger in leading the programme – one respondent used the term ‘meek’ to describe the Commission’s approach. In general respondents from DHBs felt that the Commission had more power and influence in the sector than the Commission’s own staff seemed to feel it had.

A number of people also raised the issue of clinical leadership, feeling that at a national level there was a lack of visibility and ‘top-down grunt’ through CMOs and CNOs. This left the clinicians in the HHNZ team working at lower levels in each DHB than otherwise might have been the case, with less reach and overall impact. As one respondent noted, infection control staff were sometimes left to ‘carry the can’. One respondent compared HHNZ unfavourably to the Australian programme with its clinical steering group and clearer clinical messaging from the centre.

### Audit role

All respondents were clear on the need for a strong measurement approach, and clear mechanisms to monitor/demonstrate progress. Given the lack of direct attributability of any particular infection to any one hand hygiene opportunity missed (in which of the 40 moments in a day from 8 different staff members a day for 4 days, in ED, ward, radiology etc was the infection contracted?) a process measure was required. Having a rigorous consistent methodology able to be defended and compared from hospital to hospital was seen by many to be very important. They also provided a useful focus for some organisations, setting a direction of travel. Having the infrastructure to be able to carry out audits necessarily gave the organisation several people with knowledge of and training in hand hygiene. Others disagreed, feeling that the audit set-up had been overplayed, and that local action at a ward level for improvement did not require the rigor and time commitment needed for the training of gold auditors and the more formal process. There were queries over just how comparable the audit results were anyway, given the differing mix of wards that could be included from audit to audit, and the pressure to achieve a good result (see next section).

Respondents were also split on the publication of audit results naming DHBs. On balance most thought this was a good thing, providing motivation from senior levels of the organisation, allowing the potential for an increased allocation of staff for hand hygiene work. Others felt it had the potential to

---

<sup>27</sup> [http://www.handhygiene.org.nz/index.php?option=com\\_content&view=article&id=16&Itemid=129](http://www.handhygiene.org.nz/index.php?option=com_content&view=article&id=16&Itemid=129) Accessed 7 July 2014.

distract from the more important work of improving quality and the ward level, and might lead some to game the numbers rather than seek genuine improvements.

Whether respondents supported or did not support the emphasis on getting and reporting an estimate of DHB hand hygiene practice they were clear that local measurement and reporting was required for front-line work on improving hand hygiene practices.

### **Audit accuracy**

As noted in Section 3, several respondents raised the observer effect with regard to the audit process. The auditor is very visible on the ward, and serves as a reminder to the staff member being observed that they need to think about hand hygiene. Some DHBs have special-coloured t-shirts to make the auditors stand out even more – to add to the socialisation of the audit process and hand hygiene in general. This concern that the audits might be over-optimistic as to the level of hand hygiene actually being performed in our hospitals was refuted by some respondents. Given the length of time the auditors spend on the floor it was felt that staff would habituate to their presence, and that the audit would fairly reflect the performance of staff. Two DHBs noted the practice of changing the wards being gold audited to ones not thought to be doing well to provide extra stimulus for change, potentially reducing the overall rate measured. Either way the effect is likely to be variable across hospitals, so it can be difficult to compare audits results at individual DHBs. The differences may cancel at a national level, providing what is likely to be comparable results from quarter to quarter.

Also queried was the use of nominated wards originally, with the same wards being used each time in the audit. This may have painted an overly rosy picture of the penetration of hand hygiene practices throughout the whole hospital. This might have served to slightly inflate earlier audit figures, meaning the measured change from 2012 to 2014 may be underestimating the full change actually occurring.

Where DHBs have multiple sites it was unclear how the DHB compliance figures related to each facility.

Three respondents recounted ‘mystery shopper’ episodes where they or a close family member had cause to use inpatient services in the past year. Two were scathing about the slipshod hand hygiene seen at times, putting overall achievement below 50%. The other was full of praise for the precision and completeness of hand hygiene compliance in the specialist unit observed.

It would be fair to say that penetration of hand hygiene is still mixed across the sector, and that the audit results may not be telling the whole story. The aggregation of bias thought to create over-inflated figures with that thought to under-estimate figures may cancel out somewhat at a national level.

### **Hand gel**

Making hand washing easy, with visual prompting as key patient tasks are performed is a key plank of hand hygiene programmes. The optimal placement of hand basins in rooms, and the introduction of wall-mounted and bed-mounted alcohol hand-gel dispensers makes hand hygiene more accessible – ‘the right thing to do becomes the easy thing to do’. Similarly, the inclusion on trolleys used by the nursing and medical staff of hand-gel dispensers has further improved access. Alcohol-based hand gels or rubs were seen as being well accepted, with the advantage over soap and water of being faster and easier. They were seen as being easier to teach to apply, and less prone to user error (shortcutting) than hand wash. Otherwise there is no compelling evidence to favour the general use of antiseptic hand-washing agents over liquid soap or one antiseptic agent over another.

With the newer formulations with emollients these were considered to be well tolerated by staff, and not a major barrier to uptake. One respondent noted an initiative in their ICU where different coloured

gowns and gloves were used for each bed. It was immediately clear to staff when they needed to change gloves and gowns and perform hand hygiene when moving from patient to patient.

### Workforce motivation

All respondents noted that there had been a significant improvement in staff approaches to hand hygiene over the past five years, with practice more visible, and attitudes changing. Most also felt there was still a long way to go before the practice was fully embedded in New Zealand health care practice. Some of the factors cited as being the cause of the improvement in hand hygiene not being as great as needed were a lack of motivation/understanding of the importance of hand hygiene, busyness, forgetfulness, high workload, and understaffing. So it is not people wilfully ignoring the message per se. All felt we are some way off the situation where hand washing routines are so ingrained that it becomes an automatic action for people, like putting on a seat belt when getting into a car.

For staff who have been working for some time (eg ten years or more) well entrenched habits have to be dismantled and re-established. Without good support and motivation this will be difficult to achieve, and potentially needs to get in the micro-routine of each task.<sup>28</sup> As noted above hand gel placement was thought to be much improved now (though always potential to keep improving and fine-tuning), and there was thought to be little issue with skin irritation caused by hand-gels. Glove-wearing was noted as an issue, complicating the hand hygiene message with messages around personal protection. Placing gloves on dirty hands does not protect the patient; presumably staff members moving from patient to patient with the same gloves on are thinking of their own protection rather than their patients.

### Attitude change

While all respondents felt that attitudes were starting to change, all felt that there was 'still a long way to go' for hand hygiene to become standard practice in every task. The acceptance of the "bare below the elbow" message was cited as an example of staff attitude change in this arena. Specific concern was noted about the need for strong role models. Senior doctors were cited repeatedly as a group that has not engaged as well as others, with some citing the initial rules-based audit and compliance approach to the programme as being a specific turn-off for this group. "Compliance" as a term can provoke strong reactions and push-back for some. Group behaviour, peer encouragement and the level of managerial support all influence attitude and the levels of compliance.

HHNZ carried out an online attitudinal survey, publishing the results in April 2014. Unfortunately it was largely completed by Auckland DHB staff (60%) so is not representative of the wider healthcare worker community in New Zealand. The section headed "In your experience what are the main barriers to hand hygiene" backs up the message from respondents noted above. The most common barriers noted included forgetfulness, bad habits, and being too busy. Interestingly 20% cited skin irritation as a barrier. Despite the skew to the institution which has had one of the longest-established hand hygiene programmes only 56% of respondents to the survey were able to state that "hand hygiene according to the 5 moments is the social norm in their service/department". One respondent noted an increase in visitors using hand gel when visiting patients, seeing that as a response to the high visibility of the posters/hand gel dispensers, and the role-modelling of staff.

---

<sup>28</sup> Graupp P, Purrier M. Hand hygiene training case study. Chapter 3 of *Getting to Standard Work in Health Care*, Productivity Press, 2012.

### Patient involvement in hand hygiene

Patient involvement in strategies to improve hand hygiene has been suggested as a method of continuing improvements among healthcare workers by WHO.<sup>4 29</sup> This would include making it acceptable for patients and carers to request that healthcare workers clean their hands. No stakeholders noted this as occurring at any DHB, noting that most patients and carers do not feel empowered to challenge staff, particularly doctors. Māori and Pacific patients would be particularly challenged if asked to participate in such a programme. International work has also found this difficult,<sup>30 31</sup> and there was little appetite for trialling this.

Many DHBs have promoted hand hygiene among visitors by placing hand gel containers at the entrances to the hospital, wards and patient rooms. While there is no evidence that this reduces HAIs people noted that these seemed to be increasingly used, and helped promote a general awareness of the importance of hand hygiene.

### IT/Audit

While the emphasis placed on audit created discussion (as noted above), there were generally positive comments on the data collection aspect of the audits. The tablet/phone-based data collection was seen as relatively straightforward and not adding too much time to the audit process. People would have preferred quicker local feedback loops – two DHBs cited their own local audits serving the purpose for ward/service-based improvement cycles. The (apparent) comparability with other DHBs and with the Australian programme were seen as plusses.

---

<sup>29</sup> HHNZ. Patient participation guidelines, June 2013

<sup>30</sup> McGuckin M, Taylor A, Martin V, et al. Evaluation of a patient education model for increasing hand hygiene compliance in an inpatient rehabilitation unit. *Am J Infect Control* 2004;32:235–238.

<sup>31</sup> Lent V, Eckstein BC, Eckstein EC, et al. Evaluation of patient participation in a patient empowerment initiative to improve hand hygiene practices in a Veterans Affairs medical center. *Am J Infect Control* 2009;37:117–120

## 7. Approaches to improving hand hygiene

Most of the studies in this area are before and after studies, open to confounding and regression to the mean. There are only 2 randomised controlled studies, one of which was unable to show a decrease in MRSA infection or colonization.<sup>32</sup> RCTs are challenging to design in this area, so the reliance is on more observational studies.

Many different approaches have been tried to increase hand hygiene compliance. Huiz et al<sup>33</sup> categorised interventions into a behaviour determinant framework, which provides a useful way to dissect the various components of strategies:

1. Knowledge (eg information provision)
2. Awareness (eg risk communication, feedback of individual behaviour)
3. Social influence (eg feedback of clinical outcomes, peer opinions, group sessions)
4. Attitude (eg reinforcement of positive progress)
5. Self-efficacy (eg role-modelling, goal setting)
6. Intention (eg agreement to commit)
7. Action control (eg use of cues and reminders)
8. Integration (eg linkages with other quality/safety programmes)
9. Maintenance (eg longer term follow-up measures)
10. Professional support (eg from professional group, or infection control team)

**Table 4 Strategies for hand hygiene improvement**

Strategy	Evidence of effect
<b>Best practice guidelines</b>	Multiple produced - 11 for hand hygiene in ten years. Little evidence of impact
<b>Education addressing knowledge, awareness, technique</b>	<p>Little evidence of behaviour change when education given in large groups or passively (through posters etc). Some evidence using the Toyota Production System "Training Within Industry" (TWI). This education was delivered one-to-one and focussed on embedding the 'standard work' of hand hygiene.<sup>34</sup> Using this method the Virginia Mason Medical Centre achieved hand hygiene compliance rates of 98% that were sustained for over 11 months.</p> <p>Education and training are seen as low reliability tools – necessary but not sufficient to improve hand hygiene compliance.<sup>33</sup></p>
<b>Auditing</b>	Auditing is an important step to measure baseline compliance and compliance over time. However, auditing of itself is unlikely to change behaviours, unless it is done by the team themselves as part of the engagement process with rapid feedback and transparency of data.
<b>Quality improvement science, front-line ownership</b>	Using the Model for Improvement and small tests of change (Plan-Do-Study-Act cycles). This technique has been widely used to address healthcare safety problems, and there are some explicit examples relating to hand hygiene. Two studies in the

<sup>32</sup> D Metz, N Dafoe, SD Walter et al. Effect of a multifaceted intervention on adherence to hand hygiene among healthcare workers: a cluster-randomized trial. *Infect Control Hosp Epidemiol.* 2010 31(11):1170-6

<sup>33</sup> Huis A, van Achterberg T, de Bruin M et al. Systematic review of hand hygiene improvement strategies: a behavioural approach. *Implementation Science* 2012, 7:92

<sup>34</sup> Graupp P, Purrier M. Hand hygiene training case study. Chapter 3 of *Getting to Standard Work in Health Care*, Productivity Press, 2012 This book chapter is a free download.

	<p>paediatric population used QI science with &gt;95% compliance in one study and &gt; 90% in the other.<sup>35 36</sup></p> <p>Recent work termed front-line ownership or FLO builds on the well-tested improvement science precepts, with an emphasis on social networks and local ownership<sup>37</sup></p>
<b>Lean thinking and six sigma</b>	<p>A key initial premise to lean thinking is to recognise that only a small fraction of the total time and effort when producing a product or delivering a service actually adds value for the end customer. It is therefore critical that all the non-value activities - or waste - can be targeted for removal step by step. Lean thinking tools such as cause-effect diagrams, can help staff identify areas for improvement in hand hygiene. Six sigma uses similar tools to eliminate defects (e.g. hand hygiene not performed), displaying data in statistical process control (SPC) charts – these have proven particularly useful for feedback of hand hygiene compliance and engendering a sense of competition between units and healthcare professional groups.<sup>38</sup></p>
<b>Behavioural approaches</b>	<p>A recent systematic review of hand hygiene behavioural approaches<sup>39</sup> reviewed 41 studies. It concluded that addressing only determinants such as knowledge, awareness, action control and facilitation are not enough to change hand hygiene behaviour. Combinations of social influence, attitude, self-efficacy, and intention techniques showed better results.</p>
<b>Human factors</b>	<p>The human factors approach aims to optimize environments and processes that are natural and easy to use by matching them to human cognitive and physical strengths and making allowances for human limitations. This approach was taken by the Canadian Patient Safety Institute, and their 2010 study<sup>40</sup> produced an Environmental Assessment Toolkit for hospitals that took into account human factors. This covered the supply and position of hand gel dispensers and wash basins that became part of the normal workflow. Many of these approaches were taken by New Zealand hospitals early in the HHNZ campaign</p>
<b>Social marketing</b>	<p>Social marketing seeks to develop and integrate marketing concepts with other approaches to influence behaviours that benefit individuals and communities for the greater social good.<sup>41</sup></p> <p>Social marketing has been applied successfully to many health-related issues including seat belt usage, tobacco consumption, alcohol-impaired driving, physician prescribing practices, and hand hygiene. In a 2002 study the principles of societal marketing were</p>

<sup>35</sup> White CM, Statile AM, Conway PH et al. Utilizing improvement science methods to improve physician compliance with proper hand washing. *Pediatrics* 2012; 129(4).

<http://pediatrics.aappublications.org/content/129/4/e1042.full.html> Accessed 19/06/2014

<sup>36</sup> Linam WM, Margolis PA, Atherton H, Connelly BL. Quality-improvement initiative sustains improvement in pediatric health care worker hand hygiene. *Pediatrics* 2011;128(3)

<http://pediatrics.aappublications.org/content/128/3/e689.full.html>. Accessed 19/06/2014

<sup>37</sup> Zimmerman B, Reason P, Rykert L, et al. Front-line ownership: generating a cure mindset for patient safety. *Healthcare Papers: New Models for the New Healthcare*, Vol 13, No 1. 2013.

<sup>38</sup> Carboneau C, Bengé E, Jaco MT, and Robinson M. A lean six sigma team increases hand hygiene compliance and reduces hospital-acquired MRSA Infections by 51%. *Journal for Healthcare Quality* 2010; 32: 61–70. doi: 10.1111/j.1945-1474.2009.00074.

<sup>39</sup> Huis A, van Achterberg T, de Bruin M, et al. A systematic review of hand hygiene improvement strategies: a behavioural approach. *Implementation Science* 2012 <http://www.implementationscience.com/content/7/1/92> Accessed 19/06/2014

<sup>40</sup> Chagpar A, Banez C, Lopez R, Cafazzo JA. Challenges of hand hygiene in healthcare: the development of a tool kit to create supportive processes and environments. *Healthcare Quarterly* 2010; 13 (Sept): 59-66

<sup>41</sup> International Social Marketing Association, European Social Marketing Association & Australian Association of Social Marketing (2013). *Consensus Definition of Social Marketing* (4 October 2013).

	applied to improve hand hygiene. Pre-marketing analysis of strengths, weaknesses, opportunities and threats to implementation; attention to product (hand gel), price, promotion and placement; and post-marketing 'customer' surveys were the essential components of the marketing strategy and its implementation. This study showed reductions in both MRSA and <i>Clostridium difficile</i> . <sup>42</sup>
<b>Positive deviance</b>	Positive deviance is based on the observation that in every community there are certain individuals or groups whose uncommon behaviours and strategies enable them to find better solutions to problems than their peers, while having access to the same resources and facing similar or worse challenges. <sup>43</sup> The efficacy of this approach was tested at the Albert Einstein Medical Centre in the U.S. <sup>44</sup> This was conducted in 2 ICU step-down units and measured the number of hand gel applications (using electronic hand washing counters). It showed a significant difference in the number of hand washing encounters and the volume of hand washing gel used, between the intervention and the control ward. There was also a significant decrease in HAI per 1,000 patient days.

The WHO's systematic review concluded that "to be successful, these interventions need to be multimodal and sustained over time in the context of an improved patient safety climate; in addition, particular attention should be paid to embed hand hygiene in the care flow and within best practices for specific procedures."<sup>45</sup> A recent extensive review also concludes that multimodal interventions would result in greater compliance by healthcare staff.<sup>46</sup>

The New Zealand campaign has borrowed heavily from the WHO programme and the Australian programme and has evolved over time. In the beginning it was drawing on infection prevention and control principles, with perhaps less attention to quality improvement science or behavioural change theories. Recent work has moved this much more to the fore, with the recent national workshop featuring FLO heavily.

Two of the stakeholders spoken to were impressed with the work from the Virginia Mason Medical Centre, particularly with its deliberate focus of specifically, one on one, teaching staff members *how* to wash their hands with gel; and *why* each action of that hand wash routine was important. UV fluorescent stain was used to test each person's wash technique. This hand wash ritual was clear enough that patients would recognise the pattern as all staff around them did the same wash – even to the extent of being told in a public toilet by an ex-patient 'oh, you must work at the Virginia Mason Centre'. This conveyed a sense of professionalism and unity to patients. The chapter on hand hygiene in the book is a free download from the website.<sup>34</sup>

<sup>42</sup> Gopal Rao G, Jeanes A, Osman M, et al. Marketing hand hygiene in hospitals— a case study. *J Hosp Infect* 2002; 50 (1):42-47.

<sup>43</sup> Marsh DR, Schroeder DG, Dearden KA et al. the power of positive deviance. *Br Med J* 2004; 329:1177-1179

<sup>44</sup> Marra AR, Guastelli LR, Pereira CM, et al. Positive Deviance: a new strategy for improving hand hygiene compliance. *Infect Control Hosp Epidemiol* 2010;31(1): 12-20

<sup>45</sup> Evidence of hand hygiene to reduce transmission and infections by multi-drug resistant organisms in health-care settings. Geneva: WHO. [www.who.int/gpsc/5may/MDRO\\_literature-review.pdf](http://www.who.int/gpsc/5may/MDRO_literature-review.pdf) Accessed 19/06/2014

<sup>46</sup> Loveday HP, Wilson JA, Pratta RJ et al. epic3: National evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. *J Hosp Infect* 2014;86:S1–S70

## National target for hand hygiene

Although there is good circumstantial evidence that high rates of hand hygiene are associated with decreased healthcare associated infections (HAIs), there is no good evidence that a particular hand hygiene compliance target is associated with significant decreases in HAIs.

Coupled with this, the definition of hand hygiene compliance is problematic – does it mean compliance with all the WHO 5 moments of hand hygiene, or could you just use the Canadian 4 moments? Are any of the moments more important? Is it self-reported compliance or external gold audit? Is it on selected wards? Does it include Emergency Care and ICU? These units have more “moments” and generally more visible moments than a general ward – especially Moments 2 & 3. How often should it be measured?

Many commentators suggest that hospitals should aim for 100% compliance; however, at least one study concludes that 100% compliance may interfere with patient care.<sup>47</sup> The HHNZ has used 70% as a reasonable interim target to attain. The Australian hand hygiene programme, run along similar lines with similar audit standards reached 80% in March 2014.<sup>48</sup> Some stakeholders noted figures quoted by some US hospitals in the high 90% as likely to have been less rigorously arrived at than the gold audit methods used here. However some programmes appear to have been strongly designed and measured, and have consistently attained near or over 90% compliance.<sup>49 50</sup>

Considering say reaching a 75% target, this would leave one in four hand washing moments not carried out. For a patient having say 20 moments a day this would mean 5 potential infection opportunities, or 20 over the course of a 4 day stay. A fully-occupied 30 bed ward with such patients might have 150 infection opportunities a day. It would only take 0.66% of those occasions to transfer an infection to give one HAI per day per ward. With carriage rates of MRSA on fingertips measured from 1-7% in one careful study,<sup>51</sup> it is easy to see how infections can transmit.

The WHO comment on targets:

*“Any such targets should first be realistic and attainable, in view of the long-term efforts required to bring about improvements in hand hygiene behaviour. Aiming for complete compliance in the short-term would obviously be difficult to achieve in facilities where the initial compliance rate may be less than 40%. What should be aimed for is the establishment of a baseline, and a steady, sustainable, month-by-month, year-on-year improvement.”<sup>52</sup>*

Conclusion: There is no internationally agreed target for the ideal hand hygiene compliance/adherence, and a number of methodological issues. Greater engagement is likely if adherence measurement is owned as part of a quality improvement approach at the unit/ward level, with rapid feedback and display of data. The current national gold audit programme is methodologically rigorous, but is time consuming and results may not be immediately available for feedback and engagement. Some DHBs are now incorporating local audits to provide this function. The production of league tables when hospitals include different wards (e.g. EC and ICU) can create debate about the measures used rather than the need for progress. When

<sup>47</sup> J Storr, S Clayton-Kent. 2004. Hand hygiene. *Nursing Standard* 18(40):45-52

<sup>48</sup> <http://www.hha.org.au/LatestNationalData.aspx>. Accessed 9/07/2014

<sup>49</sup> Kirkland KB, Homa KA, Lasky RA et al. Impact of a hospital-wide hand hygiene initiative on healthcare-associated infections: results of an interrupted time series. *BMJ Qual Saf* 2012; doi:10.1136.

<sup>50</sup> Graupp P, Purrier M. Hand hygiene training case study. Chapter 3 of *Getting to Standard Work in Health Care*, Productivity Press, 2012.

<sup>51</sup> Creamer E, Dorrian S, Dolan A, et al. When are the hands of healthcare workers positive for methicillin-resistant *Staphylococcus aureus*? *J Hosp Infect* 2010; 75: 107–111.

<sup>52</sup> <http://www.who.int/gpsc/tools/faqs/implementation/en/>. Accessed 19/06/2014

probed stakeholders felt 70% was too low to settle on as 'job done', especially in view of the concerns regarding extra diligence by staff due to the auditor's presence. A target over 80% was nominated by several correspondents; others did not proffer a value. One noted continued norovirus outbreaks with staff infections in DHBs with nominally higher audit results as illustrating the journey still needed. All felt it was too soon to be reducing emphasis on hand hygiene.

Given the likely infection transfer possibilities the system should be looking for as high as possible rates of hand hygiene adherence within the bounds of practicable work practice. We would suggest seeking greater than 80% adherence as the next goal for the programme.

### Alternatives to Audit

Various studies have sought ways of monitoring hand hygiene without really coming up with a better method than direct observation. This is summarised in Table 5.

**Table 5 Hand hygiene adherence measurement**

Method	Description	Advantages	Disadvantages
Direct observation	Considered the gold standard method for hand hygiene, because it is the only metric that directly measures compliance	The only hand hygiene audit method that can evaluate the 'Five Moments' and generate an adherence rate	a) The observer effect; b) inter-observer agreement can vary, needs trained data collectors; c) time intensive for observers; d) only short observation periods possible, in mainly 9-5 period
Measuring product use	An indirect way to measure hand hygiene compliance, measuring alcohol-based hand rub use	a) Less resource intensive; b) possible to do it manually or electronically; c) can be done in different hospital settings	a) Not possible to distinguish hand hygiene practice among staff, whether using product appropriately or not
Electronic sensors	Several different types of electronic sensors using different RFID technologies (Wi-Fi, Bluetooth, ZigBee, ultrasound)	a) Electronic hand hygiene systems designed to ensure that workers perform hand hygiene prior to patient care and issue an automated notice to do so; b) can also promote real-time feedback c) when integrated with a database, allow for automated reports of adherence, and a log of patient care episodes per each staff member	a) Technologies are expensive and generate high maintenance costs; b) necessary to work closely with engineering to assess possible interference with existing equipment or whether an existing wireless network may be overloaded
Video surveillance	Cameras with views of every sink and hand sanitizer dispenser to record hand hygiene. Sensor in doorways identifies when an individual enters/exits	Remote video can monitor hand hygiene with real-time feedback to staff	a) Employee/patient privacy; b) high initial cost; c) high maintenance costs

After Marra and Edmond 2014.<sup>53</sup>

<sup>53</sup> Marra AR, Edmond MB. Innovations in Promoting Hand Hygiene Compliance. *Web M&M*, AHQR May 2014

## 5 Moments?

The 5 moments of hand hygiene were discussed in Section 1. Some respondents felt they have not translated well to behavioural change or social marketing. While technically correct from an Infection Prevention and Control perspective - that there are 5 key moments when a healthcare worker should perform hand hygiene – several stakeholders felt the message was complex and off-putting to some people. One respondent noted there should in fact be 6 moments – to include *before* touching a patient’s environment. Another suggested “some accept it, some are resigned to it, some reject it completely”.

Although the WHO literature says that the 5 moments are simple to remember, this is not borne out in routine practice. Moments 2 and 3 are less commonly encountered in routine auditing, so they are under-represented in the auditing data (even with EC and ICU included). This led to some confusion for healthcare workers interpreting the results of the gold audits.

The Canadian Patient Safety Institute simplified the approach with 4 moments of hand hygiene:<sup>54</sup>

- i. Before initial contact with a patient or patient’s environment
- ii. Before performing and aseptic procedure
- iii. After risk of body fluid exposure
- iv. After contact with a patient or patient’s environment

An even simpler approach was mooted to translate the 5 moments modifying Moments 1 and 4:

- i. Before contact with a patient or their environment
- ii. After contact with a patient or their environment

This simple schema incorporates Moments 2, 3, and 5 and has the advantage of simplicity of message, adding the ability to tailor messages to different staff groups. Respondents were divided on this approach; the majority felt that the 5 moments were technically correct, and not all that difficult to learn. Three or four respondents were very strong on wanting the ability to vary the message for the target audience, and to allow the local situation to dictate the best approach. With the intention of promoting the FLO approach, this may well come to pass in future years.

---

<sup>54</sup> Chagpar A, Banez C, Lopez R, Cafazzo JA. Challenges of hand hygiene in healthcare: the development of a tool kit to create supportive processes and environments. *Healthcare Quarterly* 2010; 13 (Sept): 59-66

## 8. Future sustainability

Stakeholders spoken to from three different DHBs had noted issues with maintaining progress. The loss of a key person such as the hand hygiene coordinator, organisational drift, or other programme distractions led to falls in audited performance. The loss of a project manager was been shown to impact on the sustainability of hand hygiene compliance rates in a pilot programme in Australia.<sup>55</sup> Small hospitals can be hit harder with the loss of a key person, any one individual being a larger part of the team, but even in larger hospitals this is a risk. Respondents felt that there was a clear need for the continuation of a national programme. "This is not like a project that you can do for a year, and then move on to something else. The problem is always going to be with us."

To provide the necessary environment to ensure DHBs keep investing in hand hygiene respondents saw a two prong approach as necessary. The first was the continuation of the national audit process, possibly twice yearly rather than three times a year (to reduce costs), but publishing DHB-specific results to maintain pressure on Boards and senior managers to continue to allocate resource to this area. The second approach is the front-line ownership/local QI approaches, where peer support, role modelling and desire to do better from a professional and personal point of view hold sway. While this has the potential to become self-sustaining over time, individual hospitals are always at risk of losing staff and momentum. Some agency with the resource and expertise to support encourage and foster QI learnings at any DHB, whether hand hygiene or more generally will be required.

In their report of April 2014 regarding *Sustaining the HHNZ Quality and Safety initiative beyond June 2014* the HHNZ team makes the following points about services that need a national presence that are congruent with the views of respondents:

- strategic oversight and leadership functions
- some operational functions :
  - data management and reporting;
  - website maintenance and development;
  - wider engagement with practitioner organisations and educational institutions;
  - some communication services
- the establishment of a single, high level 'steering group' to govern all the national infection prevention quality improvement programmes (including HHNZ).

As estimated in Table 2 around 90% of the costs of the hand hygiene programme are borne by DHBs, with the payment to the national team adding the remaining 10%. Maintaining the pressure on DHB to continue improving in this area is important as it will require continued or even increased expenditure by DHBs.

Stakeholders were interested in the spread of hand hygiene practices to other healthcare areas, but all were clear that there needed to be a strong focus on inpatient wards and services for the foreseeable future. Any diminution of effort would place more patients at risk. Should further resource be available people thought areas of interest would include:

- Theatres
- Day units
- Aged residential care
- General practice
- The public more generally

---

<sup>55</sup> Grayson ML, Jarvie LJ, Martin R, et al Significant reductions in methicillin-resistant *Staphylococcus aureus* bacteraemia and clinical isolates associated with a multisite, hand hygiene culture-change program and subsequent successful statewide roll-out. *Med J Aust* 2008;188:633-640

This latter point looks to merge messages with the public health occasional campaigns around safe food preparation, influenza prevention, winter campaigns, etc. As health care workers meet congruent messages from work in their private lives it should become mutually reinforcing.

Also noted by a stakeholder was the risk of **patient to patient transmission**.<sup>56</sup> Patients routinely share toilets and often are cared for in multi-bed rooms where there are many opportunities to pass on infections, including through poor coughing or sneezing practices which can easily aerosolize infective material. They are clearly at risk of passing their multi-resistant organisms from one to another, even if staff remain scrupulously hand hygiene adherent.

**Environmental cleanliness** requirements were also noted – a curtain can retain clostridium difficile spores for months. Admission of a patient into a bed previously occupied by an infected patient significantly increases their chance of acquiring the same pathogen, regardless of compliance with hand hygiene.<sup>57</sup> Given the high turnover of patient beds many patients may be at risk of inheriting the microbiology of the previous patient without careful attention to detail. Are there national procurement opportunities in assessing types of infection-resistant curtains, wall hangings, bed linen etc? In devising effective methods of cleaning beds and other equipment and surroundings between patients?<sup>58</sup>

While neither of these concerns are explicitly hand hygiene they are clearly related, and would provide a natural and congruent growth path out of hand hygiene.

---

<sup>56</sup> Loveday HP, Wilson JA, Pratta RJ et al. epic3: National evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. *J Hosp Infect* 2014;86:S1–S70

<sup>57</sup> Carling PC, Bartley JM. Evaluating hygienic cleaning in healthcare settings: what you do not know can harm your patients. *Am J Infect Control* 2010;38:S41-S50.

<sup>58</sup> Dancer SJ. The role of environmental cleaning in the control of hospital-acquired infection. *J Hosp Infect* 2009; 73: 378-85.

## 9. Conclusion

Hand hygiene has been a national priority since 2008. Over that time there has been a clear improvement in New Zealand public hospitals, with audit results suggesting most DHBs are able to manage over 70% adherence with hand hygiene opportunities, at least on those wards being audited. The improvement is linked with, and likely to have been the result of the HHNZ work. Not all areas of hospitals are covered, with ED, theatres, mental health, maternity, AT&R and day and community units being noted as having patchy coverage.

Staff attitudes towards hand hygiene have improved, but there is still far from universal agreement that this is an important area that people should be taking note of. It is yet to become a 'social norm' in our hospitals. More than one in four hand washing opportunities are being missed across New Zealand public hospitals, even assuming that rates in the non-audited wards are as good as those on audited wards. Changing such a simple behaviour has proved to be more resistant to change than expected.

The public health system is estimated to be spending around \$3m a year on the hand hygiene programme as it currently stands. It is not possible to use the current measures to estimate outcomes linked to hand hygiene practice, or to determine programme cost-effectiveness. It is possible that there was a reduction in healthcare-associated *S. aureus* bacteraemia in public hospitals in New Zealand from 2012 to 2014. This possible reduction may or may not be associated with the likely improving hand hygiene over that time. Theoretical calculations based on New Zealand data would suggest avoided costs upward of \$13m a year are possible through improved hand hygiene in New Zealand public hospitals.

The change process undertaken for hand hygiene is incomplete. It would be easy to regress if continued pressure was not being applied. This is not an area that can be considered a candidate for a one-off campaign; rather it needs continued emphasis to embed it into the fabric of our health system. It also cannot be seen in isolation, or to be overly prioritised compared to other aspects of infection control or quality and safety in the hospital setting. Intense and focused effort will continue to be required as drug resistance increases, hospital capacity is more utilised, and the inpatient cohort becomes older and more vulnerable to infection.

The signalled emphasis for the programme for 2014/15 on front-line ownership and continuous quality improvement - pdsa cycles, feedback, peer support and leadership seems to have wide support. Further investment is likely to be needed to accomplish the end goals of the programme. Until results are more sustainable in the hospital setting it would be premature for attention to switch to hand hygiene improvement in primary and community care settings, aged residential care or private facilities.

Based on the analysis undertaken and the feedback received from stakeholders, we would suggest the following considerations for future hand hygiene planning in New Zealand:

1. A national approach supporting hand hygiene will be needed for at least the next three years. Elements of this approach will include:
  - a. strategic oversight and leadership functions
  - b. maintaining IT infrastructure for data collection
  - c. maintaining links with Australian programme
  - d. audit data management and reporting
  - e. ensuring maintenance of gold auditor training capacity
  - f. continued resource refreshment, refinement and development
  - g. website maintenance, development and promotion

Also useful would be:

- h. continued proactive support for DHBs
  - i. engagement with practitioner organisations and educational institutions
  - j. assistance for hospitals to expand practice to all areas of clinical care
  - k. annual national workshop/shared learnings
  - l. publicity and social marketing re hand hygiene, including publications
- 2. Embed the changes to a quality improvement science mode of working, ie front-line ownership, pdsa cycles, feedback, peer support and leadership
- 3. Consideration of increased national investment in infection prevention and control, including hand hygiene
- 4. Progress a more collaborative approach to the commissioning and monitoring of quality initiatives
- 5. Ensuring stronger clinical oversight – eg establishment of a single, high level multi-agency governance group for all the national infection prevention quality improvement programmes including HHNZ
- 6. Review the S. aureus bacteraemia results collection and reporting process, including how each DHB identifies and collates cases. Exploration of other key infection indicators – norovirus, multi-resistant Gram-negative bacteria
- 7. Moving formal national audit reporting to twice-yearly from thrice-yearly and continuing publication and publicity around DHB-specific results
- 8. Starting a conversation around seeking hand hygiene rates higher than 80%
- 9. Areas that may be useful to assess in the future:
  - a. current practice and measures being taken to reduce patient-to-patient infection transmission within hospitals
  - b. current practice in maintaining environmental cleanliness in hospital settings to prevent cross-infection.

## Appendix 1 – List of people interviewed, Interview questions.

### HQSC

Deborah Jowett	Senior Advisor Infection Prevention & Control
Mary Seddon	Consultant
Diane Callinicos	Senior Portfolio Manager

### HHNZ

Joshua Freeman	Clinical Lead Hand Hygiene
Sally Roberts	National Clinical Lead Infection Prevention & Control
Henry Dowler	past Project Manager
Louise Dawson	National Hand Hygiene Coordinator
Christine Sieczkowski	Infection Prevention & Control Coordinator ADHB

### DHBs

Penny Andrew	Manager Quality Improvement, Waitemata DHB
Stephen Mc Bride	Infectious Diseases and General Physician, CMDHB (clinical lead hand hygiene)
Ray Pickles	Clinical Nurse Specialist Infection Prevention & Control, Tairāwhiti
Mary Gordon	Executive Director of Nursing, Canterbury DHB
Allan Cumming	Systems Improvement Advisor, Southern DHB

### Interview questions

Starting questions for semi-structured interviews.

What aspect of the programme were you involved with?

What changes have occurred at your institution as a result of being involved with the hand hygiene programme?

Has clinical practice changed as a result of the hand hygiene programme? Any quantitative/qualitative data supporting that?

Have staff attitudes changed as a result of the hand hygiene programme? Any quantitative/qualitative data to support that?

Have patient outcomes improved as a result of the hand hygiene programme? Any quantitative/qualitative data to support that?

What has gone well – key success factors? Any areas better than others, any occupation groups better than others? Probe: has it linked with/reinforced other quality programmes?

What has gone less well – barriers, issues – what would you have done differently. Any unintended consequences? Probe: Has it diverted attention from other quality and safety programmes? Probe: has there been any estimate of any reduction in time available for staff to care for patients (due to hand hygiene needs)?

Has there been a burden for the DHB in carrying out the audits – in terms of how many people involved, how many hours etc.? Are the audits useful to the DHB itself? Is publishing DHB rates publicly helpful?

Thinking about the national programme specifically, has the national structure with HHNZ been a useful way of organising the resource in this area? Has HHNZ been supportive and helpful for your DHB? Was the right skill mix available in HHNZ? The right approach? In retrospect do you think there would have been a better way to organise the programme?

Have there been any broader learnings re organisational improvement models?

Looking forward, what is needed in the area of hand hygiene? Probe:

- coverage across health sector [Probe: AT&R, aged residential care, primary care]
- sustainability – same programme format or something different, same content or something different
- measurement - longer term monitoring (Specific question: Is there a need for ongoing national audits? How often?)
- requirement for continuation of a national programme at all?

Any other comments

## **Appendix 2 – Hand hygiene programme documentation reviewed.**

Hand Hygiene New Zealand monthly reports – Dec 2013 – Apr 2014

HHNZ National Performance Reports Jun 2012 to March 2014

HHNZ Sustainability Reports - May 2013, April 2014

HHNZ attitudinal survey results overview report to the Health Quality \_ Safety Commission April 2014

HHNZ Stakeholder engagement and communication strategy 2013-2014

HHNZ Stakeholder engagement and communication plan 2012-2013

HHNZ Situation Review 2013

HHNZ Education Strategy 2013-2014

HHNZ Annual Summary Reports - Year 1 and 2

HHNZ Project Plans 2009, and Years 1- 3

HHNZ Situation Analysis and DHB Engagement Strategy Oct 12

HHNZ Implementation Guidelines Jan 2012, revised June 2013

HHNZ eBulletin Feb, April 2014

HHNZ Resource kit for health professionals, April 2014

HHNZ Patient participation guidelines, June 2013

HHNZ Auditing Manual Mar 2012, revised Mar 2013

Material on HHNZ website, including presentations from national conference June 2014 – Accessed June 2014

Material on HQSC website

## Glossary

CLAB	central line-associated bacteraemia
ED	emergency department
FLO	front-line ownership
HAI	healthcare-associated infection
HASAB	healthcare-associated Staphylococcus aureus bacteraemia
HHNZ	Hand Hygiene New Zealand
HQSC	Health Quality and Safety Commission
IPC	infection prevention and control
ICU	intensive care unit
Moment	an opportunity for hand hygiene (see page 9)
5 Moments	WHO methodology for assessing opportunities for hand hygiene
NQIP	National Quality Improvement Programme (forerunner of HQSC)
pdsa	Plan-Do-Study-Act cycles, core component of QI
QI	quality improvement
SPC	statistical process control
WHO	World Health Organisation