Target CLAB Zero
National Collaborative to Prevent Central Line Associated Bacteraemia

Final Report
September 2011 to March 2013
Revised 24th June 2013

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Confidentiality

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Foreword

This collaborative, funded by the Health Quality and Safety Commission, commenced in October 2011 and is due to end in April 2013. At the commencement only 2 units of 25 were reporting CLAB rates per 1,000 line days and only 1 District Health Board (DHB) had implemented the insertion and maintenance bundles. There was no national consensus on the definition of CLAB or key processes in the diagnosis of a CLAB infection. All 20 DHBs were recruited to be participants in this collaborative.

This is the final report on the collaborative to prevent CLAB and follows on from the report submitted in August 2012 and approved in December 2012. It presents findings based on data collected from DHBs for the period January 2012 to March 2013, highlights the successes of the collaborative, lessons learnt and makes recommendations for the future sustainability of the achievements and ongoing spread to other hospital areas. This report also presents reflections from participants in this collaborative and their experience.

The DHB efforts and ongoing hard work to prevent CLAB through compliance with central venous line (CVL) insertion and maintenance bundles, improved local-level data collection as well as focusing on holding the gains are reflected in the successes.

The areas of focus since August 2012 have been transitioning from testing to implementation and embedding of practices into Business As Usual. Teams have focused on the documentation of the maintenance compliance and moved from person dependent processes to system integration.

The collaborative methodology has been successful in the New Zealand context and will be important for the future implementation of similar programmes. Together with clinical leads, the HQSC and Ko Awatea work has continued since the report submitted for the period to August 2012 to continuously improve the quality of infection prevention and control, data collection and reporting.

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Document Purpose

The purpose of this document is to report the Central Line Associated Bacteraemia (CLAB) rates for Intensive Care units in all New Zealand DHBs, as per reporting requirement as outlined in Part B-Reporting; B2 in accordance with:

Output 9 Analysis of 31 March period results and full year results

Quality Measure Summarises results in terms of compliance rate by DHB, identifies any trends and covers the full year results.

Output 10 Final report

Quality Measure Covering lessons learnt, recommendations for future sustainability

Indicative Delivery Date: 30th April 2013

The document will:

- Highlight achievements and include process and outcome measures
- Successes of the programme
- Lessons learnt
- Recommendations for future sustainability

1. Background

This collaborative, funded by the Health Quality and Safety Commission, commenced in October 2011 and is due to end in April 2013. At the commencement only 2 Intensive Care Units (ICUs) of 25 were reporting CLAB rates per 1,000 line days and only 1 DHB had implemented the insertion and maintenance bundles. There was no national consensus on the definition of CLAB or key processes in the diagnosis of a CLAB infection. All 20 DHBs were recruited to be participants in this collaborative.

Key Objectives of this project are to:

- Reduce the rate of CLAB in New Zealand ICUs towards zero (<2 per 1000 line days by 30 April 2013)
- Share evidence based practices and provide leadership, coordination and data management that will lead to sustainable improvement and better patient outcomes
- Establish a robust national measurement approach for CLAB
- For each DHB to roll out the CLAB prevention tools to at least one other hospital area
- Develop sustainable clinical networks

2. Strategies for Change

Two key groups were established, the Steering Group, which provided overall guidance and leadership for the National Collaborative to Prevent CLAB. This group served as a guiding force and the accountability component of the collaborative, reviewing progress and results against the Project Charter. The second group was the measurement group who approved key measurement requirements including the approval of the operational definitions and the establishment of the Institute for Healthcare Improvement (IHI) Extranet as the initial host of the national data base.

3. Effects of Change

There was a reduction in the national CLAB rate from 3.32/1000 line days to a rate of 0.46/1000 line days; a reduction of 86%

Reduction in the CLAB rate/1,000 line days

At the start of this initiative very few ICUs were counting line days and measuring their rate of CLAB per 1000 line days. A baseline was established by units completing a retrospective audit against the National Healthcare Safety Network (NHSN) definitions and endorsed by the Measurement Group and was estimated to be 3.32/1,000 line days.

New Zealand has been CLAB infection free for 6 non-consecutive months out of 12 in the period April 2012 to March 2013, the post set up period. The total number of CLAB infections for this period is 15; a reduction from an expected estimate of 105 for this 12 month period should there have been no change in performance.

Table 1 National CLAB Rate/1,000 central line days January 2012 to March 2013

The overall rate drops to 0.46 per 1000 line days for the post set up phase April 2012 to March 2013 (15/32,303 x 1,000)

(Based on data summary at 14.04.13)

	2012												2013		
ALL DHBs	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
No Of CLAB	4	4	7	0	0	2	2	0	0	3	2	3	0	3	0
Line Days	2487	2228	2557	2451	2708	2845	3112	2767	2586	2684	2650	2510	2550	2448	2992
CLAB Rate	**1.61**	**1.80**	**2.74**	**0**	**0**	**0.70**	**0.64**	**0**	**0**	**1.12**	**0.75**	**1.20**	**0**	**1.23**	**0**

Once enough national data was available, 12 data points (Provost, 2011) a run chart was developed to assist in understanding infection rate performance over time.

Chart A Based on Data from January 2012 to March 2013

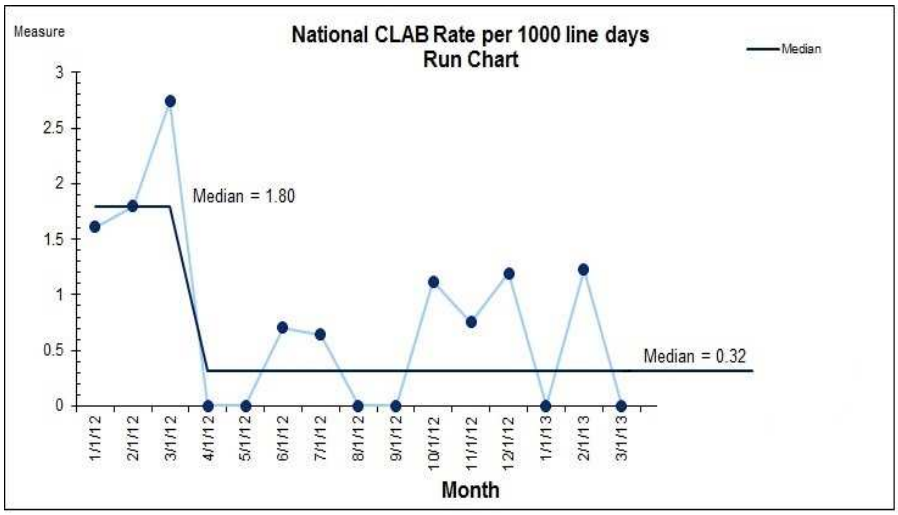
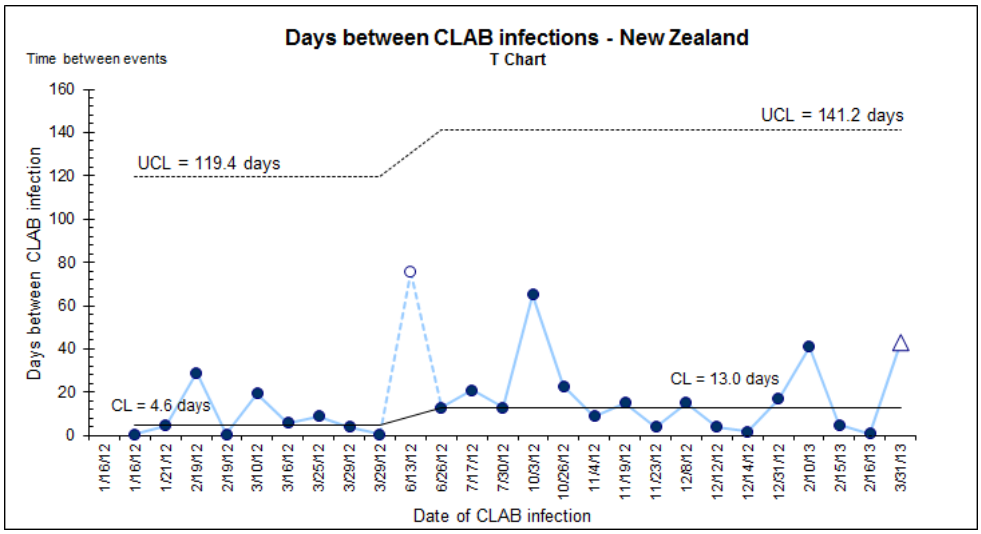


Chart B Based on data from January 2012 to 31st March 2013



The run chart A includes the data provided from 23 units, one unit has not had one line day for the duration of this programme and one unit has implemented the insertion and maintenance bundles but have not yet determined a method for data collection on the three key measures. Chart B displays time between events (t-chart), where the data plotted along the y-axis represents the days between CLAB infections in New Zealand (Provost, 2011).

What is clear from these charts is a statistical change in performance. Between January 2012 and June 2012, New Zealand expected to experience approximately 4.6 days between CLAB infections and could go as long as 119.4 days between infections and not be out of the ordinary. After the observed improvement, the country expects to experience an infection every 13.0 days with ordinary variation not to exceed 141.2 days.

These results are important for two reasons. They indicate that as a whole country New Zealand can expect CLAB infections to happen 3 times less frequently. The availability of more data also indicates a lower threshold for detecting future improvements as the country continues to improve its compliance to both the insertion and maintenance bundles.

Reduction in morbidity and excess costs associated with CLAB

These results are also consistent with a reduced morbidity rate, shorter lengths of stay in hospital, and a reduction in the economic burden of CLAB [7]. These early results provide strong incentive for the continued application of cost-effective, evidence based preventive measures.

Reduction in costs

The cost per CLAB infection has been estimated to be approximately NZ$20,000 in New Zealand (Burns et al, 2010). The implied monthly number of CLAB at the baseline level is between 8-9 per month (3.3/1000 * 2700)

For the post set up period from April 2012 to March 2013 there have been a total of 15 CLABs, had no corrective action been taken the number of CLAB infections could have been as high as 105 , a potential saving of up to 90 (105 minus15) infections and NZ$1.8 million

Other Benefits of pursuing this national collaborative effort:

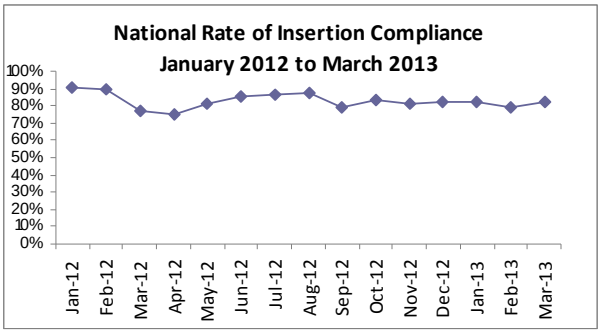
- Development and agreement on process flow for obtaining blood cultures
- An agreed national approach to determining a CLAB from a positive blood stream infection (BSI)
- Establishment and development of four regional reusable networks
- Increase in staff awareness and commitment to reducing CLAB
- Establishment of multi-disciplinary teams.

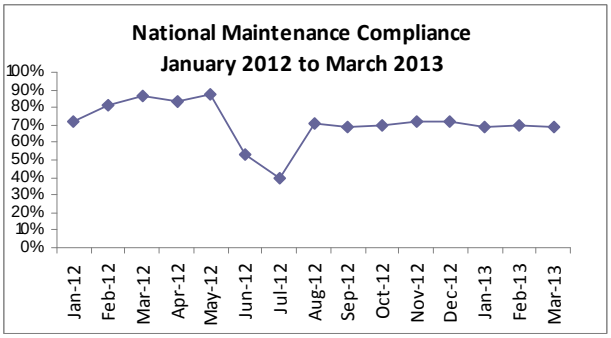
- Increased capacity and capability in using the IHI improvement methodology
- Better patient experience, decreased hospital stay, reduction in patient harm

Process Measure Outcomes

The two process measures are percentage compliance to the insertion and maintenance bundles. The insertion compliance overall for the programme from January 2012 to March 2013 is on average 80% and maintenance compliance for the same period on average 75%.

Insertion and Maintenance Percentage Compliance





Insertion bundle compliance rates have ranged from 70% to 90% nationally. Improvements in these rates are expected when the approved, trialed new drape replaces the drape that is currently being used.

Maintenance bundle compliance rates have ranged from 70% to 80%. Teams are working hard to improve this towards 100%. The key focus is on completion of documentation and having this work integrated as part of the daily activities.

Other Notable Outcomes

These outcomes are taken from the Annual Report approved in December 2012

- Development and agreement on process flow for obtaining blood cultures
- Development towards a standardised approach to determining a CLAB from a positive blood stream infection (BSI)
- Establishment and development of four regional reusable CLAB networks
- Increase in staff awareness and commitment to reducing CLAB
- Development of a national approach to the prevention of CLAB including the development of the following resources:

1. ‘How to guide’ promotional material
2. DVD on the Middlemore Hospital experience
3. DVD on the maintenance bundle
4. National Collaborative Project Charter
5. Checklist to assist with determining the next most appropriate clinical area for roll out
6. Development of a multi-disciplinary approach incorporating the expertise of the Infectious Diseases (ID) Physicians, Clinical Microbiologists and Infection Prevention and Control (IPC) Nurses
7. Development and procurement of a national insertion pack leading to on-going reduction in costs and consumables (from $89 to $59 per pack since introduction)
8. Increased capacity and capability in implementing the IHI Model for Improvement.

4. Lessons Learnt

4.1 The Collaborative methodology

The collaborative methodology has proven to work extremely well as a structured way to implement evidence based practices that have been enhanced by using local knowledge and skills within the New Zealand context. The collaborative methodology encourages both a bottom up and top down approach with frontline staff being given the tools, knowledge and direction to solve their own problems within a wider ‘community’ of like-minded individuals and teams.

In reference to this coordinated joint effort across the whole of New Zealand, the national clinical lead concluded that *“Target CLAB Zero has enabled DHBs to work together and put in place an agreed, standardised measurement system. For the first time, we are all speaking a common language about this important health issue”. (Dr Shawn Sturland, Intensive Care Physician, Capital & Coast DHB*). This is an unprecedented achievement.

4.2 Engagement

The collaborative structure provided a mechanism for engagement of the 20 DHBs across New Zealand. There were 18 DHBs represented at the first Learning Session, an excellent uptake which was created through providing teams with clear information and a

call to action to do the right thing and be part of an initiative that helps you to deliver high quality, safe care, through a proven methodology.

Once engaged the learning sessions and the action periods between learning sessions provided teams with ongoing information, personal and team development.

The three two day Learning Sessions provided team members the opportunity to learn from one another as they presented on successes, barriers, and lessons learned workshops, as well as providing the opportunity for informal dialogue and exchange among attendees. Teams also received. Coaching from two Improvement Advisors on the Model for Improvement enabled teams to test powerful change ideas locally, reflect, learn, and refine these tests.

The intervening Action Periods included onsite visits, regional meetings and phone and web based coaching and mentoring support from the project manager, National Clinical Lead and technical experts.

4.3 Attendance at the Institute for Healthcare Improvement (IHI)

The two courses delivered by the IHI, The Improvement Science in Action (ISIA) and Breakthrough Series (BTS) sponsored by the Commission provided those who attended with knowledge and skills in the IHI collaborative improvement methodology which benefited, local and regional teams and contributed significantly to the success of this collaborative.

This training built competency in the collaborative methodology, improvement science, and measurement.

4.4 Clinical Leadership

A key observation by the Clinical Leads in each of the units was that they require support from the Charge Nurse Manager in the unit, Project Lead, the participating Microbiologists and Infectious Diseases Physicians to implement sustainable changes. It was acknowledged that this needs to be a team effort.

4.5 Education material

The development of the ‘How to Guide’ by the Middlemore team and the DVD on the Middlemore experience were considered integral to enabling the other DHB teams to rapidly progress the work.

Material development needs to be responsive and developed to specifically meet the needs of a team, region or at a national level.

4.6 Branding

Branding the collaborative with the CLAB zero logo helped to unite the teams and provide a visual reminder of the goal.

4.7 Communication

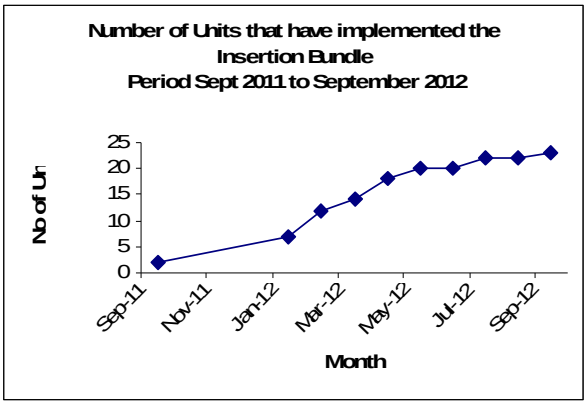
The development of a communication plan is essential particularly in relation to consistent and regular communications to all stakeholder groups, providing regular updates, celebrating milestones, and reinforcing the aim and the implementation strategies. This helps engagement, helps to socialize the bundles of care, celebrates achievements and builds sustainability.

The following section focuses on the successes of the programme that are not explicitly referred to in the results section and may overlap with some of the lessons learnt.

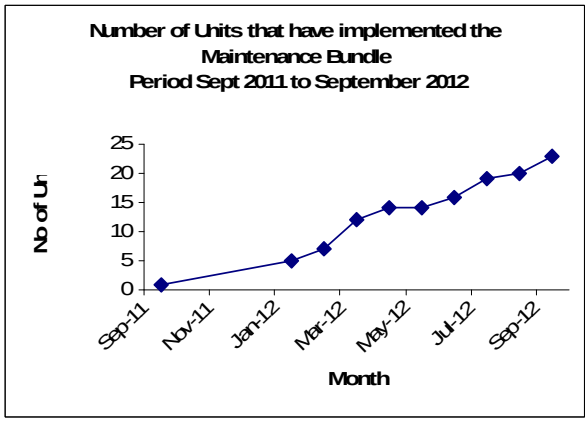
5. Successes

5.1 Engagement

All 20 DHBs are engaged in this collaborative. The graphics below show their progression as the insertion and maintenance bundles were implemented across 24 units. Wairararapa DHB has had zero lines for the duration of the programme.



5.2 Data Base



At the start of this initiative very few ICUs were counting line days or measuring their rate of CLAB per 1000 line days. A national data base was set up in November 2011, training of ALL 20 DHB representatives was completed by December 2011and data entry by the DHB commenced in January 2012

5.3. Making the right thing the easiest thing to do

One great success of this initiative has been in making the right thing the easiest thing to do as demonstrated through the creation and implementation of a national central line insertion pack now being used in 10 ICUs across the country.

Those DHBs who are not using the pack have set up specified trolleys with all the requirements for the insertion of a central line.

Teams have packaged their blood sampling bottles into sets of two to support staff in following the agreed blood culture guidelines. At the commencement of this collaborative a number of units were only collecting one set of bloods as opposed to the required two.

5.3. A National Programme

The fact that this was a national programme sponsored by the Health Quality Safety Commission in partnership with Ko Awatea was a significant success factor. Had the programme been regional or localised without the 'national' overview the collaborative may have been less successful. A number of the participants commented on the fact that this was a national programme and the expectation set by the Commission and Ko Awatea was that all DHBs were expected to participate.

5.4. Development of multi-disciplinary teams

Multi-disciplinary teams do not naturally or spontaneously work together on issues that require input of their specific expertise in solving a common problem such as the diagnosis of a CLAB infection. The creation of multi-disciplinary teams that understand how to use improvement methods to solve problems together is a success of this collaborative. The persistence of capacity and capability within these teams creates the opportunity for ongoing improvement efforts in the New Zealand Health system beyond the scope of just CLAB infections.

5.5. Time

For change to be embedded into 'Business As Usual' teams require significant time. The teams on this collaborative started with the testing of the implementation of the insertion bundle and then progressed to the implementation of the maintenance bundle. Following implementation of these bundles into the ICU teams at March 2013 require more time to sustain the gains they have made.

Sustainability is discussed in the next section of this document

5. Recommendations for Future Sustainability

5.1 Focus on Measurement

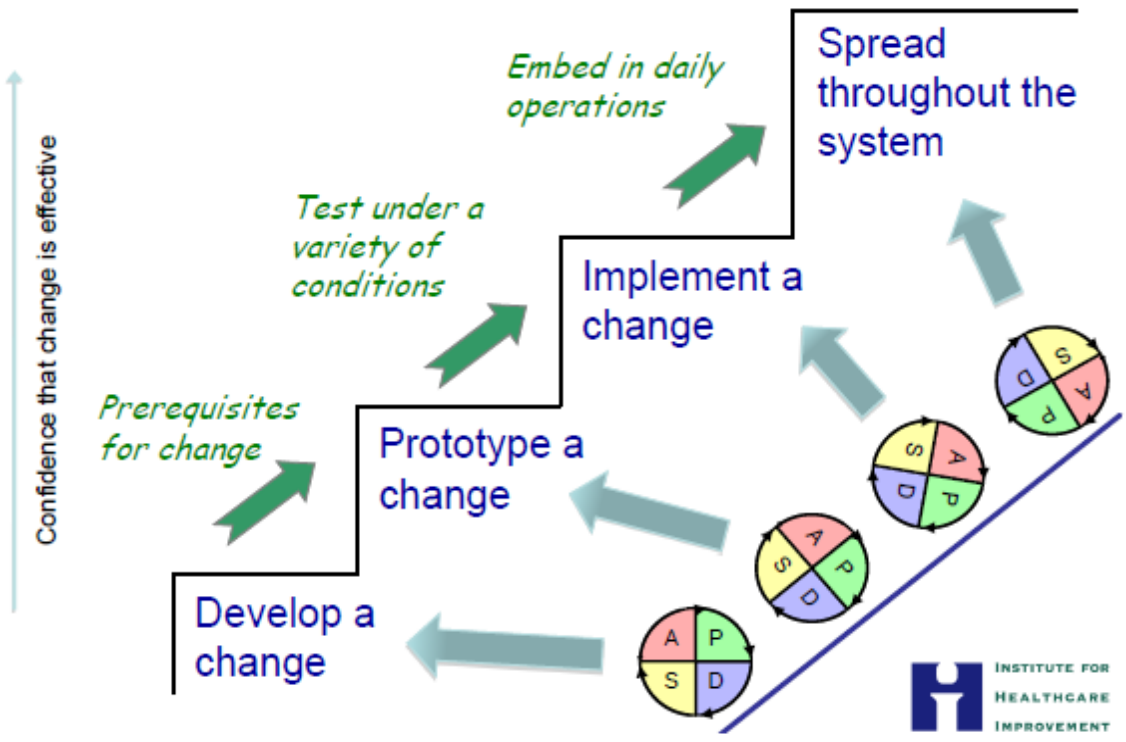
An ongoing focus on performance measurement will help DHBs to monitor performance, and take corrective action should their progress start to slip away.

Future models are still to be developed. In the interim it will be critical to maintain central co-ordination, monitoring, reporting and recording activities.

5.2 Transition from Testing of Changes to Implementation and Sustainability

The participating units demonstrated variation in their current status in relation to the measurement of CLAB infections, their understanding of the CDC definitions, their current practices and whether or not they had implemented systems and processes for the management and monitoring of CLAB infections.

This variation fed into the individual units' ability to move from testing to implementation and it was only in June 2012 that all 24 participating units had commenced recording their percentage compliance to the insertion bundle and September 2012 for the maintenance bundle. One unit has had zero line days for the duration of this collaborative.



Reference: IHI Breakthrough Series, Ko Awatea, October 2011

The patient safety programme in Scotland suggests a 4 year time frame for the teams to move through all the steps and get to a point where the changes are embedded and part of Business As Usual. (IHI Breakthrough Series Ko Awatea October 2011)

5.3 Governance Structure

After the completion of this project in April 2013 a governance structure could be formed to provide ongoing support and leadership, as well as the funding to provide oversight of this important work. There is currently a proposal with the Commission for consideration which outlines some of the activities that would support sustainability of what has been achieved and moving from person dependent processes to a systems approach.

5.4 Rolling out to Other Areas

19 DHBs have commenced the roll out to at least one other area outside ICU and the total number of areas is now 51. Project leads continue to express concern in regards to ongoing organisational support to roll out this programme outside of the ICU because of the challenges of maintaining accurate data collection and reporting.

6. Conclusion

The level of will, ideas and execution by the participating teams continues to be impressive. A mini learning session held in each of the 4 Regions in November 2012 provided some much needed impetus to support the teams in managing their local barriers to achieving higher percentage compliance to their maintenance bundles. Achievements in the 18 months have demonstrated the benefits of having a robust process established in the pilot site. The success to date can be attributed to the collaborative methodology that has been proven to work extremely well in spreading evidence based best practice, provided there is good clinical, project and management leadership. National clinical leadership, supported by three Regional Leads and on site unit Clinical Leads has been invaluable. The programme is further supported by the expertise of an Improvement Science Advisor, consulting independently from Washington DC and the Clinical Director for Quality Improvement in Counties Manukau Health.

Ko Awatea is currently exploring the opportunity to work with the Commission on an extension plan for this work. Our target remains CLAB zero beyond April 2013.

7. References

1. Pittet D, Tarara D, Wenzel RP. Nosocomial bloodstream infection in critically ill patients. Excess length of stay, extra costs, and attributable mortality. JAMA. 1994 May 25; 271(20):1598-601.

2. Soufir L, Timsit JF, Mahe C, et al. Attributable morbidity and mortality of catheter-related septicaemia in critically ill patients: a matched, risk-adjusted, cohort study. Infect Control Hosp Epidemiology. 1999 Jun; 20 (6):396-401.

3. Mermel LA. Prevention of intravascular catheter-related infections. Ann Intern Med. 2000Mar 7;132 (5):391-402

4. Burns A, Bowers L, Pak NT, et al. The excess cost associated with healthcare-associated bloodstream infections at Auckland City Hospital. NZ Med J. 2010 Oct 15; 123(1324):17-24.

5. Lief Solberg, Gordon Mosser and Sharon McDonald *Journal on Quality Improvement* vol.23. No 3, (March 1997), 135-147

6. Blot SI, Depuydt P, Annemans L, et al. Clinical and economic outcomes in critically ill patients with nosocomial catheter-related bloodstream infections. Clin Infect Dis 2005;41:1591-8.

7. Burns A, Bowers L, Pak NT, Wignall J, Roberts S. The excess cost associated with healthcare-associated bloodstream infections at Auckland City Hospital. NZ Med J. 2010 Oct 15;123(1324):17-24.

8. Institute for Healthcare Improvement. Getting started kit: prevent central line infections. How-to guide. Boston: Institute for Healthcare Improvement 2006.

9. Pronovost P, Needham D, Berenholtz S, Sinopoli D, Chu H, Cosgrove S, et al. An intervention to decrease catheter-related bloodstream infections in the ICU. N Engl J Med. 2006 Dec 28;355(26):2725-32.

10. Pronovost PJ, Goeschel CA, Colantuoni E, Watson S, Lubomski LH, Berenholtz SM, et al. Sustaining reductions in catheter related bloodstream infections in Michigan intensive care units: observational study. BMJ 2010;340:c309.

11. Seddon ME, Hocking CJ, Mead P, Simpson C. Aiming for zero: decreasing Central Line Associated Bactaraemia in ICU. NZ Med J. 2011 July 29;, 124(1339): ISSN 1175 8716. Accessible at: http://journal.nzma.org.nz.ezproxy.auckland.ac.nz/journal/124-1339/4791/content.pdf