Building Momentum: The Evolution of Lean in BC’s Health Sector

Annual Report 2011–12

This report presents Lean process redesign work carried out in the British Columbia health authorities in 2011/12.

For more information contact Kevin.Samra@gov.bc.ca.

March 2013

Ministry of Health
Contents

3  Executive Summary

8  A. The Evolution of Lean in the Health Authorities
9    Provincial Health Services Authority
10   Vancouver Coastal Health
11   Interior Health
12   Vancouver Island Health Authority
13   Northern Health
13   Fraser Health
14   In Summary

16  B. Case Studies Highlighting Lean Implementation
16    Case Study #1: Provincial Health Services Authority
19          Increase the number of patients receiving pre-admission care prior to child psychiatry
          inpatient treatment
19    Case Study #2: Vancouver Coastal Health
26          Richmond Hospital Birth Centre — Caesarean birth quality improvement initiative
29    Case Study #3: Interior Health
29          Interior Health Hips & Knees service line: discharge order to patient discharge
29    Case Study #4: Vancouver Island Health Authority
31          Vancouver Island Health Authority mood disorders clinic process improvement
34    Case Study #5: Northern Health
34          Dawson Creek operating room Lean initiatives
39    Case Study #6: Fraser Health
39          Improving access to the Chronic Pain Clinic at Jim Pattison Outpatient Care and Surgery
          Centre in Surrey

39  C. Building Momentum: Supporting the Use of Lean in the Health Authorities

39    Provincial Lean Network
Contents cont’d

40 Conclusions

42 Appendix 1: Provincial Lean Network
42 Lean Network Members
42 Education Working Group
42 Measurement for Evaluation Working Group
43 Capital Projects Working Group
43 Community of Practice Core Team

44 Appendix 2: Glossary
Executive Summary

“In very large measure, improving care and reducing waste are one and the same thing.”

— Don Berwick, founding CEO of the Institute for Healthcare Improvement

British Columbia’s six health authorities are committed to implementing Lean across the province’s health care sector through the Ministry of Health’s Innovation and Change Agenda. The agenda is a comprehensive plan comprised of strategic actions (Key Result Areas or KRAs) for achieving the Ministry’s vision of “a sustainable health system that supports people to stay healthy, and when they are sick, provides high quality publicly funded health care services that meet their needs.” KRA 6 focuses on using Lean methods to reduce waste, improve care, and increase value in the health care sector.

Lean is an improvement methodology that was developed in the manufacturing industry in Japan that is now also widely used in the health care sector across the globe. The striking improvements that have been realized in organizations by utilizing a Lean approach are based on a fairly simply principle: Lean promotes a structured, client-focused approach to eliminating waste in processes, leading to improvements in quality of care, patient experience, productivity and efficiency. It also promotes the evaluation, uptake and dissemination of leading practices to ensure patients receive safe, high quality care allowing for the best possible health outcomes.

The heart of Lean in health care is the mapping of a patient’s journey through various parts of the system (value streams) in order to identify the steps that are of value to the patient, and those that add no value to the patient, or waste. Once wasteful activities are identified and removed, the process is improved by ensuring the remaining steps are as efficient and integrated as possible, allowing for optimum flow. The final step of Lean is the pursuit of continuous improvement, so that processes become more and more streamlined.

The most basic application of Lean involves individual process improvement events which equip staff with the tools and knowledge they need to embed continuous process improvement in their everyday work. When it is implemented as a management strategy, the principles, values and attitudes needed to sustain continuous improvement permeate every aspect of the organization. These core management principles are articulated through the twin pillars of continuous improvement (relentless elimination of waste) and respect for people (engagement in long-term relationships based on continuous improvement and mutual trust).

1 Definitions for words in italics can be found in the Glossary (page 44).
This report communicates the ongoing progress on the Change and Innovation Agenda’s Lean initiative. It provides a snapshot of the use of Lean throughout the province in 2011/12, outlines the evolution of Lean within each health authority, and creates a space for sharing the work that is being led by the Provincial Lean Network in driving Lean across the province’s health care sector. As in 2010/11, health authorities were asked to select a case study that best illustrates the impact of Lean initiatives in their organizations. The case studies are summarized below, with a brief overview of how Lean activities are organized in each of the health authorities.

**Provincial Health Services Authority (PHSA)**

PHSA continues to implement Lean methods as a basis for continuous improvement. In fiscal year 2011/12, work was completed in 13 value streams across the organization, which included a total of 56 Rapid Process Improvement Workshops (RPIW/kaizen events) and 37 5S events. PHSA is also using Lean in the design of the new BC Children’s and BC Women’s hospital, and is using Lean Management practices throughout the organization. By implementing this tool, leaders will be able to effectively manage their areas by standardizing their work day, increasing time spent on front-line coaching and supporting staff in sustaining improvements and solving problems in real-time.

For this report, PHSA has selected a project which aimed to increase the number of patients receiving pre-admission care prior to treatment. The project took place in the Child Psychiatry Inpatient Unit, a 10 bed unit in the British Columbia Mental Health and Addictions Services Agency (BCMHAS) of the Provincial Health Services Authority (PHSA), which serves the needs of children up to 12 years old.

As a result of the Lean initiative, the percentage of patients (and families) receiving pre-admission care rose from an average of 18% to 100% for the 6 months between October 2011 and April 2012. There has also been a dramatic reduction in the referral to admission lead time from an average of 65 days to an average of 28 days.

**Vancouver Coastal Health (VCH)**

During fiscal 2011/2012 VCH focused its Lean work on three areas to sustain continuous improvements and embed Lean culture into the organization:

1. **Lean Management** is a management approach that engages frontline staff in daily improvement and fosters sustainability of improvements in everyday work; 572 frontline leaders and physicians were trained this fiscal year. These leaders are now focused on integrating their Lean learning into daily work practices.

2. **Continuous Daily Improvement** accounts for a large portion of the organization’s Lean work and includes 42 Lean projects across VCH this year. As an example, the People First Workplace initiative translated into a $2.3 million bottom-line savings in Long Term Disability and WorkSafeBC costs.
3 **Strategy Deployment** provides management with a structured and two-way (top-down and bottom-up) method to focus on the organization’s critical goals. This component helps to identify the most significant improvement opportunities and engages all staff in working toward the same goals by enabling effective communication throughout the organization.

The VCH case study outlines the journey undertaken by the Birth Centre team at Richmond Hospital to embed Lean thinking and Lean management into daily practice as a way to ensure quality of care and efficiency. The case study details key improvements, including reducing the operating room turnaround time by 138%, increasing the percentage of Caesarean births done in the birth centre (where it is most appropriate) by 185%, and improving the *Code Pink* response time by 40%. Further, the length of stay for Caesarean section births at the centre has improved to 56.83 hours, compared to the provincial average of 72 hours.

**Interior Health (IH)**

IH continues to move forward in its Lean journey, aligning Lean to their organizational strategy by focusing on a service line model. The Lean Promotion Office develops standard processes, resources and education to support Lean work in the organization. The primary goal of the office is to advise, coach, and facilitate effective Lean work across IH.

Projects coordinated by the Lean Promotion Office have been focused within two specific service lines: frail elderly activation, and hips and knees surgery. In addition, the Interior Health Quality, Risk and Accreditation Department also supported several Lean projects.

For its case study, Interior Health selected the work they have undertaken on improving the time from the patient discharge order to patient discharge in the inpatient surgical unit of the Kootenay Boundary Regional Hospital. The unit provides care for patients undergoing orthopaedic and general surgeries. Discharge was being delayed by poor communication between staff, patients, and families, and confusion around staff roles in the discharge process.

As a result of the Lean event, a number of communication tools were introduced resulting in a 17% decrease in the time to discharge from approval at ninety days post event and 20% fewer quality defects in documentation received by the unit. Further, productivity gains realised from the event meant that nurses were able to redirect the time saved to direct patient care and additional teaching activities.
**Vancouver Island Health Authority (VIHA)**

VIHA's Lean program has expanded from localized program improvements to projects strategically aligned to organizational goals. Lean is also now recognized as VIHA's main process improvement tool. RPIWs which have been identified by leadership to help support the strategic goals of the organization now encompass half of the Lean events undertaken at VIHA.

VIHA is increasing resource capacity in the Lean program, as well as general Lean knowledge among health authority staff, through increased Lean education opportunities. Successes are being amplified through ongoing partnerships with Provincial Health Services Authority on Lean education and Impact BC on Patient Journey Mapping.

VIHA's case study focuses on the work being done at the mood disorders clinic in the patient care centre at the Royal Jubilee Hospital to improve the discharge process from inpatient units to community services.

The event led to a pull system being implemented whereby the nursing coordinator in charge of temporary alternate level care (ALC) beds enables clients to move to temporary housing while awaiting an appropriate Mental Health and Addictions Services (MHAS) home. This change reduced lead time for transfer to ALC by two to three days. Guidelines regarding response times to acute care referrals by community support services were also implemented by the acute care team (ACT) with good effect: the response times to referrals by the ACT have improved significantly and they are now completed within 72 hours, as opposed to four to seven days.

**Northern Health (NH)**

Northern Health’s Lean implementation strategy involves employing champions across the organization to support Northern Health’s goals to measurably improve staff and physician engagement and to establish a culture of continuous quality improvement. To date, over 60 staff and executive have completed or are completing Lean certification training. In 2011/2012, 10 Lean projects were completed, and an additional six were initiated. The projects were undertaken across three different Northern Health sites, and included participation by more than 78 staff and physicians. Northern Health has also implemented a plan that aligns Lean projects with the organizational strategy.

The case study highlighted by Northern Health involved initiatives at the Dawson Creek and District Hospital (DCDH) operating room (OR). DCDH is a full service community hospital for Dawson Creek and the surrounding communities, and is the northeast’s orthopaedic trauma centre. DCDH was an opportune site for Lean initiatives because of historic issues in the OR with staffing coverage and teamwork.
The objective of the project was to apply Lean methodology to the DCDH operating rooms and surgical services to help identify improvement opportunities, increase capacity and generate staff engagement in sustainable process improvement. The hospital OR culture has shifted towards continuous improvement, demonstrated by the fact that OR staff and physicians are already planning future Lean events, including an orthopaedics wheel in/wheel out project.

**Fraser Health (FH)**

Lean thinking continues to be used to improve care and service in Fraser Health (FH). FH clinical programs, support areas, and business areas are actively pursuing over 750 improvements using a variety of quality improvement methods across the organization within the Strategic Imperatives framework of Capacity, Quality and Safety, Integration, Progressive Partnerships, Research and Academic Development, and Great Workplaces. Approximately 200 of these improvements are focused on waste reduction — a key Lean principle.

The case study selected by Fraser Health highlights a quality improvement project undertaken in the Chronic Pain Clinic at the Jim Pattison Outpatient Care and Surgery Centre in Surrey. The Clinic reduced the waitlist and improved access for new patients — increasing the number of appointments to an average of 26.2 patients per week, a 285% increase from the 6.8 new patients taken in prior to the improvement.

**In Summary**

This report outlines six case studies which demonstrate how Lean methods have been used successfully to improve the quality of care and efficiency in health authorities. It also examines how the implementation of Lean is evolving over time within health authorities, with many health authorities aligning their Lean efforts with their organizational goals.

It was a year of momentum building in the use of Lean across the province. In 2011/12, approximately 100 events were held across the province, in over 35 different health care facilities, resulting in improved patient experience, quality of care, access to services, and efficiency. Both PHSA and VCH are using Lean management to strategically deploy and embed Lean methods within their organizations. Interior Health continues to align Lean to their organizational strategy by focusing on a service line model. Lean is now recognized as VIHA’s main process improvement tool, and their Lean program has expanded from localized improvements to projects strategically aligned to their organization’s goals. Staff and executive training and Lean activity continue to grow in Northern Health, while Lean, depending on the objective, remains one of many improvement methods utilized in Fraser Health.
In terms of investing in successful deployment of Lean, the health authorities have focused on building internal capacity — over 2,000 health sector staff received Lean training, and more than 200 staff were trained as Lean facilitators in 2011/12, supporting the overarching objective of embedding a culture of continuous improvement in health authorities.

The continued spread of Lean across the province, increase in trained staff, focus on aligning Lean projects with organizational objectives, and implementation of Lean management methods in two health authorities demonstrate the evolution and continuing success of Lean in BC’s health system.

A. The Evolution of Lean in the Health Authorities

British Columbia’s six health authorities are committed to implementing Lean across the province’s health care sector through the Ministry of Health’s Innovation and Change Agenda. The agenda is a comprehensive plan comprised of strategic actions (Key Result Areas or KRAs) for achieving the Ministry’s vision of “a sustainable health system that supports people to stay healthy, and when they are sick, provides high quality publicly funded health care services that meet their needs.” KRA 6 focuses on using Lean methods to reduce waste and increase value in the health care sector.

In November 2010, Leadership Council decided to support the use of Lean within the health authorities as a process improvement tool, while allowing health authorities the latitude to determine where along the Lean spectrum (from tool to management philosophy) to position their Lean initiatives. Within the pages of the 2010/2011 Lean in British Columbia’s Health Sector annual report, the health authorities each provided an overview of how Lean activities were organized and implemented within their organizations.

Fiscal 2010/11 was a year in which the Provincial Lean Network worked on building greater awareness of Lean and its benefits, promoted its use in health authorities, and created the infrastructure necessary to support the successful deployment of Lean across the province. This report outlines the progress that has been made since then by providing new case studies for 2011/12 which illustrate how Lean methods have been used to improve the quality of care and efficiency within the province’s health sector.

The report also examines how the implementation of Lean has evolved over time within health authorities, with almost all health authorities now focusing their Lean efforts towards strategic deployment of Lean to align with their organizational goals. In many ways, fiscal 2011/12 was a year of momentum building in the use of Lean across the province. Both Provincial Health Services Authority (PHSA) and Vancouver Coastal Health (VCH) are using Lean Management systems to strategically deploy and embed Lean methods within their organizations. Interior Health (IH) continues to move forward in its Lean journey, aligning Lean to its organizational strategy by focusing on a service line model. Further, Lean is now recognized as Vancouver
Island Health Authority (VIHA)’s main process improvement tool and VIHA’s Lean program has expanded from localized program improvements to projects strategically aligned to its organizational goals. Staff and executive training and Lean activity continue to grow in Northern Health, while Lean remains one method among a whole host of continuous improvement activities used by Fraser Health.

By assessing the current state of Lean within each organization, the province can better understand where opportunities exist to support Lean program development within health authorities. More detailed information on the approach of each health authority is provided below.

In 2011/12, approximately 100 events were held across the province, in over 35 different health care facilities, resulting in improved patient experience, quality of care, access to services, and efficiency. The continued spread of Lean across the province, increase in trained staff, focus on aligning Lean projects with organizational objectives and strategies, and implementation of Lean management methods demonstrate the development and continuing success of Lean in BC’s health system.

**Provincial Health Services Authority**

Provincial Health Services Authority (PHSA) is continuing to implement Lean methods as a basis for continuous improvement. In fiscal year 2011/12, work was completed in 13 value streams across the organization, which included a total of 56 Rapid Process Improvement Workshops (RPIW/kaizen events) and 37 5S events.

PHSA is also using Lean in the design for the new BC Children’s and BC Women’s Hospital. In 2011/12, six Integrated Facility Design (IFD) events were held. The first one established guiding principles. Two of the events addressed the conceptual design and three of the events provided the functional design for three of the seven floors of the new acute care center. Lean hospital design is an approach in which one design development team is established comprised of the all user groups, patients and families, architects and designers, and project team including lean practitioners. The expertise of all parties is integrated simultaneously into the design process using extensive quantitative and qualitative data analysis, applying lean principles, and simulations for testing service flows. The result of this approach is that form follows function. In other words, the shape and layout of the building is based primarily on its intended purpose.

In addition to using Lean to improve service delivery and quality of care, PHSA has begun using Lean Management practices throughout the organization. By implementing this tool, leaders will be able to effectively manage their areas by standardizing their work day, increasing time spent on the front-line coaching, and supporting staff in sustaining improvements and solving problems in real-time. The first Daily Management system has been successfully trialed by the BC Cancer Agency, Vancouver Center, and includes the use of a Daily Management Board where clinic supervisors work to engage the front line staff in daily huddles to discuss performance in relation to daily operational metrics, solve problems at the source, assign accountability and follow up on action items.
Highlights of PHSA’s Lean events this year include:

- BC Bedline was able to reorganize and streamline their transfer forms, eliminating 152 unnecessary documents and reducing case management errors.

- In BC Children’s Hospital, delays experienced in operating rooms’ first cases were reduced from 90% to 65%, which resulted in improved quality of service to patients and families.

- By standardizing tools and processes in BC Women’s Neonatal Intensive Care Unit, the number of babies that remained skin to skin with their mothers within their first 24 hours of life increased from 30% to 63%, contributing to a healthy maternal milk supply used to feed the baby. Mother’s breast milk is best for growth and development of the premature baby, therefore babies should ideally be breastfeeding or given breast milk through bottle feeding before discharge.

**Vancouver Coastal Health**

Currently in the sixth year of its Lean journey, during fiscal 2011/2012 Vancouver Coastal Health (VCH) focused its Lean work on three strategies that will embed Lean culture and sustain continuous improvements into the organization.

*Lean Management* is an approach that engages frontline staff in daily improvement. To embed this into the organizational culture, 572 organizational leaders were trained in fiscal year 2011/2012, including some frontline leaders and physicians. These staff are now focused on integrating their Lean learning into daily practice.

*Continuous Daily Improvement* accounts for a large portion of the organization’s Lean work and includes a variety of Lean events — this included 42 Lean projects across three communities of care in fiscal year 2011/12. These events have helped the units achieve quality and efficiency improvements. For example, a standard regional system for inter-hospital transfers of acute mental health and addiction patients was established across six different hospitals, allowing acute patients to receive faster care. In terms of improved efficiency, the ‘People First’ workplace initiative translated into a $2.3 million bottom-line savings in Long Term Disability and WorkSafeBC costs.

In addition to these front-line activities, *Strategy Deployment* provides management with a structured two-way (top-down and bottom-up) method to focus on the organization’s critical goals. This component helps to identify the most significant improvement opportunities and engages all staff in working toward the same goals by enabling effective communication throughout the organization.
Highlights of VCH’s Lean events this year include:

» Vancouver General Hospital significantly improved its cardiac catheterization processes, resulting in 61 minutes of staff time saved per patient, and a 50% decrease in patient time spent waiting in a bed pre-procedure.

» Within VCH’s caesarean birth pathway, the Richmond Hospital decreased OR turnaround time from 3.5h to 1.5h while improving the quality of care for mothers and babies.

» By implementing Lean within the Medical Imaging department of Peace Arch Hospital, VCH is saving over $100,000 a year through efficiencies which have enabled them to increase the number of scans the department completes.

**Interior Health**

Interior Health continues to move forward in its Lean journey this year, aligning Lean to its organizational strategy by focusing on a service line model.

The Lean Promotion Office in Interior Health continues its work developing standard processes, resources and education to support Lean work in the organization. The primary goal of the office is to advise, coach, and facilitate effective Lean work across the organization. Projects coordinated by the Lean Promotion Office have, until now, been focused within two specific service lines: frail elderly activation, and hips and knees surgery. In addition, the Interior Health Quality, Risk and Accreditation Department also supported several Lean projects.

In fiscal 2011/2012, the Lean Promotion Office supported several additional priority strategic initiatives in conjunction with larger corporate initiatives, which were aligned with organizational priorities and could have a substantial impact on the organization. An example was the staffing services project, within which the Lean work focused on improving the process of, communication about, and successful completion of filling vacant shifts. Another such project used Lean to support the redesign of a small rural emergency department. By using Lean principles and tools, the facility design team was able to optimize the new space for flow and ensure high quality services could be provided efficiently.

As capacity grows and the knowledge of the power of Lean spreads, the organizational demand for Lean and Lean education is increasing within Interior Health at a rapid pace, and it is anticipated this demand will continue to grow in the coming years.
Highlights of IH’s Lean events this year include:

» The hip and knee patient operating room (OR) booking process at Kootenay Boundary Regional Hospital decreased the lead time for OR bookings by 30%.

» Royal Inland Hospital’s housekeeping and nursing staff worked together to reduce steps and waiting time, allowing beds to be clean and available for patients 31% faster in the Frail Elderly Activation Service Line.

» In the Diagnostic Imaging Services Line, the time for notifying elective computerized tomography (CT) outpatients of procedure appointments decreased from five months to three days.

**Vancouver Island Health Authority**

Lean is now recognized as Vancouver Island Health Authority (VIHA)’s main process improvement tool. Over the past few years, VIHA’s Lean program has expanded from localized program improvements to projects strategically aligned to their organizational goals. RPIWs which have been identified by leadership to help support the strategic goals of the organization now encompass half of the Lean events undertaken at VIHA. These events occur within departments and programs which have received Lean training, and have dedicated resources to focus on improving a value stream.

VIHA is increasing resource capacity in the Lean program, as well as general Lean knowledge amongst health authority staff, through increased Lean education opportunities. Successes are being amplified through ongoing partnerships with the Provincial Health Services Authority on Lean education, and Impact BC on Patient Journey Mapping. Incorporating patient journey mapping into the toolkit offered to Lean projects has helped support and galvanize teams to reduce and eliminate waste from the patient’s perspective, as patient journey mapping provides a helpful lens through which to focus on how care is received.

Highlights of VIHA’s Lean events this year include:

» Improvements to VIHA’s job description and classification grievance process reduced the backlog of 203 outstanding classification grievances, reducing VIHA’s liability by over $1 million.

» VIHA was able to increase the efficiency of the Campbell River office administration staffing processes, resulting in a savings of 0.9 FTE, and allowing reinvestment of the time saved into customer-focused services.

» Modifications made to Heart Health inventory and accounting reconciliation processes reduced the variance over budget allowances by $897,260 (47.7% reduction) and improved inventory accuracy to 100% from 50%.
**Northern Health**

Northern Health’s (NH) Lean implementation strategy is based on employing a wide group of champions across the organization. To date, over 60 staff and executive have completed or are completing Lean certification training. In the 2011/2012 fiscal year, 10 Lean projects were completed, and an additional six were initiated. The projects were undertaken across three different Northern Health sites, and included participation by more than 78 staff and physicians.

The Lean program has developed substantially this year within Northern Health, and there has been a considerable cultural shift toward quality improvement as a result of program promotion, Lean training, execution of Lean projects, and the creation of knowledge dissemination tools such as the Quality and Process Improvement intranet, a Lean community of practice, and a Lean conference which was held in March 2012. Northern Health has also implemented a plan which strategically aligns Lean projects with the organizational strategy. Lean directly supports the organization’s goals to measurably improve staff and physician engagement and to establish a culture of continuous quality improvement. Northern Health will continue to integrate and unify all quality improvement initiatives and activities so that progress can be effectively leveraged across the system.

Highlights of NH’s Lean events this year include:

» Mental Health and Addictions Community Services in Quesnel initiated a same day intake process, reducing delay in initial contact with clients by three to four weeks. Approximately 25% of people requesting service require one to one services, with the remainder being referred to other community resources, and/or provided information to aid with self care.

» Prince Rupert Hospital laundry services transitioned from a fold laundry system to a no fold laundry system. Under the new system, staff spent a total of 30 minutes moving laundry from the dryer and onto the carts. The old system took 196 minutes to complete. In addition to the 85% efficiency gain, there was a reduction in staff overtime, a higher level of workplace satisfaction reported from staff, and a savings of $15,000 in capital equipment replacement costs.

**Fraser Health**

Lean thinking continues to be used to improve care and service processes in Fraser Health (FH). Fraser Health clinical programs, support areas, and business areas are actively pursuing over 750 improvements using a variety of quality improvement methods across the organization, targeted within the Strategic Imperatives framework of Capacity, Quality and Safety, Integration, Progressive Partnerships, Research and Academic Development, and Great Workplaces. Approximately 200 of these improvements are focused on waste reduction, which is a key principle of Lean.
Highlights of FH’s improvement initiatives this year include:

- Centralizing the Interventional Cardiology services management process, FH was able to reduce wait times for both inpatient (11%) and outpatient (21%) procedures.

- FH’s Chronic Pain clinic significantly increased both its number of new patients (290%) and clinical visits (30%) after streamlining intake and wait-listing processes.

In Summary

Although each is at a different stage of evolution in Lean deployment, health authorities have demonstrated that Lean is improving the ability of health care providers to be effective in their work, and to provide high quality treatment in a system that is responsive to the needs of patients.

There are some commonalities across the health authorities in their application of Lean, including that improvement initiatives have already demonstrated tangible benefits in terms of quality of care, safety, and value for money. Examples of this are found within this report, including in-depth case studies from each health authority (see page 16), and event highlights which offer a window into the diverse array of areas within the health system in which Lean can make a measurable impact. Not only have these examples validated the Innovation and Change Agenda’s focus on Lean and the work of the Provincial Lean Network over the past two years (learning from each others’ successes to support and foster continuous improvement), but health authorities also report an increased use of Lean, a shift toward strategic deployment and, in some cases, an evolution toward Lean management.

This year, the province has begun to better understand and measure how Lean is spreading across the organizations. The high number of trained employees (over 2000) and facilitators (over 200) in health authorities is a strong indicator that they are addressing the need for the internal capacity that is crucial for organizations as their Lean deployment matures and progresses.

---

2 The 2011/2012 fiscal year is the first year health authorities have reported their training data, and as such there is no comparison to previous years included in these figures.

3 Trained employees were defined as staff that have either participated in a Lean event and received training through that process, or attended at least one day of Lean-specific training. Facilitators are defined as staff who has received training at least equivalent to a green belt program or higher. There may be some variation across the health authorities in terms of interpretation of these definitions.
The increase in trained staff, focus on strategically aligning Lean projects with organizational strategy, and implementation of Lean management methods all demonstrate the development and continuing success of Lean in BC’s health system.

4 The numbers reported are solely for Lean training. It should be noted that health authorities also use a variety of alternative quality and process improvement techniques to achieve their objectives.
B. Case Studies Highlighting Lean Implementation

Health authorities are applying Lean across various service lines and contexts, and each story reflects the adaptability and applicability of Lean to help instigate improvements in quality and efficiency in the health system. Below are in-depth case studies of successful Lean events from each health authority.

CASE STUDY #1: Provincial Health Services Authority

Increase the number of patients receiving pre-admission care prior to child psychiatry inpatient treatment

Impetus for Lean:

The Child Psychiatry Inpatient Unit is a 10 bed unit in the British Columbia Mental Health and Addictions Services Agency (BCMHAS) of the Provincial Health Services Authority (PHSA), which serves the needs of children up to 12 years old. In the Child Psychiatry Inpatient Unit, the average referral to admission lead time (wait) was 65 days. According to patients, an ideal lead time from referral to admission would be three to four weeks. The two objectives of this Lean project included: reducing the percentage of non-value added lead time; and increasing the levels of pre-care provided to the patients and family prior to admission.

Objectives:

The objective of the Rapid Process Improvement Workshop (RPIW) was to provide better pre-admission care for the patients and families referred to the Child Psychiatry Inpatient Unit. Pre-workshop, an average of only 18% of patients and families received any pre-admission care; these were typically patients living in the lower mainland of Vancouver. Data showed that due to an existing dual admission process, non-local patients were being admitted faster than local patients because pre-care was being offered to local patients as a stop-gap to full admission. This dual process was causing unnecessary delays for some of the local patients and not providing pre-care for the non-local patients.

The aim of this Lean event was to increase the percentage of patients (and their families) receiving pre-admission care to 100%, and to develop one simple process that served every patient and family equally, reducing all patients' leadtime to an average of 42 days.
Implementation of Lean:

RPIWs are the primary Lean method used by PHSA; they include three weeks of preparation and current state data gathering, followed by a five day event to implement solutions. The project team is usually made up of trained Lean leaders, an imPROVE\textsuperscript{5} facilitator, content experts, participants and family representatives. The final process that is developed is formalized into Standard Work for all team members to follow.

FIGURE 2: FORM IMPROVEMENTS

Results:

The referral form was revised to reduce defects (missing information), such as previous testing results from schools or community treatment teams. These defects were causing delays in the processing of referrals and increasing lead time for patient entry.

A pre-established routine and set time for the presentation of new cases was developed to improve communication between the referral source (Regional Mental Health teams) and the BCMHAS Child Inpatient Unit intake team. Each patient file is now presented for 10 minutes to establish that all the information is present and correct, and determine if the patient is ready for admission.

Typically, information on topics such as school testing, problems at school or at home, and interactions with family members is requested from patients’ families and teachers. Parent and teacher information flow was improved by combining and eliminating unnecessary information requests. This increased the likelihood of the documents being completed and returned prior to the admission, enabling the correct setup of a team for the pre-admission meetings.

\textsuperscript{5} imPROVE is PHSA’s Lean program which focuses on value for patients and empowering staff to reduce waste and improve patient safety, quality and outcomes.
The most significant change to the process was the establishment of a new standard for pre-care: a two-hour full team meeting with every patient and family. The primary tool used to enable this change was the tele-psychiatry system; tele-health allows full team meetings to be held remotely with patients, families and the referring team within regional Mental Health offices.

Results for the RPIW primary measure of the percentage of patients (and families) receiving pre-admission care rose from an average of 18% to 100% for the six months between October 2011 and April 2012, as can be seen in the illustration of process compliance (Figure 3):

**FIGURE 3: PATIENTS RECEIVING PRE-ADMISSION CARE**

As a result of the improved process and increased number of patients and families receiving the pre-care program, there has also been a dramatic reduction in the referral to admission leadtime from the average of 65 days (for fiscal year 2011/12) to an average of 28 days, a 22% improvement beyond the target of 42 days.

**Next Steps:**

As of July 2012, 100% of patients were receiving the appropriate pre-admission care, and as such no further action steps are required for sustaining the gains within the Child Psychiatry Inpatient Unit, however, there are opportunities to spread improvements to other BCMHAS inpatient units, such as the Adolescent (13-18 years old) Psychiatry Unit.
CASE STUDY #2: Vancouver Coastal Health

Richmond Hospital Birth Centre — Caesarean birth quality improvement initiative

**Impetus for Lean:**

The Richmond Hospital Birth Centre (Birth Centre) is comprised of 15 single room maternity care beds, one operating room (OR), a two-bay post anaesthetic care area, a three-bay triage and assessment room, and six neonatal intensive care (NICU) beds. Birth centre activity has increased by 35% to 1600 births/year and outpatient activities have doubled since 2006/07 (see Figure 4 below).

**FIGURE 4: TOTAL BIRTHS AND OUTPATIENT VISITS**

In 2010, the Birth Centre team embarked on a journey to embed Lean thinking and Lean Management into daily practice, as a way to ensure quality and efficiency. As a part of this ongoing continuous improvement initiative, this project focused on increasing skin to skin time for mothers and babies in the first hour after caesarean section births (C-births), by increasing the use of the Birth Centre OR for C-births as opposed to the Main OR. The Birth Centre was already doing well in keeping mothers and babies together after vaginal births, however, it was a challenge to keep them together after C-births, particularly C-births that did not occur in the Birth Centre OR.
**Objectives:**

- Develop standard work, roles and responsibilities for Code Pink\(^6\) including standard language to communicate urgency level, a communication algorithm, and standard work for Code Pink preparation.

- Initiating breastfeeding within the first hour after birth to align with the Baby Friendly Hospital Initiative breastfeeding guidelines (WHO and UNICEF). This can be accomplished by promoting skin to skin in the OR and keeping the family together in the recovery area.

- Reduce the Birth Centre OR turnaround time (from the time the patient leaves the room to ready state for the next patient) from a current state of 3.5 hours to 1.5 hours, and increase Birth Centre OR utilization by 50% (from 27% of all C-births to 45%).

- Embed Lean Management and Lean thinking into the Birth Centre through utilization of visual boards and tools, education for medical and hospital staff, and by involving staff in process and continuous improvement activities.

**Lean events:**

Monthly two-hour workshops were held with the multidisciplinary team, as a strategy for engagement and collaborative planning. The team developed a standard communication algorithm between the obstetrician and anaesthesiologist. One of the workshops included a mock Code Pink session to test processes and further develop roles and responsibilities.

**FIGURE 5: MOCK CODE PINK CONDUCTED TO TEST THE PROCESS**

---

\(^6\) Code Pink is a hospital term that includes Cord Prolapse with abnormal Fetal Heart Rate; severe APH with abnormal fetal heart rate; uterine rupture with abnormal fetal heart rate; abnormal fetal heart rate requiring immediate delivery; admission of imminent delivery of breach presentation or twin pregnancy.
A pregnant woman participated as the ‘patient’ during the mock exercise, which provided the voice of the patient in addition to data gathered from focus groups. One key improvement which was developed from the mock experience was to have standard work for each role in a Code Pink displayed on neck lanyards.

**FIGURE 6: CODE PINK STANDARD WORK EXAMPLES FOR PHYSICIANS AND STAFF**

<table>
<thead>
<tr>
<th>OB (co-pilot)</th>
<th>Anaesthesiologist (co-pilot)</th>
<th>Paediatrician</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Provides direction to the team</td>
<td>- Greets pt</td>
<td>- Prep for baby resuscitation</td>
</tr>
<tr>
<td>- Verbal consent &amp; explanation</td>
<td>- who can get the meds the quickest</td>
<td>- Double check ICC</td>
</tr>
<tr>
<td>- Primary RN gives report</td>
<td>- Check equipment</td>
<td>- Primary RN gives report</td>
</tr>
<tr>
<td>- Site mark?</td>
<td>- Receive report from OB</td>
<td></td>
</tr>
</tbody>
</table>

Lean Management was introduced to embed and sustain a culture of safety, quality and efficiency in the Birth Centre (Figures 7 – 9). This has been accomplished through a variety of strategies, including:

» Implementation of Leader Standard Work which has increased efficiency and enhanced communication flow in day to day operations.

» Initiation of daily operational huddles at visual boards (which display problems that staff have identified and posted). This has been successful in engaging front line staff in daily problem solving. Over 38 continuous improvement ideas have been suggested and implemented by staff, physicians, and midwives during the first three months following Lean implementation.

» Initiation of daily ‘cuddles’, which are short educational huddles with staff related to a priority topic or a topic of their choice. The cuddles have been successful in engaging front line staff in learning about new and existing workflow processes.
» Improvement Boards have been implemented to provide an engagement opportunity, visual tracking/trending, and action planning on key improvement areas where the unit is seeking a significant improvement.

» Standard Work Observation Boards have been implemented to provide an ongoing visual approach to auditing and refining current standards of practice.

FIGURE 7: BIRTH CENTRE DAILY IMPROVEMENT BOARD AND DAILY HUDDLE WITH THE MANAGER

FIGURE 8: BREAKTHROUGH IMPROVEMENT BOARD (FOR STRATEGY DEPLOYMENT)
Results:

Since implementing Lean, the Birth Centre has met or exceeded its targets for quality and efficiency. Examples of the quality and efficiency improvements achieved in fiscal year 2011/12 are summarized in Figures 4-11. One of the success stories that staff share with pride refers to a new unit record of nine minutes for a Code Pink response time (from the time the code is called until time of birth).

A key objective within this initiative was to keep mothers and babies together, which is better accomplished in the Birth Centre OR than the Main OR. Through this initiative, 75% of scheduled and non-scheduled C-births have been shifted from the Main OR to the BC OR. This amounts to a 117% improvement, far exceeding the objective of 50% improvement. Additionally, the Birth Centre OR’s turnaround time was reduced significantly, from 3.5 hours to 1.5 hours, enhancing the ability to reach the ultimate goal of achieving 100% of C-births occurring in the Birth Centre OR.

Implementation of Lean in the Birth Centre has also led to a more intentional focus on metrics that drive both quality outcomes and efficiency. As an example, the provincial postpartum length of stay average for 2011/12 is 40.0 hours for vaginal births, and 72 hours for C-births.7 In comparison, the postpartum length of stay average at Richmond Hospital for 2011/12 is 35.2 hours for vaginal births and 56.83 hours for C-births.

---

source: Perinatal Services BC
Some physicians have expressed that they are amazed with the number of positive changes that have taken place in the last year. They feel there is an increased awareness of how everyone contributes to patient care, thereby resulting in more effective teamwork.

“To be able to have 15 minutes to make a difference to improvement to the ward was great, but the best thing was seeing the capacity we have within our frontline staff to make changes happen. This is the power I see LEAN harnessing that I have never seen harnessed before.”

“I have been blown away by the improvements during the past year.”

“I enjoy working in a multidisciplinary, interactive team. The subject connects me with the project.”

One of the immediate outcomes from the Lean work in the Birth Centre included a subsequent 5S (Sort, Simplify, Sweep, Standardize, Self Discipline) event of the Infant Care Centres (ICC). The result of the 5S is that nurses are now spending much less time retrieving supplies. The inventory is updated consistently, preventing the accumulation of expired items or backlog of orders (Figure 11).

**FIGURE 10: OUTCOMES MEASURED AT FISCAL YEAR END 2011/2012**

<table>
<thead>
<tr>
<th>Measures</th>
<th>Baseline (Period 1, FY2011/12)</th>
<th>Target</th>
<th>Outcome (Period 13, FY2011/12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Centre OR Turnaround Time (TAT)</td>
<td>3.5 h</td>
<td>1.75 h</td>
<td>1.5 h (↓ 138%)</td>
</tr>
<tr>
<td>% of Caesarean Births done in Birth Centre OR</td>
<td>27%</td>
<td>45%</td>
<td>75% (↑ 185%)</td>
</tr>
<tr>
<td>Code Pink Response Time (Decision to Baby Born)</td>
<td>~30 minutes</td>
<td>n/a</td>
<td>18 minutes* (↓ 40%)</td>
</tr>
<tr>
<td>% of Caesarean Birth Patients in Birth Centre Recovery Room</td>
<td>n/a (no patients as this is a new practice)</td>
<td>80%</td>
<td>18%*</td>
</tr>
<tr>
<td>% of Skin to Skin in OR</td>
<td>New practice (not done before)</td>
<td>100%</td>
<td>Currently auditing</td>
</tr>
</tbody>
</table>

*30 day data
**Next Steps:**

Sustainment of the improvements achieved through the application of Lean is the largest challenge for the Birth Centre. The leadership team has identified Lean Management and Strategy Deployment as key factors for managing increased activity, maintaining momentum, and achieving short and long term targets. The frontline and medical staff are learning to embrace and use Lean thinking and tools to support and structure their daily work and facilitate continuous improvement. A total of 45 Birth Centre staff have been trained in the basics of Lean in the past year, including four physicians.

The Birth Centre plans to continue their Lean journey by addressing vaginal birth, ante partum, and postpartum during the next improvement events, which will be completed by the end of March 2013. Work is in progress on a number of smaller projects such as OR booking processes, surge activity challenges, and neonatal resuscitation that require the involvement of the multidisciplinary team. The Birth Centre leadership team is deeply committed to continuing on its Lean journey to improve care for patients and their families and create a quality work environment for the multidisciplinary team.
**CASE STUDY #3: Interior Health**

**Interior Health Hips & Knees service line: discharge order to patient discharge**

*Impetus for Lean:*

The Inpatient Surgical Unit at Kootenay Boundary Regional Hospital is a 20 bed surgical unit, providing care for patients undergoing orthopaedic and general surgeries. The interdisciplinary care team for the hip and knee service line consists of Registered Nurses (RNs) and Licensed Practical Nurses (LPNs), as well as care providers from the physiotherapy and occupational therapy departments.

The discharge process begins at the time the patient is admitted to the surgical ward. Formal discharge takes place when physiotherapy and occupational therapy have determined patient readiness, and the physician has written discharge orders. Actual discharge is delayed, however, by a number of barriers including poor communication between staff and patients and their families, and confusion about staff roles in the discharge process.

*Objective:*

The objective of this Lean event was to improve processes and workflow and achieve a smoother, more effective and timely discharge process for hip and knee joint replacement patients. Using Lean tools and principles, the aim was to decrease the overall lead time (time from beginning to end of the discharge process).

*Implementation of Lean:*

All events for this project were carried out using the Rapid Process Improvement Workshop (RPIW) method, which is deployed when trying to make rapid changes to a complex process. During this event, Lean tools and principles such as 5S, Set-Up Reduction, Mistake Proofing, Continuous Flow and Standard Work were used to achieve targets.

*Results:*

During the RPIW, several types of waste, including quality defects, time, and motion, were identified and eliminated through application of Lean principles such as Mistake Proofing, Continuous Flow and Standard Work.

In addition, a number of communications tools were developed. This included a standard checklist for surgical patients; a whiteboard in the nurse’s station to identify the stage of discharge readiness; and a whiteboard was put into the patient’s room as a way of communicating anticipated day of discharge to allow the family to plan more efficiently.
Various tools were developed to aid discharge, including a checklist and standard script for facilitating communication to family and completion of discharge requirements by the Unit Clerk, discharge packages were developed to minimize the seeking and gathering activities of staff when preparing to discharge a patient, and a call bell system has been implemented to alert nursing staff when patients are ready for discharge, which now triggers the final steps of the discharge process.

As a result of the Lean event, there was a 17% decrease in the time to discharge measured ninety days post event. A decision was made to reallocate some of the time saved to provide additional teaching activities to patients prior to discharge. In addition, there are 20% less quality defects in documentation received by the unit, with more standard documentation being completed by the time of discharge. These results are illustrated by the following graphs:

**FIGURES 12: LEAD TIME RESULTS**

---

*LEAD TIME RESULTS*

Hip/Knee Patient Discharge RPIW Apr 16-20/12

Boundaries: From time discharge is approved until patient leaves the department

![Bar chart showing lead time results with baseline and 90-day results.](chart.png)
Next Steps:

An action plan was developed to ensure outstanding recommendations were implemented, and the staff developed a communication plan to ensure all other staff were educated in the new process. Audits were scheduled to be carried out by the staff under the coaching and guidance of the assigned Lean Implementation Specialist. In addition, a visibility wall was developed to assist staff in continuing with their improvement journey and to promote implementation of “every-day Lean ideas.” Coaching of front-line staff in the principles of visual and daily management is an ongoing strategy to ensure Lean is embedded into organizational culture.
CASE STUDY #4: Vancouver Island Health Authority

Vancouver Island Health Authority mood disorders clinic process improvement

Impetus for Lean:

Vancouver Island Health Authority (VIHA)’s Mental Health and Addictions Services (MHAS) is committed to ensuring that acute care patients are able to receive the level and type of care that best meets their needs. Evidence from the Canadian Institute of Health Information, and data routinely collected within VIHA, suggests that opportunities may exist to improve the process of discharging patients from south island inpatient units to the community services. Therefore, the main goal of the project was to increase the efficiency of clinically appropriate transitions as identified by care providers.

The scope of this project was to follow patients through the inpatient unit (also known as 1S) at the Royal Jubilee Hospital patient care centre from admission through discharge to community/housing services.

Objective:

The objectives of the mood disorders clinic project were to:

» Improve patient and family experience;
» Decrease delays to discharge, improving patient flow;
» Decrease length of stay and enhance quality of care for psychiatric inpatients on 1S by reducing process impediments to timely care;
» Improve care transitions by improving communication; and
» Reduce non-value added work within the current process.

Implementation of Lean:

A charter for this work was created with the MHAS Director and a group of stakeholders which identified the scope, resources required and the authorization to proceed with a five day event. The event was kicked off by gathering the voice of the customer: three patients and their caregivers/support shared their experience of care in 1S through participation in a Patient Journey Mapping event which was facilitated by ImpactBC. The voice of the patient was then used to validate the current state mapping, and as a touchstone during the opportunity identification and prioritization that informed the future state map and implementation plan.
Leadership understood that moving this work forward would require significant effort and a dedicated project lead was provided for the first three months of implementation and has remained available part time as required to continue implementation and monitoring.

**Results:**

From the point of admission in 1S to the point of discharge, reliable communication and milestone planning were seen as the potential areas in which to improve quality. Figure 14 below represents the identified opportunities for improvement:

**FIGURE 14: IMPROVEMENT OPPORTUNITIES**

<table>
<thead>
<tr>
<th>3 Quick Wins</th>
<th>2 Activities</th>
<th>PDSAs</th>
<th>3 Long Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Communicate discharge information</td>
<td>1. Early identification and involvement of case manager</td>
<td>1. First available housing</td>
<td>1. First available housing</td>
</tr>
<tr>
<td>2. Transportation arrangements with housing services</td>
<td>2. Timely communication of Pathways referrals</td>
<td>2. Firm housing admission dates</td>
<td>2. Firm housing admission dates</td>
</tr>
<tr>
<td>3. ALC RN to contact 1S Unit Coordinator when an ALC bed is coming available</td>
<td>3. Timely and resource information provided to Patient/Family</td>
<td>3. Continuity of psychiatric care</td>
<td>3. Continuity of psychiatric care</td>
</tr>
</tbody>
</table>

With these improvements in mind, the team created a goal of reducing the average length of stay (ALOS) by three days. Although the ALOS on 1S has yet to decrease, there have been improvements in other areas.

For example, discharge has been streamlined. Planning now begins upon admission and is documented, and communication of discharge information within the inter-professional care team is being successfully implemented through the use of a discharge board and checklist. Areas identified as opportunities for further improvement include early notification of discharge to patients, and family and community resources.

A pull system has been implemented, and now the nursing coordinator in charge of temporary alternate level care (ALC) beds is pulling patients from 1S, enabling clients to move to temporary housing while awaiting an appropriate MHAS home. This change reduced lead time for transfer to ALC by two to three days.

Communication has been improved in a number of ways: case managers and psychiatrists are now identified and notified immediately if one of their patients is admitted; patient and family resources have been updated and are included in admission packages; the structured morning reports have been implemented and are providing better quality information to incoming staff; inter-professional team huddles have been implemented, and staff report that they find this huddle valuable for sharing updates to patient status and planning discharge.
Referral process improvements include: the referrals system was adapted to enable tracking of referrals by unit as opposed to program, and referral education was provided to RNs regarding the new process. A performance support tool was put in place to ensure that complete referral information is provided as the referral is made, eliminating the need for clarification and delays. Guidelines regarding response times to acute care referrals by community support services were implemented by the acute care team (ACT) with good effect: the response times to referrals by the ACT have improved significantly and they are now completed within 72 hours as opposed to four to seven days.

**Next Steps:**

The next steps for the 1S project are continued implementation of identified action items, PDSAs on items in progress, and monitoring of implemented items.

**CASE STUDY #5: Northern Health**

**Dawson Creek operating room Lean initiatives**

**Impetus for Lean:**

Dawson Creek and District Hospital is a full service community hospital that provides service to the city of Dawson Creek and the surrounding communities, and acts as the northeast’s orthopaedic trauma centre. There are two operating rooms but due to resource restrictions, only one operating room (OR) slate is run per day, utilizing the operating rooms on a rotational basis.

Dawson Creek was an opportune site for Lean initiatives because historically, issues in the OR with staffing coverage and teamwork caused friction between workers and management. Consequently, turnover was high and there were three OR nurses who were new to their roles. Below are some examples of feedback received through pre-event interviews with the OR staff and management:

- “Poor communication between central sterile services and OR resulting in multiple members of staff making phone calls for the same task.”
- “Patient surgery frequently cancelled to cope with overruns leading to poor patient experience and frustrated surgeons.”
- “Pick lists and instrument names not standardized.”
- “Lack of OR-trained staff.”
**Objectives:**

The objective of the project was to apply Lean methodology to the Dawson Creek operating rooms and surgical services to help identify improvement opportunities, increase capacity and generate staff engagement for sustainable process improvement.

**Implementation of Lean:**

The initiative was conducted in two distinct phases. Phase one consisted of the initial assessment and analysis of the current state of the surgical patient’s journey through the operating room. A high level value stream map was developed which charted the surgical patient’s journey from pre-operative assessment to discharge from post anaesthetic recovery, and identified opportunities for improvement. Phase two consisted of an analysis of the issues identified in the current state and execution of a Rapid Improvement Event (RIE/Kaizen Event).

A Gemba walk through the OR allowed the Lean facilitation team to meet with frontline staff and communicate the aim and structure of the upcoming Kaizen event. Following the Gemba walk, the team of OR nurses and managers, OR aides, administrative support staff and physicians convened for a value stream mapping (VSM) exercise to further evaluate the surgical patient’s journey.

It was agreed that the general disorganization of supplies, instruments and equipment storage was having a negative impact on efficiency within the OR. Subsequently, this issue was made top priority for a Kaizen event, especially because improvements could be achieved in a short time frame. Throughout the week of improvements, the OR staff stayed into the evening to discuss the day’s activities with the Lean facilitation team and to plan for the following day’s workload. This also gave staff members an opportunity to continue to contribute to the current state maps as the project progressed and revealed further process issues.

**Results:**

- Over 200lbs of obsolete equipment were removed from the OR. The items were “red tagged” during the 5S exercise and left in a staff lounge near the OR for staff to decide whether the equipment needed to be disposed of entirely or was required to be located somewhere else in the hospital.
- Excessive storage carts were removed to ensure that maximum floor space could be cleared for ease of access through the supplies area.
- New storage layouts for equipment, instruments and supplies were developed and a clear visual management system agreed upon to ensure that on-call staff can locate equipment and supplies rapidly.
Opportunities for data collection and further improvement projects were identified with staff members.

OR staff members have put themselves forward for formal Lean training and a schedule for this has been developed.

Staff from the OR and support services were engaged and had the opportunity to learn process improvement techniques and how to apply them in the workplace.

The health service administrator has continued the OR 5S and visual management work as part of his Lean Healthcare Green Belt project and is committed to providing an organized workplace for the OR staff.

This Lean project has been very successful as a tool for engaging staff and physicians in a continuous improvement mindset. Since the Kaizen event, the OR staff have already taken on many “just do its” and “low hanging fruit” projects, and have reorganized various surgical carts and the urology cart, reorganized the placement and labeling of supplies, reworked inventory sheets, organized supply carts for the OR theatres, and organized shelving and cupboard areas. The area has experienced a shift in culture, and is demonstrating a new orientation to continuous improvement - OR staff and physicians are already planning future Lean events, including an orthopedics wheel in/wheel out project, and further Lean training. Physician, front-line staff and management involvement has been instrumental to the project’s success.

**Next Steps:**

The 5S tool is being utilized in a continuous improvement cycle and thus many changes have continued to happen since the Kaizen event took place.

The set in order stage of the 5S project, which consisted mostly of reorganizing the supplies, will continue to evolve; similarly, standardizing the area is still ongoing — work is being done to create a storage template that can be used not only in the OR but also for medical supply areas throughout Dawson Creek and District Hospital. A Kanban system is currently being developed which incorporates a picture of the product and a bar code that can be scanned by the supply personnel and relayed by a hand held device to expedite the ordering process. This device and barcode system arrived on site at the end of May, 2012 and the 5S project was included in supply management’s roll out of this new technology.

The sustaining stage of the project has yet to occur. Planned improvements include: sign off sheets which will be used to determine a regular ordering rotation; and developing and implementing clear responsibilities for the replenishment of stock and for cleaning. The Lean team from the OR will continue to meet monthly to review how its processes are being maintained to determine if adjustments will be needed to ensure the processes put in place are continued.
CASE STUDY #6: Fraser Health

Improving access to the Chronic Pain Clinic at Jim Pattison Outpatient Care and Surgery Centre in Surrey

Impetus for Improvement:

Fraser Health’s (FH) case study describes a focussed operational improvement initiative that employed operations engineers working collaboratively with clinical staff to identify and implement innovative solutions that specifically improved access to care and the removal of waste in the system (a key principle of Lean). The Chronic Pain Clinic at the Jim Pattison Outpatient Care and Surgery Centre in Surrey provides chronic pain patients with two streams of pain management care — a community clinic which provides clinical assessment, education and support, and nerve block procedures which are outpatient surgeries. The clinic is supported by anaesthesiologists, a nurse practitioner, nurses, and allied health professionals. The clinical assessments are provided in exam rooms, while nerve block procedures (which require anaesthesia) are provided in procedure rooms.

The clinic organizes referrals according to four categories of priority.

1. ASAP referrals - cases which are generally advanced and require surgery (make up 14% of the demand).\(^8\)
2. Four week referrals (20% of the demand).
3. Three month referrals (55% of the demand).
4. Six month referrals (9% of the demand).

The remaining two percent are in the other category which may be undetermined or referred to other clinicians for consult. ASAP cases usually have already been assessed and are considered highest priority. Categories other than ASAP generally require assessment, are lower priority, and may be streamed into the various types of support offered by the clinic.

At the time that the improvement initiative was undertaken, the clinic had a waitlist of more than 820 patients, and the wait time for an initial appointment exceeded several months for lower priority patients. The average rate of referrals for January 2011 to July 2011 was 14.8 per week. The average rate of initial appointments (new patients) with physicians for January 2011 to October 2011\(^9\) was 6.8 appointments per week, and consequently the waitlist was constantly increasing.

---

\(^8\) Demand is the total number of referrals received by the clinic.

\(^9\) Two systems are used in the clinic — an online Community Wide Scheduling (CWS) system, which is provided corporately in Fraser Health, and a manual scheduling book. The difference in date ranges of the data is because the rate of referral was gathered by a manual count of paper referrals that exist in the waitlist of the clinic.
The intake rate\textsuperscript{10} varies seasonally, for example there was an increase in intake during the last month of summer in 2011 where on average the clinic saw 9 new patients per week from mid-August to the end of September. The demand also increased during that time period. For two sample weeks, the clinic received 34 and 38 new referrals. This was a significant increase compared to the average demand for 2011, which was 14.8.

The clinic’s capacity can accommodate the total amount of incoming ASAP referrals, and in general the wait time for this type of referral does not exceed two weeks. However, more than 80\% of the other categories of referrals had not been scheduled for their first visit as of October 2011 and therefore had been added to the waitlist.

Three issues with the clinic’s operations were identified: (1) the clinic’s increasing waitlist, (2) inefficient booking processes, and (3) lack of discharge criteria. During this improvement initiative, only the problems with the clinic’s waitlist were addressed. This problem can be summed up as:

The clinic receives more referrals in a week than the capacity available for new patient appointments, and therefore the waitlist is continually increasing.

The clinic had an appointment-slot schedule for each practitioner in an online Community Wide Scheduling (CWS) system, which determines the portion of time each of them dedicate to new, repeat or fluoroscopy\textsuperscript{11} appointments. The week’s schedule accommodates around 9 new patients per week in the clinic — this schedule is a good monitor of the capacity of the clinic for an ongoing basis. Because the clinic has a fixed number of new patient appointments, they were struggling to accommodate the increasing demand they were experiencing.

**Objective:**

Identify opportunities to reduce waitlists and improve access (increase intake of new patients) to the Chronic Pain Clinic at the Jim Pattison Outpatient Care and Surgery Centre. Areas identified for improvement included reducing the time clerks and nurses spent doing non-value added work, and redesigning the waitlist system to improve efficiency.

**Improvement methodology:**

The project was proposed by the clinic manager, and the bulk of the improvement work was led by the manager and supported by an operational engineer. Data collection included interviews with nurse practitioners, clerks, nurses, and doctors, and in-person observation of the flow of data, documents and patients. Once the process was understood, the current state was mapped out as shown in Figure 15.

\textsuperscript{10} Intake rate is the total number of initial appointments booked in the clinic.

\textsuperscript{11} Fluoroscopy is a moving imaging tool that enables physicians to look at many body systems, including the skeletal, digestive, urinary, respiratory, and reproductive systems.
The current state map was discussed at team meetings, and potential solutions were developed. These solutions were then packaged by an operational engineer into a set of recommendations which were presented to the manager and participants, where they were subsequently endorsed by clinic staff.

**Observations:**

The waitlist was organized by the four categories of priority for the clinic, and bookings were made two months in advance, except for ASAP patients which were booked within a week or two. This resulted in any ASAP referrals being prioritized when openings in the schedule occurred. For the other category referrals, the clerk organized patient files from the highest priority and oldest referrals, based on referral received date. The clerk then contacted the patient to inform them of the date and time for their first visit to the clinic. Subsequent visits were booked after each appointment, and were based on the practitioner’s clinical decision, availability of time, and the patient’s preference.

**Recommendations:**

Strategies were developed to reduce the waitlist. Firstly, reconfiguring the intake categories to accept ASAP and four week appointments only would decrease the number of referrals in the three month and six month categories. This was communicated to physicians, who referred patients that didn’t fit those two categories to community resources such as self-management groups. Another strategy for decreasing the demand was to focus on improving access to the Chronic Pain Clinic for Fraser Health (FH) patients, which was the intended population for the clinic.
Staff identified improvements to the triaging process which could further optimize the use of clinic resources. The categories of ASAP, 4 weeks, 3 months and 6 months, could be replaced by three pathways for streaming patients:

1. Nerve block procedures (mainly ASAPs) who have already received a clinical assessment;
2. Patients potentially requiring nerve blocks who need their initial clinical appointment;
3. Patients who have seen a care provider for some time but require an initial clinical appointment with an allied health professional, mental health therapist, pharmacist, or nurse.

A significant improvement to the waitlist structure was developed which would organize and schedule patients according to the month that they should be seen at the clinic (as opposed to the month they were referred). This way the length of the waitlist would be transparent to the clinic, and priorities would be automatically harmonized with the patient’s triage category. By organizing the waitlist according to each patient’s needs, based on what made sense clinically, the waitlist could reflect the right time for the patient to receive treatment instead of reflecting the order in which the referral was received.

The staff also expressed interest in improving intake assessment. One strategy developed was to introduce group intake assessment sessions, to bring potential patients in a group setting before their initial visit. This would allow a nurse to do triage, and subsequently the patients could decide whether or not the services of the clinic were suitable for them. This group assessment would potentially lower no-show and cancellation rates, which, between January to October 2011 were averaging ten cancellations and five no shows per week. New triage criteria were also developed, which allowed Registered Nurses (RNs) and/or Physiotherapists to conduct initial intake appointments, in addition to physicians.

Efficiencies in the procedure room were developed which could decrease the number of follow up visits necessary in the clinic, in the hopes of creating more appointments available for patients.

Due to workload issues, clerks are unable to place reminder calls to the patients prior to the visit. The group hopes to continue exploring the possibility of implementing an automated reminder system which interfaces with Meditech and calls patients according to a schedule in order to decrease no-shows.

Most importantly, it was suggested that at the end of every week, the clerk should record the number of new patients accepted by the clinic in that week as well as the number of new acceptable referrals received within that week. This would allow the clinic to monitor whether the gap between demand and intake rate is widening or shrinking and adjust policies accordingly.
**Results:**

From December 2011 to January 2012:

- The intake rate was an average of 26.2 patients per week, a 285% increase from the 6.8 new patients taken in prior to the improvement.

- The clinic also increased the number of weekly non-initial clinical visits from an average of 64 to 82.5, an approximately 30% improvement.

Since implementing improvements to the waitlist structure, the waitlist is now easier to manage and reflects how many patients are waiting to be seen in each month. These changes have helped close the gap between demand and capacity, resulting in a reduction of the waitlist. Although there is no quantitative data to demonstrate that the waitlist was reduced, discussions with all levels of the clinic staff have indicated that it is improving. It is difficult to establish a link between the improvement work and a decrease in the waitlist, because many factors, including variable demand, affect the list size at any given time.

As a direct result of the improvement work, staff also undertook actions to ‘clean up’ the waitlist, which included calling all patients still on the waitlist to confirm their need to be seen at the clinic. This work has further reduced the waitlist.

Staff in the clinic feel that the improvement work was very successful, both at relieving some stress caused by the gap between service capacity and demand, and with staff engagement. All levels of staff were able to participate and contribute to the improvement, which benefited not only employee satisfaction/morale and clinic functioning, but more importantly patients’ access to clinic services.

**Next Steps:**

Continue to monitor demand (# referrals) and intake rates closely, as well as seasonal fluctuations, as these affect the waitlist. Continue to look for opportunities to influence these factors.

- Look at opportunities to use an automated calling system to help decrease the no-show rate.

- Address problems which were identified but not addressed during this improvement initiative.
C. Building Momentum: Supporting the Use of Lean in the Health Authorities

**Provincial Lean Network**

The Provincial Lean Network (the Network) brings together representatives from each of the health authorities and the Ministry of Health to support the coordination of provincial Lean activities, facilitate information sharing across health authorities, and champion the use of Lean within members’ regions. In collaboration with the Ministry of Health, the Network sets out the key deliverables which guide the group’s activities for the year and provide a basis for measuring success.

The Network has established four working groups to create the infrastructure to support successfully meeting Network deliverables and spread the use of Lean in the health authorities: the Education Working Group, Measurement for Evaluation Working Group, Capital Projects Working Group, and a Community of Practice. Highlights related to Network deliverables include:

**The Education Working Group** focused on providing health authority employees with a common system-wide Introduction to Lean training course. Based on a template provided by the Provincial Health Services Authority, and with input from over 20 working group members, a suite of three training modules was made available on the Lean Hub website for use by all health authority staff in late spring 2012.

**The Measurement for Evaluation Working Group** has been tasked with recommending appropriate measures and data elements for the evaluation of the Lean initiative across the province. The group is approaching this evaluation from three perspectives: measuring the outcomes of individual Lean events; evaluating the effect of the Lean initiative at a whole system level; and examining the costs and benefits of Lean, both at an event and a system level. In 2011/12, the group continued developing a framework for measuring the outcomes of individual Lean events. This draft framework is based on seven quality dimensions: client-centered service, accessibility, continuity of service, effectiveness, efficiency, patient and staff safety, and wellness in the work environment. The framework outlines a set of potential measures of event outcomes that are both short-term (reflecting organizational changes), and longer term (primarily reflecting patient health outcomes and satisfaction).

**The Capital Projects Working Group** carried out a comprehensive literature review and interviewed key informants from across Canada and the US on integrating Lean into health care facility design. The working group also held several workshops to map the current state of health care facility design in BC as well as design a future state in which Lean methods would be integrated into the planning and design process.
The Provincial Community of Practice on Lean was set up to help practitioners solve problems, share ideas, transfer best practices, develop professional skills, build tools, and develop relationships. Community meetings have been held every quarter, with hundreds of practitioners attending each teleconference. The group shares ideas through short presentations on “teach topics” such as physician engagement, and panel discussions on topics such as the role of leaders in sustainment. The Lean Hub website provides an online venue for practitioners to report on Lean work, share information, and create a community of those interested in Lean.

Conclusions

This report contributes to the growing body of evidence demonstrating the effectiveness of Lean in British Columbia’s health system. The case studies exhibit how Lean has been used to improve the patient experience in terms of access, and the quality of care and services. Briefly, the outcomes of the case studies are as follows:

> As a result of the improved process and increased number of patients and families receiving the pre-care program in the Child Psychiatry Inpatient Unit at the BC Mental Health and Addictions Service Agency, there has been a dramatic reduction in the referral to admission lead time from an average of 65 days to an average of 28 days.

> At the Richmond Hospital Birth Centre, 75% of scheduled and non-scheduled C-births have been shifted from the Main operating room (OR) to the Birth Centre OR in order to enable mothers and babies to stay together after birth. This amounts to a 117% improvement. Additionally, the Birth Centre OR’s turnaround time was reduced significantly, from 3.5 hours to 1.5 hours. Finally, the postpartum length of stay average at Richmond Hospital is now 35.2 hours for vaginal births and 56.83 hours for C-births, compared to 39.9 and 72.3 hours respectively provincially.

> A Lean event at the inpatient surgical unit at Kootenay Boundary Regional hospital led to a 17% decrease in overall lead time for the patient discharge process and resulted in 20% less documentation defects. Further, productivity gains realised from the event meant that nurses were able to redirect the time saved to direct patient care and additional teaching activities.
At the patient care centre at the Royal Jubilee Hospital in Victoria, a pull system has been implemented enabling clients to move to temporary housing while awaiting an appropriate MHAS home, reducing lead time for transfer to ALC by two to three days. Guidelines regarding response times to acute care referrals by community support services were also implemented by the acute care team (ACT) with good effect; the response times to referrals by the ACT have improved significantly and are now completed within 72 hours as opposed to 4 to 7 days.

At the Dawson Creek and District Hospital, over 200lbs of obsolete equipment were removed from the hospital operating room. In addition, the hospital OR has experienced a shift in culture oriented to continuous improvement, demonstrated by the fact that OR staff and physicians are already planning future Lean events.

The Chronic Pain Clinic at the Jim Pattison Outpatient Care and Surgery Centre in Surrey reduced the waitlist and improved access for new patients — increasing the number of appointments to an average of 26.2 patients per week, a 285% increase from the 6.8 new patients taken in per week prior to the improvement.

The theme of this report has been building momentum — as in the shift in the use of Lean towards strategic deployment and alignment with organizational goals in most health authorities. The work of the Provincial Lean Network has helped provide momentum for that shift through the sharing of best practices, collaboration across health authorities, and development of infrastructure supports required for successful deployment and reporting of Lean projects. The results speak for themselves.

In 2011/12, approximately 100 events were held across the province, in over 35 different health care facilities, resulting in improvements to the patient experience, quality of care, access to services and efficiency. In terms of building the capacity for successful deployment of Lean, over 2000 health sector staff received Lean training, and more than 200 staff were trained as Lean facilitators in 2011/12, building awareness of Lean methods, creating internal capacity to undertake Lean initiatives, and embedding a culture of continuous improvement in health authorities. The high number of events, increased demand for Lean events across health authorities, increase in trained staff, focus on strategically aligning Lean projects with organizational strategy, and implementation of Lean management methods all demonstrate the evolution and continuing success of Lean in BC’s health system.
Appendix 1: Provincial Lean Network

Lean Network Members

- **Northern Health**: Bonnie Urquhart, Regional Director, Planning and Performance Improvement
- **Interior Health**: Erin McGarvey, Leader Lean Promotion Office
- **Vancouver Island Health Authority**: Mélie de Champlain, Executive Director Strategic Process Improvement
- **Vancouver Coastal Health**: Rena van der Wal, Executive Director, Lean Transformation Services
- **Fraser Health**: Eric Demaere, Director Strategic Transformation Team
- **Provincial Health Services Authority**: Jennifer Mackenzie, Vice President Strategic Planning, Transformation Support & Innovation
- **Ministry of Health**: Kevin Samra, Director Business Transformation; Frances Bryan, Senior Policy Analyst Business Transformation; Emmy Beaton, Policy Analyst Business Transformation

Education Working Group

- **Provincial Health Services Authority**: Marg Seppelt, Director of imPROVE BC Women’s Hospital & Health Centre;
- **Vancouver Coastal Health**: Kelly Frankson, Lean Educator; Carissa Looman, Coordinator, Lean Transformation Services; Desiree Mou, Interim Manager, Lean Education
- **Vancouver Island Health Authority**: Helga Avila, Manager, Process Improvement
- **Interior Health**: Erin McGarvey, Leader Lean Promotion Office
- **Northern Health**: Bonnie Urquhart, Regional Director, Planning and Performance Improvement
- **Ministry of Health**: Emmy Beaton, Policy Analyst Business Transformation; Kevin Samra, Director Business Transformation

Measurement for Evaluation Working Group

- **Provincial Health Services Authority**: Graham Worsely, Agency Director imPROVE
- **Vancouver Coastal Health**: Kate Yang, Analyst Lean Transformation Services; Michael Moore, Manager Lean Transformation Services
- **Vancouver Island Health Authority**: Farhad Ramezani, Consultant Process Improvement; Eric Young, Performance Metrics Support Analyst; Donna Conway, Regional Manager
- **Interior Health**: Erin McGarvey, Leader Lean Promotion Office
» **Fraser Health:** Eric Demaere, Director Strategic Transformation Team  
» **Ministry of Health:** Kevin Samra, Director Business Transformation; Frances Bryan, Senior Policy Analyst, Business Transformation; Juanita Arthur, Director Business Intelligence

**Capital Projects Working Group**

» **Consolidation Facilities Department:** Alan Grossert, Executive Director Facilities Operations; Darlene MacKinnon, Corporate Director Strategic Renewal & Clinical Design (Providence Healthcare); Sue Melnychuk, Director, Clinical Planning and Lean; Brent Alley, Executive Director, Quality and Risk Management; Kelly Duke, Facilities Clinical Planner; John Little, Manager Facilities Strategic Planning

» **Vancouver Island Health Authority:** Richard Brown, Manager Design and Construction; Mélie de Champlain, Executive Director Strategic Process Improvement; JoAnne Skillings, Manager of Laboratory Medicine Operations and Integration

» **Interior Health:** Renee Caillier, Lean Implementation Specialist Transformation, Innovation and Change; Norma Malanowich, Corporate Director, Capital Planning & Projects; Tish Smith, Capital Projects Clinical Coordinator

» **Northern Health:** Michael Hoefer, Regional Director Capital Planning and Support Services

» **Provincial Health Services (PHSA):** Jane Sun, Director imPROVE Innovation; 

» **Fraser Health:** Eric Demaere, Director Strategic Transformation Team; Yurik Sandino, Leader, Health and Business Analytics; Ehsan Nobakht Managing Consultant, Health and Business Analytics

» **Vancouver Coastal Health:** Raymond Lim, Coordinator Lean Transformation Team; Rena van der Wal, Executive Director Lean Transformation Services

» **Ministry of Health:** Dragana Perisic, A/Director Capital Services; Kevin Samra, Director Business Transformation; Frances Bryan, Senior Policy Analyst; Steve Noyes, Senior Policy Analyst

**Community of Practice Core Team**

» **Fraser Health:** Lisa Kempton, Senior Consultant Community of Practice; Eric Demaere, Director Strategic Transformation Team

» **Interior Health:** Erin McGarvey, Leader Lean Promotion Office

» **Vancouver Island Health Authority:** Duncan Etridge, Process Improvement Consultant

» **Vancouver Coastal Health:** Desiree Mou, Interim Manager, Lean Education

» **Provincial Health Services Authority:** Simon Ip, Lean Leader imPROVE Promotion Office

» **Ministry of Health:** Emmy Beaton, Policy Analyst Business Transformation
Appendix 2:
Glossary

5S is a visually-oriented system for organizing the workplace to minimize waste. Sort, Simplify, Sweep, Standardize, Self-Discipline (IHI, 2005).

**Code Pink** is a hospital term that includes Cord Prolapse with abnormal Fetal Heart Rate; severe APH with abnormal fetal heart rate; uterine rupture with abnormal fetal heart rate; abnormal fetal heart rate requiring immediate delivery; admission of imminent delivery of breach presentation or twin pregnancy.

**Continuous Daily Improvement** is an ongoing effort to improve services and processes, by constantly evaluating and improving process flows to ensure their efficiency, effectiveness and quality.

**Continuous Flow** is the ultimate goal of Lean — services or products flow efficiently through the value stream uninhibited by any barriers or waste.

**Gemba Walk** is a visit to the gemba (shop floor; worksite) location where the service provider interacts directly with the patient.

**Kaizen** is the Japanese term for continuous, incremental improvement of an activity to create more value with less waste.

**Kaizen event** see Rapid Process Improvement Workshop.

**Kanban System** is a scheduling system that helps determine what to produce, when to produce it, and how much to produce.

**Lean Management** is an approach that engages frontline staff in daily improvement.

**Mistake Proofing (poka-yoke)** is any mechanism in a Lean process that helps service provider avoid mistakes. Its purpose is to eliminate product defects by preventing, correcting, or drawing attention to human errors as they occur.

**Patient Journey Mapping** is a tool that brings together patients and providers to review a specific patient journey — for example, from experiencing the first symptoms of diabetes to having a self-management plan.

**Plan-Do-Study-Act Cycle (PDSA)** cycles test change in real work settings. Plan-Do-Study-Act means planning the change, trying it, observing the results, and acting on what is learned.

**Rapid Process Improvement Workshop (RPIW)** is a workshop in which the kaizen approach is implemented to improve some aspect of work flow.

**Set-Up Reduction** refers to removing waste from equipment and operations changeover times, by making setup faster, easier, and more predictable. This allows for shortened leadtimes, smaller batch sizes, reduced work in process and ultimately more responsive value streams.

**Standard Work** refers to the most efficient method to produce a product or perform a service at a balanced flow to achieve a desired output rate. It can also be described as a carefully documented and balanced work process that must be adhered to by each operator to ensure consistency.

**Strategy Deployment** is a management process that helps executives to align and engage their organizations around the most important goals.