

Using Lean Thinking for Integration, Collaboration and Regionalization of Cardiac Rehabilitation Services

Glyn Boatswain, Lorraine Carrington, Rohan Gonsalves, Amber Heath,
Dr. Amelia McCutcheon, Dr. Joe Ricci, Dr. Ravi Tahiliani, Paul VanWiechen

Rouge Valley Health System, Toronto, Ontario, Canada

gboatswain@rougevalley.ca

lcarrington@lakeridgehealth.on.ca

rgonsalves@rougevalley.ca

aheath@rougevalley.ca

amccutcheon@rougevalley.ca

jricci@rougevalley.ca

rtahilia@hotmail.com

pvanwiechen@lakeridgehealth.on.ca

Abstract

A Cardiovascular Rehabilitation and Secondary Prevention service (CRSP) is an evidence-based strategy. It has been shown that among patients with ischemic cardiac disease, a strategy of CRSP results in a 20-30% reduction in the risk of cardiac-related hospitalization and mortality. In Ontario there are barriers to accessing CRSP, which has created an immediate needs gap. In the Central East Local Health Integration Network (CE-LHIN), it is estimated that the current gap between those who need CRSP services and those who actually receive them is approximately 5,000 patients annually. In order to address this gap, a voluntary integration and regionalization of CRSP services, guided by Lean thinking between two health systems, Rouge Valley Health System (RVHS) and Lakeridge Health (LH) was established. Results include a reduction in the initial needs gap of approximately 2,000 patients annually, efficiently and effectively, and creating the infrastructure and quality of service to support the longer term goal of 5,000 patients annually by 2016.

Introduction & Background

Barriers exist across Ontario in accessing Cardiovascular Rehabilitation and Secondary Prevention (CRSP) services. CRSP service is an evidence-based strategy that has shown to reduce the risk of cardiac-related hospitalization and mortality by 20-30% among patients with ischemic cardiac disease [1]. CRSP services consist of an individualized exercise assessment, prescription and risk factor profile; a six-month weekly exercise program; and an educational program that includes Dietician and Pharmacy consultations. In the Central East Local Health

Integration Network¹ (CE-LHIN) region, it is estimated that the current gap between those who need CRSP services and those who actually receive them is approximately 5,000 patients annually. In order to address this gap, a voluntary integration, collaboration and regionalization of CRSP services, guided by Lean thinking between two hospitals, Rouge Valley Health System (RVHS) and Lakeridge Health Corporation (LH) was established. The integration entailed a regional CRSP service within the CE-LHIN that utilized an evidence-based “hub and spoke” model that aimed to:

- Reduce patient morbidity and mortality related to vascular disease
- Help bridge the needs gap for CRSP services in the CE-LHIN
- Increase access to CRSP services
- Help ensure the appropriate use of health care resources
- Increase referral rates for CRSP services
- Increase patient participation in CRSP services
- Optimize quality through standardization, integration and regionalization
- Align CRSP services in the region with CE LHIN priorities
- Improve patient outcome
- Reduce use of health care resources

The Regional Cardiac Care Centre at RVHS functions as the regional coordinating centre (hub) providing regional management and oversight for the service delivery of care at five service sites. The integrated service received funding to augment service volumes at RVHS and LH spokes from the 2010 service volumes of 1,303 to 1,980 by April 2013. Furthermore, a secondary goal of this additional volume management was to develop within the first two years additional sites and infrastructure to support the incremental growth of the new service to meet the ultimate target of 5,000 patients annually.

Objectives and Methodology

In order to achieve seamless growth through integration, collaboration, and regionalization of CRSP services, we utilized a ‘Lean’ methodology. Lean focused on improvement of both the patient and provider experience. Lean principles have been used effectively in manufacturing by companies including Toyota Motor Corporation for many years. In 1945, Toyota Motor Corporation developed the “Toyota Production System (TPS)” [3, 4]. TPS was set out to advance quality while improving productivity and reducing costs [3, 4]. Although the concepts were derived from TPS, the term *Lean* was credited to Jon Krafcik [3], who sought out for practices that led to the success of Japanese automakers such as Toyota. Toyota popularized Lean as a management system that delivered quality to their customers by eliminating waste and demonstrating respect for people [3, 6]. Waste means any motion or effort that does not provide any *value* for the customer [3, 5]. Within hospitals, Lean can result in improvements in the quality of care for their customers, the patients, by reduction of waste in their systems. The philosophy of Lean is guided by five principles [3, 6], which are:

1. Specify *value* from the standpoint of the end customer

¹ The LHINs are the health authorities for Canadian province of Ontario. They are governing bodies that provide delivery of operational public healthcare services by geographic region. (<http://www.lhins.on.ca>)

2. Identify all the steps in the *value stream*, eliminating every step that does not create value.
3. Make the value-added step occur in a tightly integrated sequence so work *flow* smoothly.
4. Let customers *pull* value.
5. Pursue *perfection* through continuous improvement.

The team engaged the multiple sites of two hospital systems RVHS and LHas a single regional CRSP service to establish what value means from the patients perspective and to determine how quality can be delivered within an integrated service. In order to achieve this, a fuller understanding of the initial (current) state was achieved through Value Stream Analysis (VSA) exercises. A VSA is a planning tool that creates a system-creating path to develop a vision of the future ideal state with reduction of waste [1, 2, 5].

The objectives of the VSA were to enable the medical, clinical and administrative teams to:

1. Identify current process steps of the patient's journey.
2. Identify wastes or non-valued added steps within the current state.
3. Create the future ideal state ensuring quality at the forefront.
4. Develop a project plan with timelines, leads and outcomes.
5. Determine key measures of success to validate project initiatives outcomes.
6. Outline metrics for sustainability and evaluation.
7. Determine follow-up structure for measurement tracking and reflection.

It was accepted by the team that achieving the objectives of the VSA, as a system-creating path, would (1) create an integrated, collaborative regional service delivery model, (2) achieve additional volume growth (approximately 2,000 patients annually) (3) enhance the quality of CRSP services.

Results, Discussion & Conclusion

There are two interdependent paths for successful implementation using the Lean approach: a system-creating path and culture-creating path. Prior to full engagement of the system-creating path established through the VSA exercise, it was necessary to establish the culture-creating path supporting the "respect for people" aspect of Lean Thinking. To support this need, a Lean education and training session was held to generate empowerment among the medical, clinical and administrative teams. The event propagated a Lean culture across the team that instilled a learning and action oriented perspective that made the identification and elimination of waste and continuous improvement standard operating practice.

The VSA exercise was initiated with a retrospective review of prior patient satisfaction surveys. The analysis of this data aided in the understanding of value and identified opportunities for improvement through enhanced communication throughout the patient's journey, and reduction of wait times. However, as the surveys were retrospective, the corrective actions were not conducted in real time and were felt to be a limitation. Therefore, conducting a real-time patient satisfaction survey was identified as a priority prior to completion of the patient journey map

Table I summarizes major wastes/gaps identified during the VSA and describes the key results of implementing the principal project plan (see Appendix A) in order to achieve the future state developed by the team (see Figure I in Appendix B for future state map).

Table I: Gaps identified and results using Lean

Gap	Result
<p>Paper-based referral system (multiple points of referrals – 6 to 8) across both sites created:</p> <ul style="list-style-type: none"> ▪ Redundancy ▪ Batching ▪ High level of inventory ▪ No transparency ▪ Re-work/First time quality ▪ Motion/ Material movement waste ▪ Wait time 	<ul style="list-style-type: none"> ▪ Streamlined and Automation of Referral Process to one entry point ▪ Reduced inventory and batching from greater than 200 referrals to be processed to one piece flow (<5) ▪ Reduced Lead time from referral received to patient booked by >50% which freed up Exercise Therapist’s time to do value added work (additional 10 min per patient for one-on-one education) ▪ Identified change agents and leaders within the team
<p>Lack of standardization of work and processes for Regional Exercise Therapists.</p>	<p>A Standard Work Kaizen, Level Loading & Takt Time Calculation:</p> <ul style="list-style-type: none"> ▪ Define and Level Load the Exercise Therapists work routine ▪ Enhance the exercise classes and treatment regimen through understanding the voice of the customer
<p>Lack of Centralized Booking process across sites</p> <ul style="list-style-type: none"> ▪ Unable to identify total referral volume and patterns to effectively offer Cardiac Rehabilitation Services across Scarborough-Durham Region. 	<p>A VSM and 2P exercise workshop was conducted collaboratively across Scarborough and Durham region. Centralized booking for all Regional referrals:</p> <ul style="list-style-type: none"> ▪ Significantly decreased wait times (0 wait time – Scarborough from 10 weeks) ▪ Effectively manage referral volumes (one piece flow) ▪ Ensured >90% of eligible patients are captured ▪ >90% of patients receive CR services within 30 minutes travel time to CR site
<p>No electronic data management system for Cardiac Rehab Program to measure:</p> <ul style="list-style-type: none"> ▪ Patient Outcomes ▪ Referral Quality ▪ Compliance Rates ▪ Timely Intake ▪ Hospital Re-admission rates 	<p>A comprehensive regional data management system (LCVIS) was implemented allowing to track:</p> <ul style="list-style-type: none"> ▪ Outcomes such as Patient Population, Diagnosis, Prevalence, Risk Factors Prevalence and Health Status to guide quality improvement and measure efficacy of service. ▪ Promote linkages to CMG database, and potentially with ICES to capture key outcome measures including hospitalization, readmission rates, and death rates ▪ Conduct surveys to monitor hospital re-admission rates of patients who are enrolled in Cardiac Rehab across CE-LHIN.

In order to prioritize project deliverables, an action priority and effort matrix was used. A follow-up communication plan and structure was created to effectively track deliverables and to force reflection. The key measures of success for the overall project were achieved. Table II summarizes the performance outcome metrics.

Table II: Summary of performance outcomes.

Metrics	Definition	Target	Jan-13	Comment/Reflection
Volume growth	Increase annual volume	1,980	1,980	Met target
Annualized Visits 2011-12	Visits per patient = 3 clinic visits (education classes) + 1 visit/week for 6 months	27,594 (RVC) 9,828 (LH)	22,000(RVC) 7,000 (LH)	On track to meet target Additional patients at the Oshawa and Civic Centre (100) patients will surpass target.
Referral Quality	>90% of patients enrolled meet the intake criteria	90%	100%	Exceeded target
Compliance	70% of patients complete 6 month program	70%	68%	Improved past year' compliance by 4%.
Data Collection	% patients data entered in data management system	100%	100%	Target achieved
Timely Intake	Event to intake of < 6 weeks for 90% of inpatients	Less than 2 weeks	*0 weeks	*4 week wait time for a specific patient group. New site will address wait time.
	Number of patient visits to ED	n/a	8	Will have more updated data for new fiscal year
Health Care Provider Visits	Number of cardiac-related hospital admissions	n/a	0	
	Number of non-routine visits to cardiologist/specialist	n/a	12	

Applying the Lean philosophy and tools to bridge the needs gap allowed us to achieve a seamless transition, implementation and standardization of care across both RVHS and LH health systems. The success of this initiative has resulted in additional growth opportunities to expand CRSP services with across the CE-LHIN both with hospitals and community agencies. It has fostered integration of the delivery of care for cardiac patients across the region that ultimately allowed us to meet larger needs of the entire LHIN as part of a larger more comprehensive and efficient service with improved efficiency of delivery systems and more timely access for patients.

References

1. Ontario Cardiac Rehabilitation Pilot Project: Final Report and Recommendations. (2002). Toronto, Canada.

2. Clark et al. (2005). Meta-analysis: Secondary prevention programs for patients with coronary artery disease.
3. Graban, M. (2012). *Lean Hospitals: Improving Quality, Patient Safety, and Employee Engagement*. (2nd Ed.). Boca Raton (FL): CRC Press.
4. Liker, K. J. (2004). *The Toyota way: 14 management principles from the world's greatest manufacturer*. New York (NY): McGraw-Hill.
5. Graban, M., Swartz, E. J. (2012). *Healthcare Kaizen: engaging front-line staff in sustainable continuous improvements*. Boca Raton (FL): CRC Press.
6. Womack, P. J., Jones, T. D. (2003). *Lean Thinking*. New York (NY): Free Press.

Acknowledgment

The authors gratefully acknowledge the hard work and dedication of the Regional Cardiovascular Rehabilitation and Secondary Prevention service team for their efforts in ensuring the best care for the patients and their families.

Appendix A

REGIONAL CARDIAC REHABILITATION AND SECONDARY PREVENTION PROJECT PLAN						
	What are the objectives and/or deliverables?	Who is responsible?	How will it be achieved? (action required)	Target Date	Actual Date	Comments
1	Identify steering committee member	Glyn, Rohan		Mar 30, 2012	TD Met	
2	Create work flow/process map of centralized booking	Rohan Rehab Team	Meeting to be held end of first week in April	April 6 th 2012	TD Met	April 19 th – Day 1 of 2P event
3	<u>2p event</u> Day 1: Identify Process, People, Equipment Day 2: Review & finalize process (LHO incld) Day 3: Simulation (trial) Day 4: Execution = GO-LIVE	Rohan, Glyn	Create a working group for a 2p event	April 19, 2012 April 19, 2012 July 5 th , 2012 July 25 th July 31 st , 2012	TDs Met	
4	Identify physical space	Glyn, Rohan	Decision to be made	July 24 th , 2012	TD Met	5/3/12 – space identified
5	Set weekly meetings for steering committee	Rohan, Eleanor	Eleanor to book weekly meetings based on availability	End of April	TD Met	Every Wednesday until further notice.
6	<u>Human Resources</u> determine availability and need	Glyn, Rohan, Rajeanne	Hired two secretaries (FT & PT) to meet target 980 volume.	October 2011	Nov-Dec 2011	Delayed by internal transfers (HR)
			Identified through 2p event, list to be compiled by Eleanor			-Ensure all computers have CVIS access
7	<u>Equipment/Supplies</u> Identify how many computers will be set up		Identified through 2p event	July 2012	TD MET	Day 2 of simulation
	Order supplies to set up workstations	Glyn, Rohan	Day 2 2P event	June 15 th , 2012	TD MET	Goal - develop scheduling, finalized regional process
8	Hold a team meeting (LH& RVHS) to review <u>booking process</u> .	All	Level loading (Heijunka)	June 2012	TD MET	
	Create standard work and training protocols for admin staff	Rajeanne, Rohan		July 2012	TD MET	
9	<u>Marketing & Communications</u> Identify regional cardiac booking phone and fax #'s and review ed. material	Lynn, Rajeanne, Paul Beth, Nick, Rohan, Glyn	Meeting to be held to look at how to pull once reports are completed.	Complete		
10	Reporting: After quality metrics are clarified (CE LHIN), address LH and RVHS schema for data reports	Glyn, Rohan, Rajeanne, Riyad	Meeting to be held to look at how to pull once reports are completed.	Complete		

Appendix B

Figure I. Future Ideal State of the Regional Cardiac Arrhythmia program.

