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Lean thinking patient flow in the Catheter Laboratory



The CDHB Cath Lab Optimisation Project led to better diagnostic and interventional cardiology services that are safer, more efficient and support better clinical outcomes for the people of Canterbury as **Megan Hopper, Quality Advisor, Vector Consulting** explains:

Project overview

The Canterbury District Health Board (CDHB) Cardiac Catheter Laboratories (Cath Labs) provide treatment for the people of Canterbury, South Canterbury and the West Coast who have experienced a cardiac event (e.g. 'heart-attack') or have other cardiac-related problems.

The Cath Labs have experienced *steadily increasing demand* over the last fifteen years, and staff have been required to meet the challenges of fitting a contemporary service into an older facility (which is due to be improved and enlarged as part of the Christchurch Hospital facilities redevelopment in five years' time).

The Cath Lab workforce comprises a specialist, skilled *multidisciplinary team* of Cardiologists, Cardiologists-in-training, Registered Nurses, Medical Radiation Technologists, Physiologists and support staff (40.5 full-time equivalent positions). The Cath Labs undertake a mix of elective (scheduled) and acute (un-planned) services during hours of operation and also provide an acute out-of-hours service.

In 2012, the Cath Labs treated 2,859 patients. Patient numbers and complexity of procedures have increased significantly over the last fifteen years. In 2012, 200 more patients were treated in the labs than in 2003. There has been a shift in procedure type with 18% less diagnostic angiography in 2012, but an increase of 40% in therapeutic procedures. Procedural complexity has increased. Excluding complex angioplasty, other complex procedures have increased by 500% with 36 complex procedures in 2003 and 177 in 2012. This has presented a *considerable challenge* to the CDHB Cardiology service; to manage increasing patient load and acute demand in a timely manner within the constraints of two laboratories. At mid-2011, this had led to increased pressure on staff, reduced job satisfaction, poor team cohesion and sub-optimal patient outcomes.

This article summarises the key learnings from the piece of work, which was developed to address these issues and resulted in the The CDHB Cath Lab Optimisation Project.

Key learnings: Positive

1. Review phase informs project objectives

Vector Consulting undertook a comprehensive review of the current issues and challenges to be addressed in the Cath Lab (from August to December 2011). This review articulated nine key issues and areas for improvement and constituted phase I of the Cath Lab optimisation project.



Cath Lab Optimisation Project Team (from left to right): David Smyth (Clinical Director), Sharron Matthewson (Charge Physiologist), Lorraine Owen (Charge Nurse Manager), Jenn Sands (Charge MRT), Barbara Ballantine (Project Administrator), Megan Hopper (Project Manager) and Gary Barbara (Service Manager).

This review involved extensive consultation with Cath Lab staff and key stakeholders, and articulated recommendations to address the issues identified. These recommendations were then formed into five project objectives, which were used to drive all project activity (Phase II – January 2012 to January 2013). These outcomes included: an increase in Cath Lab facility utilisation (deliberately not quantified); 80% of ST-elevation myocardial infarction ('heart-attack') patients re-vascularised in less than 90 minutes (previously 51%); 80% of sub-acute myocardial infarction (smaller, less acute 'heart-attack') patients to have procedures in less than 72 hours (previously 45%); Cath Lab staff satisfaction to increase by 20%; and reduced average length of stay for acute coronary patients by 20%.

2. Measurable project objectives important

The CDHB 'Decision Support' team (data collection and analysis experts) were engaged to produce a 'dashboard' report to measure the key service indicators and project objectives and to ensure that the service had an easy and meaningful method of measuring demand and service activity beyond the life of the project. The project objectives were also articulated with measurability in mind.

3. Be patient, improvements will happen

Whilst the initiatives implemented in support of the project objectives commenced in early 2012, the anticipated benefits of these improvements were not realised until September 2012, when key indicators started to improve (much to the relief of the Project Manager, Clinical Director and Service Manager!). Six results summarise the main outcomes of the project; these include: a 31% increase in the number of procedures undertaken in the Lab (without any permanent increase in hours of operation); 80% of non-STEMI patients now have procedures undertaken in less than 72 hours; a 13% increase in Cath Lab staff satisfaction; a greater than 20% reduction in length of stay for all cardiology patients; correction of skilled clinician & leadership deficits; and a 17.5% reduction in call-outs for Cath Lab staff.

4. Prioritise according to need

As patients waiting to be treated in the Cath Lab vary according to the degree of urgency for intervention, it is important that the patients that are most sick are treated first. An objective risk assessment scoring system was applied (identified according to a research-based criterion of the patients' risk of a cardiac event within the next 72 hours). The application of this objective measurement not only removed bottlenecks of patient movement in cardiology, but it reduced after-hours call backs for staff as sick patients were no longer deteriorating as in-patients (and reduced the overall length of stay for cardiology patients).

5. Visible demand drives the operation

Prior to the improvements in the Lab, the hours of operation of the Cath Lab were mostly fixed, and demand was invisible. This resulted in lengthy patient wait times for Cath Lab procedures. A simple system was implemented which made visible the number of patients waiting in the wards (and satellite hospitals) for Cath Lab procedures, and their degree of urgency.

As a result of the visibility of patient volume and acuity, Cath Lab hours of operation are now driven by demand. Patients waiting for procedures are priority scored and clearly visible to staff. If a list is too long for the Cath Lab's regular hours, planned evening and/or Saturday lists are scheduled.

6. Address team and staff deficits

Early analysis of clinician capacity to meet patient demand indicated that there were significant skill deficits within the Cath Lab clinician ranks and leadership structure. These deficits were very important to correct for team morale and capacity to contribute to improvement projects. The deficits were corrected with a new leadership position (Interventional & Diagnostic Cardiology Manager) as well as FTE increases for Cardiologists (2.0), Physiologists (2.0) and Nursing (1.6).

7. Attend to problems identified at project meetings

Implementation workgroup meetings often included a 'workshop' component in response to persistent issues, which required resolving to allow the overall project flow to continue. For example, figure 1 contains a Fishbone diagram, used to identify 'issues causing delay in patient transfers to/from the Cath Lab'. Issues were prioritised in terms of importance, and solutions developed to address the issues circled (as the circled issues were deemed to be the issues which, if resolved, would have the biggest effect in removing the delays).

Key learnings: Unexpected

1. Widespread benefits of process improvement

There were a number of unintentional benefits from the project initiatives:

- Non-STEMI (sub-acute heart-attack) patients on the Cath Lab waitlist are risk-scored and visible to all staff. Staff members are then aware an out-of-hours list may be required. However, the visibility of the list has motivated staff to treat patients in a more efficient manner and planned extra lists are often not needed (less than once per month), as they would have been pre-August 2012.
- Each week, a report of patients waiting for a Cath Lab procedure over the weekend is sent to professional leaders. This is informative and motivating. The data reporting is essential to maintain appropriate time to treatment and helps to reduce unnecessary inpatient stays over the weekend.
- The 17.5% reduction in Cath Lab staff call-backs was not anticipated as a consequence of project initiatives but was due to the improved prioritisation of patient risk of a repeat cardiac event.

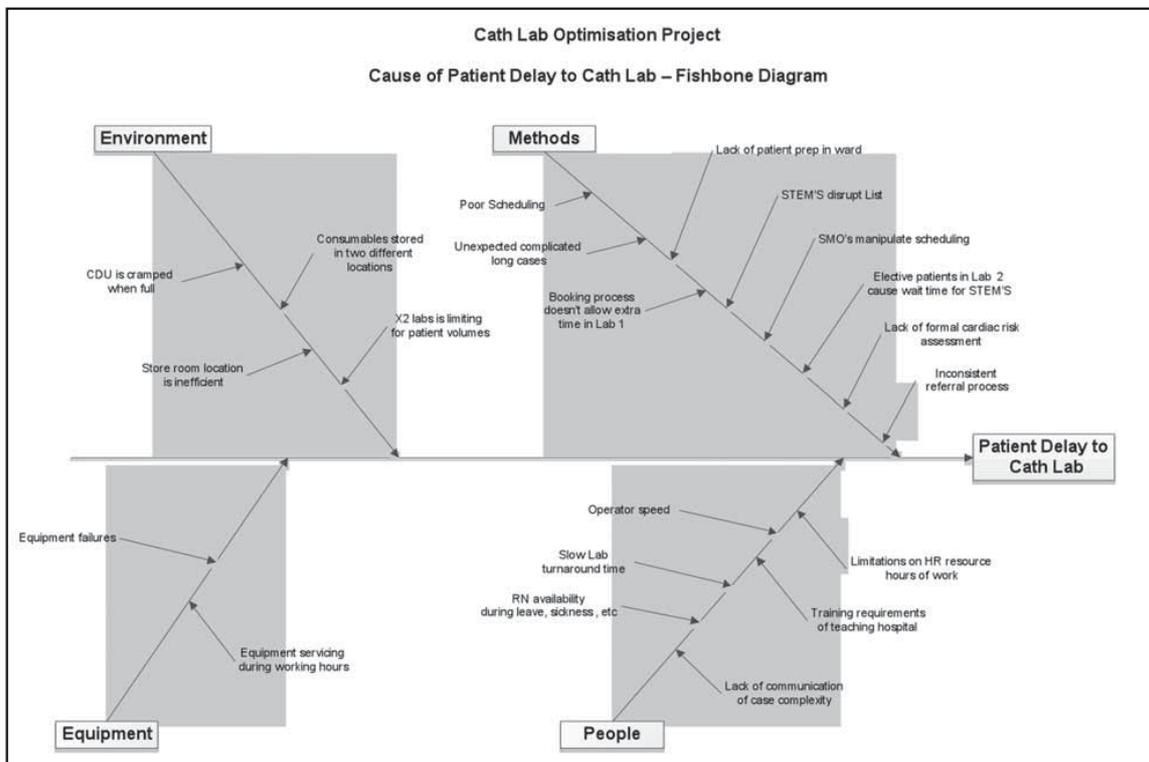


Figure 1: Issues causing delays in patient transfers to/from the Cath Lab

2. Nuggets on the edge of the project scope

Early on in Phase II of the project, the steering group determined that the impact of reducing non-chest pain admissions to cardiology would have a significant impact on cardiology patient length of stay and should be addressed as part of this project. Whilst this initiative was at the edge of the scope of the Cath Lab project, the benefits to the service and improved cardiologist availability were so significant that the development of a Chest Pain Unit was commenced.

The Chest Pain Unit utilises immediate diagnostic testing to determine if the patient's degree of risk of a further cardiac event necessitates admission. Only 16% of patients going through the Chest Pain Unit (since its inception) have required admission to the hospital. This initiative is an extension of the work being undertaken in the Emergency Department to reduce admission of very low risk chest pain patients who can be safely managed in the community.

Key learnings: Unfinished

1. Plans still to be achieved

The Cath Lab Optimisation project ended in January 2013. A number of initiatives continue to be led by the Interventional & Diagnostic Cardiology Manager (appointed April 2013), and are documented in the project transition plan. Responsibilities have been assigned to specific staff to ensure ongoing progress with project initiatives. These include:

- utilising the risk register commenced as part of the project to embed a culture of continuous and pro-active risk management in the Labs;
- ongoing development of the inter-disciplinary team approach in the Labs (and supporting staff Handbook);
- finalising renovation plans for the Labs to reduce process inefficiencies as a result of the Five S Workgroup Outcomes (as well as other organisational inefficiencies such as arranging servicing of Lab equipment out-of-hours to minimise disruption of in-hours Lab operation);
- implementing 'Scope' electronic patient management system for improved patient tracking;
- continuing the 'lean thinking' project;
- ongoing liaison with ED, Orderlies, St Johns (including working on issues with direct transmissions of electrocardiograms from the ambulances) and the coronary care unit to improve treatment time for patients with major heart attacks – this was the one planned outcome, which was not achieved at the completion of the project. (Only 50% of patients with major heart-attacks were receiving treatment in the lab within 90 minutes – unchanged from before the project.)

2. Improve staff satisfaction and engagement

The improvement in the level of satisfaction as expressed by Cath Lab staff (in their work) was articulated as one of the key goals of the project. Whilst the target for improvement was set at 20%, a 13% target was achieved. The steering group felt that the January 2013 survey was too early for the staff to realise the benefits of the project initiatives (many initiatives had just been implemented at this stage) and a repeat survey is underway at the time of writing. Figure 2 demonstrates the change in staff satisfaction results from the beginning to the end of the project.

3. Improve communication

Issues with communication within and outside the Cath Lab team were impacting on staff satisfaction. The initiatives

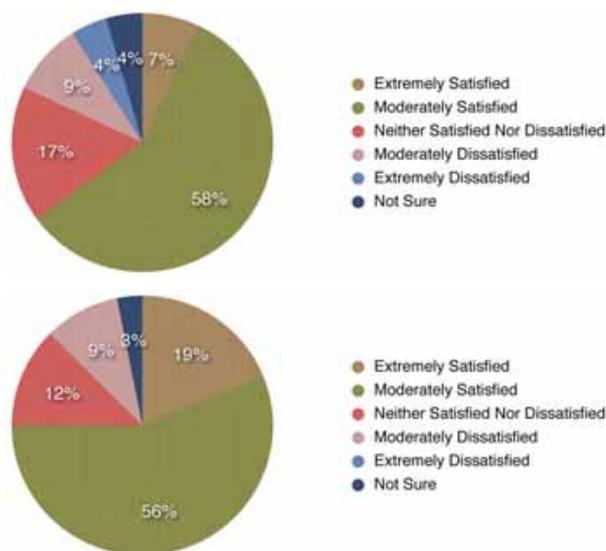


Figure 2: Staff satisfaction survey results February 2012 and January 2013

implemented as part of the project have resulted in improved communication with Cath Lab staff. Initiatives included a revised leadership structure, a new management position, improvement in staff levels, weekly protected staff meeting times, introduction of formal risk management strategies, promotion of inter-disciplinary collaboration and the planned implementation of an electronic patient tracking system viewable from multiple locations.

Key outcomes

- All nine areas identified for improvement in the Cath Lab Optimisation Project Review (Phase I) were addressed. The overall aim of the project was achieved with both increased utilisation of the Cath Labs and an increase in staff satisfaction.
- The project implementation has challenged well-established working patterns in a team that has evolved organically over more than 15 years. The new leadership structure supports greater front-line leadership responsibility and engagement with clinical staff.
- Whilst the project phase of the improvement work in the Cath Lab is complete, the transition of many of the recent initiatives to a new way of working requires ongoing commitment and focus.
- A formal project review was undertaken in January 2013 and the report distributed to cardiology staff and stakeholders. A transition plan was documented.
- The new Interventional & Diagnostic Cardiology Manager is now able to lead a Cath Lab service that has a greater strategic orientation, better awareness of its core functions and an engaged team that uses measurable outcomes to drive improvements.
- As a result of the project initiatives, the Cath Lab is now providing diagnostic and interventional cardiology services that are safer, more efficient and support better clinical outcomes for the people of Canterbury.

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