Streamlining elective surgery care in a public hospital: the Alfred experience

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ABSTRACT

Objective: To evaluate the effectiveness of redesigning and streamlining perioperative services.

Design: A before-and-after evaluation, with retrospective analysis of de-identified administrative data.

Setting: A major tertiary hospital, Melbourne, Australia.

Participants: Patients undergoing elective surgery, February 2005 – February 2010.

Intervention: Implementing a process redesign to streamline clinical pathways for elective surgery, with a focus on the patient journey from referral to discharge, and establishing a separate, dedicated elective surgery facility.

Main outcome measures: Numbers of patients waiting beyond national recommended waiting times for elective surgery; hospital-initiated postponement (HIP) rates for elective surgery; and lengths of stay (LOS), both combined and for specific diagnostic-related groups.

Results: The clinical process redesign resulted in a sustained downward trend in the number of elective surgery patients waiting longer than national recommended maximum waiting times. HIP rates were reduced to 1% in the dedicated elective surgery facility, and there was a significant reduction in the combined LOS, as well as the LOS for the most common surgical procedures ($P < 0.001$).

Conclusions: Clinical process redesign of perioperative services and collocation of a separate elective surgery centre improved (i) timeliness of care for elective surgery patients and (ii) key indicators (LOS and HIP rates) for planned elective admissions.

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Increasing demand for acute hospital care in the past 20 years has led to problems accessing care and longer waiting times for patients needing emergency or elective surgery.[1] Unplanned emergency surgery competes with scheduled elective surgery, and, when resources are limited, elective procedures are cancelled,[2] which disrupts patient flow and may compromise patient safety.[3]

The Alfred is a major tertiary, 638-bed hospital in Melbourne, a state capital in south-eastern Australia (population, 3.9 million in 2008).[4] It is Australasia's largest designated trauma service,[5] and provides elective surgery for the state of Victoria.[6] By the end of 2005, with the increase in demand, prioritisation of time-critical emergency surgery was having an increasing impact on elective surgery waiting lists, with hospital-initiated postponement (HIP) rates reaching almost 30%.

In response, in 2006, the Alfred embarked on a clinical process redesign to streamline perioperative services. The primary aims were (i) to improve the timeliness of patient care, specifically by reducing HIP rates and decreasing the number of patients waiting for elective surgery beyond nationally recommended waiting periods; and (ii) to increase the hospital's surgical treatment capacity.

Here, we describe the improved delivery of perioperative services at the Alfred Hospital, including the process redesign, and evaluate the changes in service efficiencies.

METHODS

Process redesign

The process of review and redesign involved consultation with key stakeholders, including senior hospital management, senior clinical staff, consumer representatives, the Victorian Department of Human Services (now the Victorian Department of Health) and the Division of General Practice. The redesign was overseen by an operational planning committee comprising senior hospital staff, and chaired by the Chief Operating Officer. Working groups were established, each taking responsibility for a particular aspect of the redesign, and a parallel community-participation panel represented local community views. The redesign incorporated construction of the Alfred Centre, a separate, dedicated elective surgery and procedural facility with 26 overnight surgical beds and 55 recovery beds, collocated on the hospital site.

Streamlining the patient journey

Surgical care was separated into streams to increase service efficiencies. Specific areas of the Alfred Centre and the main Alfred Hospital were set aside for the emergency, elective short-stay (< 3 days) and elective long-stay (> 5 days) streams.

With a focus on the patient journey from initial referral to discharge, the redesigned surgical care model was streamlined, standardised, and protocol-led (Box 1). It incorporated patient screening and allocation to an appropriate ward by the perioperative coordinator; one-day attendance at a pre-admission clinic for pre-surgical evaluation and investigations; and coordination of individually tailored discharge support before admission. The redesigned processes became part of standard operating practices for all elective surgery patients and facilitated the development of admission and activity targets.

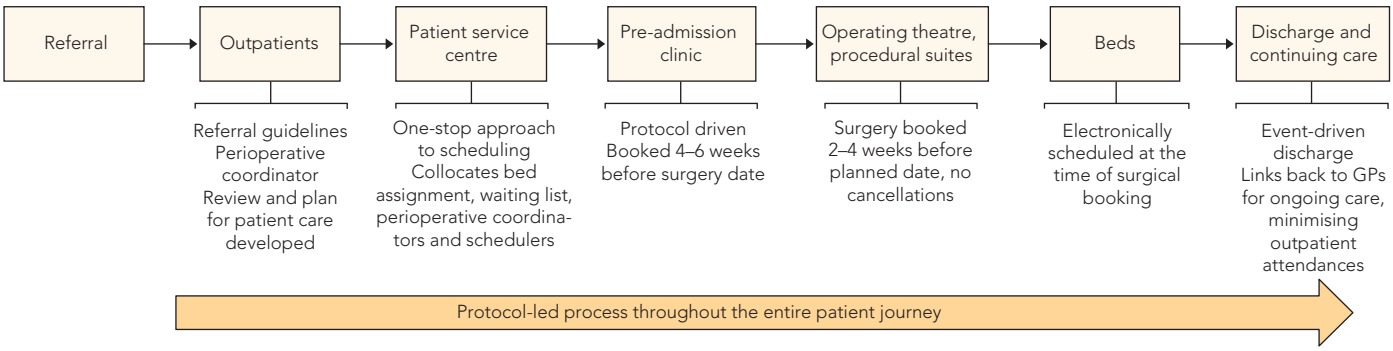
The principles of the redesign centred on clinical leadership and a dedicated management structure to coordinate all components of the new service. Initial process changes were implemented in May 2006, before the Alfred Centre opened, with appointment of the Perioperative Services Manager and coordinators for each surgical unit. The final separation of the three elective surgery streams, which began in February 2007 with the opening of the Alfred Centre and the new short-stay beds (< 3 days), was completed when the main Alfred Hospital's short-stay beds (> 3 and < 5 days) were available from mid 2008.

Evaluation of effectiveness

Study design and setting

We conducted a retrospective analysis of de-identified administrative data on

1 New streamlined model of care for short-stay surgical patients, Alfred Hospital and Alfred Centre



patients admitted for elective surgery procedures to the main Alfred Hospital and the new Alfred Centre, February 2005 – February 2010.

As a quality improvement project, our study was granted exemption from ethical review by the Human Research Ethics Committees of the Alfred Hospital and Monash University.

Data and analysis

Data comprising aggregated monthly figures and patient information were extracted and de-identified by the Clinical Performance Unit from the computerised patient-management system (HOMER), which tracks patients from admission to discharge. Aggregated monthly data included:

- summaries of all elective surgery procedures performed;
- numbers of patients having planned day surgery who were discharged on the day of admission;
- numbers of elective surgery patients waiting longer than nationally recommended maximum waiting times (including patients ready and not ready for care); and
- HIP rates (number of patients whose elective procedure was postponed by the hospital as a percentage of the number of planned elective surgery procedures).

For analyses of elective surgery waiting times longer than national recommendations, HIP rates and elective surgery admission numbers, the results presented show combined data for the main Alfred Hospital and the Alfred Centre. For lengths of stay (LOS) analyses, patient data comprised age and sex, admission and discharge dates, admission type (elective or emergency surgery), and diagnostic-related group (DRG) codes and descriptions. Data from 12 months before (February 2005 – February 2006) and after (February 2009 – February 2010) the process redesign were analysed. Data on the number of elective surgery procedures were only available from July 2005.

Analyses of changes in LOS before and after the redesign were performed with Stata 11 (Stata Statistical Software, release 11, StataCorp, College Station, Tex, USA) using the Wilcoxon rank-sum test, a non-parametric test for non-normally distributed data.[7] A P value of 0.05 was considered significant.

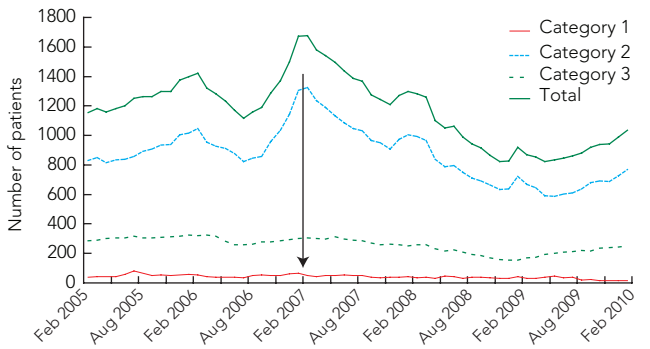
RESULTS

Improved timeliness of care

As shown in Box 2, after the new model of care was implemented and the Alfred Centre was opened, there was a sustained downward trend in the combined numbers of patients waiting longer than recommended for their elective surgery, in both the main Alfred Hospital and the Alfred Centre.[8] Comparing data from February 2010 with February 2005, there was a 45% decrease in the numbers of Category 2 patients (semi-urgent) waiting longer for surgery than the recommended time of < 90 days.

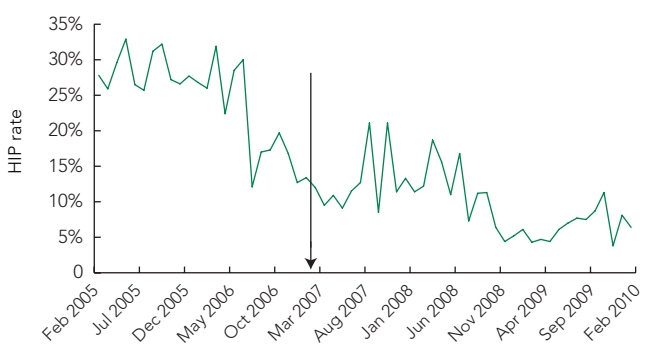
The combined HIP rate for planned elective admissions in the main Alfred Hospital and the Alfred Centre decreased over the period February 2005 to February 2010

2 Number of patients waiting longer than nationally recommended waiting times for elective surgery, Alfred Hospital and Alfred Centre, Feb 2005 – Feb 2010



Arrow denotes when the Alfred Centre was opened (Feb 2007).
Category 1 = Urgent < 30 days; Category 2 = Semi-urgent < 90 days;
Category 3 = Non-urgent < 365 days. ◆

3 Changes in hospital-initiated postponement (HIP) rates,* Alfred Hospital and Alfred Centre, Feb 2005 – Feb 2010



Arrow denotes when the Alfred Centre was opened (Feb 2007). * HIP rates = number of patients whose elective procedure was postponed by the hospital as a percentage of the number of planned elective surgery procedures. ◆

4 Lengths of stay (LOS) for 2010's top surgical diagnostic-related groups, before (Feb 2005 – Feb 2006) and after (Feb 2009 – Feb 2010) the process redesign

Diagnostic-related group (DRG)		Main Alfred Hospital (Feb 2005 – Feb 2006)		Main Alfred Hospital and Alfred Centre (Feb 2009 – Feb 2010)	
Code	Description	No. of patients	Mean (SD) LOS (days)	No. of patients	Mean (SD) LOS (days)
C16Z	Lens procedures	22	1.2 (0.7)	643	0.3 (0.9)
G11Z	Anal and stomal procedures	58	0.8 (2.3)	300	1.0 (3.1)
G10B	Hernia procedures w/o CC	54	2.6 (4.0)	286	1.5 (3.0)
H08B	Laparoscopic cholecystectomy w/o closed CDE or w/o Cat/Sev CC	40	1.6 (1.2)	183	1.2 (1.2)
L07B	Transurethral procedures except prostatectomy w/o CC	41	0.7 (2.0)	98	1.1 (2.9)
D06Z	Sinus and complex middle ear	30	2.0 (2.2)	66	2.0 (4.0)
Combined LOS for the top 10 DRGs		*397*	*4.8 (8.0)*	*1784*	*2.3 (6.3)*

w/o CC = without complications or comorbidities. w/o closed CDE or w/o Cat/Sev CC = without closed common duct exploration or without catastrophic/severe complications or comorbidities. ◆

from 28% to 6% as shown in Box 3. By February 2011, HIP rates at the Alfred Centre and the main Alfred Hospital were less than 1% and 7%, respectively.

Having a dedicated stand-alone facility for elective surgery also resulted in a reduction in the median time to time-critical non-elective surgery at the main Alfred Hospital.

Lengths of stay

Box 4 shows the combined LOS for 2010's top 10 surgical DRGs and individual LOS for 2010's top six surgical DRGs, before and after introducing the new model of care, for both the Alfred Centre and the main Alfred Hospital. There was a reduction in combined LOS for the top surgical DRGs from a mean of 4.8 days before the redesign to a mean of 2.3 days after the redesign, and the mean LOS also decreased for patients having lens or hernia procedures, and for those having laparoscopic cholecystectomy (Box 4). The differences in combined LOS and the DRG-specific LOS between the two time periods were significant ($P < 0.001$; Wilcoxon Mann–Whitney test for non-normally distributed data), as were the LOS differences for anal and stomal procedures and transurethral procedures ($P < 0.001$).

The overall proportion of patients discharged on the day of admission and procedure increased after implementing the process redesign, with a continuing overall upward trend in successful same-day discharges. There was a rise in the proportion of successful same-day discharges from 83% in February 2005 to 95% in February 2010 (Box 5).

Increased capacity to manage demand

The number of patients admitted to the Alfred Hospital per month for elective surgery increased after the opening of the Alfred Centre in February 2007. In the quarter ending 30 September 2009, there were 2648 elective surgery admissions compared with 1560 for the same quarter 4 years previously. This represented an increase of 70%. Box 6 shows the change over time in elective surgery admissions per quarter.

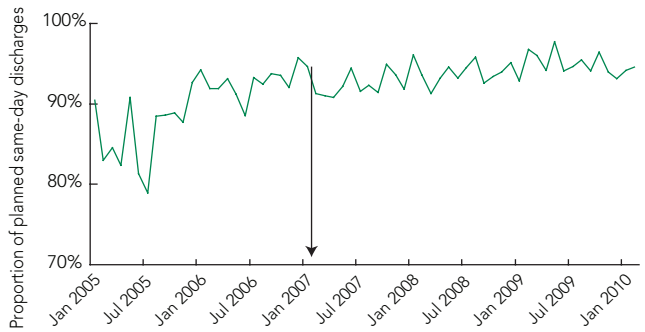
DISCUSSION

After the redesign of the perioperative surgery processes at the main Alfred Hospital and the Alfred Centre, there was a significant reduction in the number of elective surgery patients waiting longer than national recommended times. All patients waiting for elective surgery (including those ready or not ready for care) were included in the analysis. There were also reductions in HIP rates as well as LOS for the top surgical DRGs. Waiting times for time-critical emergency surgery also improved.

This is an important result for the Alfred's emergency and trauma services, which like other emergency departments have sustained year-on-year increases in demand.[9] These positive gains were shared by patients, the wider community and the whole hospital, with reduced LOS, improved patent flow, patient-centred care, minimal disruption to daily living for those having same-day care, reduced waiting times, and reduced risk of cancellation of surgery.

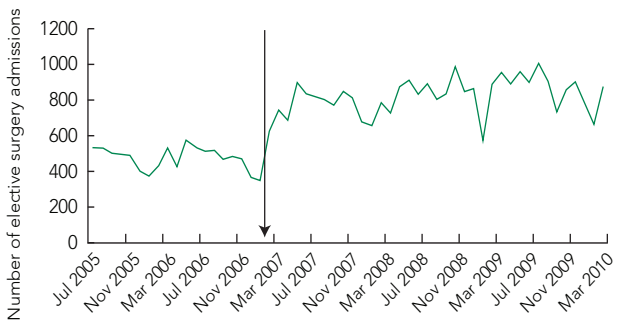
Elective surgery throughput is subject to seasonal fluctuations caused by many factors, such as staff availability and patient

5 Improvement in the proportion of elective surgery patients discharged on the day of admission, Alfred Hospital and Alfred Centre, Feb 2005 – Feb 2010



Arrow denotes when the Alfred Centre was opened (Feb 2007). ◆

6 Increase in elective surgery admissions, Alfred Hospital and Alfred Centre, Jul 2005* – Feb 2010



Arrow denotes when the Alfred Centre was opened (Feb 2007).
* Data only available from July 2005. ◆

availability or readiness for surgery. Of note, from April 2008 to January 2010, elective surgery throughput at the Alfred Centre was reduced during further building works, which may have impacted on outcomes. Despite this, there were overall improvements in the indicators examined. After completion of the study, waiting times have shown a sustained downward trend, with no Category 1 (urgent), 279 Category 2 (semi-urgent), and 51 Category 3 (non-urgent) patients waiting beyond the recommended times in February 2011.

Reductions in DRG-specific and combined LOS are also important for coping with increasing demand. Benchmarking against the Health Roundtable data[10] showed that the combined and DRG-specific LOS were similar to or lower than those at comparable hospitals around Australia. There is clear evidence from the data on specific DRGs that the redesign and streamlining of processes have improved efficiency. The substantial rise in the number of patients discharged on the same day as their admission and procedure reflects the successful streamlining of processes. Although we have not addressed cost savings, a previously published pilot redesign project in a Sydney hospital was accompanied by a reduction in costs.[11]

Establishment of the Alfred Centre and segregation of the surgical streams enabled protection of the hospital's elective surgery capacity. This has resulted in fewer cancellations of planned elective surgery when emergency surgery peaks occur, as they do in a busy trauma centre. The 44% reduction in the number of Category 2 (semi-urgent) patients waiting for longer than recommended, and the reduction in HIP rates to 1%, are clear illustrations of this key outcome.

Comparable clinical process redesigns in hospitals in Sydney and Scotland[1,11-13] have resulted in similar reductions in waiting times and cancellation rates. The process redesigns in Sydney, which also involved coordination and streamlining of patients through a pre-admission clinic using protocol-based processes, demonstrated reduced LOS, shorter operating times, theatre cost savings, and reduced waiting lists.[11]

The additional capacity gained from 55 same-day (recovery) and 26 overnight surgical beds, in isolation, would not be sufficient to improve DRG-specific or combined LOS unless accompanied by a significant redesign of care pathways, as we found in our study. Increasing capacity alone may not always have the predicted impact on throughput, as there is then less pressure to move patients through efficiently. Most importantly, a reduction in LOS facilitates further efficiencies, thereby increasing surgical throughput.

Informal surveys of the Alfred Centre medical, surgical and nursing staff have shown an improvement in morale since the implementation of the new model of care, and a telephone follow-up of short-stay elective surgery patients from September 2008 has shown 100% satisfaction with the new pre-admission process.

The strength of our study is the comparison of outcomes before and after the introduction of a redesigned model of care in a major metropolitan teaching hospital. To our knowledge, the only other study comparing LOS before and after a redesigned model of care was the small pilot study mentioned earlier.[11]

The observational nature of our study means that unknown biases and confounders may affect the outcomes reported; for example, changes in casemix complexity (eg, patients having transurethral procedures or those with sleep apnoea having septoplasty requiring a multiday stay) will impact on DRG-specific and overall LOS. In addition, it may not be possible to generalise the service efficiencies we gained to other clinical settings where beds cannot be quarantined for specific purposes.

The clinical process redesign with collocation of a dedicated elective surgery centre proved to be effective, with improved timeliness of care for all surgical patients and reduced LOS. It resulted in an increase in the volume of surgery performed, thereby enabling the Alfred to meet the increasing demand for acute care.

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COMPETING INTERESTS

None identified.

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