Improving Blood Glucose Level (BGL) Control Before Cardiac Surgery

A Strategy to Reduce Complications in Diabetic Patients Prior to Admission for Elective Coronary Bypass Graft (CABG) Surgery

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Aim Statement: Within 6 months reduce by 50% the rate of diabetic patients booked for Coronary Artery Bypass Graft (CABG) with high blood glucose levels (BGL) (>12mmol/L) on surgical admission

Cost saving:

- Negligible cost to SESLHD, no additional resources required. Up to 4 HBA1c tests in a 12 monthly period per person is rebated by Medicare.
- Surgical site infections (SSI's) associated with longer hospital stays (29 vs 11 days; p=0.003) and hospital readmissions. It is predicted that improved BGL control will reduce SSI's and therefore reduced hospital length of stay and readmissions.

Link to National Standard and Strategic Imperative

Project aligned to National Safety and Quality Health Service (NSQHS)

- Standard 1: Governance for Safety and Quality in Health Service Organisations
- Standard 3: Preventing and Controlling Healthcare Associated Infections

Project also aligned with the following diabetes and surgical guidelines

- POW Hospital Clinical Business Rule: Surgery and Medical Procedures for Patients with Diabetes Mellitus
- ADS-ANZCA Perioperative Guidelines 2016

Background

- Significant increase in elective CABG SSIs as defined by NSW health criteria was observed in the second half of 2016 (Charts 1 & 2)
- Several patient risk factors, derived from hospital patient coded data (Jul 2012 - April 2017), were observed having a statistically significant association to SSIs including; obesity (OR: 7.9; 2.7-23.0), insulin requiring diabetes (IDDM) (OR: 3.0;1.1-8.4), and gender (OR: 2.8; 1.1-8.4).
- Overtime only IDDM was shown to increase significantly (p> 0.007) and linearly (R^2 =0.173). Hence IDDM is an independent contributing risk factor to the increase in CABG SSIs.
- A brief pilot (n=32) to inform on possible differences in BGL control between diabetic patients who developed sternum SSI's (n=10) and without SSI's (n=22 randomly selected) showed that 1) BGL control was suboptimal on admission and during the hospital stay in at least 50% of patients and, 2) patients with poor preoperative BGL control (Random peak BGL >12) had significantly higher rates of any in-hospital infection (p=0.002).
- It is expected that improving BGL control in the preoperative period will reduce the risk of postoperative infections including SSIs

Chart 1. CABG Sternum SSIs Incidents Notifications.
Source: Infection control

Chart 2. Monthly sternum SSIs per 100 CABGs.
Source: Infection control

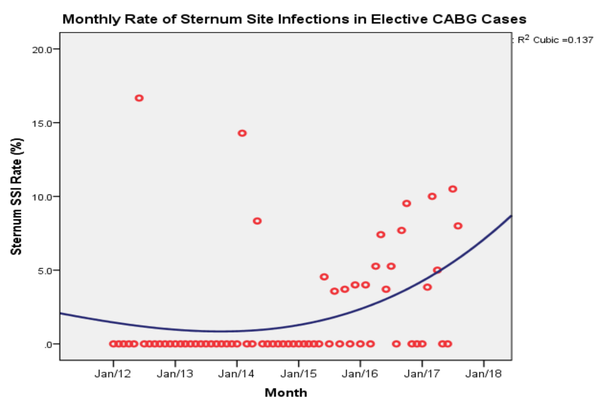
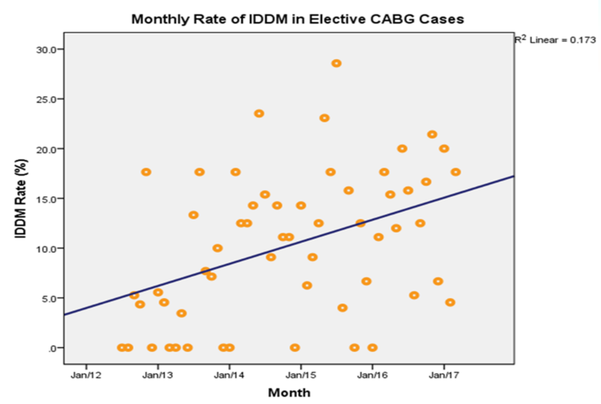
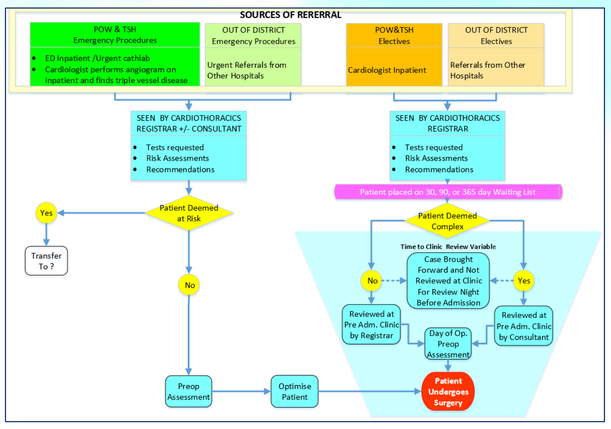
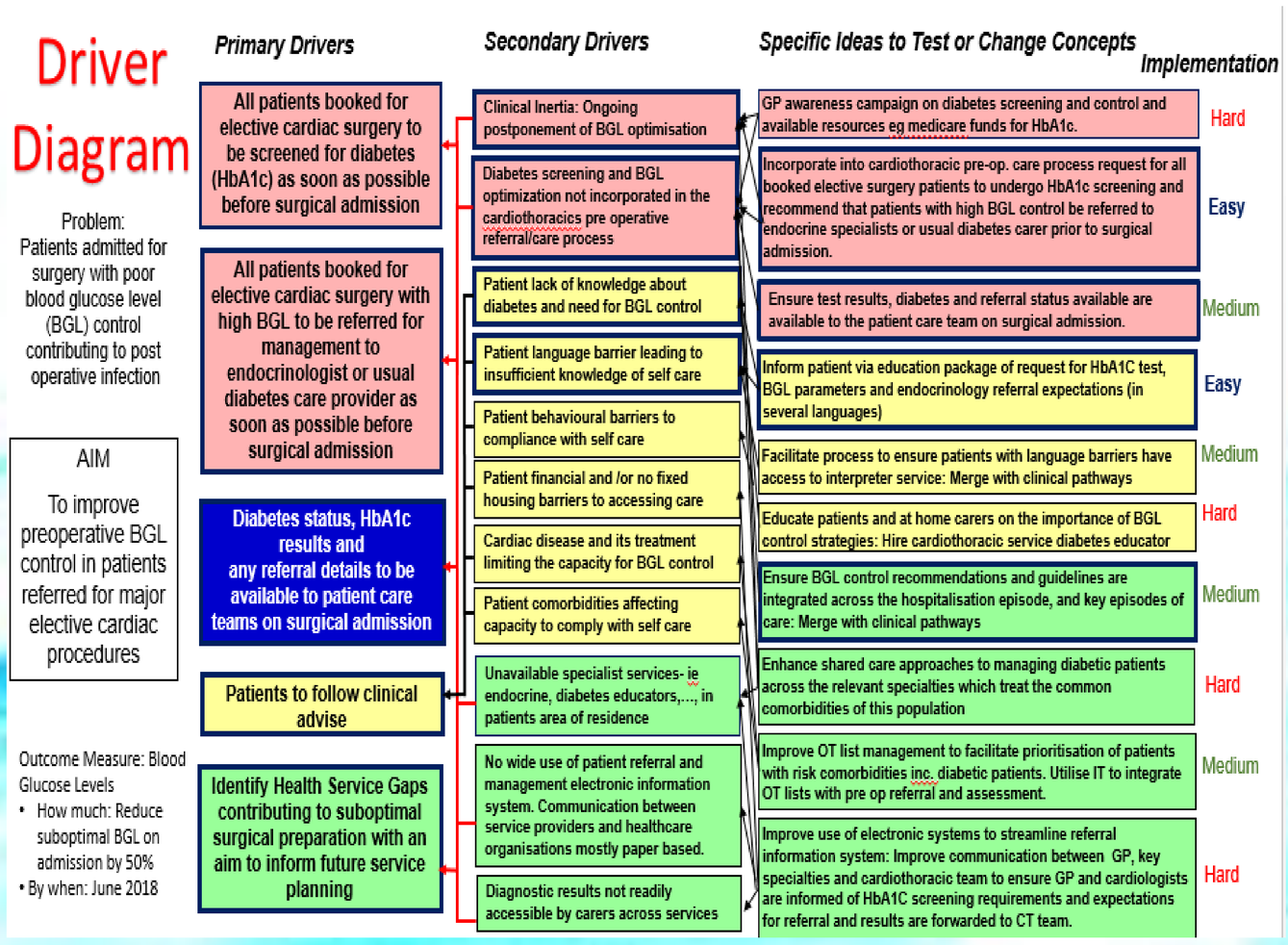


Chart 3. % CABG procedures in patients with IDDM
Source: HIE



Diag. 1 Patient preoperative care flow.





PDSA Cycle Objectives:

- Determine diabetes status and BSL control at the earliest on booking for surgery
- Refer patients with poor BSL control for specialist diabetes management
- To obtain support from surgeons to implement changes

Change 1: Test Pre Op. HbA1c in all patients
PLAN: Preadmission testing of HbA1c in all patients booked for CABG
DO: Add request for HbA1c test to GP letters, clinic and admission forms.
STUDY: Increase HbA1c testing prior to surgical admission

Change 2: Refer patients with high BGL to specialist care
PLAN: Early pre-surgery referral of all patients with HbA1c ≥ 9% for management by endocrinologist or usual diabetes carer
DO: Inform GPs to refer patients for diabetes management meeting specified criteria
STUDY: Increase in diabetes care referrals and decrease in elective surgery presentations with poor BGL control.

Change 3: Inform patients
PLAN: Inform patients to arrange early consult with GP to test HbA1c and follow up results
DO: Include requirements and safe BGL control information to in patients education pack.
STUDY: Increase diabetes care referrals before admission and decrease in poor BGL control on presenting for surgery

PDSA Cycle Actions: Integrate changes to existing clinical business rules, expand across district, and track barriers to accessing timely diabetes care.

Results

Overall Progress:

- pre-surgical care process mapped and BGL control improvement strategy finalised.
- Interventions listed in changes 1-3 incorporated into the following: preadmission clinic & cardiothoracic admission forms, letters to GP and patient information pack.
- Compliance with HbA1c tests requested, performed and captured has increased since initiatives, but remains < 50% and some patients still arrive with poor BSL control.

Discussion:

- Interventions are still to take effect and current surgical admissions are in patients who have gone through the system prior to changes been implemented.
- Delays and compliance barriers include 1) essential staff been on leave, 2) difficulties obtaining access to surgeons, 3) old forms still in circulation.
- A final report in June 2018 will inform on the sustainability of strategies as well as overall effect in reducing elective admissions with poor BGL control. A wider study in 2019 will inform on obstacles to accessing diabetes care in the community and patient risk factors for Infection.

Future measures to include in 2018 report:

- % who had a HbA1c test, % admitted with poor BGL control, % with poor BGL control referred for diabetes management, barriers to accessing diabetes care

Process outcomes:

Chart 4. % Forms include HbA1c test requests

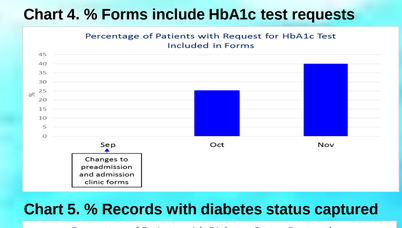


Chart 5. % Records with diabetes status captured

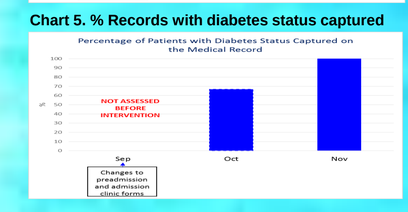


Chart 6. % Records with HbA1c performed before surgery

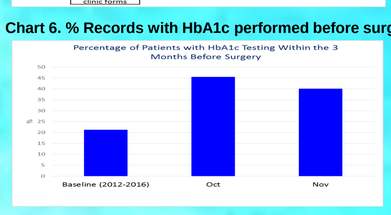
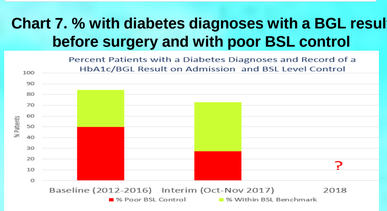
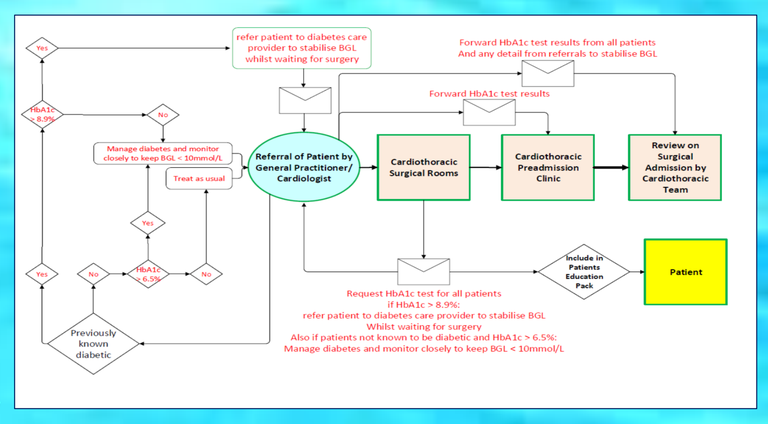


Chart 7. % with diabetes diagnoses with a BGL result before surgery and with poor BSL control



Diag. 2 Pre-op. BGL Control strategy



Sustain and spread change:

- Engaging with working groups to incorporate changes within POW cardiothoracic preoperative care processes, clinical guidelines and business rules
- Submitted with Hunter New England Health Service a Translational Research Grant Scheme proposal based listed strategies
- Epidemiological study aimed for publication in 2019

Literature review

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