

# EXPEDITE CABG - Multiplate® platelet function testing to decide timing of cardiac surgery for patients on platelet inhibitors: A single-centre retrospective cohort study

Joel Selby<sup>1,2</sup>, Akshat Saxena<sup>1,3</sup>, Ghalia Feddah<sup>4</sup>, Catherine Downs<sup>1,2</sup>

<sup>1</sup> UNSW School of Clinical Medicine, Sydney NSW, Australia. <sup>2</sup> Prince of Wales Department of Cardiothoracic Anaesthesia, SESLHD, Sydney NSW  
<sup>3</sup> Prince of Wales Department Cardiothoracic Surgery, SESLHD, Sydney NSW <sup>4</sup> Bankstown Hospital, Sydney NSW, Australia

## Background

Patients for urgent coronary artery bypass grafting (CABG) may be administered antiplatelet medications to reduce the risk of thrombotic complications. This can lead to increased risk of bleeding peri-operatively and recommended waiting periods aim to mitigate this risk (1). Multiplate® testing quantifies platelet inhibition due to drugs such as clopidogrel and ticagrelor. Many patients exhibit resistance to these drugs (2). Patients with normal platelet function despite recent drug administration may be delayed unnecessarily leading to increased hospital length of stay and cost of hospitalization in an already burdened healthcare system. Algorithms are used in many centres to identify patients who have had faster recovery of platelet function to expedite surgery sooner than the recommended waiting period (3). The Randwick Campus protocol was introduced in 2020. The cut-offs for an acceptable bleeding risk *green-zone* result are based on previous studies describing the predictive value of Multiplate® for excessive bleeding in CABG (4).

This study had two aims:

1. To audit local utilisation of the multiplate algorithm
2. To compare the risk of post-operative bleeding and red cell transfusion in patients who had expedited surgery meeting local criteria, with those who had waited the usual waiting period.

## Methods

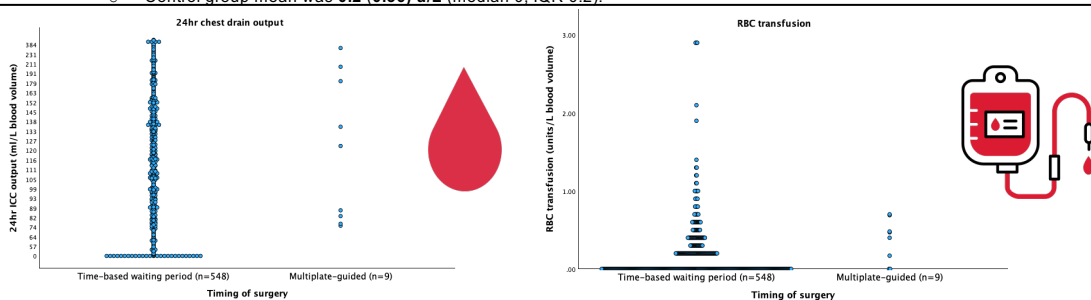
- ❖ Patients who underwent CABG over 42 months from 2021-2024 were audited for antiplatelet medication administration (excluding aspirin), and whether this was within the usual washout period for that medication (see algorithm).
- ❖ Patients on platelet inhibitors within the waiting period were defined as eligible for Multiplate®. The proportion of eligible cases who received a Multiplate® test, the result (binary green/red) and the number of days on the ward saved were collected.
- ❖ Hospital cost-savings were calculated based on LHD patient fees, \$2838/night for a medicare-ineligible acute bed (5).
- ❖ Patients who met the green criterion and proceeded to surgery early were analysed for
  - Primary outcome - chest tube drainage measured from chest closure to 24hr postop in ICU.
  - Secondary outcome - transfusion requirement for red cell (RBC) units given post-bypass prior to ICU discharge.
- ❖ Outcomes were indexed to patient blood volume using the Nadler equation to account for differing patient sizes.
- ❖ A retrospective control cohort of CABG patients in the same timeframe who had waited the prescribed number of days to offset the medication or had not been given antiplatelet drugs was collected for comparison.

## Blood Management for Adult Cardiac Surgery

Randwick Hospital Campus 2023		Prince of Wales FACULTY OF MEDICINE													
Anaemia: Hb < 130g/L (Male) < 120g/L (Female) Or Ferritin < 100mcg/L Or Transferrin Sat ≤ 20%	→ YES	Follow preoperative Haemoglobin Optimisation pathway, ideally > 2 weeks before surgery, but benefit seen at any time perioperatively													
Fibrinogen < 2g/L	→ YES	Inform Anaesthetic team as may require cryoprecipitate post CPB													
Do you have time (1-2 hours for test result) to check platelet function Mon-Fri 9am-4pm? First call COAG LAB Ext. 23482 usually if: Ticagrelor < 3 days Clopidogrel < 5 days Prasugrel < 7 days	→ YES	Pathology request form or eMR requesting 'multiplate-platelet function - ROTEM'	LOW RISK												
		Please indicate any antiplatelet therapy Aim for green zone at 24h pre-op													
		<table border="1"> <tr> <td>Result</td> <td>Green Zone</td> <td>Normal</td> </tr> <tr> <td>ADP</td> <td>≤40</td> <td>&gt;40</td> </tr> <tr> <td>ADP (AA)</td> <td>≤20</td> <td>&gt;20</td> </tr> <tr> <td>TRAP</td> <td>≤77</td> <td>&gt;77</td> </tr> </table>	Result	Green Zone	Normal	ADP	≤40	>40	ADP (AA)	≤20	>20	TRAP	≤77	>77	HIGH RISK
Result	Green Zone	Normal													
ADP	≤40	>40													
ADP (AA)	≤20	>20													
TRAP	≤77	>77													
		GREEN ZONE: Proceed to OT (no pre-arranged platelets)													
		RED ZONE: IF NON-URGENT DELAY 48 hours and re-test													
Not recommended if isolated aspirin use Hand deliver 12 Hbun tubes level 4 Coag Lab	→ NO	Must Proceed?	HIGH RISK												
		No time for Multiplate or the wait period for ceasing DAPT													
		Arrange platelet availability (at least one pooled platelets) If urgent ADP needed Multiplate													

## Results

- ❖ Of a cohort of 623 CABG patients, 177 patients had received clopidogrel or ticagrelor and of these 73 patients were still within the waiting period when booked for surgery, ie clopidogrel ≤5 days (n=68) or ticagrelor ≤ 3 days (n=5).
- ❖ Multiplate® tests were performed in 26 cases, this was only 36% of eligible patients.
- ❖ Of these 26 cases, 9 had a *green zone* ADP, TRAP and ASPI Multiplate® result despite recent antiplatelet drug.
- ❖ All 9 patients proceeded to expedited surgery.
- ❖ The number of nights in hospital saved over the audit period was 14, equivalent to approximately \$40 000 (14\*\$2838/night).
- ❖ The time-based control group consisted of 548 patients who had received neither drug, or had waited the recommended time-period.
- ❖ For the primary outcome of 24hr chest drain output:
  - Multiplate® group mean (standard deviation) was **138 (67) ml/L** (median 123ml, interquartile range (IQR) 112ml)
  - Control group mean was **129 (73) ml/L** (median 118ml, IQR 64ml).
- ❖ For the secondary outcome of RBC units:
  - Multiplate® group mean was **0.3 (0.28) u/L** (median 0.4, IQR 0.59),
  - Control group mean was **0.2 (0.36) u/L** (median 0, IQR 0.2).



## Conclusion

- ❖ In our institution the rate of Multiplate® testing (36%) is currently less than ideal. If testing rates were to improve, it is feasible that many more patients would be identified and significantly more cases could be expedited.
- ❖ Although this is a small sample cohort, the central tendencies between groups do not appear clinically different given the small difference in mean/median of primary and secondary outcomes.
- ❖ There was greater dispersion of outcomes in the Multiplate® group (higher SD and IQR) for both outcomes, however this is limited by the caveat of a small sample size (9 cases).
- ❖ These data are encouraging and form the basis for a proposed multi-centre prospective RCT to clarify if expedited surgery has non-inferior outcomes.
- ❖ If non-inferiority is demonstrated, this would translate to multiple benefits for both patients and the healthcare system, including reduced risk of preoperative complications, nosocomial infections, length of stay, and cost of hospitalization.

## References

1. Casselman FP, Lance MD, Ahmed A, Asari A, Blanco-Monillo J, Bolliger D, Eid M, Erdoes G, Haumann RG, Jeppsson A, van der Merwe HJ. 2024 EACTS/EACTA Guidelines on patient blood management in adult cardiac surgery in collaboration with EBCR. *Interdisciplinary cardiovascular and thoracic surgery*. 2025 May;40(5):ivae170.
2. Kim Y, Weisler EH, Puck N, Lutz CA. A systematic review of clopidogrel resistance in vascular surgery: current perspectives and future directions. *Annals of Vascular Surgery*. 2023 Apr 1;91:257-65.
3. Bolliger D, Lance MD, Siegemund M. Point-of-care platelet function monitoring: implications for patients with platelet inhibitors in cardiac surgery. *Journal of cardiothoracic and vascular anesthesia*. 2021 Apr 1;35(4):1049-59.
4. Petrovic M, Konosic S, Biločina B, Dirkmann O, White A, Mihaljevic MZ, Ivančan V, Konosic L, Svetina L, Göringer K. Bleeding risk assessment in patients undergoing elective cardiac surgery using ROTEM® platelet and Multiplate® impedance aggregometry. *Anaesthesia*. 2016 Jun;71(6):636-47.
5. NSW Government. Initial Budget Allocation Notice FY 2025-2026 - South Eastern Sydney Local Health District Fees and Charges Summary.pdf [Internet] [cited 2025 Oct 26]. Available from: [https://www.health.nsw.gov.au/sites/default/files/Innovative\\_Services/Budget/2025/2025-2026%20SESLHD%20Fees%20and%20Charges%20FY25-26.pdf](https://www.health.nsw.gov.au/sites/default/files/Innovative_Services/Budget/2025/2025-2026%20SESLHD%20Fees%20and%20Charges%20FY25-26.pdf)