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# ECG for all patients in the PACU: Some say, why? I say, why not?

## Abstract

Currently in many Australian hospitals, electrocardiogram (ECG) leads are removed after the operative process and, despite the machines being freely available in the Post Anaesthesia Care Unit (PACU), they are not connected to all patients.

There are many evidence-based reasons why an ECG would be advantageous for perioperative patient safety, including the detection of often asymptomatic conditions such as myocardial injury after non-cardiac surgery (MINS) and new-onset atrial fibrillation, which has been shown to increase the risk of stroke. Advantages may also be seen in saving precious minutes in a cardiac arrest, and the ability for nurses to constantly observe ECG rhythm strips as a learning tool.

The aim of this discussion paper is to challenge health care professionals' thinking about the use of ECG monitoring for the entire perioperative journey and inspire readers to implement this patient safety initiative.

**Keywords:** arrhythmia detection, atrial fibrillation, monitoring, PACU, perioperative safety, stroke.

## Introduction

In October 1997, at South West Healthcare in Warrnambool, a Victorian regional health care facility, we proudly moved into our new operating suite. The new PACU was fitted with state-of-the-art monitoring for every bay, something quite new for the times. At that time, I was one of the associate charge nurses for the PACU. In consultation with the perioperative service manager, we believed that now we were provided with this new equipment, we would connect all available monitoring capabilities, including pulse oximetry, 3-lead electrocardiogram (ECG) and automatic blood pressure monitoring, to our patients. Monitoring was connected to all patients in stage 1 PACU, regardless of age or procedure. It was felt that if we distinguished between patients, this may become a difficult decision for staff, and with the realisation that, albeit rare, cardiac events can occur in healthy patients, we wanted to ensure the

safest perioperative journey for all patients without differentiation. We assumed that when new monitoring became available, all other Australian health care facilities would do the same. Perhaps because of our regional locality, it was many years later that we realised this was not the case.

While internationally commonplace, ECG monitoring is not currently mandatory for PACU patients in Australia, despite several nursing texts recommending this practice<sup>1,2</sup>. However, a growing number of health care facilities in Australia have recognised the great advantages of ECG monitoring and have implemented 3- or 5-lead ECG rhythm strips as standard monitoring for all post-operative patients in stage 1 PACU.

This discussion paper will investigate evidence surrounding why ECG monitoring in the PACU would be a valuable addition, providing a safer standard of care for Australian

patients. This will be presented under four themes:

1. myocardial injury after non-cardiac surgery (MINS)
2. new onset perioperative atrial fibrillation (AF) and stroke
3. cardiac arrest
4. looking and learning.

## Discussion

The PACU was first developed in 1751 by surgeons who realised their immediate post-operative patients were unstable and would require a safe environment where they could be carefully monitored by specialist nurses until they were deemed 'ward ready'<sup>3</sup>. Despite updates in anaesthesia and surgery, the role of the PACU nurse has remained relatively unchanged; it requires attention to critical evaluation and stabilisation of immediate post-operative patients with an emphasis on the need for anticipating, recognising and, hopefully, preventing complications<sup>3</sup>. In many health care facilities only high-risk patients are connected to an ECG in the PACU.

### Myocardial injury after non-cardiac surgery (MINS)

A large multicentre, international trial conducted in 2012 (Vascular Events In Non-cardiac Surgery Patients Cohort Evaluation study – VISION) investigated the mortality associated with perioperative elevated troponin levels in patients (n=15,133) from North and South America, Australia, Europe and Asia<sup>4</sup>. The 30-day mortality was found to be independently associated with MINS and 84 per cent of myocardial injury patients were asymptomatic, resulting in missed diagnosis in the vast majority of patients with MINS<sup>4</sup>. More recent research conducted in

South Africa revealed comparable results to the VISION cohort<sup>5</sup>.

### New onset perioperative atrial fibrillation (AF) and stroke

Salient research conducted by Gialdini et al. in 2014 informed us that new-onset perioperative AF is the most common arrhythmia reported in perioperative patients<sup>6</sup>. When commencing their research into perioperative AF, this common arrhythmia had been viewed as a self-limited transient response to physiological stress, however the long-term risk of stroke after AF was unclear<sup>6</sup>. Findings revealed that from a cohort of 1729360 eligible patients, 24711 (1.43%; 95% CI, 1.41%–1.45%) were diagnosed with new-onset perioperative AF during their perioperative journey with 13952 (0.81%; 95% CI, 0.79%–0.82%) experiencing a stroke after discharge. These findings included both cardiac and non-cardiac participants<sup>6</sup>. A recent systematic review including 3536291 patients from fourteen studies conducted by Australian researchers supported the previous findings revealing a 2.5-fold increase in stroke after new-onset AF in non-cardiac patients<sup>7</sup>. Interestingly, it was revealed that an increased trend in the AF was noted in studies where continuous, as opposed to 'opportunistic', cardiac monitoring was employed<sup>7</sup>. Recent Japanese research revealed that of non-cardiac patients who experienced new-onset AF, 92 per cent of subsequent episodes were asymptomatic<sup>8</sup> providing further evidence that ECG monitoring of all patients in PACU would provide greater patient safety in the ability to diagnose AF post-operatively.

### Cardiac arrest

The Victorian Consultative Council on Anaesthetic Mortality and Morbidity Triennial report 2015–2017

reminds us that, while uncommon, cardiac arrests occur during the perioperative journey<sup>9</sup>. Findings revealed that 28 arrests occurred intra-operatively, five in the PACU and three post-operatively on a ward<sup>9</sup>. Of these, 15 cases involved emergency surgeries, three were semi-elective but the majority, 18 cases, occurred during routine elective surgery revealing that all patients are at risk<sup>9</sup>. These figures are not surprising when we remember that many of the complications seen in the operating suite, such as hypothermia, hypoxemia and hypovolemia, are known causes of cardiac arrest.

One of the core nursing competencies that stage 1 PACU nurses are required to meet is advanced life support (ALS), including paediatric ALS if paediatric patients are cared for in the PACU<sup>10</sup>. In any medical emergency, early recognition is believed to be the most essential step to a positive outcome<sup>11</sup>. When patients are not connected to ECG in the PACU and the patient suffers a cardiac arrest, minutes may be wasted confirming an arrest has occurred; however, when an ECG trace confirms a shockable rhythm such as ventricular tachycardia or ventricular fibrillation, nurses immediately know what they are dealing with and vital minutes may be saved. Connecting a patient to an automated external defibrillator (AED) at the earliest possible moment is vital for patients who require this therapy, as survival rates decrease by approximately seven to ten per cent every minute without defibrillation<sup>12</sup>.

### Looking and learning

Much of the learning involved in interpreting abnormal arrhythmias is to first understand what is normal. This occurs by regular observation of a normal ECG trace. When unstable patients or those with a known cardiac condition are admitted to the

PACU and staff are asked to connect an ECG to a patient, if the PACU nurse has not been regularly observing normal ECG rhythms, and maintaining familiarity with the diagnosis of arrhythmias, it is likely they may have lost some of their skills.

There has never been a more salient time to remember that PACU nurses are often asked to care for unwell patients. The COVID-19 pandemic is a perfect example with many PACU nurses being asked to upskill and work in either high dependency or intensive care units. This is evidenced by the funding being provided by the Australian government for 20 000 eligible nurses to undertake the SURGE (Specialised Upskilling and RN Growth through Education) Critical Care program<sup>13</sup>. Having been personally involved in the project and having had conversations with many of my PACU colleagues, those who have been accustomed to using ECG in the PACU are thankful for this additional skill which has made the transition to recognising more complex arrhythmias easier.

## Conclusion

Currently, my minimal clinical workload allows me to continue my patient care in the PACU. One of my first missions on commencing new employment some three years ago was to politely discuss the introduction of ECG monitoring into the PACU with every anaesthetist who would listen. While this often initially fell on deaf ears, after some time the director of anaesthetics and the perioperative service manager agreed to initiate this practice change. Once introduced, this was amazingly painless and seamless for all and has continued as routine PACU monitoring for the past 18 months. Patients arrive in PACU with monitoring attached that has been connected from the anaesthetic room, allowing monitoring

throughout the entire perioperative journey.

This discussion paper has provided information about learning and evidence related to several cardiovascular conditions that are asymptomatic and may be present in seemingly uneventful surgical procedures. In many health care facilities early signs of these conditions may be missed as patients are not connected to ECG monitoring in the PACU.

Despite all the evidence, the most resounding and salient point in this debate for me was born from a discussion with several health care workers, one of whom was a consumer representative. The consumer representative asked, 'If you have a piece of monitoring that is free, does not have contraindications, and may detect abnormalities, why would all patients not be allowed to benefit from this?' As we are all the elderly and potential perioperative patients of the future, perhaps it is time for us to reconsider this issue as consumers.

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