

CPR IN THE OPERATING SUITE A CASE HISTORY APPROACH

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We do not ever look at adverse events to 'scoff' but rather to 'learn'

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CASE HISTORY NUMBER 1

You are the circulating nurse in theatre 5 where Mr Jones, a fit 31-year-old male is undergoing an elective left inguinal hernia repair. The patient is having a non-relaxant general anaesthesia with a supraglottic airway in situ?

- During the procedure, the anaesthetist announces that the patient has two short runs of atrial fibrillation (AF)
- No treatment was required as the AF resolved spontaneously
- Once resolved and throughout the rest of the case, the patient remained in sinus rhythm

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QUESTION

As a side issue.....
Do you routinely have ECG monitoring for EVERY patient in PACU?

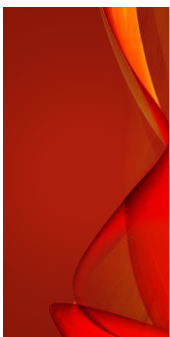
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QUESTION

Do you think a run of AF in an otherwise fit healthy patient that resolved spontaneously would be of any concern?

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CASE HISTORY NUMBER 2

- Mrs. James is a 28 year old women who presents for an emergency caesarian section under general anaesthetic for an anterior placenta praevia
- She arrives to PACU after uneventful delivery of a healthy baby boy. She has a 1 litre bag of Hartmann's solution with 40 units of syntocin added (This is an older case report – there are more modern uterotonic agents)
- After hand over from the anaesthetist, Mrs. James begins moaning and groaning, with body language indicative of severe pain

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CASE HISTORY NUMBER 2

- Her abdominal dressing is dry and intact with a small PV loss present on her pad
- 10 minutes after arrival to PACU, Mrs. James has received 10mg morphine for pain with no noticeable improvement and PV loss is present- approx. 3-4 small trickles of blood
- Surgeon notified of PV loss and after review administers 0.25mg ergometrine
- PV loss continues
- Surgeon then administers another 0.25mg ergometrine
PV loss appears to diminish



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CASE HISTORY NUMBER 2

- 10 minutes after departure of surgeon, a small PV loss recommences
- Excessive ooze is noticed on Mrs. James abdominal dressing
- Haemocue performed, with a measurement of 8 g/dL
- A slight tachycardia is present at 100 bpm with no changes to a stable blood pressure
- Anaesthetist takes blood for FBE, U&E and coagulation studies
- 4 units of packed cells are ordered




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CASE HISTORY NUMBER 2

- Throughout Mrs. James's pain has not improved with IV Tramadol and a further 10mg morphine iv given
- 1st unit of blood is commenced
- Tachycardia starts increasing to 120-130 bpm
- Mrs. James now becomes hypotensive- 70 systolic with increasing difficulty in assessing manually and mechanically
- PV loss remains small to moderate



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WHAT MIGHT BE THE CAUSE OF MRS. JAMES' HYPOTENSION

Decreased B/P may be caused by;

- blood loss
- increased size of the vascular compartment


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SHOCK

Shock is a condition of circulatory impairment leading to inadequate vital organ perfusion and oxygen delivery
Shock is a dangerous condition that may be fatal

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SHOCK

S & S

- ↓B/P & ↑ heart rate (HR)
- **Stroke volume x HR = Cardiac Output**
- **70 mls x 70 bmp = 4.9 litres**
- What is normal B/P?

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QUESTION


What is the best position for a patient with hypotension?

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ANSWER

- 1.Flat
- 2.Head down
- 3.Flat with legs elevated

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WHAT TO DO FOR ↓ B/P

Not necessarily in this order

- Call for assistance:
 - document / urgent clinical review from the consultant anaesthetist
 - call met if no one is able to attend
 - Call code blue is the situation deteriorates
- Position – flat with feet up
- O₂ therapy
- ????P – ? manual
- Check peripheral return
- Follow instructions from medical staff
- ??? fluid resuscitation
- ??? medication

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CASE HISTORY NUMBER 2

- Surgeon is paged urgently
- While awaiting surgeon 2nd unit of packed cells is commenced, tachycardia continuing
- Mrs. James is now becoming less responsive to PACU staff and incoherent
- She loses consciousness
- Suddenly Mrs. James ECG changes



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CASE HISTORY NUMBER 2



- What is this rhythm?
- Do you an ECG connected to every patient?

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CASE HISTORY NUMBER 2

- As you do not have an ECG connected, by the time you connect up etc....
- The rhythm has changed to:



ATRIAL FIBRILLATION

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TORSADE DE POINTES



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CASE HISTORY NUMBER 1

- What is the first line treatment for this rhythm?
- Why is this treatment so important?
- What, if anything, do you think could have been a possible cause for this arrest?
- What if anything could have been done during the PACU period to anticipate this outcome?

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CASE HISTORY NUMBER 1

Fundal Height

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POSTPARTUM HAEMORRHAGE

- Risk factors
- Placenta praevia
- Placental abruption
- Atonic uterus
- Delayed diagnosis & treatment
- Delayed correction of coagulopathy



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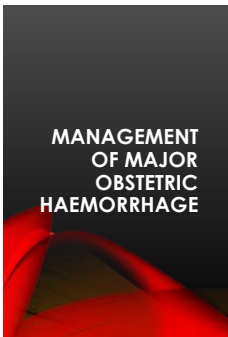
DEFINITION OF TERMS

- **Antepartum Haemorrhage:**
- Any PV bleeding from 20 weeks onwards
- **Postpartum Haemorrhage:**
- A blood loss in excess of 600ml post delivery
- **Placenta Praevia:**
- Low implantation of the placenta in the uterus, near and/or over the cervix measured from grade I – grade IV

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MANAGEMENT OF MAJOR OBSTETRIC HAEMORRHAGE

- Anticipate
- Appropriate I.V. access
- Anaesthetic technique
- Blood available
- Obtain good I.V. access
- Keep patient warm
- Use a rapid infusion / warming device
- Consider use of group specific blood
- Involve haematology early in massive transfusion



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POST PARTUM HAEMORRHAGE



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CONFIDENTIAL ENQUIRY INTO MATERNAL DEATHS, 1994-1996

- **Haemorrhage**
- 50% PPH
- 50% Placenta Previa or Placental abruption
- **Standard care in 65%**
- Delayed recognition
- Inadequate fluid resuscitation

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CONFIDENTIAL ENQUIRY INTO MATERNAL DEATHS, 2011

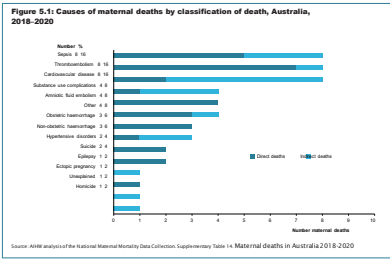
- The nine deaths from obstetric haemorrhage represent a substantial decline from the 14 deaths reported in 2003-05.
- The management of both expected major haemorrhage in women with known placenta accreta and unexpected excessive intraoperative blood loss has also improved

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CONFIDENTIAL ENQUIRY INTO MATERNAL DEATHS, 2011

- However, there is evidence of poor postpartum care in which continued bleeding went unrecognised in the immediate postpartum period (Cantwell et al. 2011)
- Do Fundal heights!!!!

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CASE HISTORY NUMBER 3

- Mrs Marsh is a fit 40-year-old lady who presents for an emergency laparoscopic cholecystectomy
- From the beginning of the case there is a large amount of oozing blood loss
- The surgical field suddenly fills with blood and the surgeon realises they have damaged an artery
- The procedure is converted to 'open'
- The anaesthetist reports that the blood pressure has fallen to 75/40

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CASE HISTORY NUMBER 2

- You can see the anaesthetic machine and the patients ECG



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CASE HISTORY NUMBER 2

Mrs Marsh rhythm changes to this;



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QUESTION

What is the second rhythm?

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ANSWER

1.Ventricular
tachycardia

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QUESTION

What is first line
treatment for this
rhythm?

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ANSWER

1.Defibrillation

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IN AN
UNCONSCIOUS
PATIENT
WHO IS IN VT

Early defibrillation




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WHAT ARE THE
CAUSES OF
CARDIAC
ARREST?

4 H's & 4 T's & consider 2 A's


- T Tamponade –Cardiac
- T Tension Pneumothorax
- T Toxins, poisons, drugs
- T Thromboembolism




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WHAT ARE THE
CAUSES OF
CARDIAC
ARREST?

- H Hypoxaemia
- H Hypovolaemia
- H Hypothermia
- H Hypokalaemia / hyperkalaemia & metabolic disorders
- A Acidosis
- A Acute Myocardial Infarct



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RATIONALE FOR EARLY DEFIBRILLATION

Early defibrillation-greatest predictor of survival rate from VT & VF

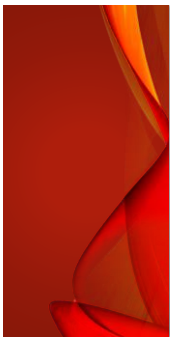
- VF less than 1 minute = 99.99% discharge from Hosp.
- VF 2 minutes = 50% discharge from Hosp. (70% - 80% revert)
- VF 5 minutes = 35% discharge from Hosp.

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BASIC LIFE SUPPORT

- The main aim of Basic life support is to defibrillate the patient where needed, and to maintain circulation and oxygenation until Advanced Life Support measures can be instituted

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BASIC LIFE SUPPORT

- What is the compression to ventilation rate for adults in hospital?
- What is the compression to ventilation rate for children in hospital?
- What is the compression to ventilation rate for neonates in hospital?

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BASIC LIFE SUPPORT

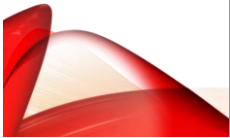
- DRS D ABC or in theatre - DRS DAB???
- Danger - Assess for danger (if applicable)
- Responsive - Assess conscious state if appropriate
- At this point if there is:
 - An abnormal, life threatening E.C.G. rhythm such as:
 - V,T
 - V,F
 - Severe bradycardia, particularly dangerous in paediatric patients
- An inappropriate conscious state, considering their condition
- A significant problem with respirations to cause hypoxia and or circulatory
- **GET ASSISTANCE**



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BASIC LIFE SUPPORT

- Send for help & **note the time**– press emergency button in the theatre / recovery.
 - Call for the resuscitation trolley
 - Connect patient pads – assess rhythm ASAP
- Defibrillation if appropriate
- Airway – Open airway
- Breathing – are they breathing? Is the chest rising and falling?
- Circulation



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BASIC LIFE SUPPORT

- N.B. Generally there will be enough staff to manage both airway and circulation simultaneously
- Do not delay defibrillation

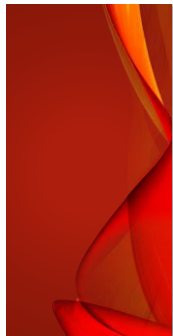


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'LIMIT HAND OFF TIME'

- Maintaining CPR while defibrillator charges

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CPR NUANCES PERTAINING TO THEATRE

How to position yourself for CRP

- Chest compressions
- ? On the operating table verses standing on a stool
- Caution must be taken not to injury yourself

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CARE OF YOUR BACK

- Do not twist to see monitors
- There may be Occupational health & Safety issues with kneeling on the table or arm boards
- Be very careful that you are actually kneeling on the OR table rather than the unstable arm board
- Practice your CPR in your theatre in the environment where an emergency may occur

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DOCUMENTATION

- Timeline documentation is essential
- This must be accurate, legible and in ink
- As CPR is not a planned or expected outcome, an 'incident report / Riskman / VIMS' should be completed
- Staffing – how many staff do you have out of hours?

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ALLOCATIONS

How many staff do you have out of hours?

- My suggestions – preplanning – allocate tasks
- Airway (anaesthetic nurse)
- Compressions (medical staff – 2-minute rotations)
- Defibrillator (in charge person)
- Medications (nurse)
- Scribe (nurse)

In charge – ?ALS trained – defibrillator
Extra – getting equipment / getting further assistance etc..

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WHAT WAS YOUR ANSWER TO THE QUESTION ABOUT HAVING AN ECG CONNECTED?

??????????

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Background / History

We assumed that when new monitoring became available, all other Australian healthcare facilities would do the same. Perhaps because of our regional locality, it was many years later that we realised this was not the case

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ECG IN PACU

Whilst internationally commonplace, ECG monitoring is not currently mandatory for PACU patients in Australia, despite several nursing texts recommending this practice (Foran & Hoch 2020; Schlick 2018) However, a growing number of HCF's in Australia have recognised the great advantages of ECG monitoring and have implemented 3 or 5-lead ECG rhythms as standard monitoring for all post-operative patients in stage 1 PACU (Foran 2020)

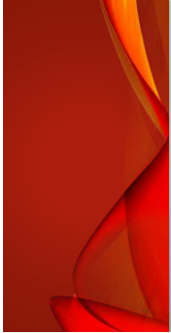
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ECG IN PACU

During investigating evidence surrounding why ECG monitoring in PACU would be a valuable addition providing a safer standard of care for Australian patients, four themes were noted;

- new onset perioperative Atrial Fibrillation (AF) and stroke,
- myocardial injury after non-cardiac surgery (MINS),
- cardiac arrest,
- looking and learning (Foran 2020)

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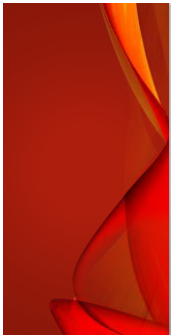


ECG IN PACU -THEME 1

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 (Gialdini et al. 2014)

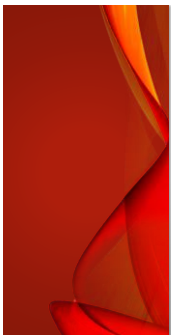
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ECG IN PACU- THEME 1

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 (Gialdini et al. 2014)

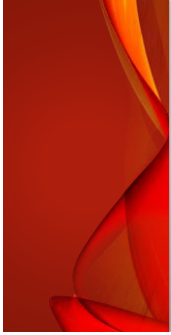
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ECG IN PACU THEME 1

Findings revealed that from a cohort of 1,729,360 eligible patients, 24,711 (1.43%; 95% CI, 1.41%- 1.45%) were diagnosed with new-onset perioperative AF during their perioperative journey with 13,952 (0.81%; 95% CI, 0.79%-0.82%) experiencing a stroke after discharge. These findings included both cardiac and non-cardiac participants (Gialdini et al. 2014)

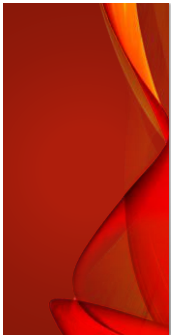
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ECG IN PACU –THEME 1

A recent Systematic Review including 3,536,291 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 (Koshy et al. 2020)

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ECG IN PACU – THEME 1

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** (Koshy et al. 2020)

Recent Japanese research revealed that of non-cardiac patients who experienced new-onset AF, 92% of subsequent episodes were asymptomatic (Higuchi et al. 2019) giving further evidence that ECG monitoring of all patients in PACU would provide greater patient safety in the ability to diagnose AF postoperatively.

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ECG IN PACU THEME 2

Myocardial injury after non-cardiac surgery (MINS)

A large multicentre international trial conducted in 2012 investigated the mortality associated with perioperative elevated troponin levels in patients (n=15,133) from North and South America, Australia, Europe and Asia (Vascular Events In Non-cardiac Surgery Patients Cohort Evaluation study - VISION) (Devereaux, Chan & Alonso-Coello 2012)

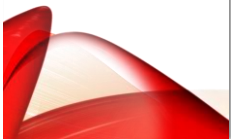
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ECG IN
PACU
THEME 2

The 30-day mortality was found to be independently associated with myocardial injury after non-cardiac surgery (MINS) and of these patients 84% of myocardial injury patients were asymptomatic, resulting in missed diagnosis in the vast majority of patients with MINS (Devereaux, Chan & Alonso-Coello 2012)
More recent research conducted in South Africa revealed comparable results to the VISION cohort (Coetzee et al. 2018)

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ECG IN PACU
THEME 3



Cardiac arrest

The Victorian Consultative Council on Anaesthetic Mortality and Morbidity Triennial report 2015–2017 reminds us, that whilst uncommon, cardiac arrests occur during the perioperative journey (Safer Care Victoria 2019)

Findings revealed that 28 arrests occurred intraoperatively, 5 in the PACU and 3 postoperatively on a ward (Safer Care Victoria 2019)

Of these, 15 cases involved emergency surgeries, 3 semi-elective but the majority, 18 cases occurred during routine elective surgery revealing that all patients are at risk (Safer Care Victoria 2019)

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ECG IN
PACU
THEME 3

These figures are not surprising when we remember that many of the complications seen in PACU such as hypothermia, hypoxemia and hypovolemia are known causes of cardiac arrest (Foran 2020)

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ECG IN PACU
THEME 3



One of the core nursing competencies that stage 1 PACU nurses are required to meet is Advanced Life Support (ALS), including Paediatric Advanced Life Support if paediatric patients are cared for in the PACU (Australian and New Zealand College of Anaesthetists 2018)

In any medical emergency, early recognition is believed to be the most essential step (Hambrecht 2020)

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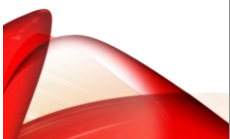
ECG IN PACU
THEME 3



When patients are not connected to ECG in PACU and the patient suffers a cardiac arrest, minutes may be wasted confirming an arrest had 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 (Foran 2020).

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ECG IN PACU
THEME 3



Connecting a patient to an AED at the earliest possible moment is vital for patients who require defibrillation as survival rates decrease by approximately 7%-10% every minute without defibrillation in a shockable rhythm (Szabó et al. 2020).

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ECG IN
PACU
THEME 4

Looking and learning

Much of the learning in interpretation of abnormal arrhythmias is in first understanding what is normal This occurs by regular observation of a normal ECG trace (Foran 2020)

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ECG IN
PACU
THEME 4

When unstable patients or those with a known cardiac condition are admitted to PACU and staff are asked to connect an ECG to a patient, if the PACU nurse has not been constantly observing normal ECG rhythms, and familiar with the diagnosis of arrhythmias, it may be likely they may have lost some of their skills (Foran 2020)

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ECG IN
PACU
THEME 4

There has never been a more salient time to remember that PACU nurses are often asked to care for unwell patients (Foran 2020)

The Covid-19 pandemic is a perfect example where many PACU nurses are being asked to upskill and work in either High Dependency Unit (HDU) or Intensive Care Unit (ICU)

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ECG IN
PACU
THEME 4

Having been personally involved in the SURGE project and having conversations with many of my PACU colleagues, those who have been accustomed to using ECG in PACU are thankful of this additional skillset which made the transition to more complex arrhythmias recognition easier (Foran 2020)

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ECG IN
PACU

Despite all the evidence, the most resounding and salient point in this debate for me was born from a discussion with several healthcare 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? (Foran 2020)

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AS WE ARE ALL THE ELDERLY AND POTENTIAL PERIOPERATIVE PATIENTS OF THE FUTURE, PERHAPS IT IS TIME FOR US ALL TO RECONSIDER THIS ISSUE AS CONSUMERS (FORAN 2020)



Best Qualities of Elderly People ... slate.com

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DISCUSSION



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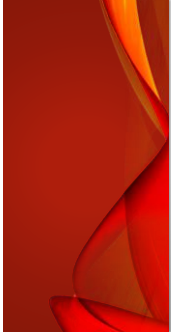
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