

Haemodynamic Tolerance of Cardiac Surgical Patients Receiving Vasoactive Medication in the ICU

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Disclosure of Interest

Edwards Life Sciences kindly loaned a Vigileo monitor for the duration of this project.

This research was also partly funded by an Equipment Grant from **The Common Good**, part of **The Prince Charles Hospital Foundation**.



Early Mobilisation of ICU patients

- Safe and feasible [1-5]
- Increased muscle strength [6]
- Reduced ICU and hospital length of stay [7,8]
- Reduced need for ongoing rehabilitation on discharge home [8]
- Improved quality of life at 6 months post discharge [6]



RESEARCH

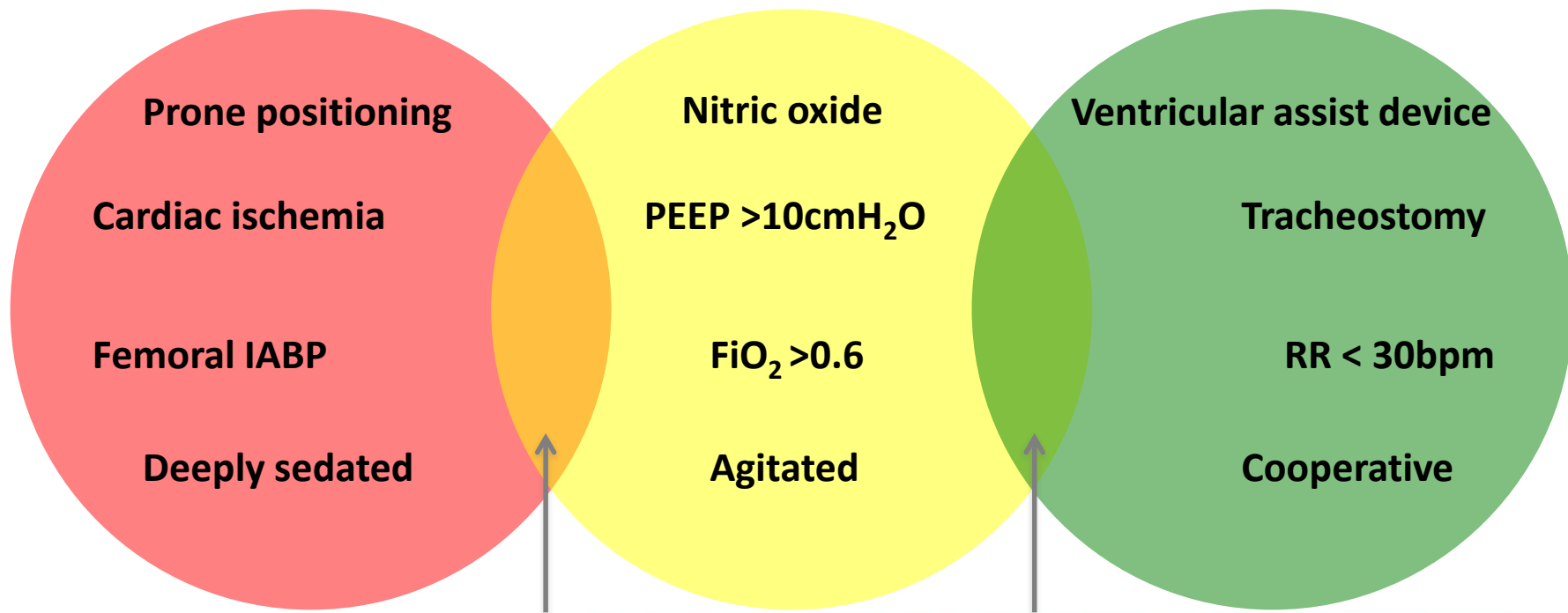
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Expert consensus and recommendations on safety criteria for active mobilization of mechanically ventilated critically ill adults

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Consensus Guidelines: “Traffic Light” system ^[9]



Grey area identified

- No consensus regarding the safety profile of mobilising patients receiving vasoactive medication ^[9]
- Appropriateness of mobilisation should be considered on a case-by-case basis ^[9]
- The haemodynamic effects of mobilisation while receiving vasoactive medication is a priority area for future research ^[9]



Cardiac surgical patients

- Among the top 5 reasons for admission to an adult ICU ^[10]
- Patients are routinely mobilised post-operatively
- Haemodynamic instability and administration of vasoactive medication is common
- This can pose a dilemma when considering the timing to commence mobility



Aims

Determine the effect of upright positioning on the haemodynamic parameters of adult cardiac surgical patients receiving vasoactive medication

Investigate what level of vasoactive medication may indicate safe mobility in cardiac surgical patients.

Describe whether any defined adverse effects occur as a result of mobility.



Method

- Prospective, single centre, cohort study at tertiary cardiothoracic ICU (HREC 17/QPCH/31)
- Cardiac surgical patients consented pre-operatively
- Pilot study (20 participants) to power future studies in this field



Inclusion criteria

- Over 18
- Admitted to TPCH following cardiac surgery
- Receiving vasoactive medication (low, moderate or high)

Exclusion criteria

- Has undergone cardiac surgery in preceding 6 months
- Mechanically ventilated
- Mobility contraindicated due to attachments (e.g. IABP, femoral sheath)
- Mobility contraindicated due to other medical reasons (e.g. agitated/combative, cardiac ischaemia, uncontrolled bleeding or seizures)



Haemodynamic measurements



- Cardiac output
- Cardiac index
- Stroke volume

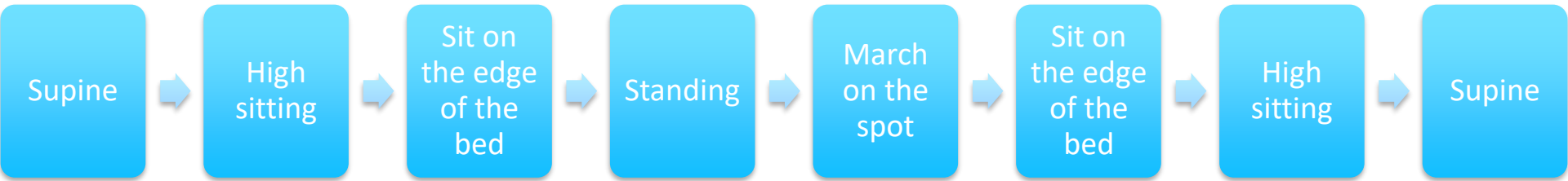
This device has been shown to have significant correlation with haemodynamic measurements derived from the highly invasive thermodilution technique in cardiac surgical patients ^[11]

Flotrac-Vigileo™



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Method



After one minute of adopting each position, haemodynamic measurements were recorded using the Flotrac-Vigileo system



Adverse event classification [12]

- Alteration in **blood pressure** or **heart rate** > or <20% of resting values which necessitated stopping intervention or required remedial intervention
- New **arrhythmia**
- Desaturation of **SpO₂** >10% of baseline levels or a figure that necessitated stopping intervention or required remedial intervention
- **Agitation** resulting in detachment of equipment or lines or requiring increased sedation



Demographic data

- Twenty participants, 16 (80%) male, mean age 66.0 (SD 10.6) years
- 11 CABG, 7 valve replacements/repairs, 1 CABG + valve replacement, 1 aortic root replacement
- All participants receiving Dopamine (mean dose 3.89 mcg/kg/min (SD 1.12))
 - 2 participants Dopamine + Adrenaline
 - 1 participant Dopamine + Noradrenaline
 - 1 participant Dopamine + Adrenaline + Noradrenaline + Vasopressin



Main findings

- 1 adverse event
 - 57F Day 1 post CABG x 3 receiving low dose Dopamine (weaning 4mls/hour)
- First attempt at mobility
- Cool peripheries noted
- Symptomatic decrease in MAP, systolic and diastolic BP on standing. Unable to march on spot and returned to sitting
- Transient → resolved when seated

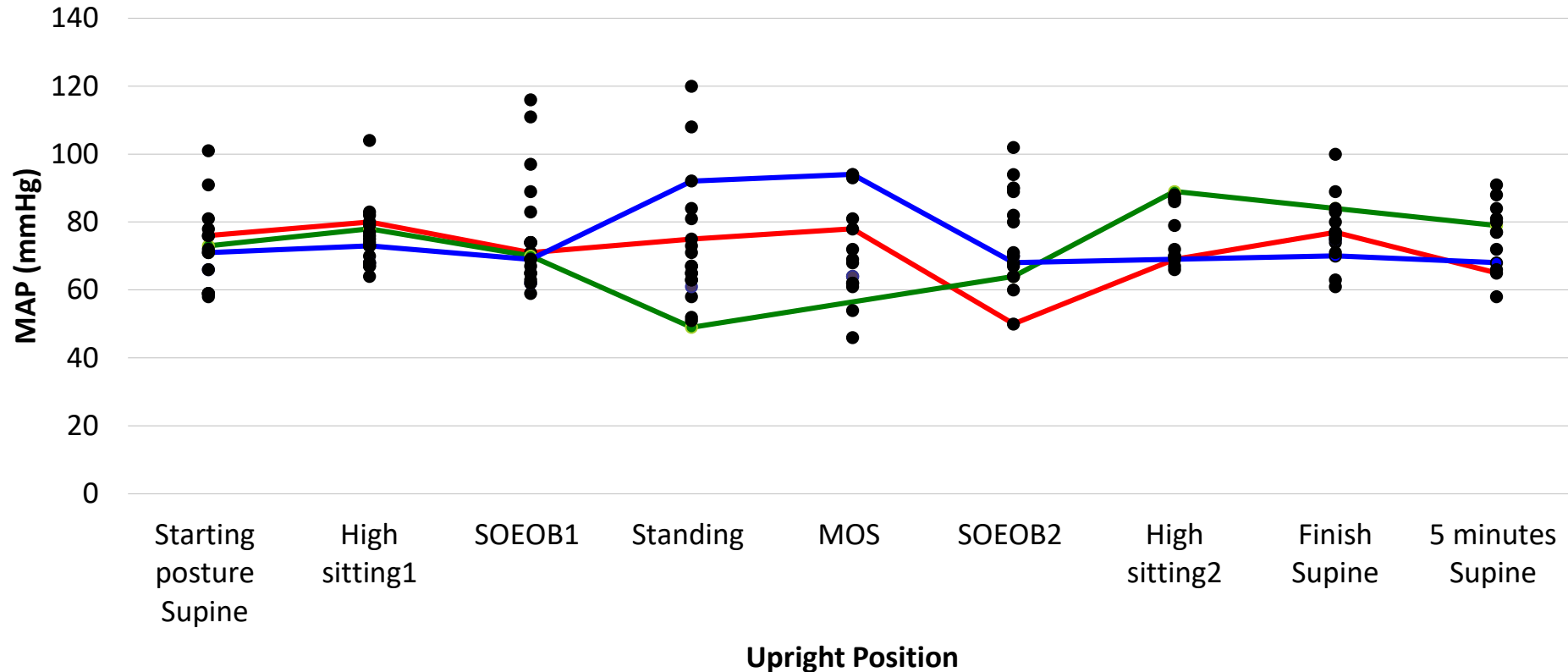


Main findings

- Statistically significant increases with upright positioning
 - Mean arterial pressure ($p=0.018$)
 - Respiratory rate ($p=0.049$)
 - Diastolic blood pressure ($p=0.008$)



MAP Measurements of all Subjects in Each Upright Position

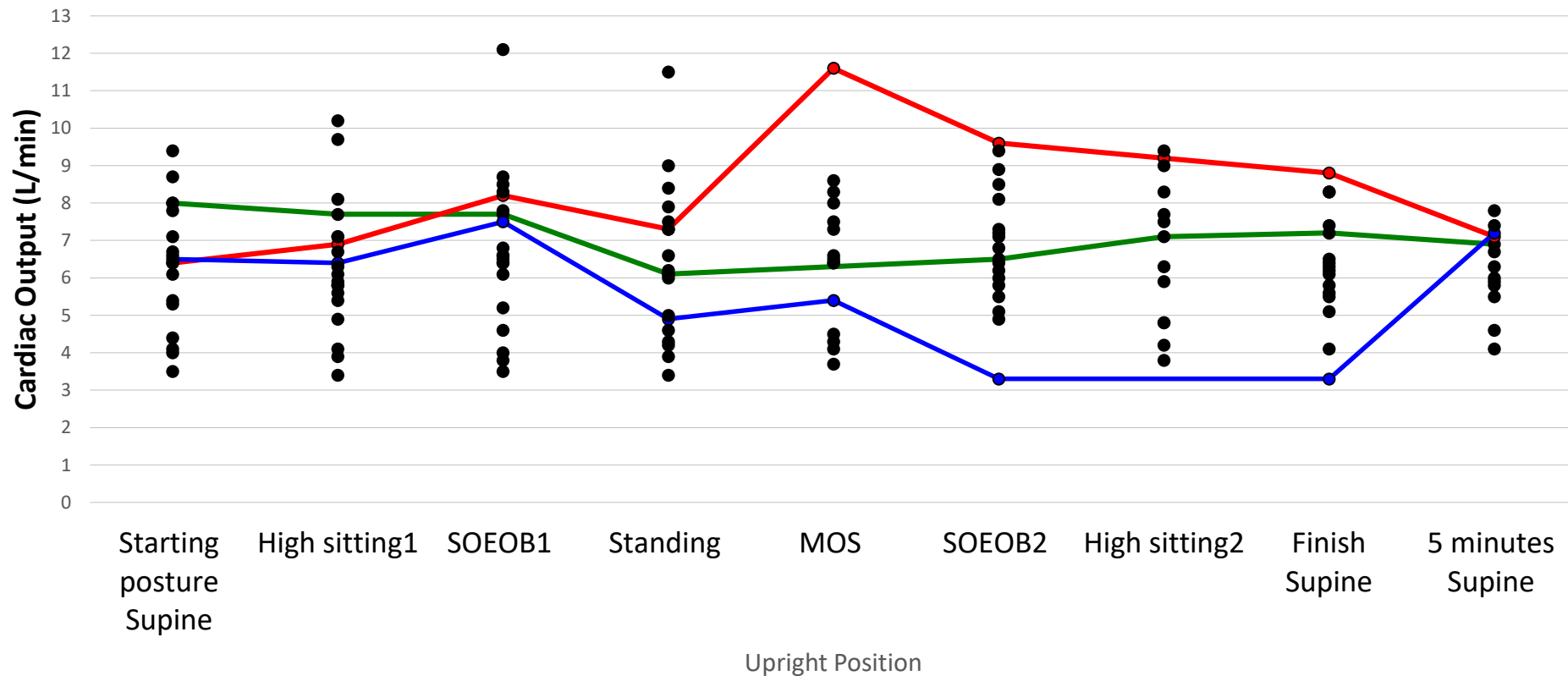


Main findings

- There was no differences in changes to haemodynamic measurements according to dose of vasoactive medication.
- While not statistically significant, changes were observed with other haemodynamic parameters when looking at individual responses e.g. cardiac output.



Cardiac Output Measurements of all Subjects in Each Upright Position



Discussion

- Upright positioning caused statistically significant increases in MAP, RR and diastolic blood pressure.
 - ?vasoconstrictive effects of medication and contractility suboptimal
 - ? sympathetic vasoconstriction secondary to a transient drop in preload and BP that occurred too quickly to be picked up by the Flotrac-Vigileo system



Conclusion

- There remains no consensus regarding when it may be safe to mobilise patients receiving vasoactive support in ICU ^[9]
- The findings from this study suggest that upright positioning and low level mobility in cardiac surgical patients receiving vasoactive support is safe, provided a thorough and holistic assessment of the patient occurs first.
- The incidence of an adverse event resulting from upright positioning is low



Future directions

- Wider range of patient presentations and reason for administration of vasoactive medication
- Include non cardiac-surgical populations
- Larger sample size, multi-site
- Longer duration and/or higher intensity of mobility
- Measure systemic vascular resistance



Thankyou



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