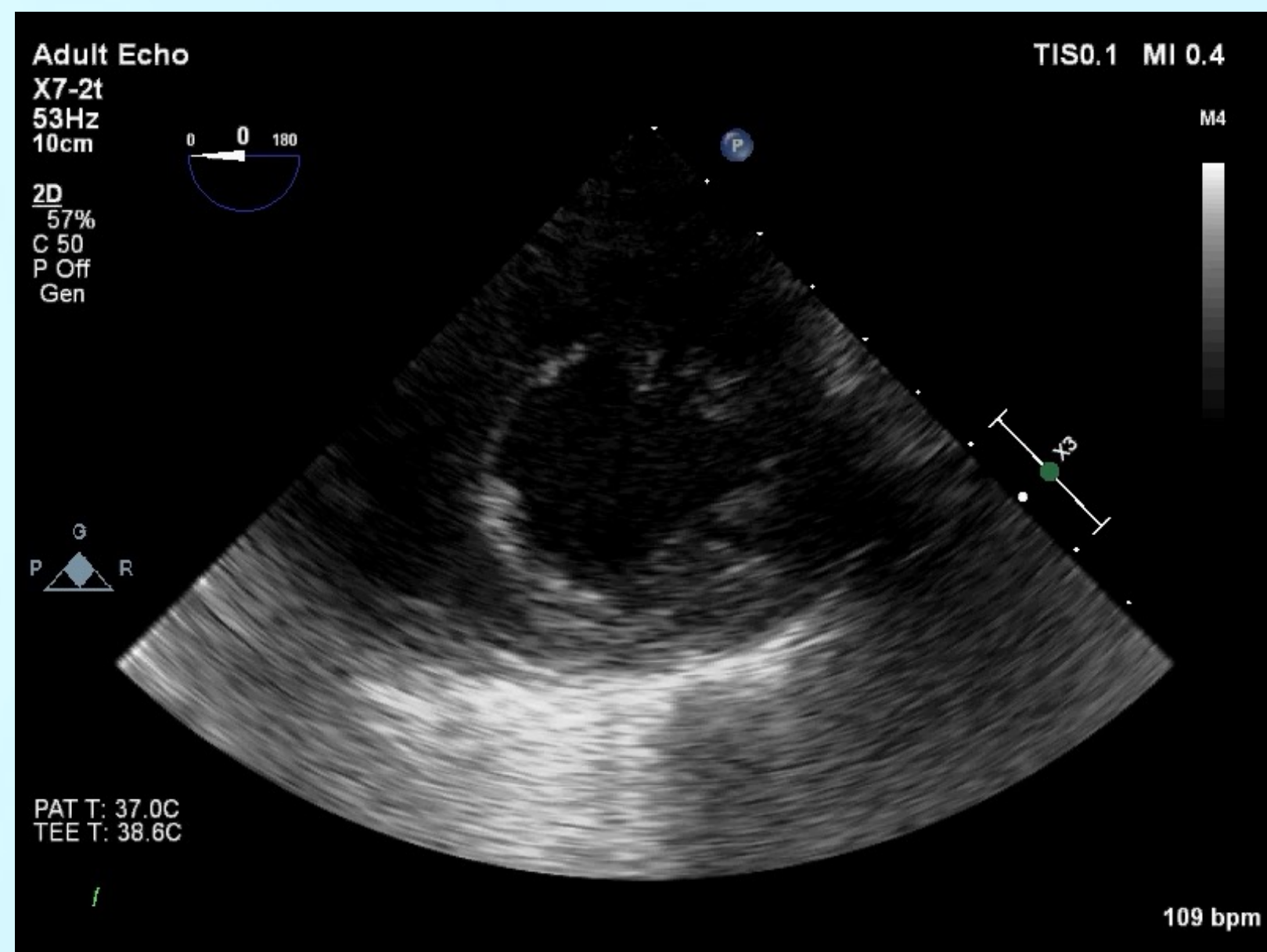




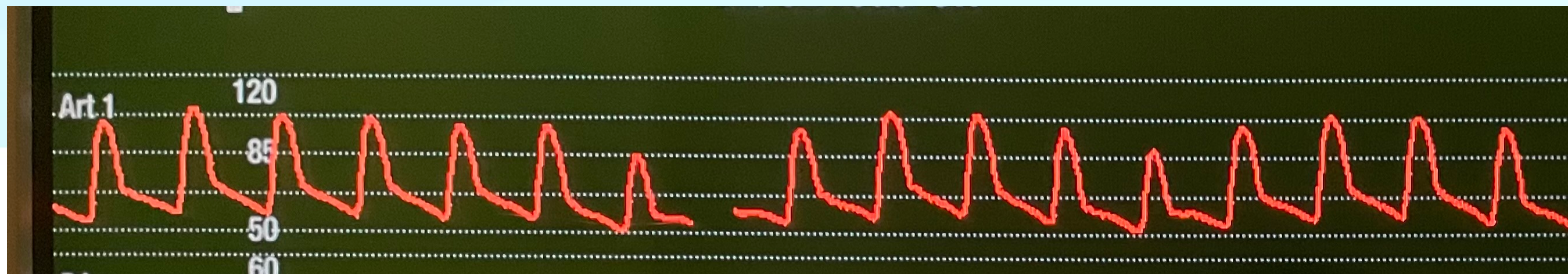
Vasoplegia in Cardiac Surgery National Survey

Carlos Corredor, Vivek Sharma, Sriveena Naganathar
Professor Gudrun Kunst

WHAT IS VASOPLLEGIA IN CARDIAC SURGERY?



**Evidence of high
(normal) CO**



Low MAP
(SVR < 800 dynes/s/cm⁵)
With 'higher than usual'
vasopressors



**“Adequate
Fluid
Resuscitation”**



VANCS

MAP <65mmHg
Resistant to fluid challenge (at least 1000ml of
crystalloid)
Cardiac Index > 2.2 l/min/m²



ATHOS II
16 cardiac patients
(total 321)

CI >2.3 l/min/m²
Or
ScVO₂ >70% (with CVP >8mmHg)
MAP 50-70mmHg



CPB

[journal of Cardiothoracic and Vascular
Anesthesia 34 \(2020\) 2766-2775](#)

Pump flow > 2.2 l/min/m²
MAP <60mmHg with
Vasopressors > 0.2-0.5mcg/kg/min Norad or equivalent



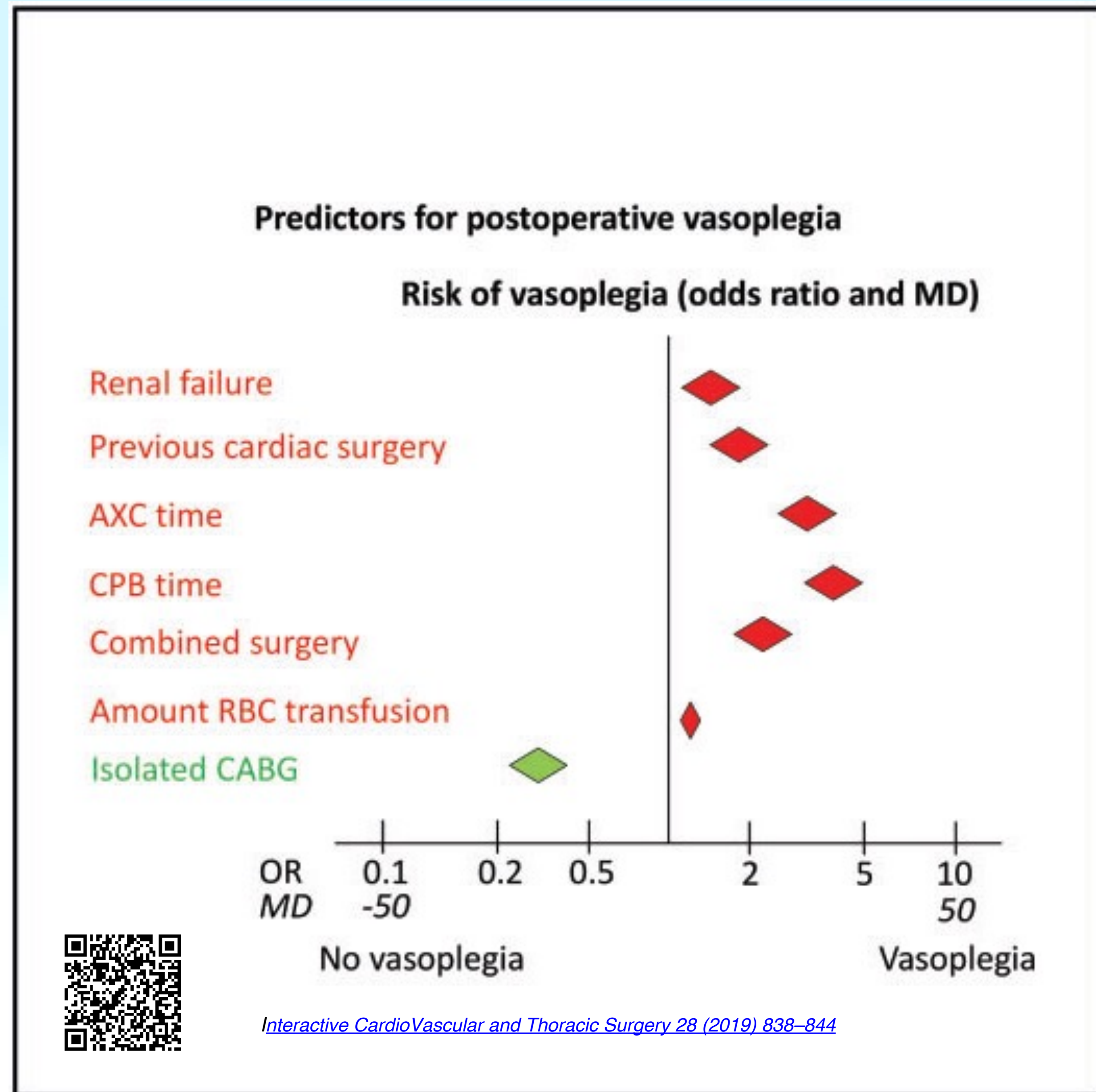
LVAD

[de Waal et al. BMC Anesthesiology \(2018\)
18:185](#)

MAP <50mmHg or SVR < 800 dynes.s.cm⁵
CI > 2.2 l/min/m²
High vasopressors (Norad >0.2mcg/kg/min or equivalent)

Epidemiology

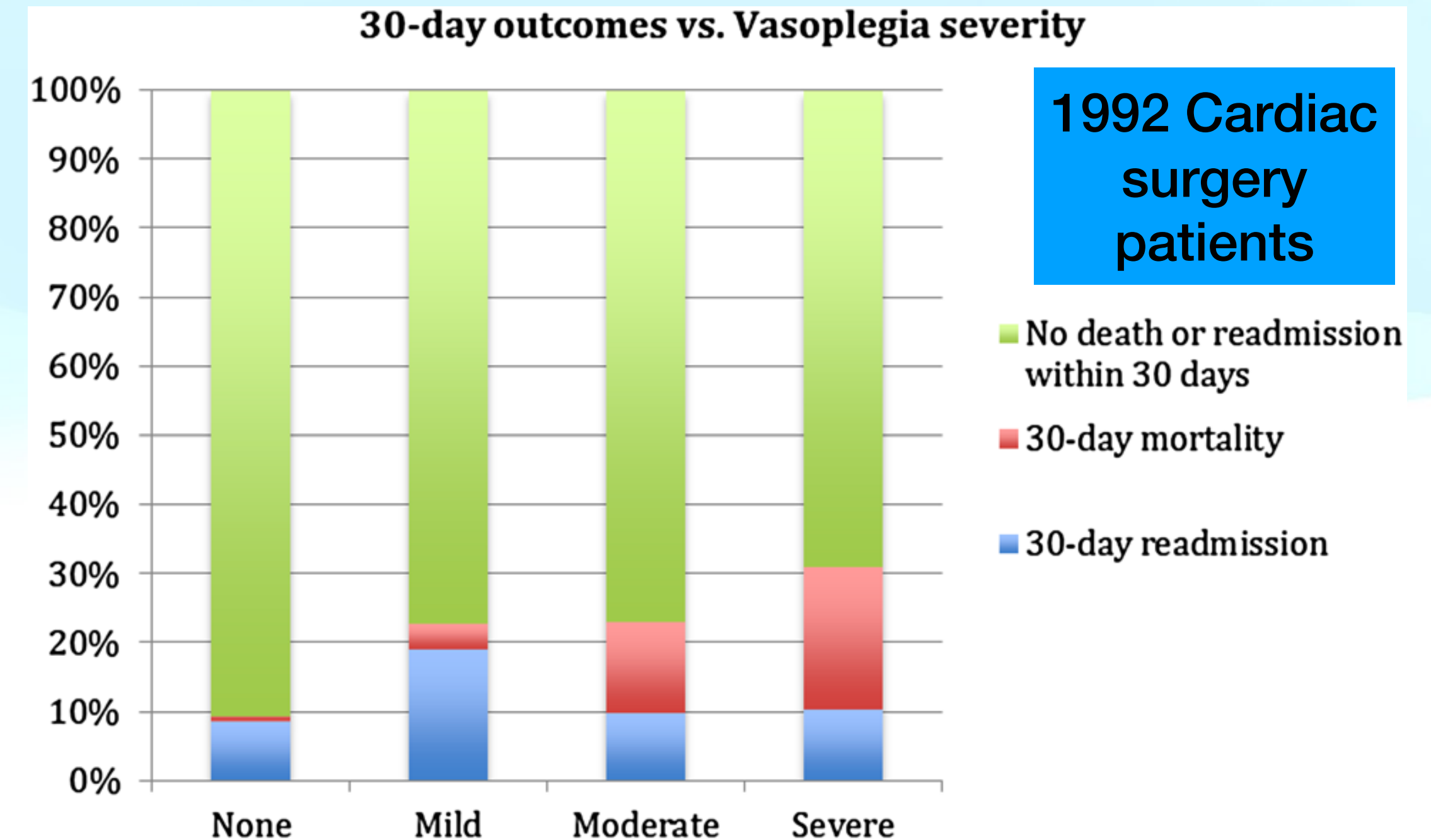
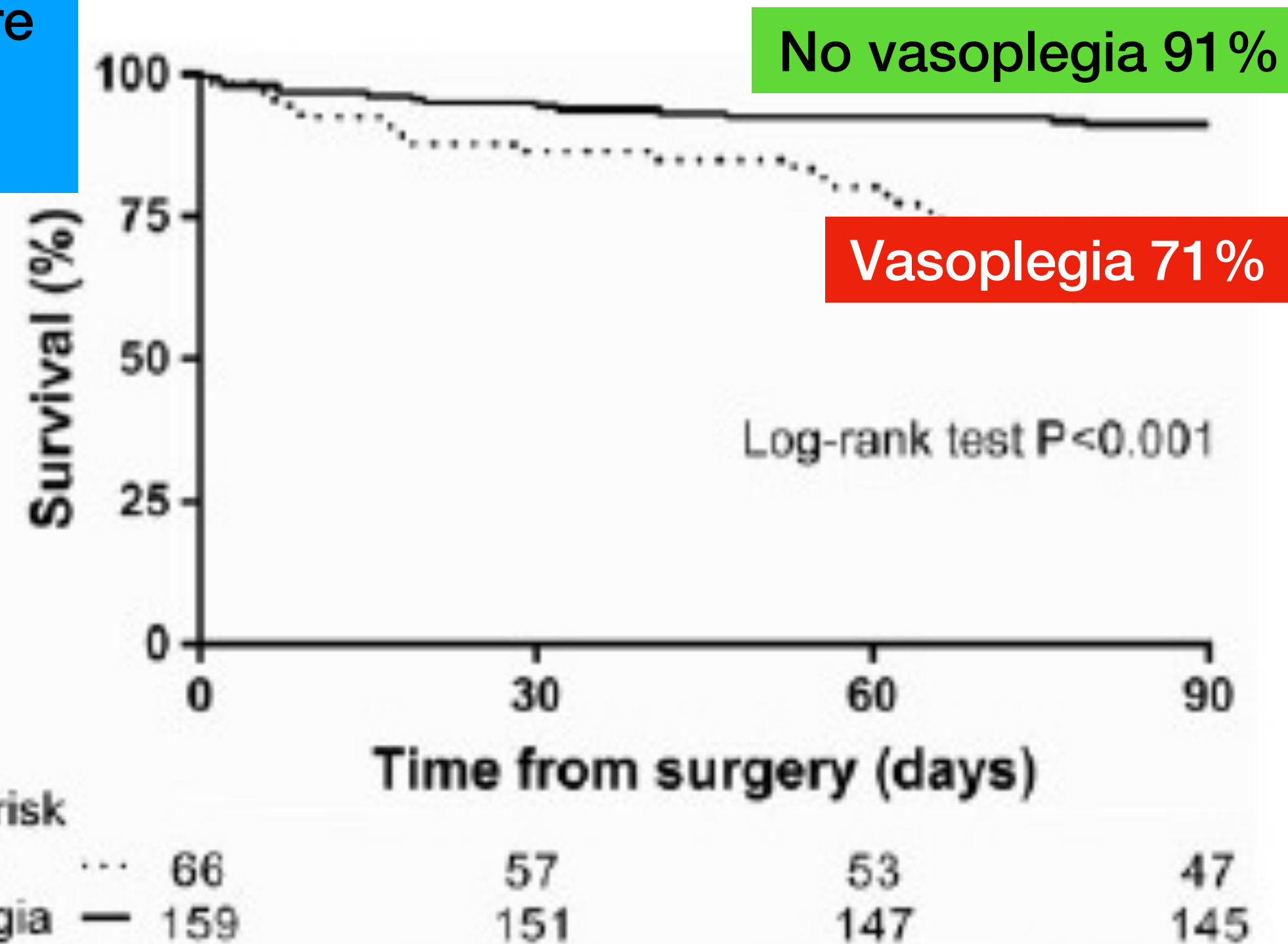
- Reported incidence 5-40% depending on definition
- 29% Heart failure surgery LVAD



Vasoplegia and outcome

No UK data

Heart Failure
Sx (225
patients)



European Journal of Cardio-Thoracic Surgery 51 (2017) 532–538



Gen Thorac Cardiovasc Surg (2017) 65:557–565

TREATMENT OPTION	RECOMMENDED DOSAGE	MECHANISM OF ACTION
Catecholamines		
Norepinephrine	0.01-0.2 µg/kg/min	Strong α-1, α-2, and mild β-1 adrenergic agonist
Epinephrine	0.01-0.5 mcg/kg/min	Strong α-1, α-2, and β-1 adrenergic agonist
Dopamine	0-20 mcg/kg/min	α-1 adrenergic agonist at higher doses (dose-dependent agonism)
Phenylephrine	0.5-5 µg/kg/min	α-1 and α-2 adrenergic agonist
Non-catecholamine agents		
Vasopressin	0.03 U/min	Acts on <i>AVPR1a</i> receptor to reduce vasodilatory effects of NO; V1 agonist
Methylene blue	1.5-2.0 mg/kg/bolus over 15 to 30 minutes	Inhibits guanylyl cyclase and endothelial NO synthase
Angiotensin 2	Start 20 ng/kg/min	AT1 agonist; stimulates release of vasopressin from posterior pituitary gland and release of aldosterone from adrenal gland
Hydroxocobalamin	5 g infusion over 5 min	Inhibits guanylyl cyclase, endothelial NO synthase, and hydrogen sulfide
Ascorbic acid	6 g IV bolus/day	Acts as a cofactor for catecholamine synthesis
Hydrocortisone	50 mg bolus every 6 h or 100 mg every 8 h (10 mg/h)	Hydrocortisone in addition to vitamin C, and thiamine decrease required dose for vasopressors; improves catecholamine response

Table 2 Therapeutic options for management of vasoplegia after cardiac surgery.^{1,10, 42} NO: nitric oxide; V1: vasopressin; AT1: angiotensin 1

Preliminary Survey

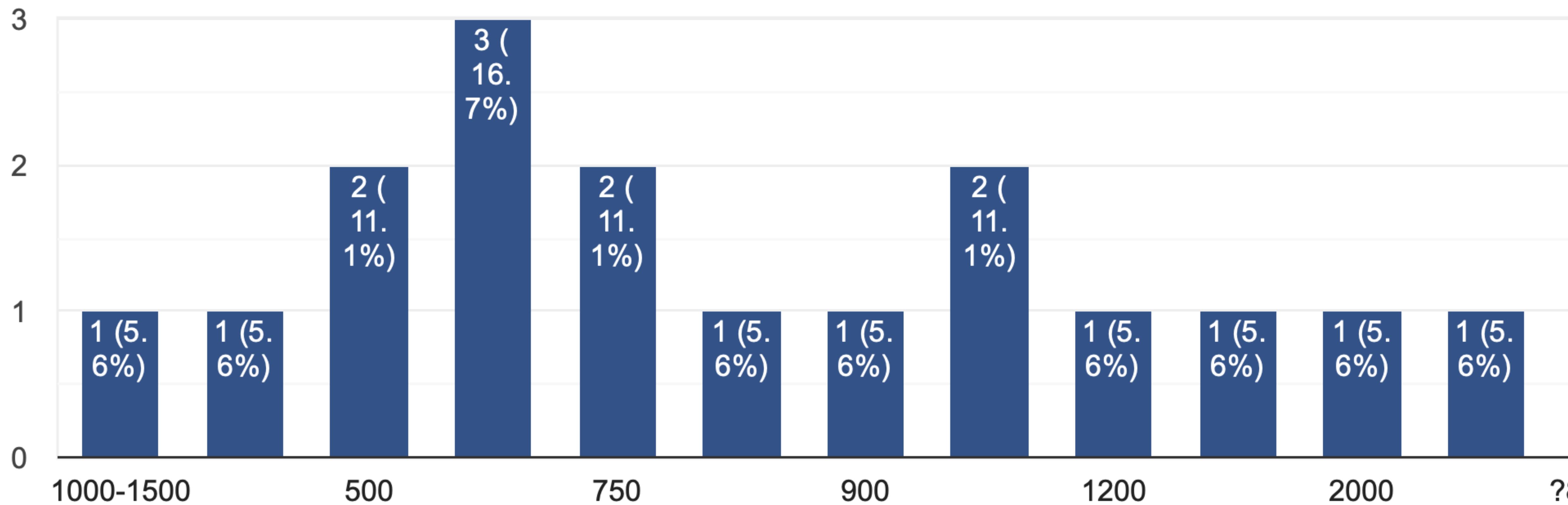
- Sent via email to ACTACC linkpersons
- Short survey enquiring
 - availability of different pharmacological agents
 - Local guidelines for vasoplegia management

**Response rate
42% (18/43)**



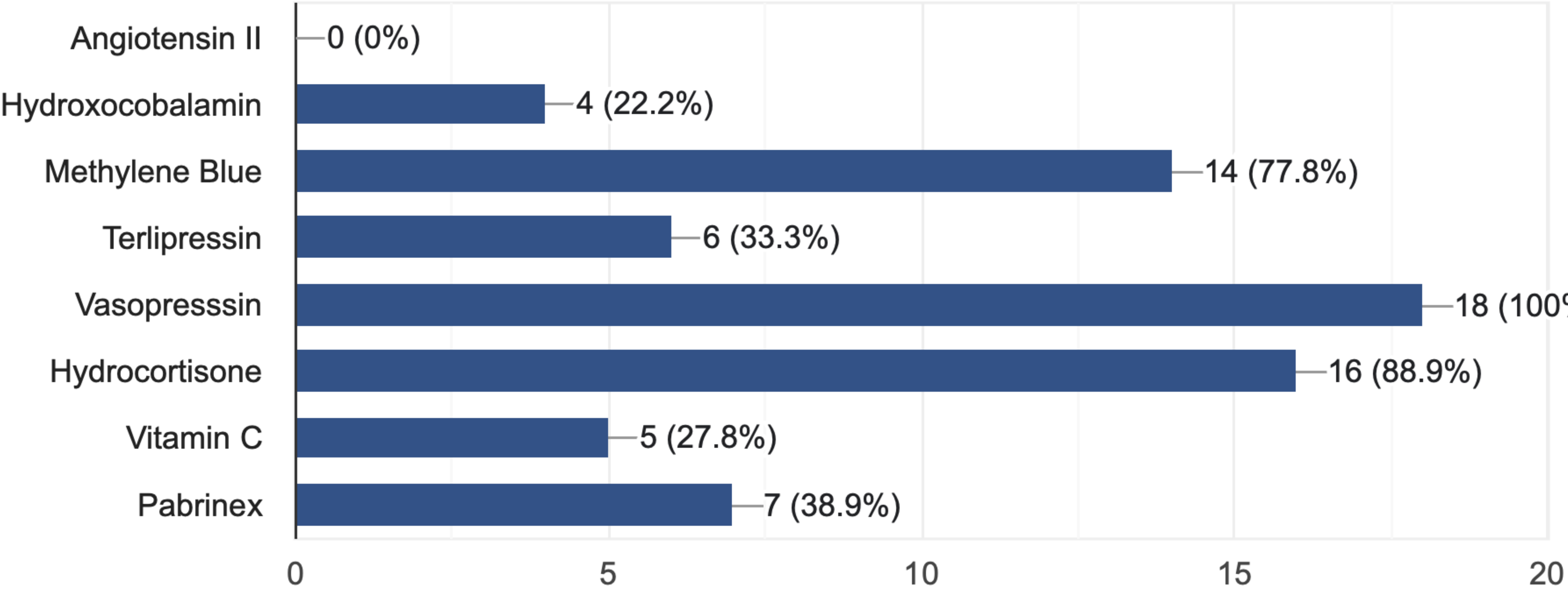
How many cardiac surgeries requiring cardiopulmonary bypass (CPB) are performed at your center annually?

8 responses



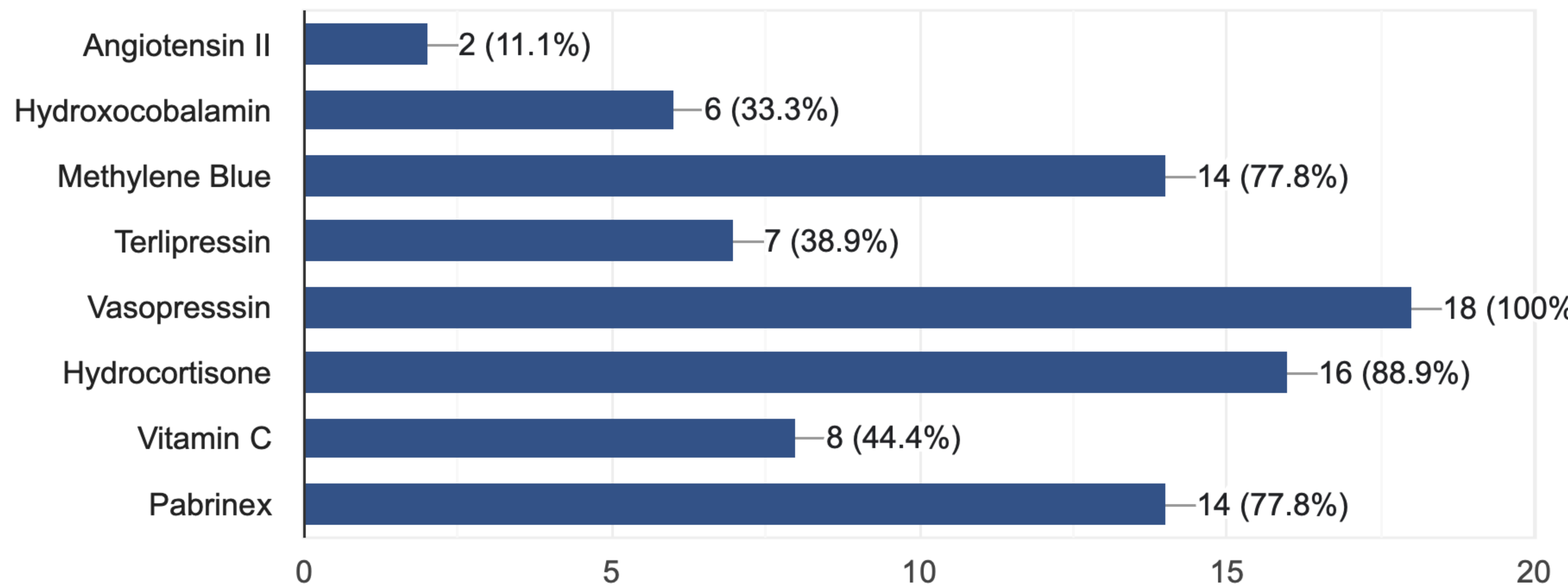
Which of the following pharmacological therapies are available at your centre for the management of vasoplegia in cardiac surgery patients IN THEATRES? (Tick all that apply)

18 responses



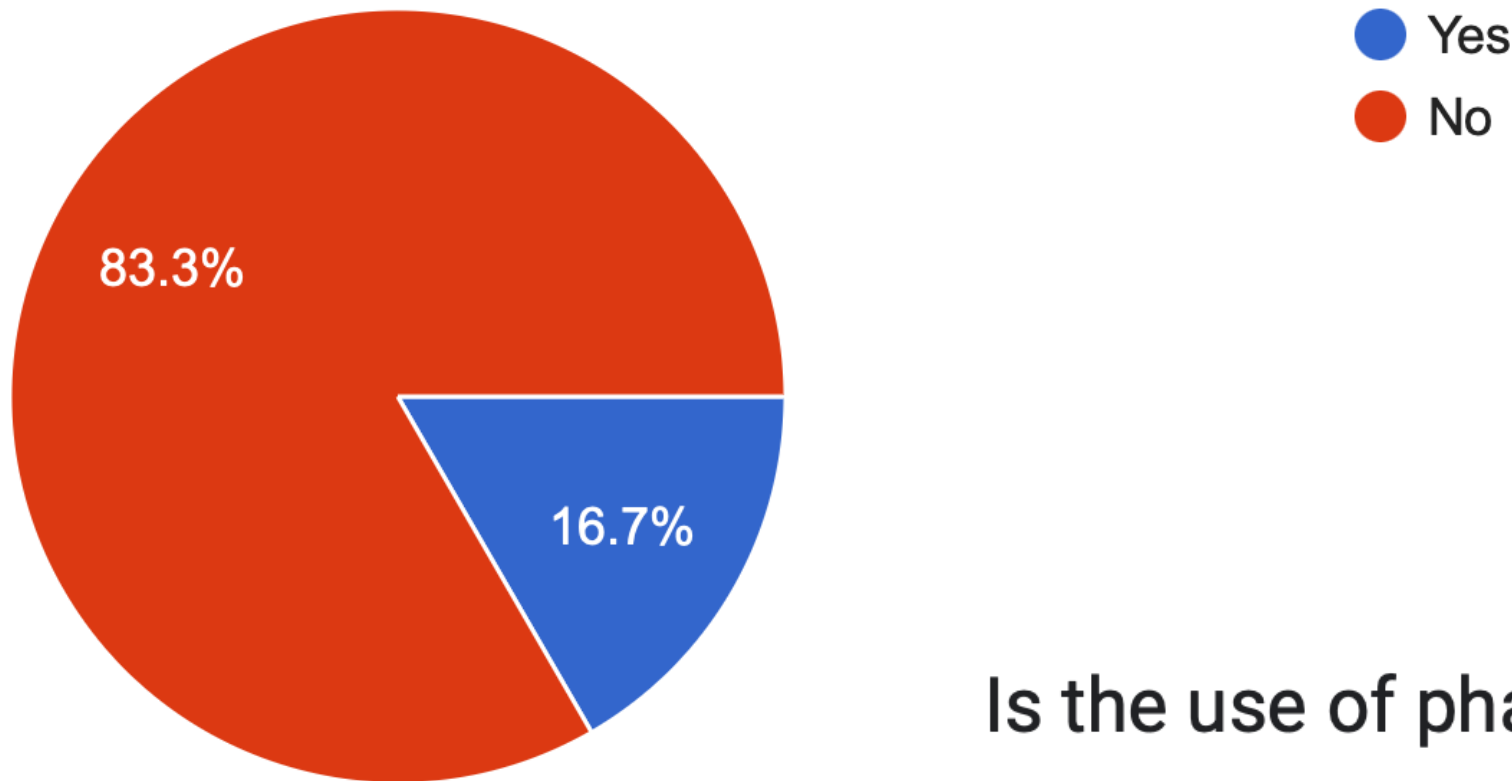
Which of the following pharmacological therapies are available at your centre for the management of vasoplegia in cardiac surgery patients IN CRITICAL CARE? (Tick all that apply)

18 responses



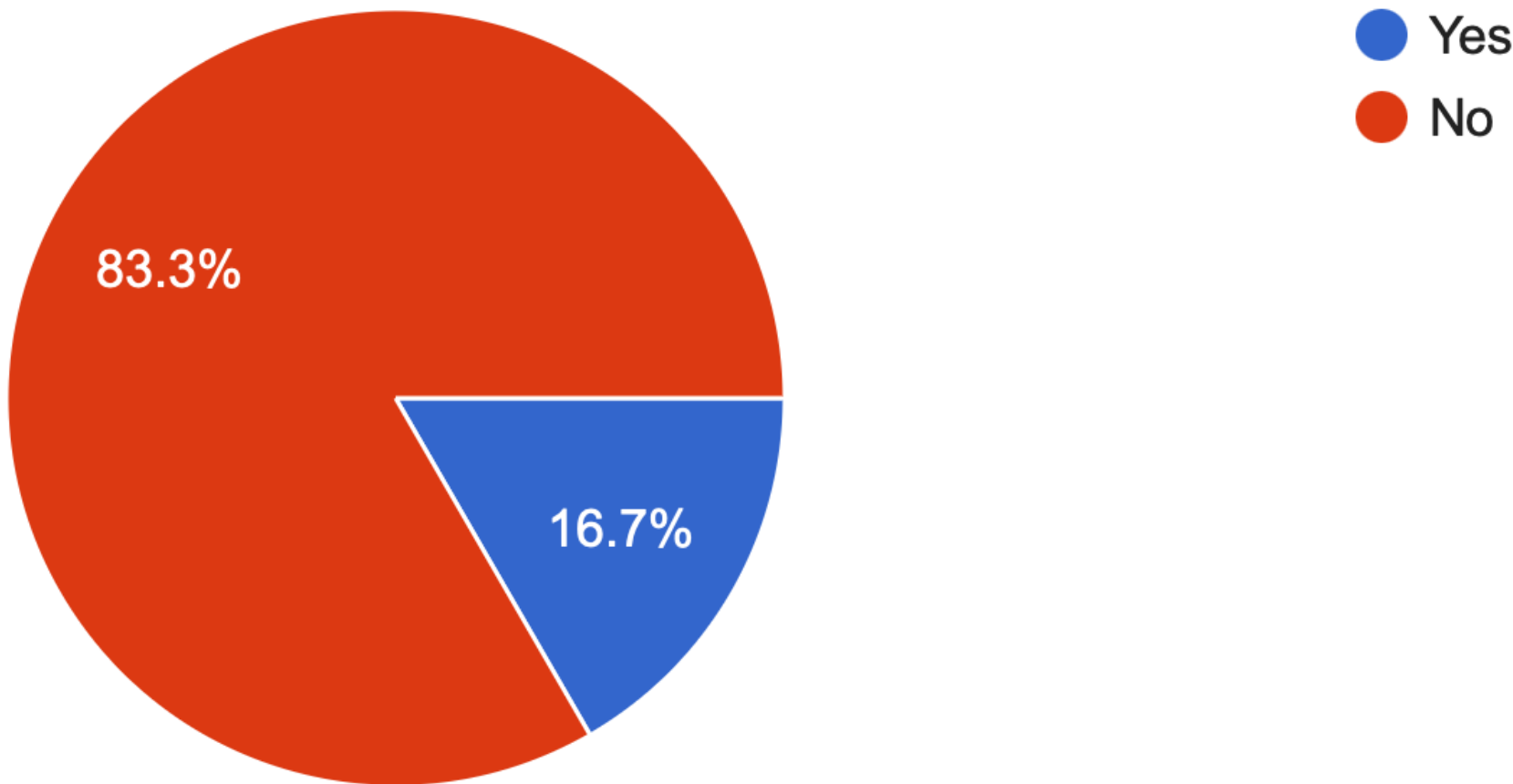
Is the use of pharmacological therapies for vasoplegia guided by a local protocol or guidelines IN THEATRES?

18 responses



Is the use of pharmacological therapies for vasoplegia guided by a local protocol or guidelines IN CRITICAL CARE?

18 responses



National Cardiac Surgery Vasoplegia Survey

**4-week survey. Adult Cardiac Surgery Patients
Registered at Barts CEU**

Numerator: Number of patients receiving pharmacological treatment for suspected vasoplegic syndrome

Denominator: Total number of patients undergoing cardiac surgery with or without CPB

- **Characterise current UK practice**
Secondary
 - **VPS UK epidemiology**
 - **Timing of therapy and outcome**
- **VPS associated morbidity and mortality**



ACTACC

Association for Cardiothoracic Anaesthesia
and Critical Care

National Cardiac Surgery Vasoplegia Survey

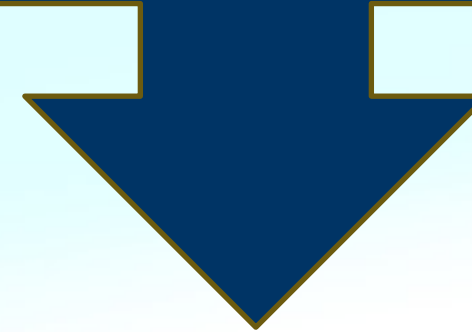
Norad $>0.2\text{mcg/kg/min}$ (or equivalent vasopressor)

OR

➤ 1 Vasopressor

➤ OR

➤ Rescue Therapies



Case report triggered

- Demographics
 - Surgical
- Haemodynamics
- Vasopressor
- Outcome

Demographics:

- Age, Sex, Height, Weight
- ASA , Euroscore
 - NYHA Class
- Pre-existing LVEF
 - CKD (eGFR)
- Type 2/Type 1 DM
 - HbA1c
 - Pre-op Hb

Pre-op Medication

- ACE inhibitors
 - B-Blocker
 - Steroids
- Immunomodulators
- Preop vasodilators i.e GTN
 - Preop Inodilators i.e Milrinone

Preop Mechanical Circulatory support
(IABP, ECMO, Impella)

Surgical Characteristics

- Type of Surgical Procedure
- Operative time(mins)
 - CBP y/n
- Duration of CPB/Xclamp
- Cytokine absorber on CPB y/n

Transfusion

- PRBC
- FFP
- Cryo
- Platelets
- Octaples
- Fibrinogen Concentrate
 - Factor VII
- Cell salvage

Clinical Assessment

- Is patient hypotensive ?
MAP<65mmhg (MAP)
 - CVP
 - Lactate
 - ScVO2/ SvO2
- Clinically vasodilated
(Peripherally warm/CRT<2s y/no)
 - Fluid balance since start
op/12h/24h (whatever closer)
- > 1 Vasopressor y/n Which?
- Mechanical support y/n Which?

CO monitoring data:

- CO monitoring y/n
- Method of CO monitor (PA, Pulse contour, calibrated y/n)
 - CO/CI if available
 - SVR/SVRI

Echo data:

- Echo TOE/TTE performed ± 4 h case report triggered
 - LV Function
 - RV Function

Vasoactive/Inotropic agents

Vasopressor

- Noradrenaline __mcg/kg/min
 - Milrinone__mcg/kg/min
- Adrenaline___ mcg/kg/min
- Phenylephrine __mcg/kg/min
 - Vasopressin__ units/min
 - Dopamine__mcg/kg/min
- Terlipressin dose/frequency
 - Angiotensin II ng/kg.min

Inotropes

- Milrinone__mcg/kg/min
- Dobutamine mcg/kg/min
- Enoxinome mcg/kg/min
- Adrenaline mcg/kg/min
- Levosimendan __mcg/kg/min

Pulmonary Vasodilators

NO __ppm

Prostacycline__

Other

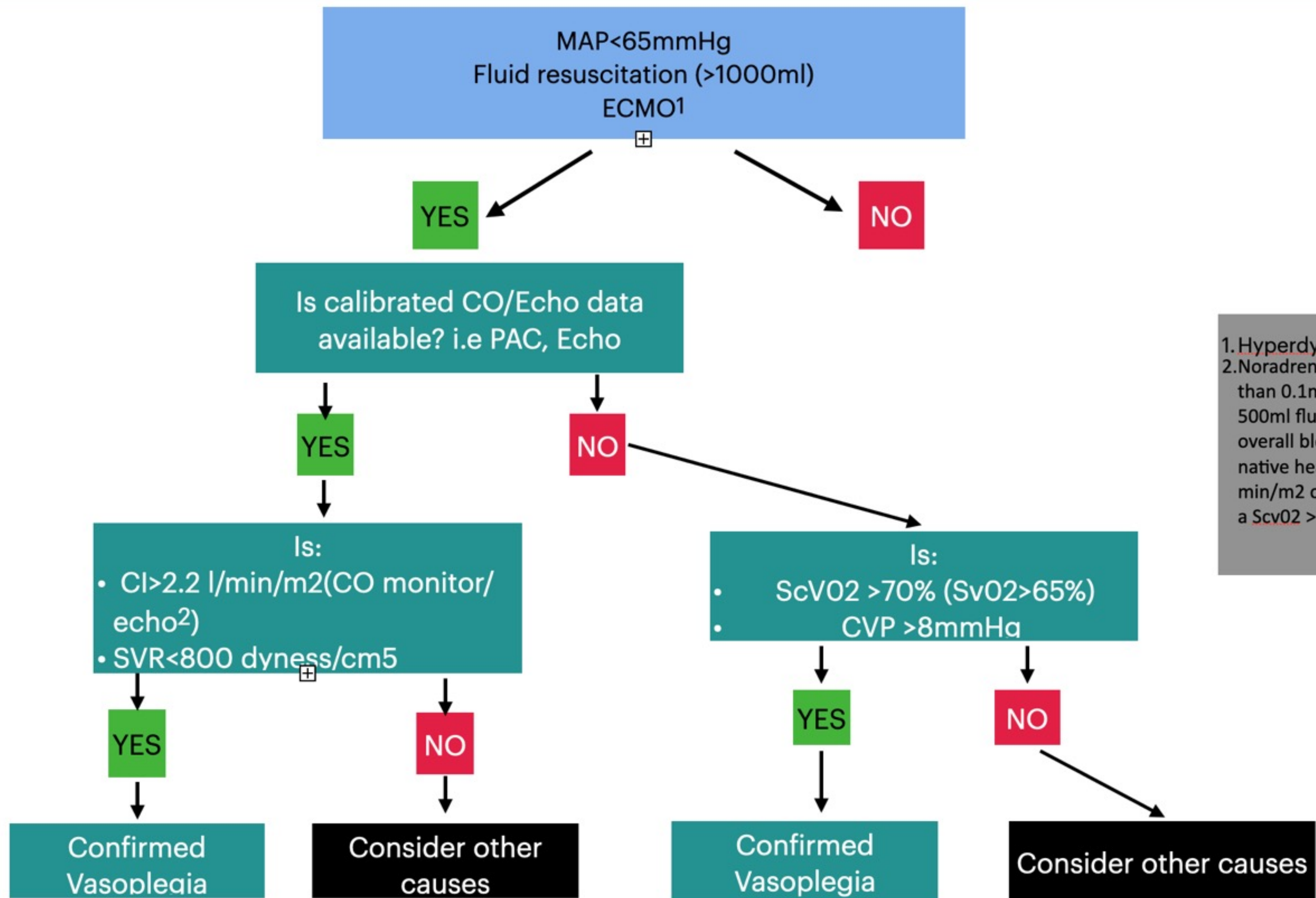
Steroids

Hydrocortisone Dose+frequency
Fludrocortisone dose+frequency
Dexamethasone Dose +Frequency

Rescue Therapies

- Hydroxocobalamin __g
 - Methylene blue __mg
- Ascorbic acid/Thiamine (Pabrinex)
dose/frequency
- Cytokine absorber y/n
 - Other

Amiodarone y/n



1. Hyperdynamic function
2. Noradrenaline dose greater than 0.1 mcg/kg/min after a 500ml fluid challenge despite overall blood flow (ECMO + native heart) greater than 2 l/min/m² or allowing to achieve a ScvO₂ > 65%.

Patient Outcome

- ICU LOS
- Hospital LOS
- Death within 30 days of op

Project Outline

- January 2024 (ongoing). Baseline Survery
- May 2024. 4 week snapshot audit



Thank you!