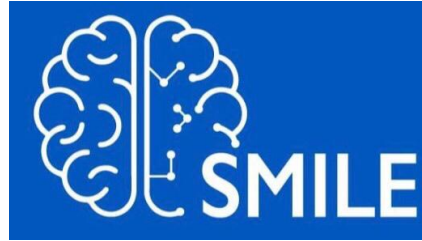


An Introduction to Anaesthesia 2020

CPOM
Centre for Perioperative Medicine




the centre for
Anaesthesia **UCL**


CIRCULATION

DR HANNAH BYKAR

Anaesthetic Registrar

UCL Hospitals

- ▶ 25 min lecture
 - ▶ 5 min questions
 - ▶ 10 min case/practical discussion
- 

- ▶ Pre-operative CVS **risk** assessment
 - ▶ CVS **effects** of anaesthesia
 - ▶ Scenario: **How to** anaesthetise patients with CVS issues
- 

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<http://dx.doi.org/10.1016/j.jacc.2014.07.944>

CLINICAL PRACTICE GUIDELINE


2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and Management of Patients Undergoing Noncardiac Surgery



A Report of the American College of Cardiology/American Heart Association
Task Force on Practice Guidelines

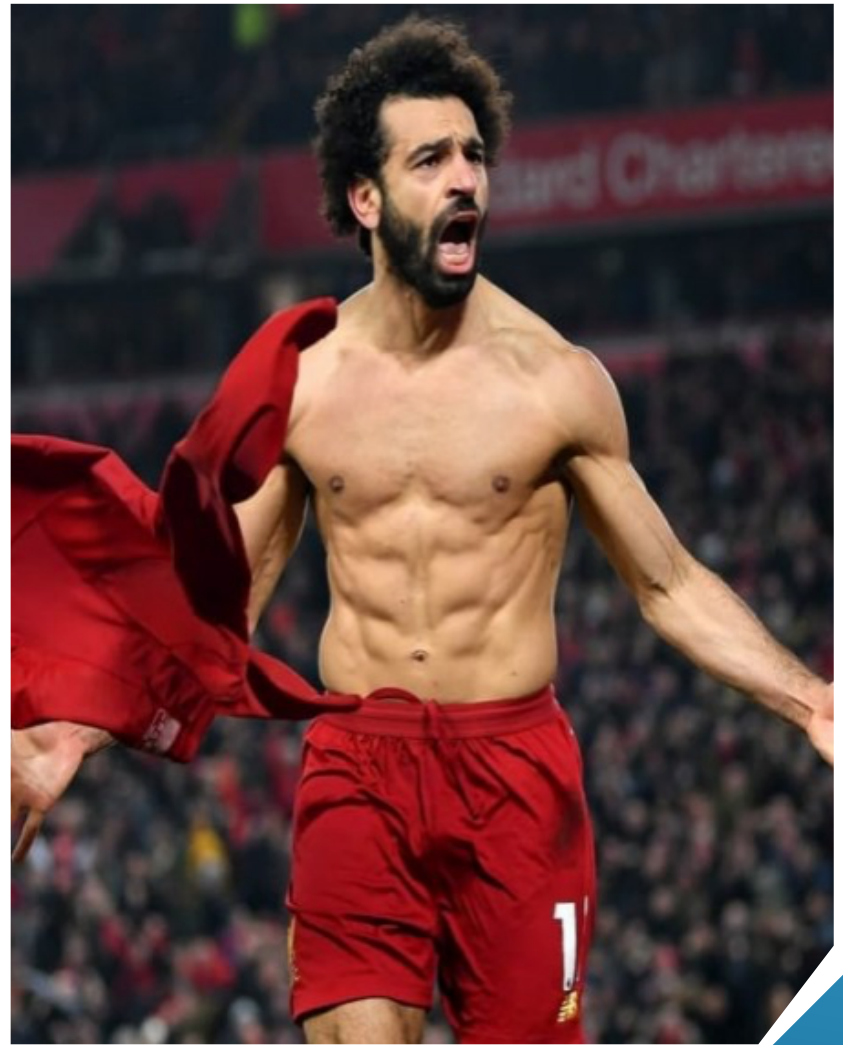
Developed in Collaboration With the American College of Surgeons, American Society of
Anesthesiologists, American Society of Echocardiography, American Society of Nuclear Cardiology,
Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions,
Society of Cardiovascular Anesthesiologists, and Society of Vascular Medicine

Endorsed by the Society of Hospital Medicine

- ▶ Risk factors
 - ▶ Patient
 - ▶ History, Examination, Investigations
 - ▶ Anaesthetic
 - ▶ Pre operative, Intraoperative, Post operative
 - ▶ Surgical
 - ▶ Pre operative, Intraoperative, Post operative
- 

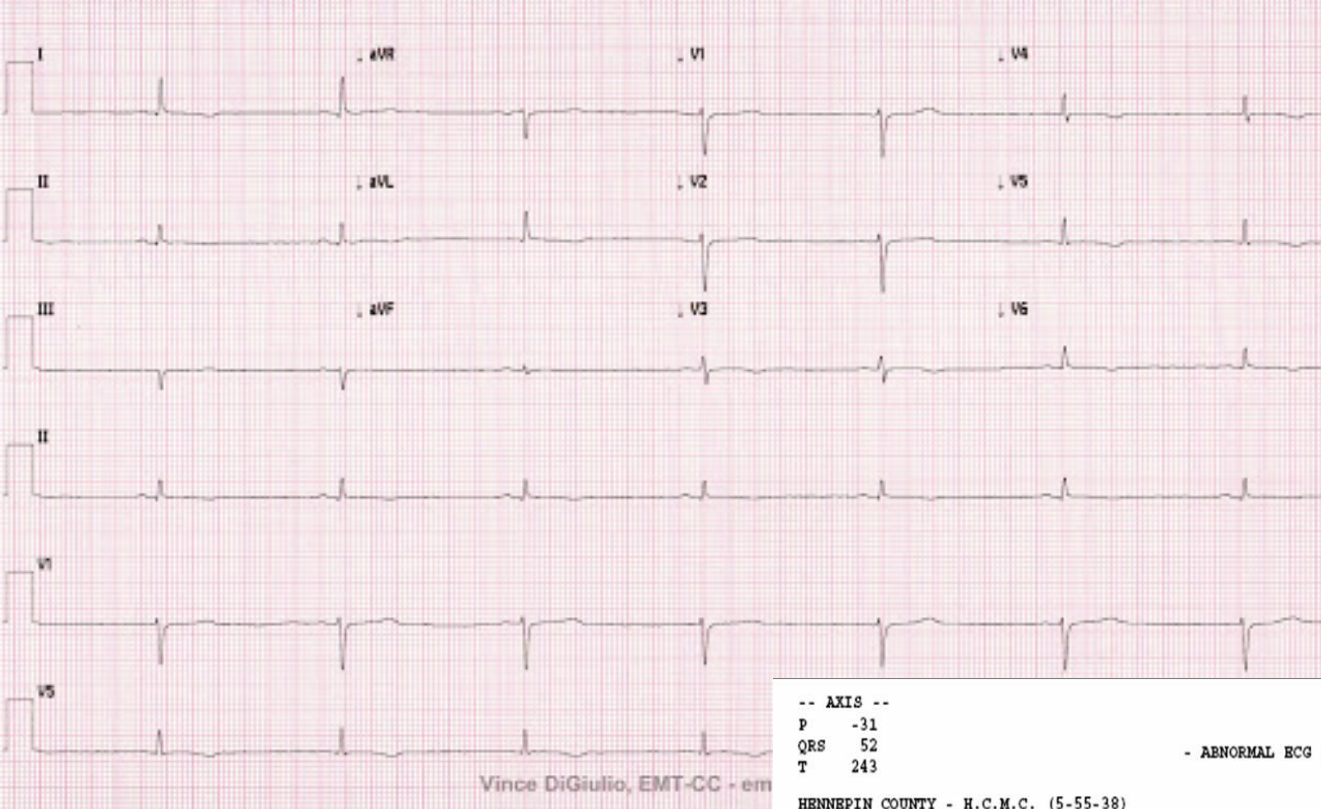
▶ Patient Risk Factors







- ▶ Risk factors
 - ▶ Patient
 - ▶ History, Examination, Investigations



-- AXIS --
 P -31
 QRS 52
 T 243

- ABNORMAL ECG -

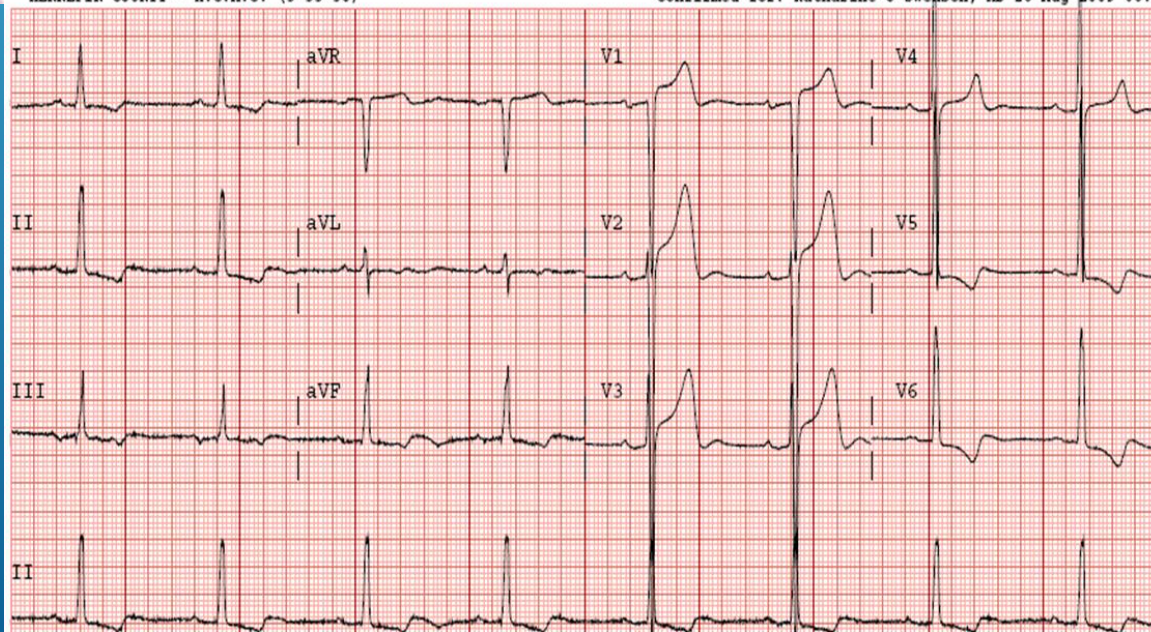
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Standard 12
 Requested By: OLSON, ANDREA

Confirmed for: Katharine O Swenson, MD 28-Aug-2009 08:

HENNEPIN COUNTY - H.C.M.C. (5-55-38)



Metabolic Equivalents - MET

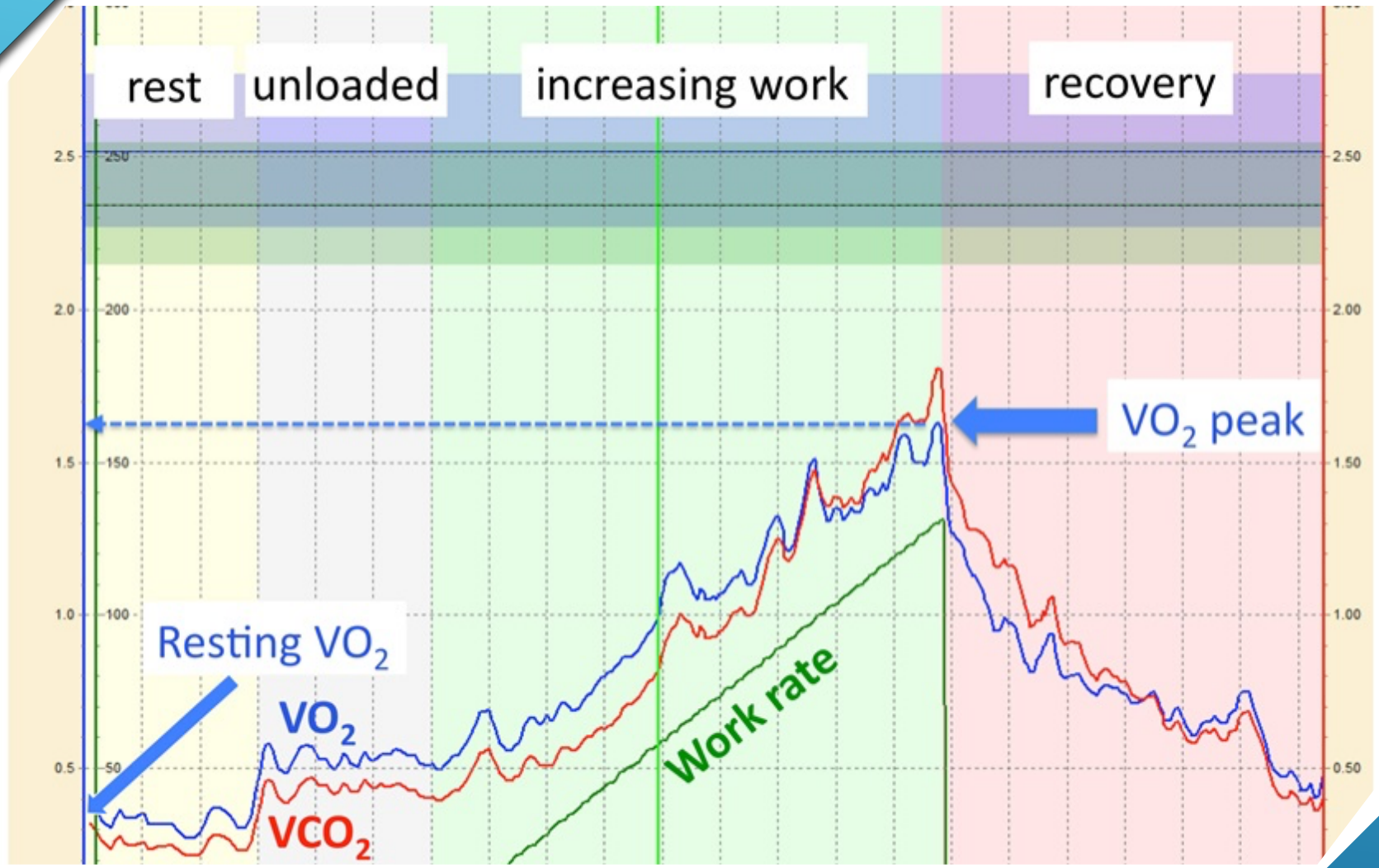
1 MET = 3.5ml O₂/kg/min

Need > 4 METS for good outcome after major surgery

Functional Capacity	
>10 METS	Swimming, football
>7 METS	Outdoor work - digging in garden Jogging
4-7 METS	Climbing 1 flight of stairs without stopping
<4 METS	Washing dishes Getting dressed without stopping Eating

Cardio Pulmonary Exercise Testing – Gold standard Functional Capacity Measurement





Physiological Parameters

Age	< 61 yrs old
Cardiac	No cardiac failure
Respiratory	No dyspnoea
ECG	ECG normal
Systolic BP	110 - 130 mmHg
Pulse Rate	50 - 80 bpm
Haemoglobin	13 - 16 g/dl
WBC	4 - 10
Urea	<7.6
Sodium	>135 mmol/l
Potassium	3.5 - 5 mmol/l

Anaesthetic Risk Factors

Pre-operative, Intraoperative, Post operative



CVS EFFECTS OF ANAESTHESIA

- ▶ Reduced SVR
- ▶ Reduced SV (preload, contractility, afterload)
- ▶ Varying heart rhythms

▶ BP ↓ = $\frac{SV \downarrow}{(CO)} \times HR \rightleftharpoons \times SVR \downarrow$

Cardiac output

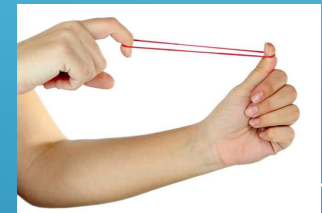
CO – volume of blood ejected by each ventricle per minute

$$CO = HR \times SV$$

SV = volume of blood ejected by each ventricular contraction

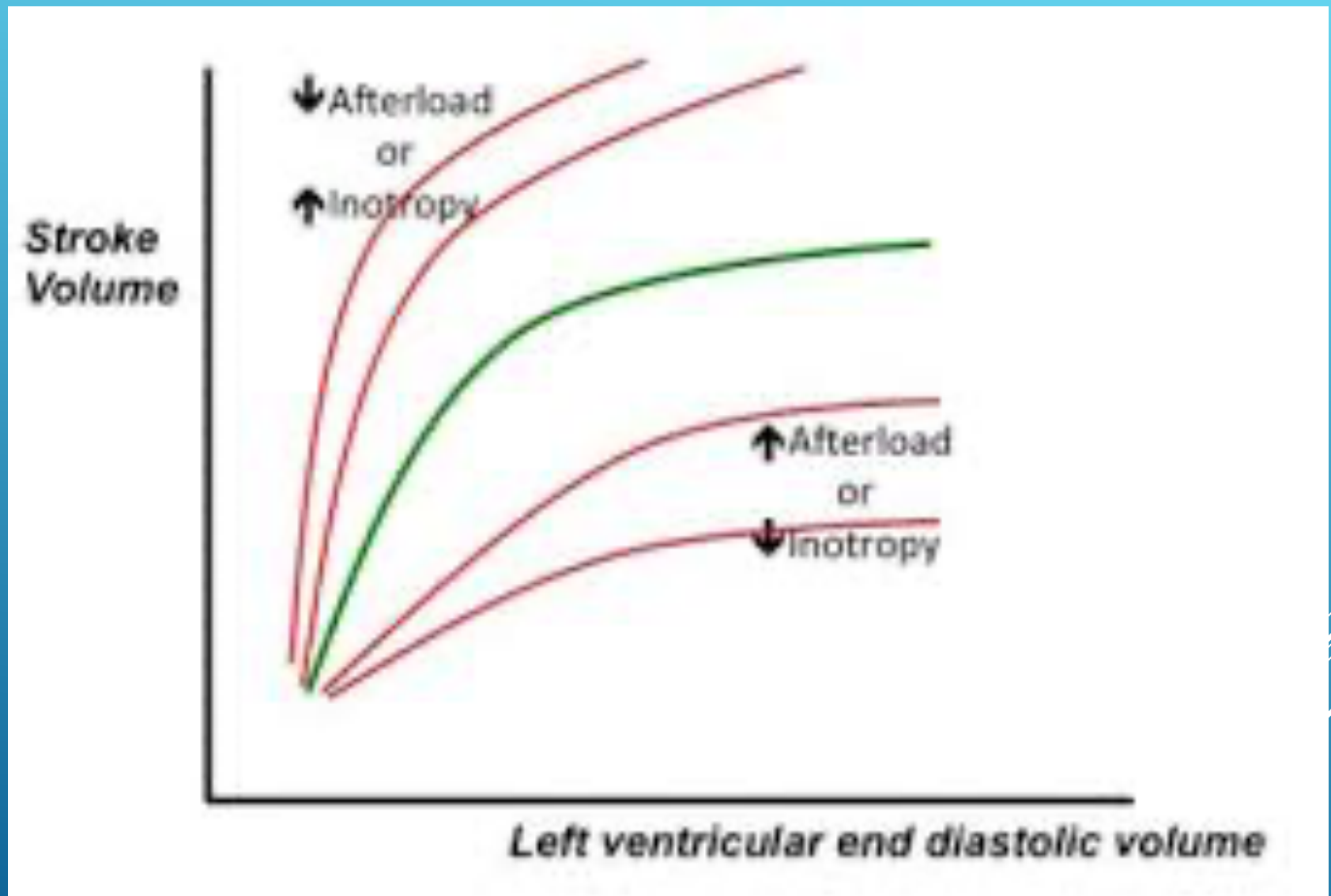
Factors affecting stroke volume:

- the degree of filling of the ventricle, or “**preload**”
- the **contractility** of the myocardium
- the resistance against which the ventricle has to work, or “**afterload**”.

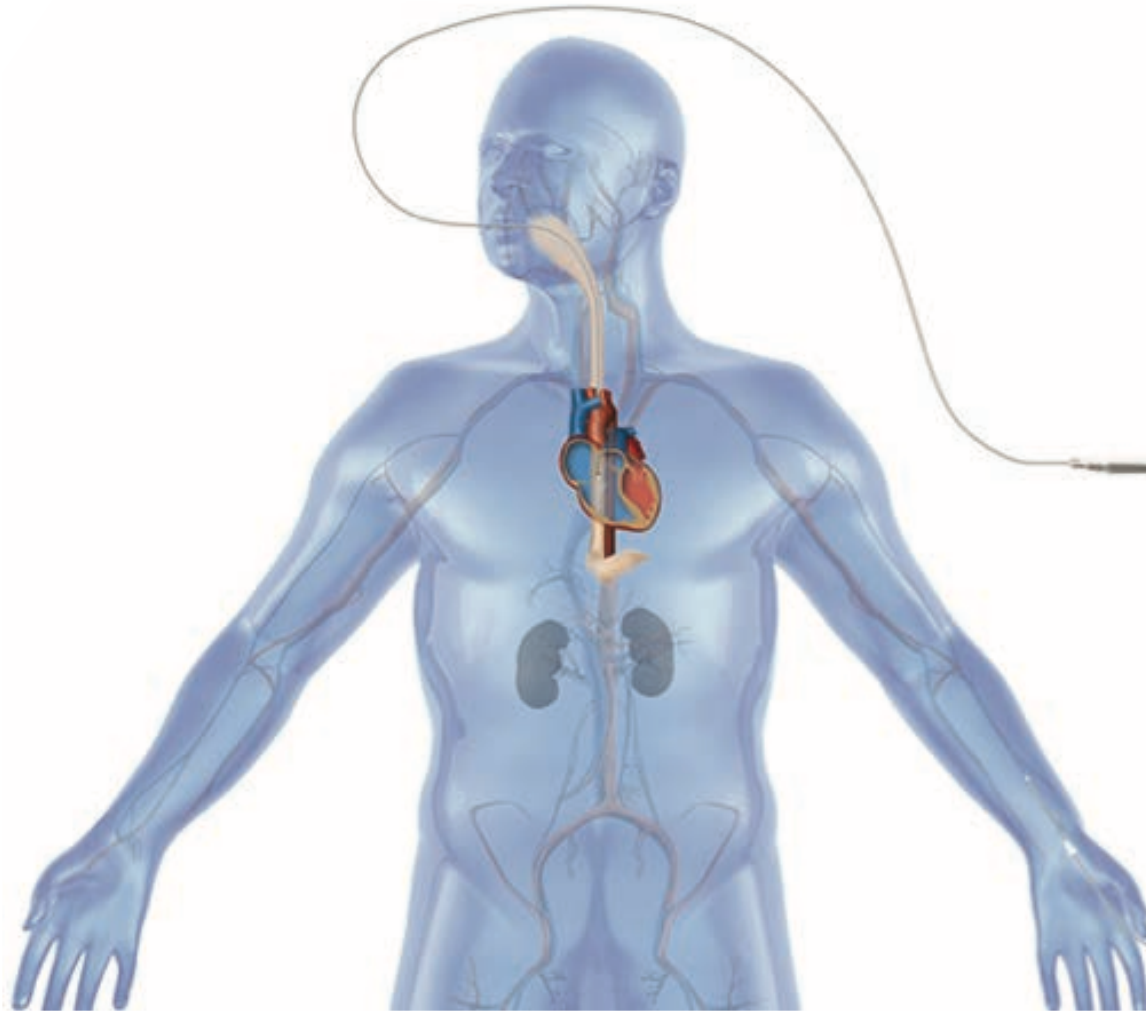


$$BP = CO \times SVR$$

Frank-Starling Law –the SV increases in response to increase in volume of blood in the ventricles.



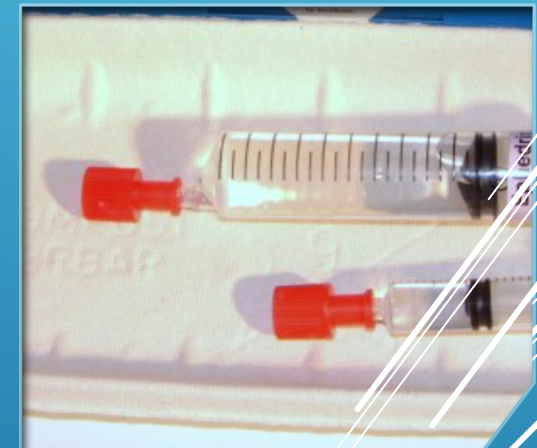
$$BP = SV \times HR \times SVR$$



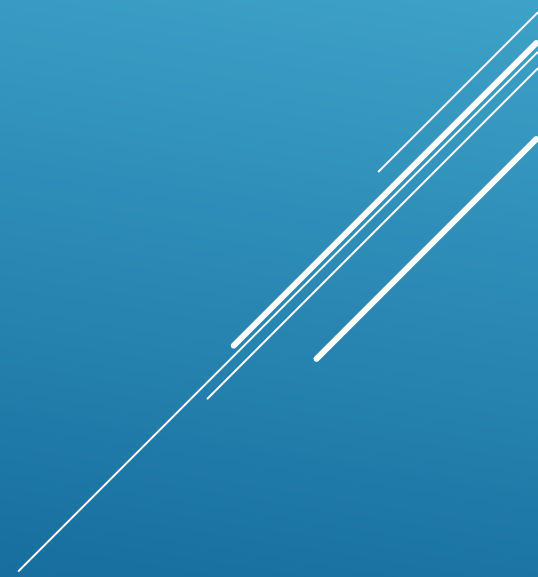
$$BP = SV \times HR \times SVR$$

- ▶ Fluids – preload
- ▶ Vasopressors - afterload
- ▶ Inotropes – contractility
- ▶ Chronotropes - HR

- ▶ α_1 / α_2 / β_1 / β_2



- ▶ Preparing for anaesthetic risk factors continued

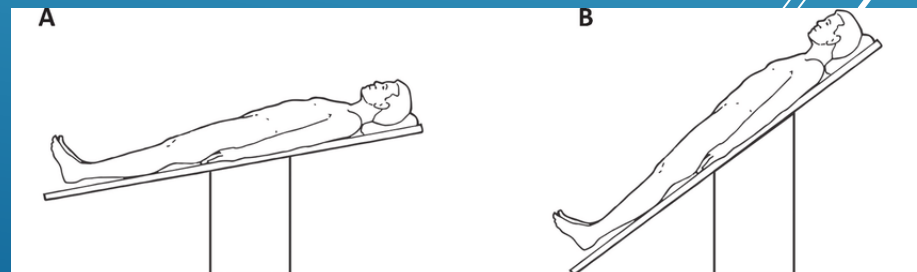




- ▶ Preparing for anaesthetic risk factors:
- ▶ Preop
 - ▶ Limit pre-operative fasting (preload)
 - ▶ Monitoring – ECG, arterial line, Central line, Oesophageal doppler, catheter (organ perfusion)
 - ▶ Access – gauge of cannula
 - ▶ Choose appropriate anaesthetic induction drugs and doses
 - ▶ Position patient appropriately
 - ▶ Have emergency drugs ready

fb.com/medicalonline1 IV Cannula

Gauge	Color code	External Diameter	Length	Flow Rate
14G	Orange	2.1 mm	45 mm	240 ml/min
16G	Grey	1.8 mm	45 mm	180 ml/min
18G	Green	1.3 mm	32/45 mm	90 ml/min
20G	Pink	1.1 mm	32 mm	60 ml/min
22G	Blue	0.9 mm	25 mm	36 ml/min
24G	Yellow	0.7 mm	19 mm	20 ml/min
26G	Violet	0.6 mm	19 mm	13 ml/min



Intra op

- ▶ Give warm fluids
- ▶ Keep warm – BAIR HUGGER – if cold increase metabolic demand, impair contractility of heart
- ▶ Minimise stress response to surgery and anaesthetic (increases oxygen demand) – appropriate analgesia
- ▶ Reduce surgical insult – less intraoperative pressure, quick surgery, limit blood loss
- ▶ Consultant care?


Postop

- ▶ Ward, Outreach, HDU, ICU
- ▶ Post op analgesia, antiemetics (hypokalaemia → arrhythmias)
- ▶ Physio

▶ Surgical Risk Factors

- ▶ Pre operative, Intraoperative, Post operative



- ▶ Long procedure
 - ▶ Position
 - ▶ Blood loss
 - ▶ Infection
 - ▶ Recovery time
 - ▶ Pressure changes – ventilation and BP
- 

▶ Questions



SCENARIO

65yo male for a Total Hip Replacement

PMH

COPD

HTN

AF

MI 5 years ago -DES

T2DM

BMI 36

Current smoker 15/day

ETOH 25 units/week

DH

Aspirin

Amlodpine

Rampiril

Bisporolol

Metformin

- ▶ So, if pre-existing cardiac disease, having an operation can have serious effects
 - ▶ The stress of anaesthesia and surgery can unmask previously undiagnosed heart disease leading to perioperative cardiovascular events
 - ▶ So plan your anaesthetic carefully!
- 

HOW TO GIVE AN ANAESTHETIC
TO PROTECT THE CVS:

▶ CAREFULLY





THANK YOU

