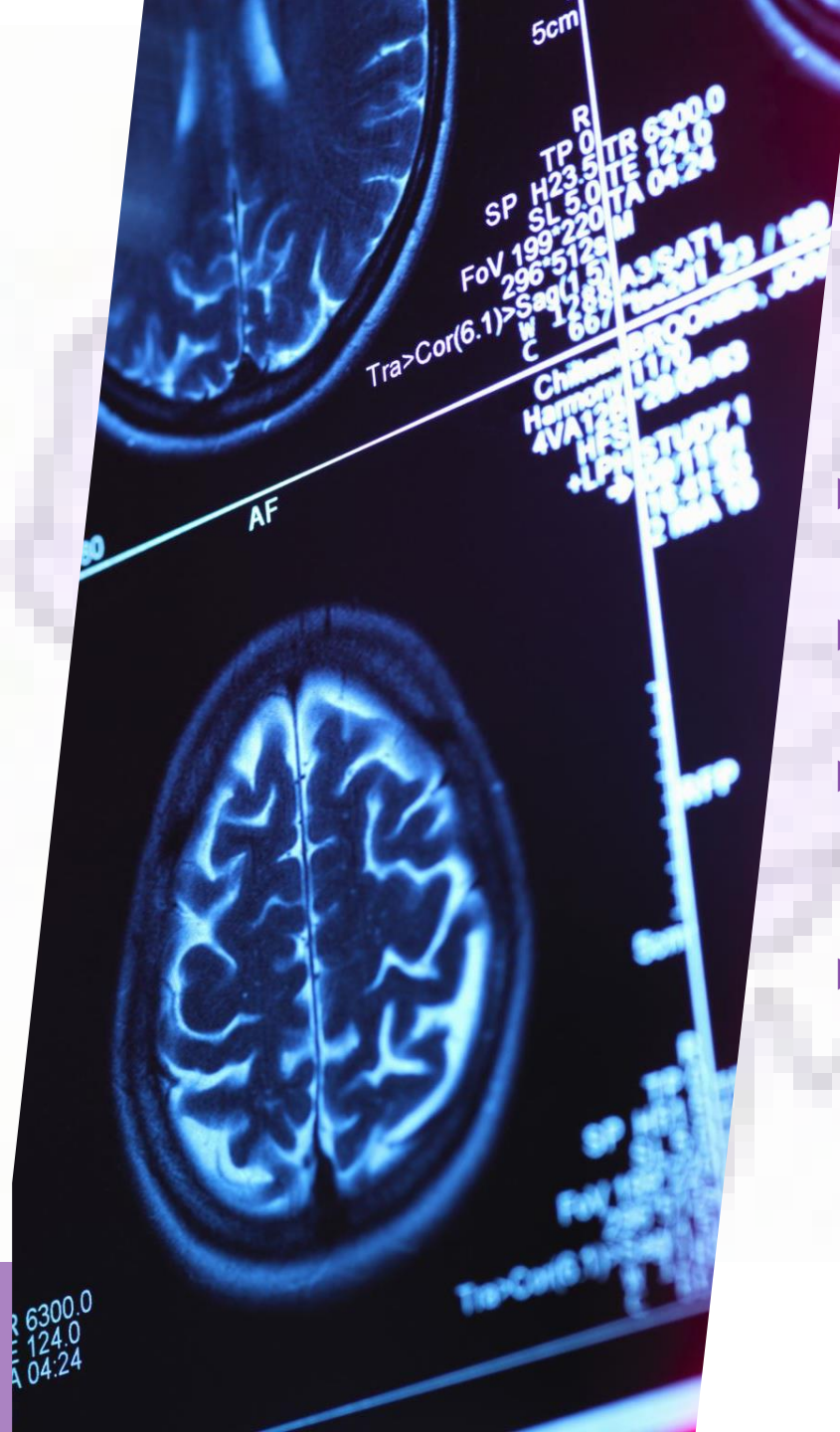


Subarachnoid Haemorrhage



Neuro ICU

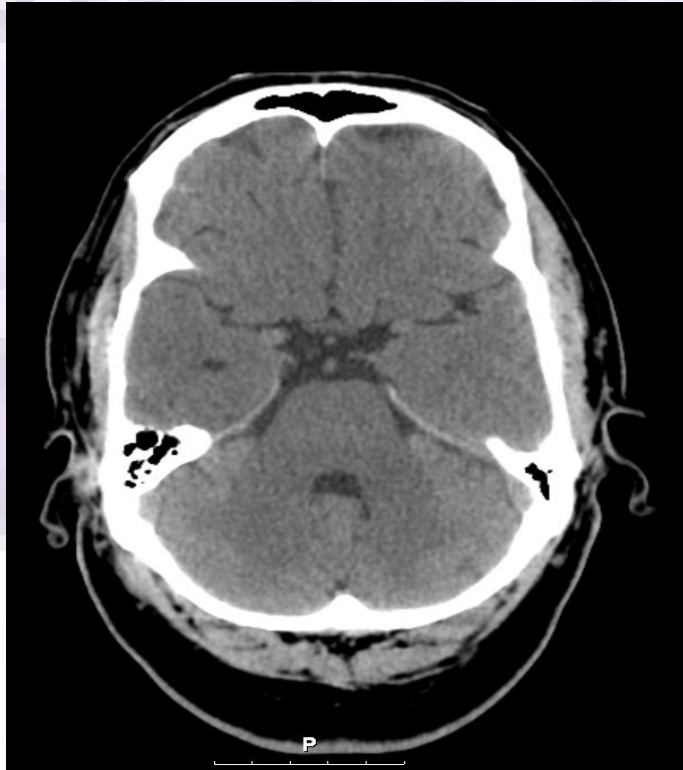


Aims and Objectives

- ▶ An understanding of the pathology of a SAH
- ▶ A toolkit for Management of SAH
- ▶ Enhanced knowledge of Vasospasm and Delayed Cerebral Ischaemia
- ▶ An Awareness of Complications

Subarachnoid haemorrhage

Normal scan on the left, abnormal on the right



Demographics

Accounts for 2-5% of all strokes.

Peak age is between 40-60 years.

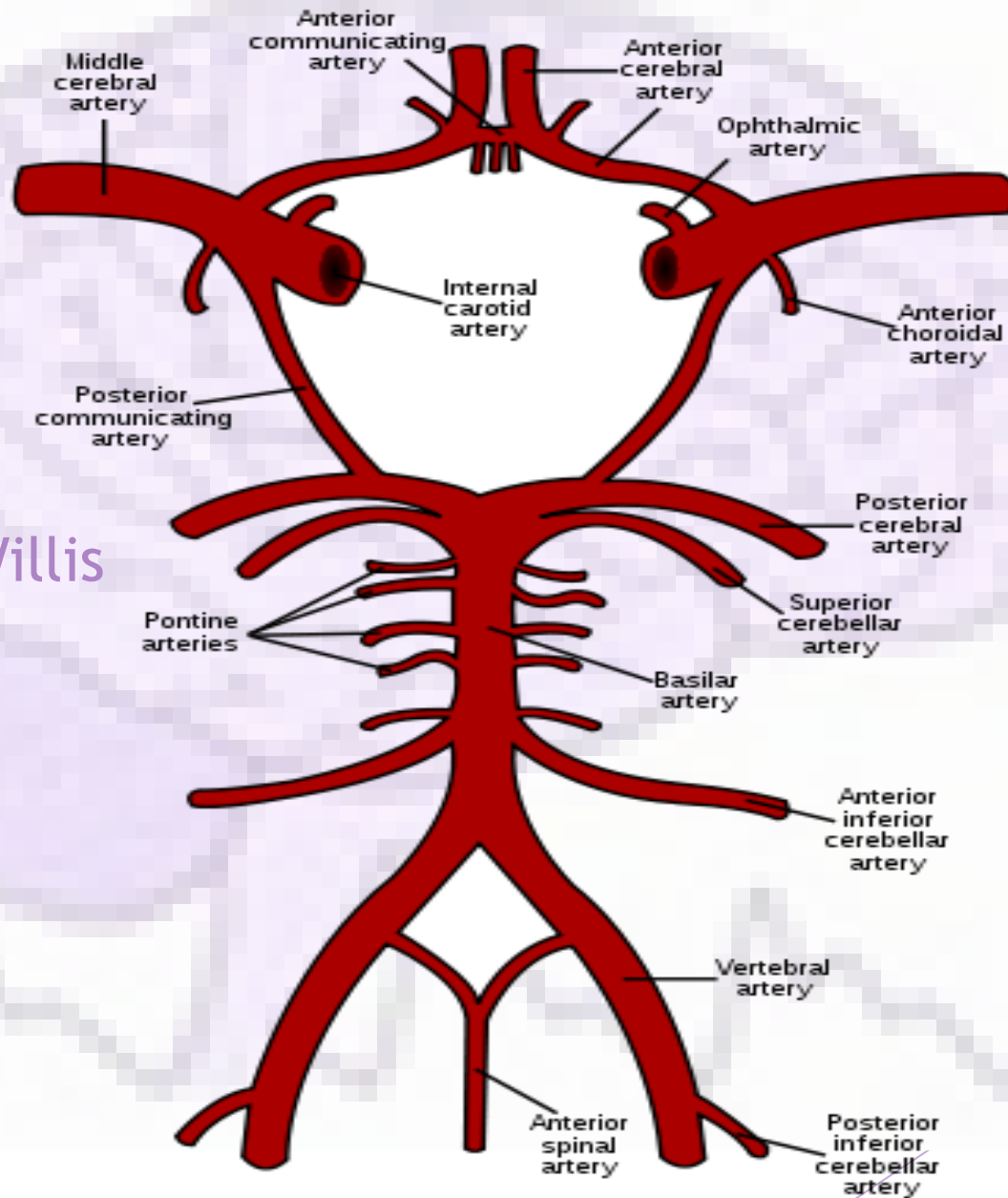
Female: male = 3:2

Under 40 years, more common in men

Sites

Anterior Circulation 35-40%

Multiple aneurysms 20-30%



Circle of Willis

SAH Scoring Systems

GCS

Clinical Deficit

SAH

Grade 1	15	No motor	Absent
Grade 2	13-14	No motor	Minimal
Grade 3	13-14	Present	Minimal
Grade 4	7-12	+/- motor	Thick
Grade 5	3-6	+/- motor	Thick

- Hunter and Hess
- World Federation of Neurological Surgeons

Outcomes

50% case fatality

25% die in first 24hrs

46% have cognitive impairment

66% do not return to same quality of life

30% of survivors require long-term care

Presentation



Typical:

Severe headache, nausea,
vomiting, meningism,
decreased GCS,
focal neurological signs



Atypical:

seizures, sentinel headache

SAH complications

Rebleed (7%)

Vasospasm (46%)

Hydrocephalus
(20%)

Seizures (30%)

Pulmonary
Oedema
(cardiogenic,
neurogenic) (23%)

Hyponatraemia
(28%)

Femoral Pseudo-
aneurysm (10-
15%)

Mr A Neuron

Previously fit and well 50 year old gentleman with only medical history of tonsillectomy aged 7. Recently started on antihypertensive medication by GP.

Admitted following grade 2 SAH

GCS 7 on admission to NICU (E2, V1(T), M4)

Immediately to theatre for EVD insertion

Now GCS 10 (E3, V1(T), M6)

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Mr A Neuron

- 1) Why did he have an EVD Inserted**
- 2) What are our aims of treatment**

① Start presenting to display the poll results on this slide.

To Reduce Pressure in the Head
(Hydrocephalus)

Blood is thicker than CSF so doesn't
flow as well (To Prevent obstruction)

To clear the heavy blood

To Measure the pressure in the head

To prevent coning

Reasons
why an
EVD was
Inserted

Aims of Treatment



Prevention of rebleed



Monitoring and Prevention of Vasospasm
(Delayed Neurological Defacit)



Detection of deterioration



Pain relief



Reassurance



Monitor for Cerebral Salt Wasting



Immediate Management and care

A

B PO₂ >10KPa

C normovolaemic, normotensive

- BP 120-160mmHG
- Stop other Ca⁺⁺ antagonists, diuretics and β blockers
- 2-2.5l/24 hour fluid intake, normovolaemia
- Correct hyperthermia
- Admission ECG
- Troponin blood test on admission
- Daily NT-pro BNP bloods
- Hb 90-100



FloTrac

- ▶ For ALL SAH patients
- ▶ ECG changes/Arrhythmias
- ▶ Pulmonary Oedema
- ▶ Consider Echocardiogram if requiring inotropes
- ▶ Polyuria with concerns over fluid balance

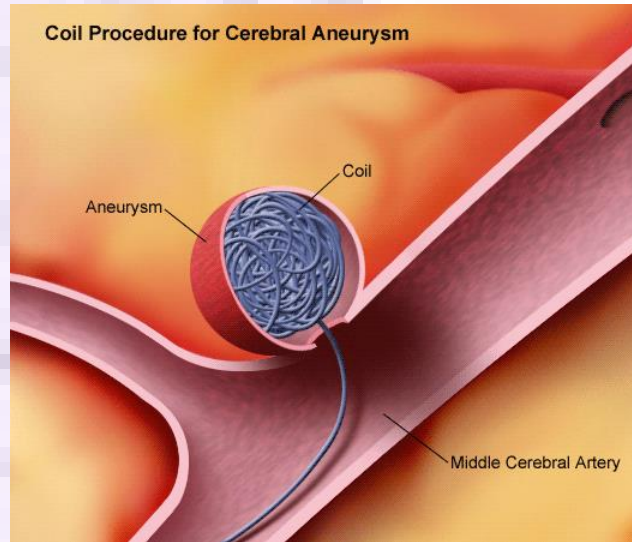
Immediate Management and care

D neuro observations at least 2 hourly

- DVT prophylaxis
- Control blood glucose
- Nimodipine and statins

E EVD care plus

- Reassurance
- Pain relief
- Anti-emetics
- Avoid pyrexia



Coil or clip ?

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Coil or Clip ?

① Start presenting to display the poll results on this slide.

Mr A Neuron

SAH 10 days ago and insertion of EVD

R MCA aneurysm coiled 3 days ago

Was GCS 13 (E3,V4,M6) now GCS 12 (E2,V4,M6) and he has developed L arm weakness which is new.

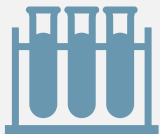
EVD remains in situ



What does this suggest?



What other information, observations would you like?



What tests may be ordered?

Delayed Cerebral Ischemia

Delayed
Ischaemic
Neurological
Deficit (DIND)

Delayed
cerebral
ischaemia (DCI)

Presents
clinically as a
deterioration in
neurology

Onset 3 -21
days

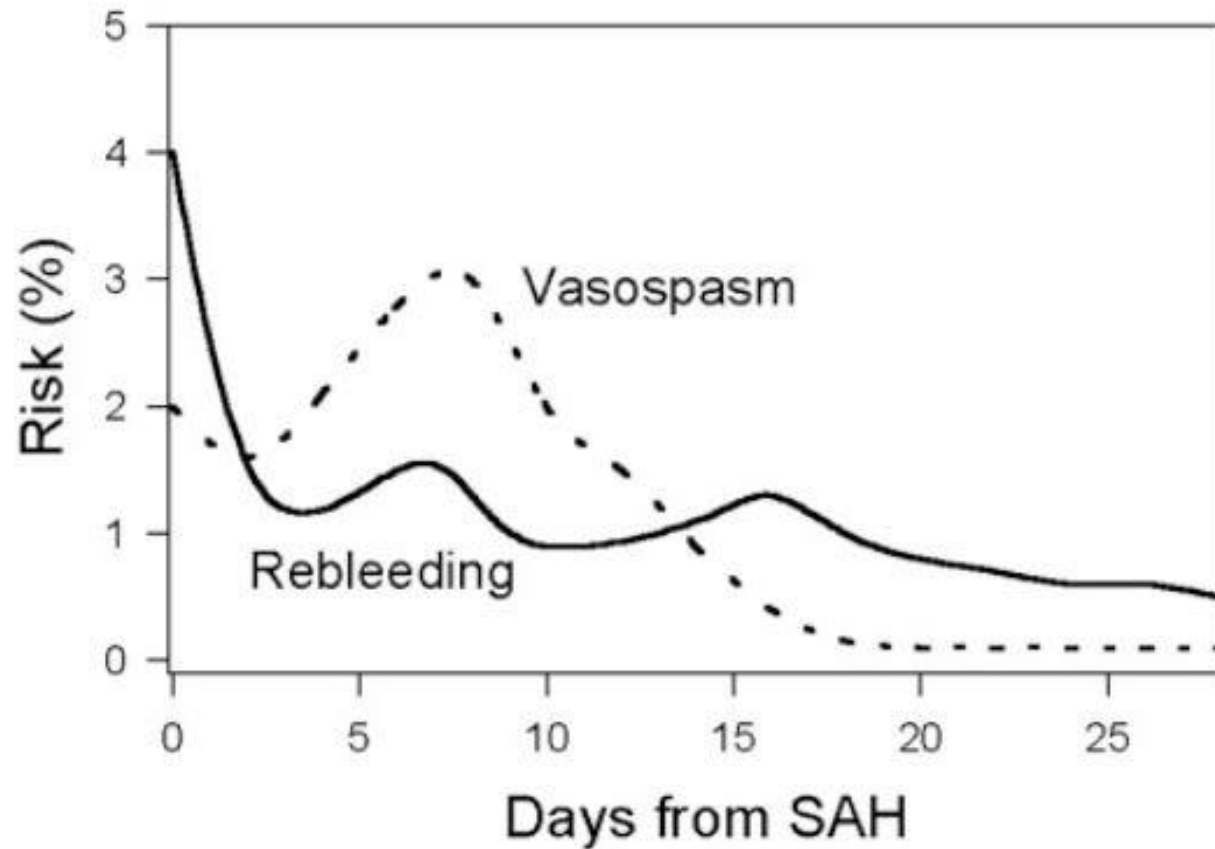
Peak incidence
3-12 days

46% of SAH
patients develop
vasospasm

Up to 57% have
asymptomatic
ischaemic
lesions

30% of patients
die
• (9% of all SAH
patients)

50% have
permanent
deficits



Risk of Rebleeding and Vasospasm

Prevention of DCI - is it possible?

Fluids - no evidence prophylactic hypervolemia improves outcome

Ca⁺⁺ antagonist

- Nimodipine 60mg 4 hourly 21 days
- Time sensitive, needs to be given regularly
- Must not miss more than 2 doses
- Decreases incidence of cerebral infarction by 34%

Mg Sulphate - hypo in 50% of SAH admissions and in patients with DIND

Medical Management of DCI



Only in secured aneurysms



Once other causes of deterioration ruled out



Ensure patient well oxygenated
preferably $\text{paO}_2 > 10 \text{ KPa}$

Medical Management of DCI

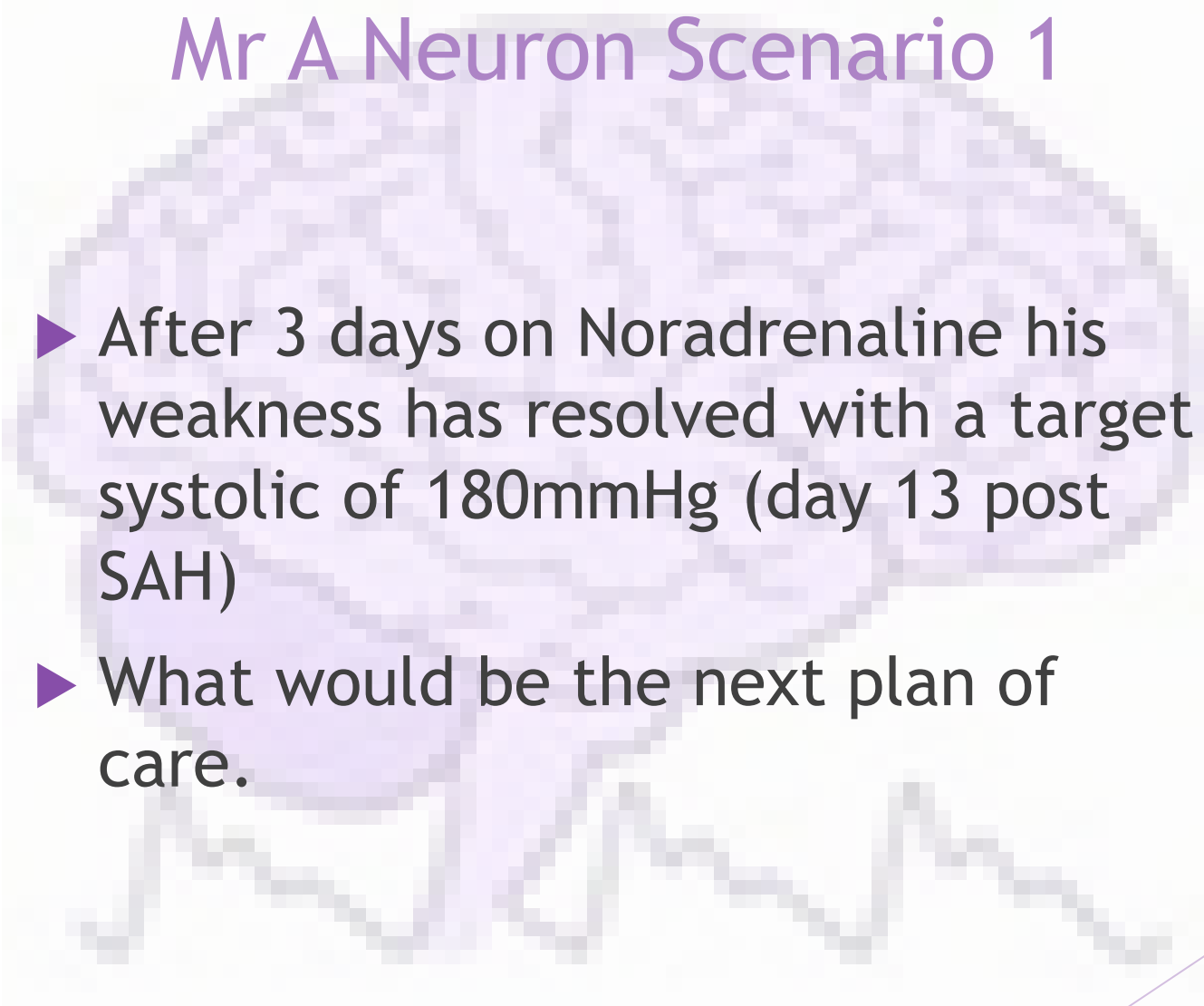
Systolic augmentation 20% of normal

up to 200mmHg

Aim for euvolemia

CT angiogram +/- intervention

Mr A Neuron Scenario 1

- 
- ▶ After 3 days on Noradrenaline his weakness has resolved with a target systolic of 180mmHg (day 13 post SAH)
 - ▶ What would be the next plan of care.

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Mr A Neuron



After 3 days on Noradrenaline his weakness has resolved with a target systolic of 180mmHg (day 13 post SAH)

What would be the next plan of care?

① Start presenting to display the poll results on this slide.

What would be the next plan of care?

Reduce support of BP and watch neurological status

If remained well then wean and stop inotropes and plan to tolerate lower BP

Ensure not to try and raise EVD to see if EVD required at the same time as reducing inotropes, ? Know which came first in that situation.

References

- ▶ Rees, G et al (2002): Subarachnoid haemorrhage: a clinical overview. *Nursing Standard* 16, 42; 47-54
- ▶ Dooling E and Winkelman C (2004): Hyponatraemia in the patient with Subarachnoid haemorrhage. *Journal of Neuroscience Nursing* 36(3) 130-135