IMY1 Regional Respiratory Training Session
HEE Yorkshire and the Humber: Respiratory Medicine

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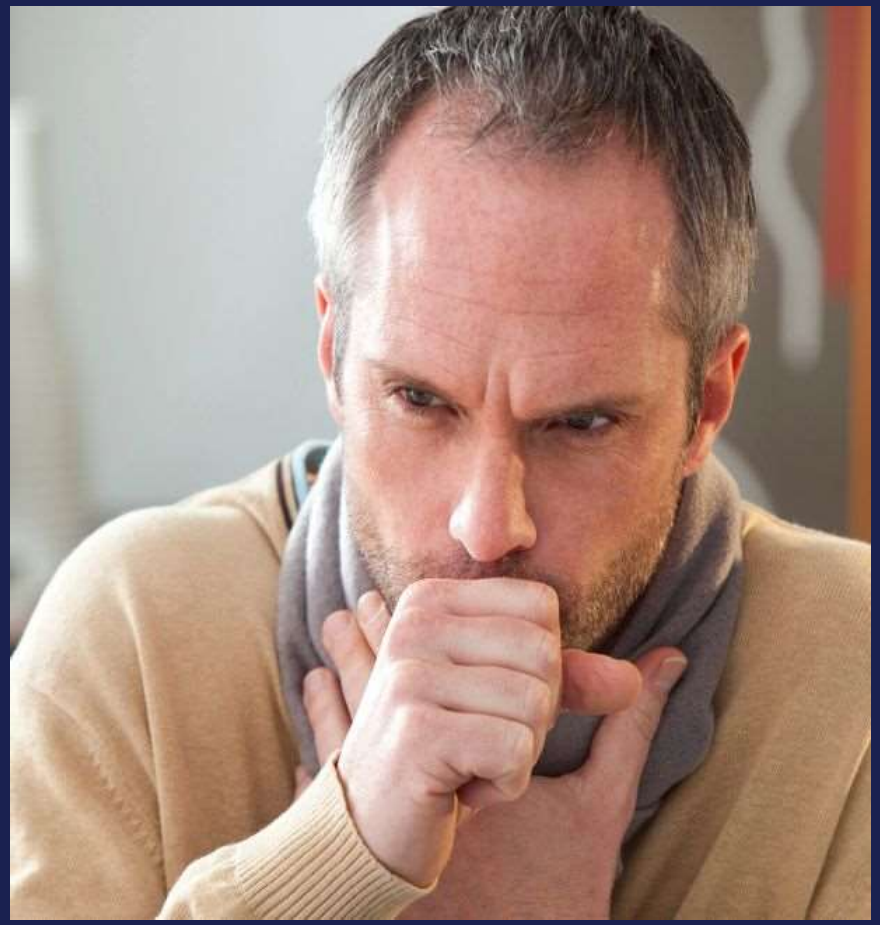
NHS
Doncaster and Bassetlaw Teaching Hospitals
NHS Foundation Trust

Introduction: Dan



- 30 year old
- Smoker 20 pack-years
- Cigarettes and cocaine
- SOBOE, wheezes and cough for years
- COPD diagnosed by chest physicians

- Admitted with an infective exacerbation of COPD
- SaO_2 85% on air


L
AP
ERECT

Poll 1: Which oxygen supplementation interface?

- Nasal cannula?
- Simple Hudson face mask?
- Venturi mask?
- Non-rebreather mask?

Concept of controlled oxygen vs uncontrolled oxygen

Nasal cannulae

- Scenario 1:
  - Breathing 1L per breath
  - 30 breaths per min
  - Inspiratory flow rate = 30 L/min
- Scenario 2:
  - Breathing 1L per breath
  - 60 breaths per min
  - Inspiratory flow rate = 60 L/min
- If given 1L/min oxygen via nasal cannulae:
  - In scenario 1, 1L of pure oxygen and 29L of air
  - In scenario 2, 1L of pure oxygen and 59L of air
- Deliver variable concentration of oxygen

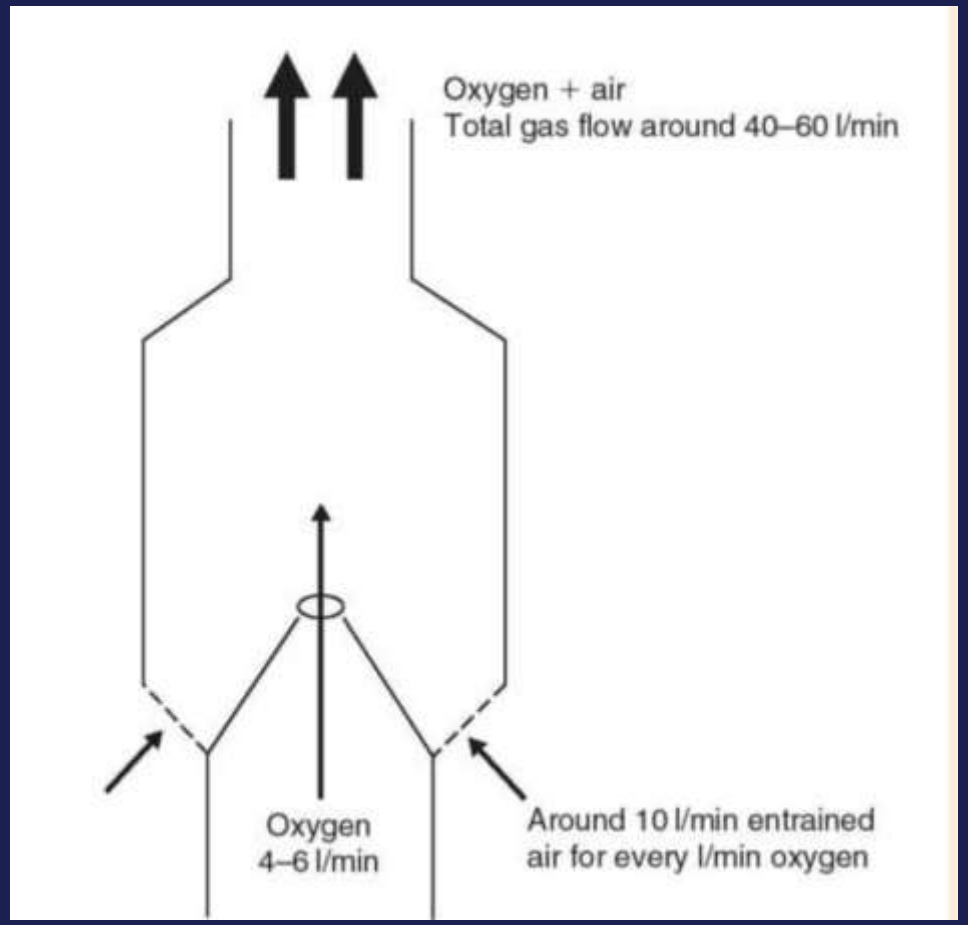
Concept of controlled oxygen vs uncontrolled oxygen

Venturi mask

- High flow mask
- Gas flow rate is fixed and set higher than the patient’s peak inspiratory flow rate
- Change in the patient’s breathing pattern doesn’t affect the oxygen concentration delivered

Concept of controlled oxygen vs uncontrolled oxygen

- Venturi mask supplies the exact amount of intended FiO_2



Dan (2)

- Venturi mask prescribed, but not given. Left on nasal cannula 4L/min.

- Conscious but not very alert; GCS 13/15

- ABG on 4L/min
  - pH 7.28
  - pO_2 8 kPa
  - pCO_2 12 kPa
  - HCO_3 22 mmol/L

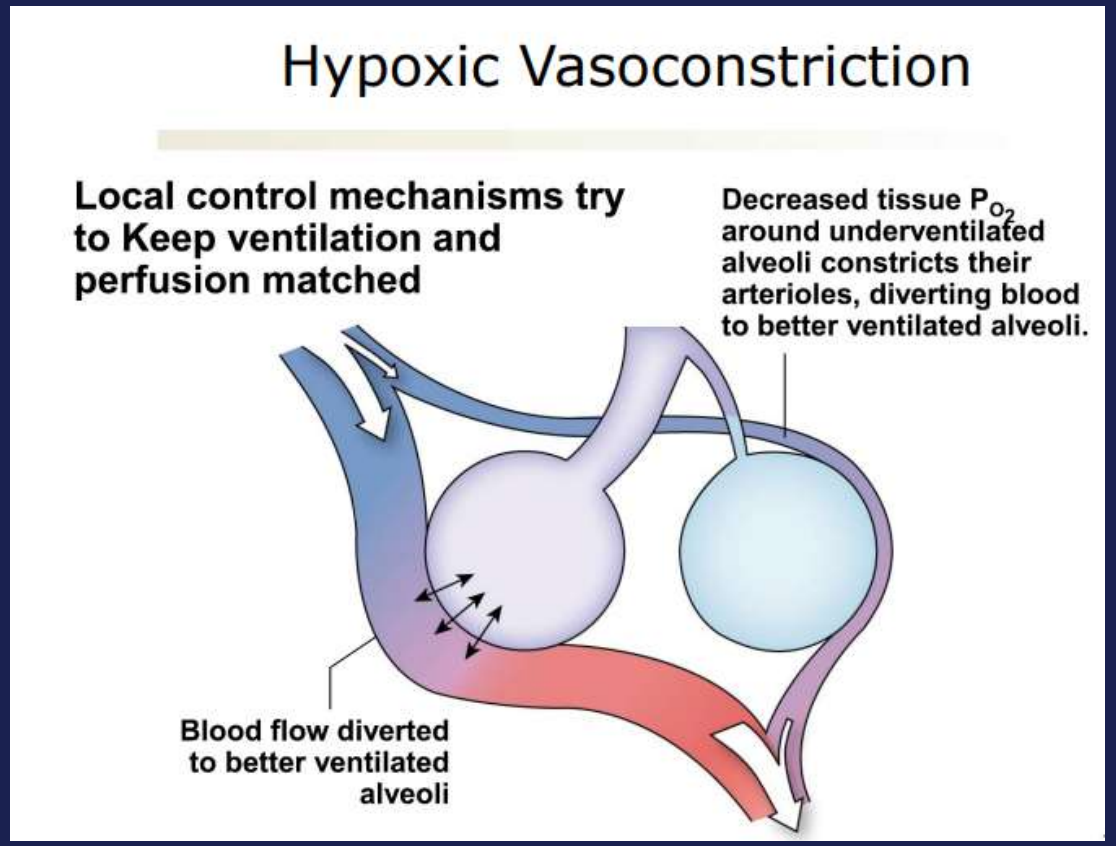
- Acute type 2 respiratory failure

Poll 2: The mechanism(s) of excess oxygen precipitating hypercapnia

1. Reduced hypoxic ventilatory drive?
2. V/Q mismatch?
3. Both?

Mechanism(s) of excess oxygen precipitating hypercapnia

- V/Q mismatch



- Reduced hypoxic ventilatory drive unlikely to be significant

Dan (2)

- Venturi mask prescribed, but not given. Left on nasal cannula 4L/min.

- Conscious but not very alert; GCS 13/15

- ABG on 4L/min
  - pH 7.28
  - pO_2 8 kPa
  - pCO_2 12 kPa
  - HCO_3 22 mmol/L

- Acute type 2 respiratory failure

Poll 3: What would you do next?

1. Take O_2 off and repeat ABG in 1 hour?
2. Change to Venturi mask and repeat ABG in 1 hour?
3. Start on Bi-level Positive Airway Pressure (BiPAP)/non-invasive ventilation (NIV)?

Non-invasive ventilation

- Bi-level Positive Airway Pressure
  - IPAP & EPAP
- EPAP is to prevent alveolar collapse/iPEEP
- IPAP over EPAP is for ventilation

- Mask + Tube + Pump
- Patient-initiated ventilation (back up rate is not adequate)
- Still needs low oxygen target

Dan (3)

- Reviewed in 1 hour

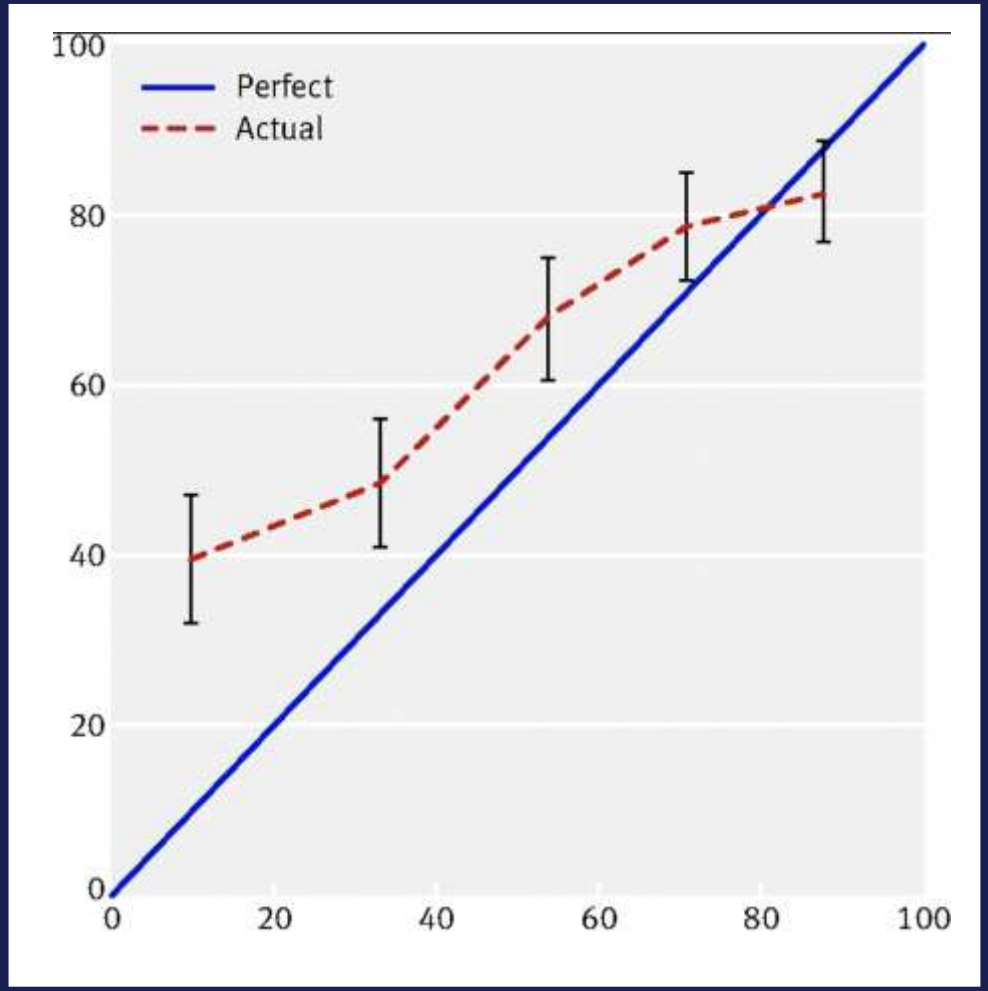
- RR 40/min, tiring
- Mask on the face
- No leakage
- Adequate pressure and sufficient oxygen
- ABG on NIV with entrained oxygen
  - pH 7.25
  - pCO_2 11
  - pO_2 8
  - HCO_3 26

Poll 4: Would you refer Dan to ITU?

1. Yes?

2. No?

COPD and asthma outcome study (CAOS)



Wildman MJ et al. BMJ 2007;335(7630):1132.
DOI: 10.1136/bmj.39371.524271.55.

CAOS Study

- >800 patients recruited
- >500 (60%) survived to 180 days
- Of the survivors, 80% responded to a questionnaire

- 73% felt the QoL the same or better
- 96% would choose similar treatment again

BODE index

- Score to estimate 4-year survival in COPD

- Based on
  - B: BMI
  - O: (airway Obstruction) FEV1 % predicted
  - D: Dyspnoea, MRC scale
  - E: Exercise tolerance, 6 minute walk distance

- 0-2 points; 80%
- 3-4 points; 67%
- 5-6 points; 57%
- 7-10 points; 18%

NEJM 2004, 350 p1005-12

BODE index

• BMI	21
• Obstruction	FEV_1 50%
• Dyspnoea	MRC scale 2
• Exercise capacity	300 metres

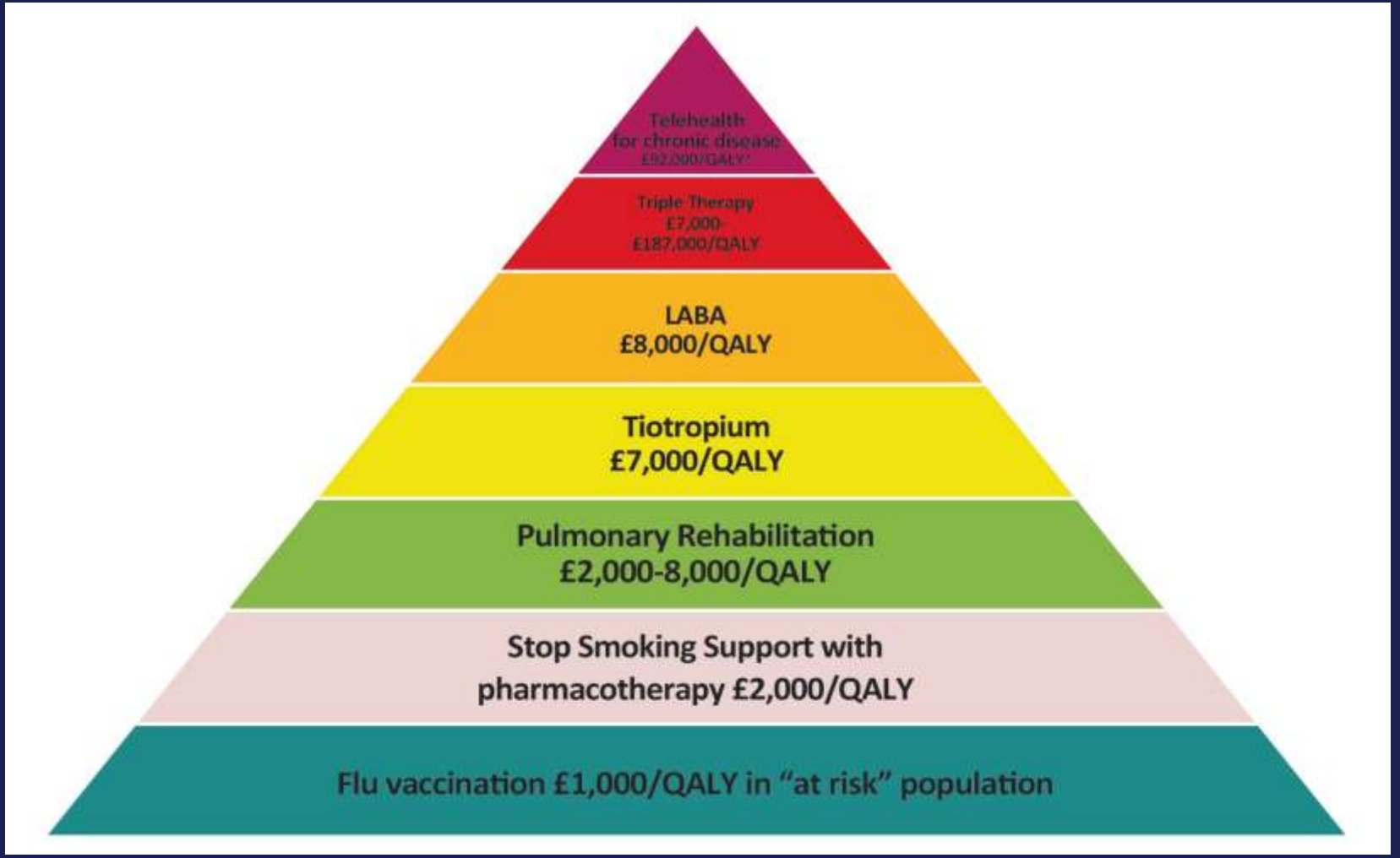
3 points

Estimated 4-year survival – 67%

Dan (4)

- Intubated for 5 days
- Discharged after 10 days
- COPD management optimised
- Smoking cessation – advised
- Pulmonary rehabilitation – referred

COPD Value Pyramid



Dan (5)

- Readmitted
- Coughing green sputum
- Febrile
- Wheezing
- Breathless

- Acute type 2 respiratory failure on 28% Venturi
  - pH 7.3
  - pO_2 8
  - pCO_2 10


R
AP ERECT
MOBILE
RESUS
Compress


L
AP
ERECT


R
AP ERECT
MOBILE
RESUS
Compress

Poll 5: Would you do a CTPA at this point?

1. Yes?

2. No?

Dan (5)

- Readmitted
- Coughing green sputum
- Febrile
- Wheezing
- Breathless

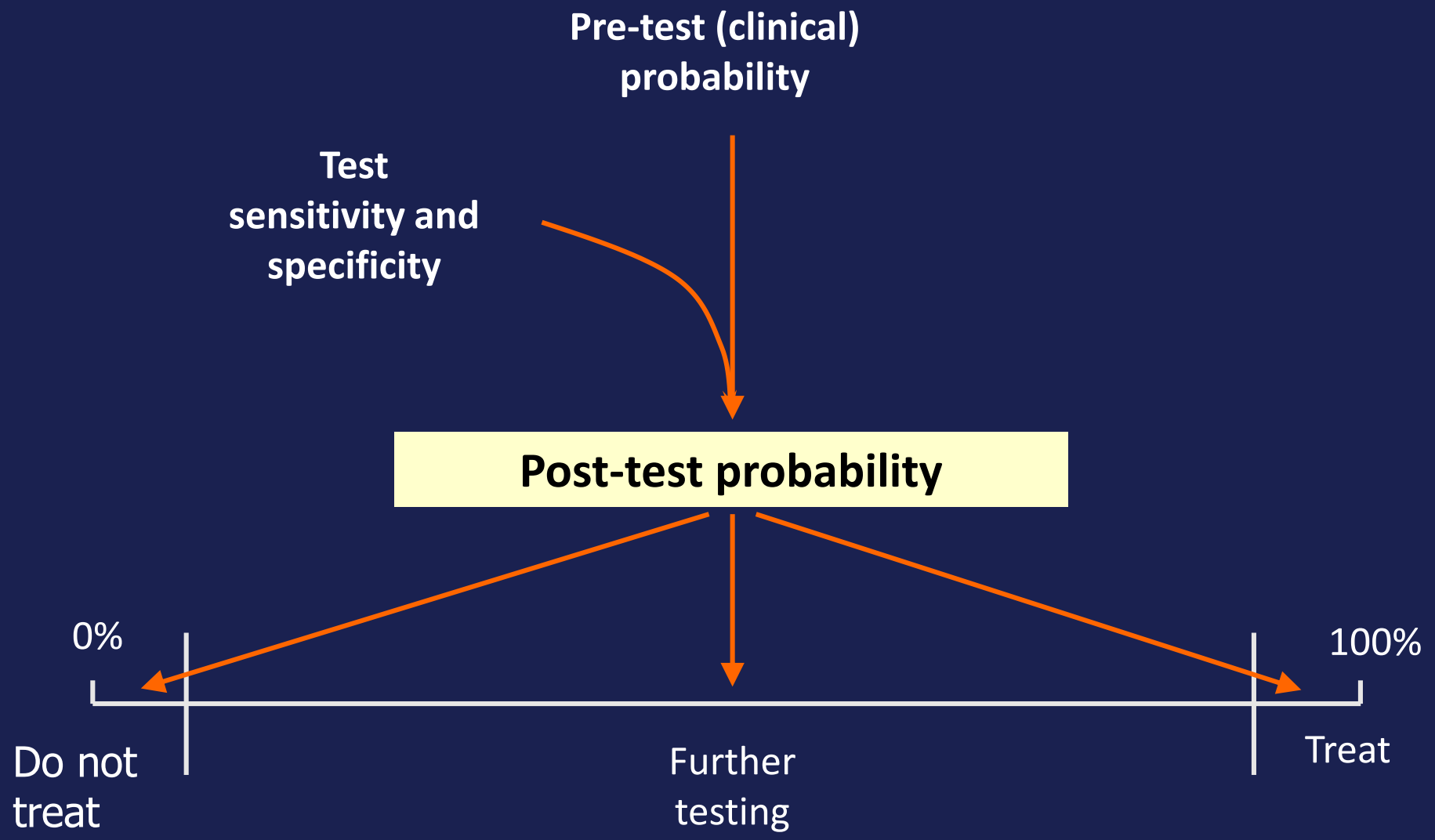
- Acute type 2 respiratory failure on 28% Venturi
  - pH 7.3
  - pO_2 8
  - pCO_2 10


R
AP ERECT
MOBILE
RESUS
Compress

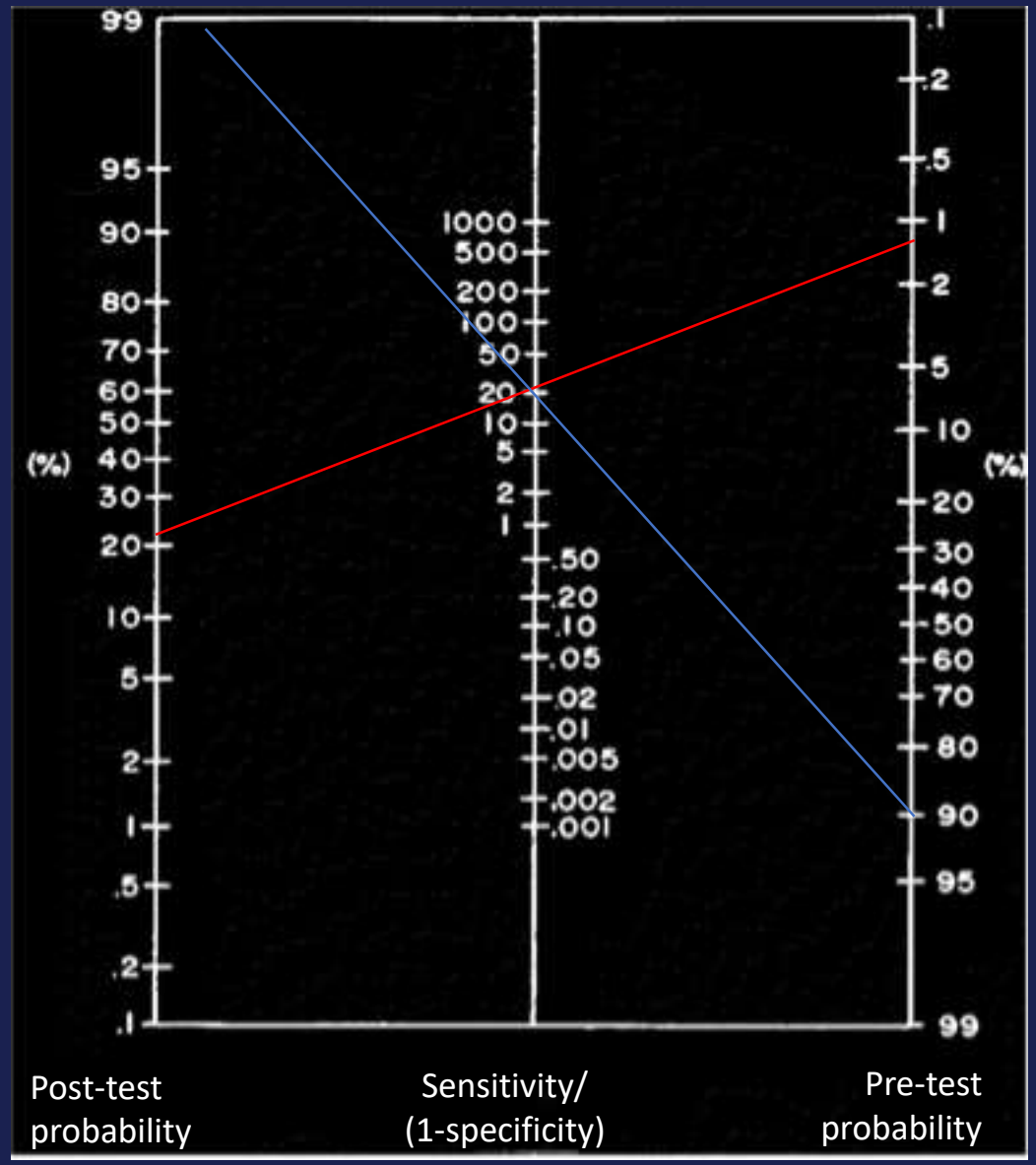
Two-level PE Wells score

Clinical Feature	Points
Clinical signs and symptoms of DVT (minimum of leg swelling and pain with palpation of the deep veins)	3
An alternative diagnosis is less likely than PE	3
Heart rate > 100 beats per minute	1.5
Immobilisation for more than 3 days or surgery in the previous 4 weeks	1.5
Previous DVT/PE	1.5
Haemoptysis	1
Malignancy (on treatment, treated in the last 6 months, or palliative)	1
Clinical probability simplified score	**Points**
PE likely	> 4
PE unlikely	≤ 4

Diagnostic test interpretation



Nomogram for Bayes's theorem



N Engl J Med 1975;293:257-257.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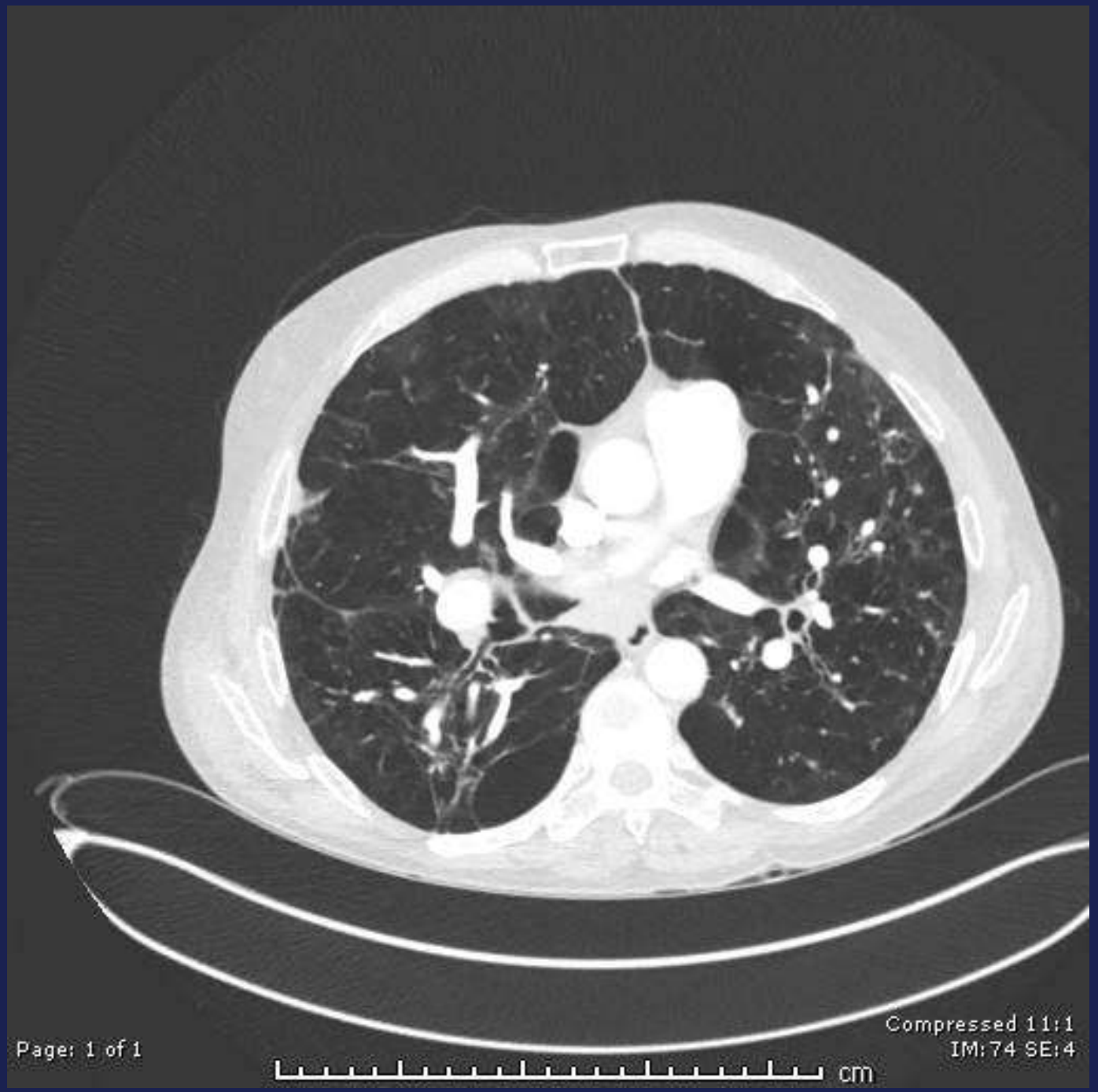
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Dan (6)

- Still smoking
- Sarcopenic, cachectic, BMI 15
- Missed opportunities for surgical interventions (bullectomy, LVRS, EBV) & lung transplantation
- 8 admissions with acute type 2 respiratory failure needing NIV in last 2 years)
- Variable engagement with GP and chest clinicians
- Residential home @ age of 47
- Exercise tolerance is only 10 steps
- On domiciliary NIV at night
- DNACPR in place
- BODE index – 10 points (4 year survival is 18%)

Dan (6)

- ABG on this admission:
  - pH 7.25
  - pO_2 7.0
  - pCO_2 12
  - HCO_3 33

Poll 6: NIV?

1. Yes?

2. No?

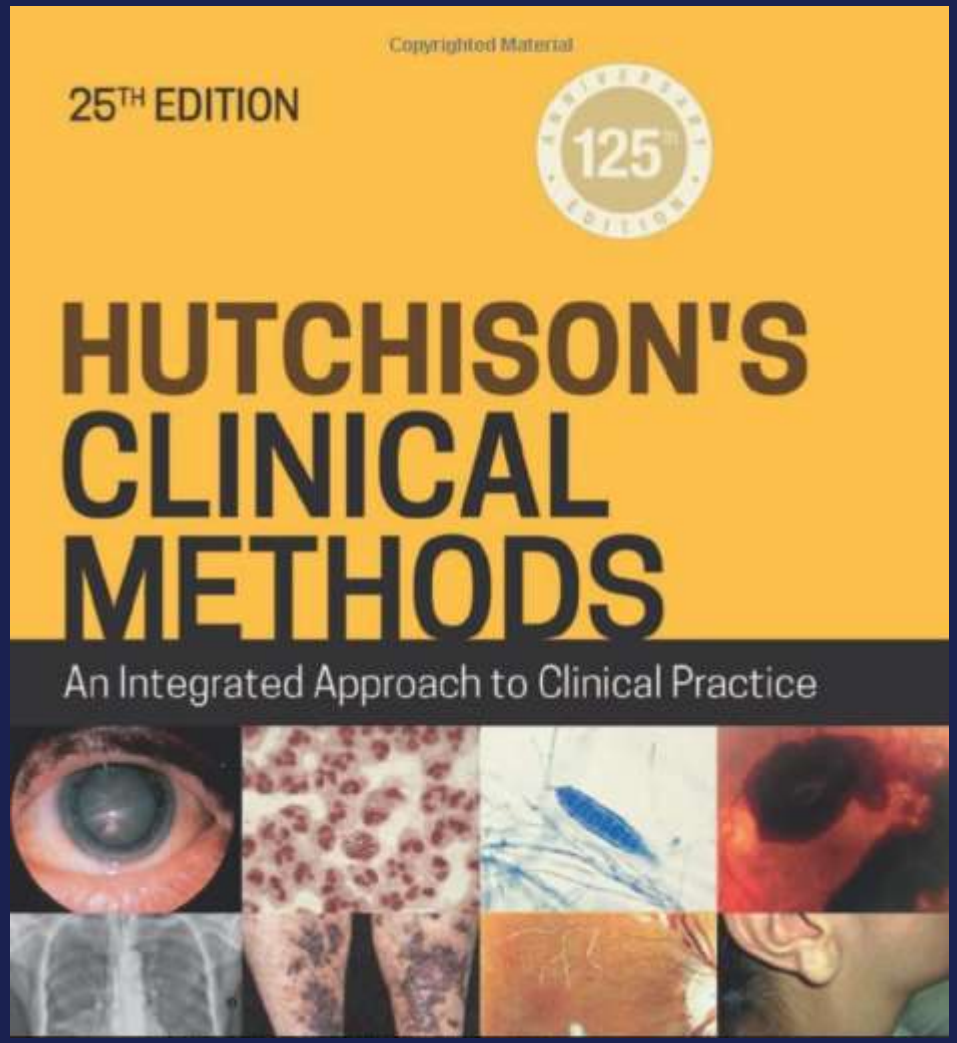
Dan - 6

- Advanced care planning
- Wishes, quality of life as perceived by the patient
- Clinical course

- Not all acute type 2 respiratory failure need NIV treatment and NIV may not be appropriate.

- Palliative approach
- Family informed
- End of Life pathway
- Passed away peacefully

Hutchison’s petition



Hutchison’s petition

“… From putting knowledge before wisdom, science before art, and cleverness before common sense;

From treating patients as cases …

Good Lord, deliver us.”


תודה
Dankie
Gracias
Спасибо
شكراً
Merci
Takk
Köszönjük
Terima kasih
Grazie
Dziękujemy
Dėkojame
Ďakujeme
ကျေးဇူးတင်ပါသည်
Paldies
Kiitos
Täname teid
谢谢
Thank You
Tak
感謝您
Obrigado
Teşekkür Ederiz
감사합니다
Σας Ευχαριστούμ
ขอบคุณ
Bedankt
Děkujeme vám
ありがとうございます
Tack