CACCN Dynamics
Halifax, NS
Mechanical Ventilation Workshop
Difficult to Wean Case Study – JIM
Jim – Past Medical Hx COPD

- 67 year old, 70 kg (IBW) male
- Diagnosed with COPD 10 years ago
- Smoked 2 ppd x 35 year; quit 5 years ago
- Reports drinking 3-4 beer a day
- Daily cough productive of moderate amount of whitish secretions
- A/E = bilateral exp wheezes with coarse crackles noted t/o
Jim –

Respiratory Assessment

- Home Respiratory Meds include:
  - Ventolin/Atrovent inhalers, 4 puffs prn
  - Advair 50/250 1 puff bid

- Jim had PFTs done in the past year 6 months previously:
  - FEV-1 = 1.8 L (54% predicted)
  - FVC = 3.4 L (65% predicted)
  - FEV-1/FVC = 53%
  - Post Bronchodilator FEV-1 = 1.95 (8% Δ)
  - DLCO (Diffusion in lung for carbon monoxide) = 60% predicted
JIM – Thinking points

- *Is Jim on the appropriate medication for his COPD?*

- *What is Advair and how does it work?*

- *What do Jim’s PFTs indicate?*
Jim – ABGs

- Jim had ABGs done when he was assessed at the COPD clinic 6 months ago:

  - pH = 7.36
  - PCO₂ = 56 mmHg
  - PO₂ = 68 mmHg
  - HC0₃ = 29 mmol/L
  - SaO₂ = 92%

What do these ABGs indicate? Explain
Jim has experienced an acute worsening of his symptoms over the past week.

- ↑ in his SOB/dyspnea, ↑ in his sputum production; sputum now *yellowish* in colour, ++ copious and thick

Jim visits his family physician who finds him to be in acute respiratory distress.

Jim is immediately sent to the ER for assessment.
JIM – ER visit

- RR 35 b/min
- HR 128 b/min
- BP 135/76 (96)
- Temp 38.9°C
- Sp02 87% on R/A, ↑ 90% on 4 L nasals
- A/E = bilateral distant b/s with inspiratory coarse crackles and expiratory wheezes t/o.
- Accessory muscle use of inspiratory and expiration noted
JIM – ASSESSMENT

- What do you think is happening with Jim?

- What do you suggest for further investigation of Jim?
What does the CXR indicate?
Explain
JIM – Current ABGs

ABGs are assessed in the ER:

- pH = 7.31
- PCO₂ = 68 mmHg
- PO₂ = 54 mmHg
- HCO₃ = 29 mmol/L
- SaO₂ = 86%

What do these current ABGs indicate? Explain
What do you note on the ECG?
JIM – recommended tx?

What do you suggest for Jim’s management?

Do you suggest ↑ FiO2 for Jim?
What is the concern with O₂ tx and COPD?

Does he need help with ventilation?
What do you suggest?
ER physician orders NIPPV for Jim

- Do you think JIM is a good candidate for non-invasive positive pressure ventilation (NIPPV)?

- What are some contraindications to NIPPV?

- Select appropriate parameters/interface for NIPPV with JIM
JIM – ABGs

- ABGs are re-assessed 30 min. post initiation of NIPPV:

  - pH = 7.33
  - PCO₂ = 62 mmHg
  - PO₂ = 57 mmHg
  - HC0₃ = 29 mmol/L
  - SaO₂ = 88%

  What do these current ABGs indicate?
  What changes if any should be made to NIPPV?
Jim is transferred to the ICU from ER

The next day in ICU Jim’s BP acutely drops to 60/30 and he becomes obtunded

He is intubated with #8.0 ETT, secured at 23 cm ATL

Jim is resuscitated with IV fluids and vasopressors, with recovery in BP to 86/60 (69).

He is being manually bagged on 100% with SpO2 99% and not breathing spontaneously at this time
JIM – ICU

- Select appropriate ventilator parameters for JIM

- **Mode and Breath Type?**
- **VT or P level?**
- **RR?**
- **FiO2?**
- **PEEP?**
JIM – ABGs

- ABGs are re-assessed 30 min. post intubation and ventilation:

What do these current ABGs indicate?

- pH = 7.48
- PC0₂ = 50 mmHg
- PO₂ = 85 mmHg
- HC0₃ = 29 mmol/L
- SaO₂ = 97%

What changes if any should be made to the ventilator?
Jim is ventilated in ICU for one week with ventilation support increasing and decreasing several times.

Jim receives multiple courses of antibiotics, as well as anti-fungal medication.

Jim is suctioned for +++ thick yellowish secretions.

Jim has been tried on CPAP/PS or other SPON modes several times but has not tolerated these changes.
**JIM – ICU**

- *What do you suggest to facilitate weaning with JIM?*
  - *Hint – it will ↓ Airways Resistance (Raw) and WOB for Jim!*

How does a tracheostomy improve Raw and WOB?

What other factors will it help?
What ventilator modes or strategies can be used to increase Jim’s workload gradually and improve respiratory muscle strength?

What else can be done to improve Jim’s respiratory and overall muscle strength?
Mobilization, especially early in ICU course, can ↓ ventilator and ICU days as well as ↓ incidence of delerium and long-term NM weakness.
After a total of 28 days on a mechanical ventilator, Jim was weaned gradually down to a trach mask for all day and back to the ventilator at night. After 5 days of nocturnal ventilation, Jim was able to tolerate being on trach mask for 24 hr a day. He was de-cannulated after another week as his cough was strong and his secretions had decreased in thickness and volume.