

# Experiences in developing a ward based Specialist NIV Team

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## Background

12 years ago the mortality rate across the Cambridge University NHS Foundation Trust for those receiving NIV for acute hypercapnic type 2 respiratory failure (AHRF) was 26%. This was in comparison to published multicentre RCT mortality rate of 10% (Plant et al, 2000). A business case was put forward to reduce this mortality rate and improve NIV patient care by creating a Specialist NIV Team and a trust wide NIV pathway.

## The Specialist NIV Team

NIV Specialist Team

- NIV Lead Consultant
- Respiratory Consultant on-call
- Respiratory Registrar on-call
- NIV (Respiratory) Specialist Physiotherapists (2.1 WTE)

Additional supportive staff

- Acute Respiratory Team Nurses
- Respiratory Ward NIV Link Nurse
- Respiratory Ward Senior Sister
- Respiratory Ward nursing staff
- Ward Physiotherapist
- Rapid Response Team

## Key Protocol/Pathways within the trust.

- Dedicated Specialist NIV Team of Physiotherapists
- Early Referral to Respiratory Registrar/Consultant for review, in conjunction with Specialist Physiotherapists
- Early Rapid Response/Critical Care input if patient classified as higher risk
- NIV care provided in a dedicated Respiratory Care Unit (8 Beds) with bed side monitoring within the Respiratory Ward
- Daily review by the Specialist NIV Team, with careful weaning based on clinical presentation.

## Conclusion

Our mortality rate has improved significantly with the dedicated Specialist team and clinical pathway in place.

Dividing patients with acute hypercapnic type 2 respiratory failure into sub-groups aids risk assessment and this could affect management.

NIV may be an appropriate for those with non-COPD related acute hypercapnic type 2 respiratory failure. However this group have been found to be at higher risk of death during their admission.

## Stats 2016

159 patients were admitted to the Respiratory Ward requiring NIV for AHRF. 15 patients receiving acute NIV died whilst an inpatient. This equates to a mortality rate of 9.4%, a reduction in our mortality rate by 16.6%.

We performed further analysis of this data and split it into 3 distinct subgroups based on the cause of respiratory failure:

- COPD with no comorbidity (COPD) = 2 deaths in 50 patients
- COPD and presence of an additional comorbidity (COPD+) = 5 deaths in 60 patients
- Non-COPD e.g. heart failure, neuromuscular disorder, obesity related ventilatory failure (Other) = 8 deaths in 49 patients

Chart 1 shows the division of total number of patients receiving acute NIV by subgroup.

Chart 2 demonstrates the majority of deaths were non-COPD related

Chart 3 Demonstrates that the "other" subgroup were twice as likely to die than the COPD+ and 4x likely than COPD

Excluding data of those patients with a non-COPD diagnosis our mortality rate is currently 6.4%.

## Future directions

We are now looking to make further improvements in our NIV service and have the following on-going projects:

1. Use of a NIV care bundle:
  - Start IPAP 15cmH<sub>2</sub>O. Titrate to IPAP 20-30cmH<sub>2</sub>O over 10-30min depending on clinical impression
  - Entrain O<sub>2</sub> to keep S<sub>a</sub>O<sub>2</sub> 88-92%
  - Perform ABG at 1 and 4 hours post NIV initiation, or alteration in settings
  - Monitor pulse oximetry continuously, measure hourly respiratory rate, BP, pulse and GCS in first 12 hours
  - Reviewed and accepted by NIV Specialist Team prior to transfer to respiratory Ward. Decision about regarding placement (e.g. Respiratory Ward, HDU, ICU)
  - Decision made regarding UFTO, ceiling of care, DNACPR.
2. Introduction of an NIV Discharge Bundle to include:
  - Number of previous admissions requiring NIV
  - ABG/CBG on discharge
  - Sleep study
  - BTS Oxygen Alert card
  - Follow up plan
  - Onward referral for domiciliary NIV
  - Palliative care referral
3. Patient satisfaction surveys
4. KPIs:
  - 1-4 hour gas completion rates
  - 78% completion for 1 hour ABGs
  - 33% completion for 4 hour ABGs
  - Time to pH reversal
  - 13 hours
  - Door to mask time
  - Around 40 minutes

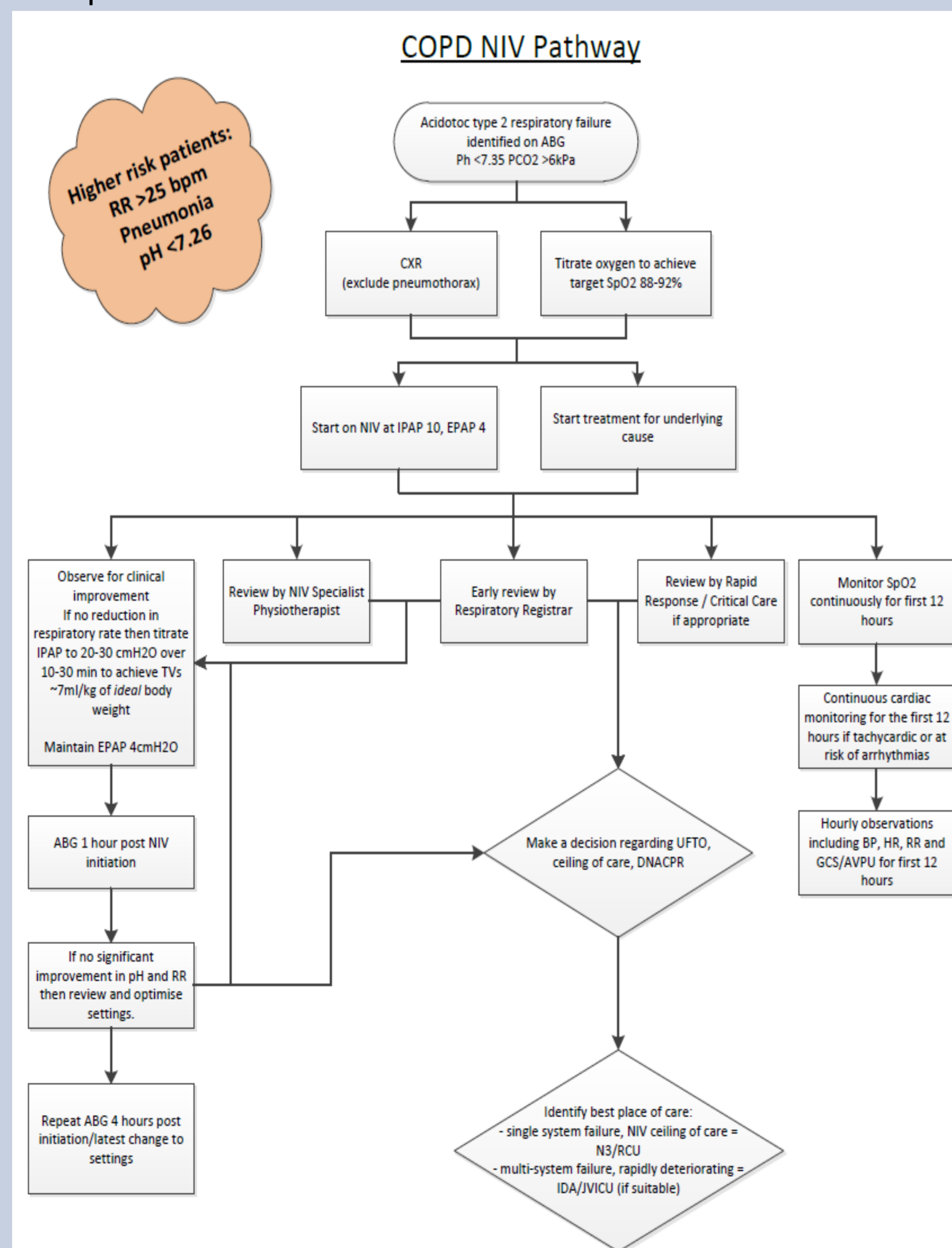


Chart 1. Patients receiving acute NIV by subgroup

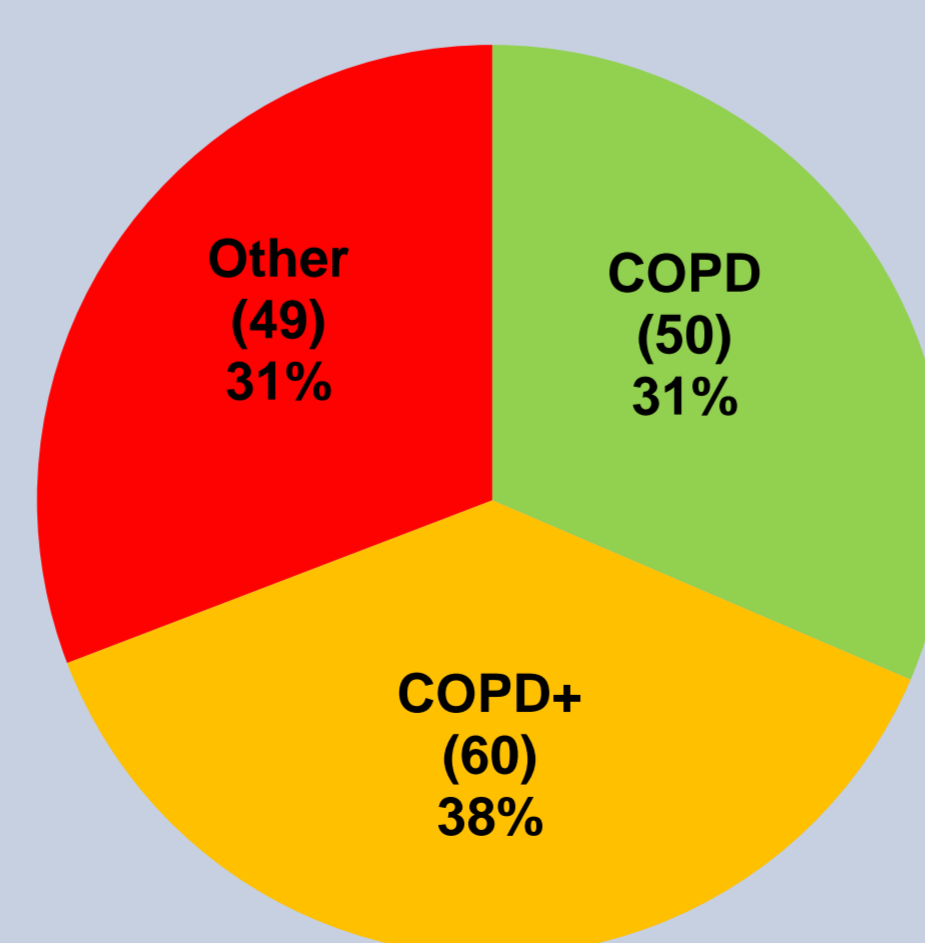


Chart 1

Percentage of acute NIV deaths by subgroup

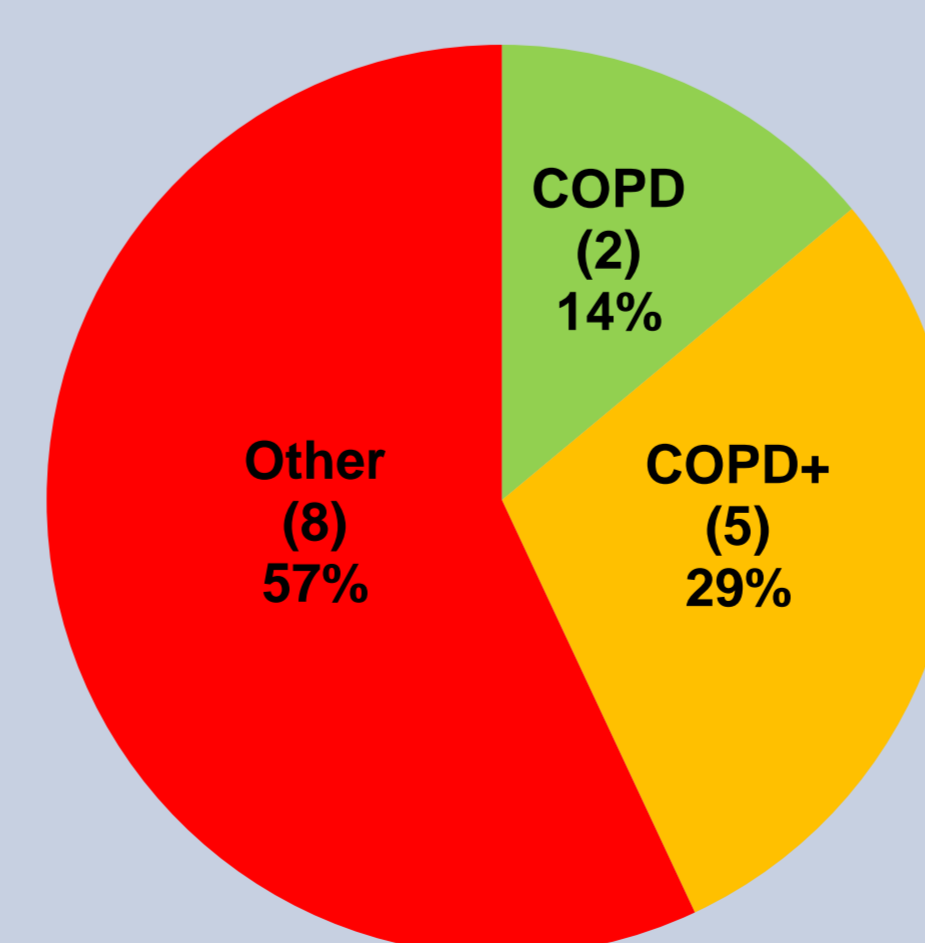


Chart 2

Mortality rate by subgroup

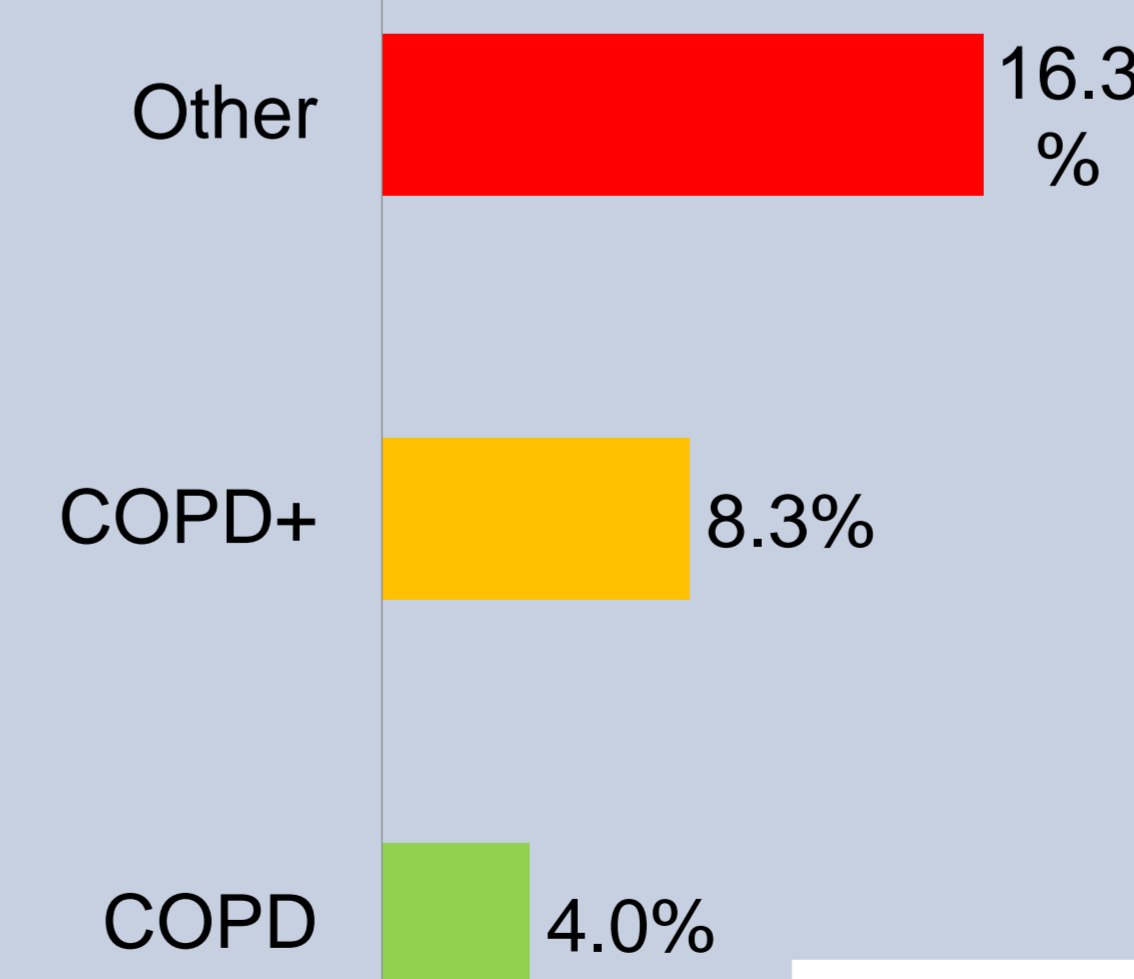


Chart 3

## References:

1. Plant, P.K., Owen, J.L. and Elliott, M.W., 2000. Early use of non-invasive ventilation for acute exacerbations of chronic obstructive pulmonary disease on general respiratory wards: a multicentre randomised controlled trial. *The Lancet*, 355(9219), pp.1931-1935.