

IN PRACTICE

A23

**EMBEDDING ESCALATION PATHWAYS:
CRITICAL CARE OUTREACH IN SIMULATION-
BASED NIV TRAINING FOR RESIDENT DOCTORS
– A QUASI-EXPERIMENTAL STUDY**

Jack Brown¹, Aonghas Michie¹, Jhiamluka Solano-Velasquez;
¹*Northern Lincolnshire and Goole, Scunthorpe, United Kingdom*

Correspondence: j.brown83@nhs.net

[10.54531/ARST9987](#)

Introduction: Early and appropriate use of Non-Invasive Ventilation (NIV) reduces patient mortality [1]. Simulation-based multidisciplinary education enhances realism, teamwork, and clinical preparedness in acute care settings [2]. Embedding Critical Care Outreach (CCOT) teams into simulation training mirrors real-world escalation pathways and strengthens clinical decision-making. However, resident doctors often report low confidence and high anxiety when managing NIV, primarily due to limited formal training – a pattern seen in the UK [2]. Addressing this gap is essential to optimise acute patient care. We collaborated with CCOT and peer-led teaching initiatives to deliver simulation-based sessions focused on recognising suitable patients, setting up, and initiating NIV [3]. We aimed to evaluate the benefits of interdisciplinary, CCOT-integrated simulation in developing skills for managing respiratory failure.

Methods: A quasi-experimental pre- and post-test study involved 16 participants, including foundation doctors,

internal medicine trainees, and specialty registrars. All doctors attending the sessions were eligible to participate. The intervention comprised a simulation-based workshop delivered with CCOT, using real NIV equipment. Participants assessed a simulated patient using case-based vignettes, set up and initiated NIV pressure settings, and reassessed therapy effectiveness. CCOT actively guided escalation protocols, clinical decision-making, and team communication throughout the scenarios, providing real-time feedback. Data were collected before the programme and two weeks after the simulation. An 8-point Likert scale assessed self-rated confidence, and the Six-Item State Anxiety Scale (SAS) measured anxiety. Ethical approval was not required as the project was part of service improvement.

Results: Among participants, 91.7% had not received previous formal NIV training. Baseline confidence averaged 2.7/5, improving to 4.2/5 post-simulation, Table 1. Anxiety scores decreased from 16/24 to 11.7/24. Overall, confidence increased by 56% and anxiety reduced by 27%, exceeding initial targets. Notably, 93.8% of participants reported that CCOT input benefited their learning experience, describing it as pivotal for understanding effective escalation processes, multidisciplinary communication, and the practical application of NIV management.

Discussion: Embedding Critical Care Outreach into simulation-based education significantly improved resident doctor confidence and reduced anxiety in managing NIV. Positive feedback regarding CCOT involvement highlights the value of incorporating real-world multidisciplinary escalation pathways into training. Adopting this model could enhance national NIV training standards, strengthen acute care teamwork, and improve patient safety. Limitations include the small sample size and short follow-up period; however, immediate educational impacts were significant. Integration into local postgraduate teaching is planned to sustain and expand the benefits observed.

Ethics Statement: As the submitting author, I can confirm that all relevant ethical standards of research and dissemination have been met. Additionally, I can confirm that the necessary ethical approval has been obtained, where applicable.

REFERENCES

1. Plant PK, Owen JL, Elliott MW. Early use of non-invasive ventilation for acute exacerbations of chronic obstructive pulmonary disease on general respiratory wards: a multicentre randomised controlled trial. *Lancet*. 2000 Jun 3;355(9219):1931-5. doi: 10.1016/S0140-6736(00)02323-0.
2. Hare A, Simonds A. Simulation-based education for non-invasive ventilation. *Breathe (Sheff)*. 2013 Dec;9(5):366-74. <https://breathersjournals.com/content/9/5/366>
3. Moerer O, Harnisch LO, Herrmann P et al. Patient-ventilator interaction during noninvasive ventilation in simulated COPD. *Respiratory Care*. 2016;61(1):15-22. doi: 10.4187/respcare.04141.

SUPPORTING DOCUMENTS – TABLE 1-A23

Table 1

Outcome Measure	Pre-Simulation	Post-Simulation	Change
Confidence Score (mean,/5)	2.7	4.2	+56% increase
Anxiety Score (mean,/24)	16.0	11.7	-27% reduction
Participants with prior formal NIV training (%)	8.3%	—	91.7% without prior training
Participants finding CCOT input beneficial (%)	—	93.75%	