British Thoracic Society
Respiratory Support Audit Report 2023 (Part 2: Organisational Report)
Audit period 1 February – 31 March 2023
Data collection period 1 February 2023- 31 May 2023
Audit lead: Dr Michael Davies

Number of participating institutions and records submitted:

Organisational audit: Completed for 115 hospitals

Patient-level outcome audit: 4,136 individual patient records

Introduction

This was the first national BTS Respiratory Support audit. It builds from the previous BTS acute non-invasive ventilation (NIV) audits[1] and a successful pilot Respiratory Support audit in 2021-22[2] using standards drawn from existing national guidance documents and reports, including BTS,[3] BTS/ICS, [4,5] NCEPOD,[6] GIRFT,[7] RCP,[8] and FICM.[9] Its aim was to include all adult inpatients who were treated in an acute Respiratory Support Unit (RSU), or who would have been if an RSU were available.

To gauge performance, data were also collected to calculate the Non-Invasive Ventilation Outcomes (NIVO) score,[10] a validated clinical tool to aid decisions about acute NIV for patients with chronic obstructive pulmonary disease (COPD). Since it provides a risk adjustment, it can also help with benchmarking.

Background

With an ageing population and greater burden of comorbid conditions, the demand for, and complexity of, acute respiratory care is ever-increasing. Often, due to limited critical care resources or other constraints, such patients are managed in general wards despite requiring organ support such as acute non-invasive ventilation (NIV) and/or continuous physiological monitoring. Prior research has demonstrated the safety and effectiveness of treatments like acute NIV in a ward setting, providing that the patients are not severely unwell before starting it (pre-NIV pH 7.30-35).[11] National guidance has consistently recommended that patients who present with more severe respiratory failure should be managed in a high-dependency or critical care setting.[4]

Recognising the gap in staffing and infrastructure between a ward and critical care area, in 2007 the Royal College of Physicians' Acute Medicine Taskforce recommended the creation of Enhanced Care ward areas specifically designed for patients developing acute medical illnesses.[8]

However, the practice of acute NIV in the UK evolved such that most activity was conducted in a ward setting regardless of the degree of physiological instability. Some hospitals created designated NIV areas with enhanced staffing, though uptake was inconsistent. Successive national acute NIV audits between 2010-2013 showed worsening outcomes for patients treated with acute NIV, with more marked differences in outcome seen for high-acuity patients managed in a ward rather than higher intensity environment. For example, the 2013 audit showed that patients with COPD who presented with pH<7.26 experienced 28% hospital mortality if treated in HDU/ICU, and 40% if treated in a standard ward setting.[12]

British Thoracic Society Reports
ISSN 2040-2023:
Vol 15, Issue 6, 2024

The issues around acute NIV led to the NCEPOD Inspiring Change study, published in 2017.[6] NCEPOD's methods include in-depth case note review and confirmed significant deficiencies in the timely delivery of treatment, the monitoring of vital signs and blood gases, and staffing levels.

Building on NCEPOD's findings, the BTS established acute NIV quality standards in 2018.[3] The 2019 national audit showed significant improvement in patient outcomes, though many units still lacked sufficient staffing and infrastructure.[1] This gap in provision was further emphasized in the GIRFT (Getting It Right First Time) Programme's National Specialty Report for Respiratory Medicine, commenced prior to the COVID-19 pandemic and released in March 2021.[7] Like NCEPOD, the GIRFT report recommended that every acute trust should establish a dedicated acute NIV service.

Beyond the focus on acute NIV, it was always the case that a wider group of patients may benefit from enhanced ward care. The COVID-19 pandemic highlighted the critical role of respiratory units, though simply represented one aspect of care that could be provided by the multidisciplinary respiratory ward team. Growing recognition of the role of such units led to the publication of national guidance on the development of Acute Respiratory Support Units to provide high-quality enhanced care at ward level.[5]

In summary, acute respiratory care has undergone significant change in recent years and BTS clinical audit has provided key data to guide future healthcare practice. Respiratory medicine services played a huge and positive role in the response to the COVID-19 pandemic. It is now timely to reassess the status of care provided for patients with the highest acuity respiratory conditions who are managed outside of a critical care environment.

Aims and objectives of the audit

- To provide benchmarking data on adult patients requiring enhanced ward-level monitoring and treatment, with a view to better understanding variations in clinical practice and outcome.

- To use these benchmarks to assess patient outcomes against the existing BTS quality standards for acute NIV[3,4] and BTS/Intensive Care Society joint national guidance for the development and implementation of RSUs.[5]

- In light of prior evidence from the NCEPOD enquiry into acute NIV care[6] and the 'Getting It Right First Time' Programme's National Specialty Report for Respiratory Medicine,[7] to establish if there are any concerns about patient safety within current service provision of RSU/NIV services nationally that may inform further quality improvement initiatives.

Methods

The audit ran from 1 February – 31 March 2023, with a data entry period of 1 February - 30 June 2023. Data were entered onto the online data collection tool via the BTS audit system by a lead clinician at each site. The audit had two parts:

- An organisational questionnaire – one record to be submitted by each participating site to provide information on available resources for each institution
- A patient questionnaire – one record per patient

This report reviews the organisational questionnaire alone. It describes the infrastructure and staffing provision for respiratory enhanced care and provides a framework against which to review the patient-level outcomes reported separately.

In line with standard BTS audit practice, a series of organisational questions were asked, with one response requested from each hospital. Responses reflect the services available at the time of the audit period and with respect to the ward area(s) where RSU-level care was undertaken.

Prior national audits relating to the provision of acute NIV had confirmed significant variation, with some acute hospitals well-equipped and staffed to provide enhanced respiratory care, whereas others were not.[1] For the current audit, we therefore asked respondents to consider the main ward area(s) where patients typically receive respiratory enhanced care in their institution, whether the area is formally designated or not. In contrast, the patient level was not specific to a single area; it sought to include all adult inpatients managed outside a critical care area who required a level of monitoring or treatment of an acute respiratory problem that exceeded routine ward provision. Reasons for RSU-level care were as described in the BTS/Intensive Care Society joint national guidance for the development and implementation of RSUs[5] and aligned with the principles of national guidance for enhanced care.[9]

Results

Of the 115 separate institutional responses received, 69 hospitals (60%) had a designated RSU (median 8 beds). The remaining 46 (40%) institutions provided enhanced respiratory care outside a critical care area, such as acute NIV, and may have had some areas designated as enhanced care but did not have an RSU. These data were similar to the findings of NHS England's GIRFT report[7] and 2019 BTS Acute NIV audit.[1] The GIRFT survey (England) was undertaken in 2018 and found that 77/130 (59%) acute trusts had dedicated beds for acute NIV. The 2019 NIV audit (England, Scotland, Wales, and Northern Ireland) found that 91/137 participating trusts (66%) had designated respiratory ward beds for acute NIV.

Staffing

National standards for patients with acute respiratory conditions who require enhanced-level ward care include:

- There should be medical, nursing, and physiotherapy leads for the RSU[3-6]
- Consultants should all have experience and competence in the management of complex respiratory conditions with 24/7 cover available from the same pool of consultants who deliver daytime work[5]
- BTS recommend 1:2 nursing care for all patients treated with acute NIV until NIV requirements reduce to nocturnal use only[3,4]
- There should be 7-day physiotherapy cover, 7-day access to pharmacist and microbiology advice, and at least 5-day access to other services including speech and language therapy, occupational therapy, dietetics, specialist palliative care teams and psychology[5]

Table 1 shows performance against these standards for all institutions (n=115) and according to RSU status (data shown as percentages of totals):

	All hospitals	No RSU	RSU-equipped hospitals
Leadership (%)			
Medical	88	83	91
Medical + time in job plan	48	37	55
Nursing	53	30	67
Physiotherapy	38	22	49
Routine nursing staffing (%)			
1:2	17	4	25
1:2-1:4 (can flex to 1:2 for some)	39	28	46
1:4 – 1:8	44	68	29
Medical staffing and function (%)			
24/7 Respiratory cover	30	15	39
Twice daily medical review	37	17	51
Physiotherapy cover (%)			
7/7 cover	91	89	93

Table 1: Summary of the staffing position against RSU organisational standards

An effective RSU requires multidisciplinary leadership. In the 2019 NIV audit, 52% of services had a nursing lead and 34% had a physiotherapy lead. In the current audit, we asked trusts if they had medical, nursing and physiotherapy leads for their RSU or, if they did not have an RSU, for their acute NIV service. As shown in table 1, we found no meaningful improvement. Further analysis showed that 22% of RSU-equipped hospitals had a medical lead, but lacked nursing or physiotherapy leads.

Routine nursing staffing levels were also suboptimal. National guidance states that 'it is unlikely that enhanced care can be consistently delivered where the nurse-to-patient ratio falls below 1:4.'[9] Alongside BTS guidance, it also recommends that areas providing acute NIV are staffed at 1:2. As shown in Table 1, RSU staffing to 1:2 as routine was rare (17% overall), although 56% of hospitals could provide 1:2 nursing for a proportion of patients with highest acuity. These staffing levels mirror the 2019 NIV audit,[1] which showed 17% staffed at 1:2, 36% at 1:2-1:4, and 47% at 1:4-1:8.

Physiotherapy staffing cover appeared more robust, though the audit did not ask the extent to which colleagues covered other clinical areas of the hospital, alongside the high-dependency respiratory patients.

We reviewed senior medical staffing cover. National guidance advocates 24/7 coverage from the same consultant pool as daytime services.[5] The aligns with similar enhanced care models such as acute Coronary Care or Hyperacute Stroke Units. We found that only 30% of hospitals provided 24/7 respiratory consultant cover for enhanced care.

Notably, we found that the combined staffing recommendations for nursing (1:4 or better), medical (24/7 respiratory consultant cover), and physiotherapy (7/7 cover) were provided in 18/69 (26%) of RSU-equipped hospitals, and 21/115 (18%) of the whole cohort.

Multiple additional professional groups are essential for safe and high-quality RSU care. Audit responses were as follows:

Role	Available every day (%)	At least 5 days per week
Microbiologist	92	100
Pharmacist	90	100
Specialist Palliative Care	70	98
Speech and Language Therapist	5	96
Dietetics	3	97
Psychology	2	33

Table 2: Availability of professional groups

Infrastructure

National standards for enhanced respiratory ward care include:

- Continuous monitoring (saturations, blood pressure, ECG) should be available at each bedspace and displayed centrally on the RSU[5]
- All ventilators used to deliver acute NIV should be designed for this purpose[5]

Table 3 shows performance against these standards for all institutions and according to RSU status:

Physical infrastructure	Standard	All units (n=115)	No RSU (n=46)	RSU (n=69)
(all values as % of their total)				
Bedside monitoring				
Continuous pulse oximetry	100	96	91	99
Intermittent BP	100	94	91	96
ECG Monitoring	100	75	59	86
Central monitoring	100	47	22	64
Point of care facility				
Nearby blood gas analyser	100	91	90	93
Ultrasound	100	91	91	91
Use of acute ventilators	100	62	59	64
Ringfenced beds	-	22	9	30

Table 3: Physical infrastructure against national standards

Inadequate monitoring poses serious risks during acute NIV patient management and lack of remote telemetry is of particular concern. This likely applies to any patient with acute lung disease who is deemed to require continuous monitoring. A national report in 2021 underlined the impact of poorly monitored environments on patient safety.[13] Its index case described a fatality due to unwitnessed disconnection from respiratory support in the absence of central monitoring, and in the setting of routine ward-level nursing and inaudible ventilator alarms.

We assessed the provision of central monitoring together with the routine nursing staffing ratio to assess the likelihood that similar harm could be repeated in future. We found that only 10% of hospitals had central monitoring and 1:2 nursing as routine. A further 23% of hospitals had 1:2-1:4 nursing. Central monitoring is only effective if there are sufficient staff to enable prompt recognition and management of inadvertent patient disconnection from respiratory support. National guidance indicates that consistent enhanced care is not feasible at 1:4 – 1:8;[4,9] as such, over 2/3 of hospitals did not meet the threshold required for central monitoring plus safe staffing.

Furthermore, the use of ventilators in hospitals varies, with 62% employing acute ventilators and the rest opting for models designed for home usage. Home ventilators are usually cheaper but lack key safety features such as an oxygen blender, essential for maintaining a set inspired oxygen concentration.

At present, there are no set recommendations around ringfencing beds for RSU though prior audit data confirms that demand for beds far exceeds capacity and, despite this, a proportion of beds are routinely occupied by patients with non-respiratory conditions. For the current audit, we found that few hospitals had a formal policy for ringfenced beds. Figure 1 shows the respective provision of

central monitoring, acute ventilators, and ringfenced beds. Notably, only 28% of hospitals met current national guidance that patients treated with acute NIV should be managed in areas that are equipped with central monitoring and acute ventilators designed for purpose:

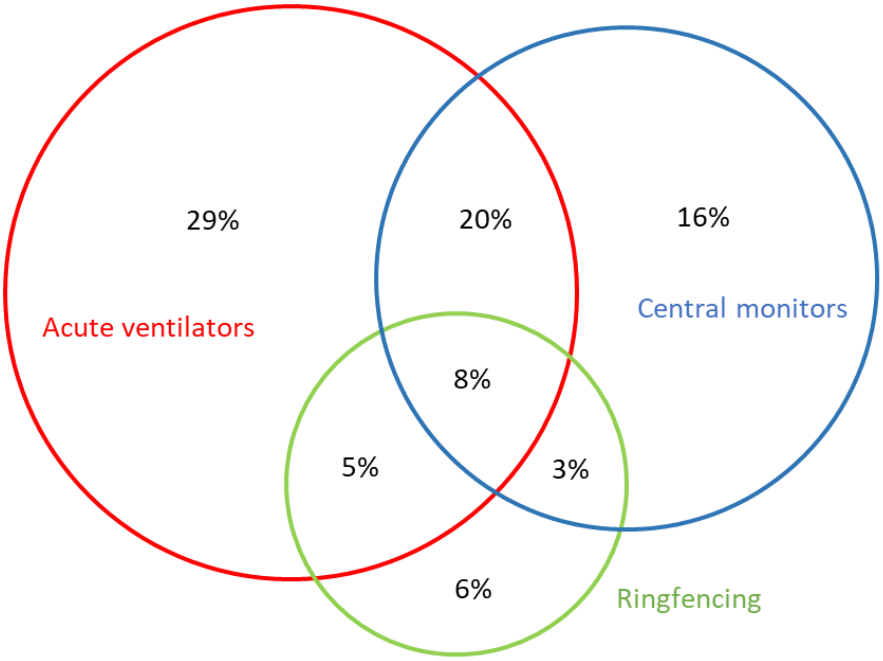

Figure 1: Venn diagram showing the relative overlap in RSU infrastructure (n=115 participating centres, data expressed as percentages)

Whilst capacity for point of care blood gas monitoring was excellent, we found a significant reliance on repeated, intermittent arterial stabs. Only 3 units routinely recommend local anaesthesia for arterial sampling despite good evidence to support its use. Few units used arterial lines, though this is not standard practice outside critical care given the staffing ratios of ward-level care. A minority of units used additional sampling methods for monitoring on an occasional basis (25% of units using capillary, and 23% of units using venous).

Conclusions

We assessed acute hospitals against longstanding national standards based on evidence from prior studies and audit.[1,2,6,10,11] The COVID pandemic further underscored the crucial benefits of the RSU. Unfortunately, we found that this has not translated into consistent uptake across the NHS, with no meaningful increase in provision of enhanced respiratory care, compared to pre-pandemic studies.[1,7]

Significant deficiencies in staffing and infrastructure were seen against standards. Whilst RSU-equipped hospitals were closer to these standards, it was of significant concern that 29% of designated RSUs were routinely staffed at a 1:4-1:8 nursing ratio. It is unlikely that safe, effective care can be delivered to higher-acuity patients under such circumstances. Despite all hospitals having access to side-rooms for enhanced respiratory care, fewer than half of them could monitor such patients remotely. Our data showed that the infrastructure and staffing provision associated with a tragic outcome following inadvertent patient disconnection from ventilation could still be replicated across most hospitals.

Consultant medical supervision of respiratory enhanced care was also concerning, with only 30% of hospitals providing round the clock cover. For many hospitals, respiratory physicians are key contributors to the general medical on-call rota and establishing a dedicated 24/7 respiratory rota is challenging. Acute NIV has evolved in the UK as a ward-level intervention that can be covered from a general medical rota. This is out of line with the approach of other developed nations, where NIV is most usually delivered within higher dependency or critical care areas and care supervised by specialists in respiratory and ventilation medicine. Patient acuity and complexity is such that appropriate expertise ought to be available if we are to provide safe and effective care.

For hospitals that do not have an RSU, each responding clinician indicated that they were keen to develop an RSU in their hospital. They cited failure of business cases, sometimes multiple, and insufficient staffing as the main barriers to implementation. The Respiratory GIRFT report highlighted the shortage of RSU provision, stating '*Regrettably, we found a gap in provision between trusts with only 77 acute providers having dedicated NIV beds, only 4 having five or more beds and many lacking sufficient nursing numbers to support these beds. This was perhaps one of the most distressing findings from the GIRFT review - a very severe shortfall in a life-saving therapy*.'[7] Its report included clear recommendations to improve RSU provision in each acute trust for completion by 2022. Despite this, significant variation in RSU provision continues.

Whether such variation between hospitals is mirrored for other Specialty services is unknown. The acute Cardiac Care Unit (CCU) is a close comparator, accepting that the CCU model originated long before the RSU and has had some years to evolve.[14] GIRFT's Specialty report for Cardiology was published one month prior to the Respiratory report in 2021.[15] It noted that 22% of trusts do not provide consultant cover 7/7, but importantly did not raise concerns about the infrastructure of CCUs or their routine nursing establishment.

In conclusion, there was considerable variance in the provision of RSUs. Despite the key role of respiratory ward care during the COVID pandemic, there has been no meaningful change since the 2019 NIV audit. The accompanying part 2 Respiratory Audit report 2023, 'Whole cohort findings from the patient-level questionnaire', demonstrates the impact that these organisational factors have had on outcomes for patients.

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