RESPIRATORY INTENSIVE CARE UNIT- A NEED OF THE HOUR
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ABSTRACT

BACKGROUND
A respiratory intensive care unit (RICU) is a designated area specially designed for management of patients with acute respiratory conditions with an essential endeavour of meticulous cardiorespiratory monitoring and holistic management of acute respiratory conditions. Availability of ventilation thorough the non-invasive mode (NIV) has revolutionised therapy in chronic respiratory diseases.

METHODS
We analysed the data of 50 patients over two-months’ duration. The mean duration of stay and treatment outcomes were analysed. The qualitative data was analysed using percentages and mean. Chi-Square test was used for statistical analysis.

RESULTS
Study sample was of 50 patients out of which 26 were men and 24 were women. The indications for hospitalisation were classified as per aetiology as COPD- 29 (58%), ILD- 6 (12%), parenchymal diseases- 5 (10%), pleural diseases- 4 (8%), malignancy- 3 (6%), others- 3 (6%). The patients were further classified into 21 (42%) with type I respiratory failure and 29 (58%) with type II respiratory failure. Of the total 50; one-third (18) required only oxygen therapy and two-third (32) mechanical ventilation (25 NIV and 7 IMV). The mode of ventilation impacted outcomes significantly with oxygen therapy and NIV having very good outcomes (Chi Square test; p-value is 0.000838).

CONCLUSIONS
RICU is the need of the hour to manage patients with critical respiratory illnesses.

KEYWORDS
RICU, Tertiary Care, COPD


BACKGROUND
Respiratory diseases are the notorious culprits of mortality in community as well as hospital set ups. Respiratory medicine and critical care medicine are specialities that are offshoots of general medicine and have developed along parallel lines but are intricately related. A major bulk of the patients requiring an intensive care has a predominant or associated respiratory aetiology. A respiratory intensive care unit (RICU) is a designated area specially designed for management of patients with acute respiratory conditions with an essential endeavour of meticulous cardiorespiratory monitoring and holistic management of acute respiratory conditions. The target beneficiaries include those suffering from acute exacerbation of chronic obstructive pulmonary disease (AECOPD), exacerbations of other airway diseases like obliterative bronchiolitis, bronchiectasis, acute severe asthma, acute exacerbations of interstitial lung diseases (ILD), acute respiratory distress syndrome (ARDS), severe community acquired pneumonia (CAP) and respiratory failures due to various other conditions like obstructive sleep apnoea (OSA) and obesity hypoventilation syndrome (OHS).

It caters to various respiratory requirements. Invasive mechanical ventilation (IMV) can be offered to patients with severe respiratory acidosis with altered neurological status or hemodynamic compromise. Non-invasive ventilation (NIV) is another specialty care which has landmark role in management COPD and other airway diseases, pulmonary oedema and post thoracic surgery status. Apart from this management of patients with artificial airways such as
tracheostomy, expedited and timely weaning from ventilator support and optimisation of airway disease therapy is also facilitated. Respiratory bedside interventional procedures such as fibroptic bronchoscopy (FOB) and a medical thoracoscopy can best be performed in a RICU setup. This RICU may be instituted as an independent model, a parallel model or an integrated model. An independent model is an entirely separate model and runs autonomously in a health care facility. A parallel model is allocated in the vicinity of Medical intensive care unit (ICU) in the same hospital. An integrated model allots certain beds for respiratory care the main ICU itself. The Pulmonary Medicine Department of our hospital initiated its RICU as a parallel model in the same campus as our Medical ICU with an intention of offering whole hog respiratory care to patients with acute respiratory conditions.

We wanted to analyse the database of first 50 patients hospitalised in RICU.

METHODS
An administrative appraisal of the respiratory medicine services in line with the medical council of India (MCI) requirements and the patient care needs at our tertiary care centre led to the establishment of the much-needed respiratory intensive care unit at our hospital in 2019. It was setup as a four-bed facility with adequate doctor to patient and nurse to patient ratio per shift. We analysed the data of the first 50 patient’s cohort from inception of our RICU. The first 50 patients were hospitalised within the 2 months duration since inception. The demographic details, indications of hospitalisation and management from the ventilation point of view i.e. need for only oxygen therapy versus non-invasive ventilation (NIV) versus invasive mechanical ventilation (IMV) were evaluated. The mean duration of stay and treatment outcomes were analysed. The qualitative data was analysed using percentages and mean. Chi-Square test was used for statistical analysis.

RESULTS
The 50 patients consisted of 26 men and 24 women. The mean age was 56.4 (16.5) years. The indications for hospitalisation were classified as per aetiology as COPD - 29 (58%), ILD - 6 (12%), parenchymal diseases - 5 (10%), pleural diseases - 4 (8%), malignancy - 3 (6%), others - 3 (6%) (Table 1). The patients were further classified into; 21 (42%) with type I respiratory failure and 29 (58%) with type II respiratory failure. Of the 21 patients with type I respiratory failure; 12 (57%) required only oxygen therapy, 7 (33%) NIV and 2 (10%) IMV. Of the total 50 patients; one third patients i.e. 18 (36%) required only oxygen therapy and two-third patients i.e. 32 (72%) mechanical ventilation (25 NIV and 7 IMV). Of 29 patients with type II respiratory failure; 6 (21%) required only oxygen therapy, 18 (62%) NIV and 5 (17%) IMV. Of the total 50 patients; 42 (84%) improved and 8 (16%) died. Of the 18 patients requiring oxygen therapy; 17 (94%) improved and 1 (6%) died. Of the 25 patients who required NIV; 23 (92%) improved and 2 (8%) died. Of the 7 requiring IMV; 2 (29%) improved and 5 (71%) died. The mode of ventilation impacted outcomes significantly with oxygen therapy and NIV having much better outcomes than IMV (Chi Square test; p-value is 0.000838). The mean stay in total patients was 5 (2.5) days in patients requiring oxygen, 7.5 (4.5) days with NIV and 7 (2.6) days with IMV. The mean stay in those who improved was 5.2 (2.4) days in patients requiring oxygen, 7 (4.2) days with NIV and 6.5 (3.5) days with IMV. The duration of stay had no statistically significant impact on outcomes. The aetiology also did not impact survival outcome significantly (Table 2). Comorbidities were observed in 28 patients with Diabetes Mellitus and hypertension being the commonest.

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<tr>
<td>Others</td>
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| Table 1. Distribution of Patients as per Aetiology |

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| Table 2. Treatment Outcomes as per Aetiology (Chi Square test; P>0.05) |

DISCUSSION
The rationale behind the inception of the concept of a dedicated RICU lies in certain crucial reasons. Patients suffering from acute respiratory conditions have certain demands which are specific for the underlying pathology. The attending intensivists, physiotherapists and nursing personnel should preferably be a respiratory connoisseur which is possible only in a distinct RICU. A scrupulous cardio-respiratory monitoring which is extremely crucial for acute pulmonary conditions is thus possible. In patients with underlying chronic pulmonary conditions an optimum rehabilitation can be executed with an interdisciplinary approach. This not only improves the prospects of recovery from the acute event but also improves the quality of life and progression free survival in an underlying chronic disease. A vigorous chest physiotherapy, early weaning from ventilator and early ambulation decreases the incidence of bedbound complications like venous thromboembolism. A separate respiratory unit can decrease the burden on the general ICU and also decrease the costs incurred due to a longer stay in a general ICU setup. Furthermore, as it is an area earmarked for respiratory care, the identification and management of patients with communicable respiratory infections is earlier. This enables timely initiation of appropriate antimicrobial therapy thus improving the prognosis and salvaging precious lives. Also the segregation of infectious pulmonary conditions inevitably curtails their transmission that would have happened in a general critical care setup. Infection control protocols can be better implemented in this setting thus decreasing the risk of nosocomial infections.
of nosocomial infections. The limited and peculiar patient setup makes a thorough patient and caregiver counselling possible. This enables a better participation of the caregivers in the overall patient nursing care which is in turn positively reflected in a better home care. A critical care respiratory setting also makes zealous and dedicated respiratory training of the resident doctors and paramedical students possible. This procreates a proficient crew of respiratory specialists contributing creditably to patient care. Hence an RICU should be an essential element of all tertiary health care setups. This holds true particularly for teaching hospitals and government setups catering to a huge patient load.

Administrative steps towards establishment of an RICU are crucial and critical in nascent phases of planning. A thoughtful planning and proposal formulation is important. Pre-establishment proposals should be submitted for administrative sanctions with complete details. These involve firstly, justification of the need of RICU (i.e. dedicated space for treating critically ill patients with respiratory diseases, increasing ICU bed requirements with the ever-increasing patient care load and specialized requirements like oncological emergencies in lung cancer). Secondly, identification of future RICU space in close proximity of medical/ chest medicine wards and medical ICU or from where maximum transfers are expected. Further, identification of an appropriate facility includes calculation of required adequate space for the number of beds designated with centralised air conditioning facility, air exchange, central nursing station and availability of adjacent washroom and pantry. Non-recurring expenditure should account for electrical work like air conditioning, fan coil unit, electrical load, fire safety and civil work like false ceiling, doors, windows, curtains/partitions, painting. The adequate doctor, nursing and other staff requirements must be calculated as per shift duty hours and national guidelines. Recurring expenditure for them should also be calculated in the proposal. Procurement of adequate medical equipment must be planned in this phase with budget estimates for the same. These include ICU multifunction beds, ventilators, multiple parameter patient monitors, syringe infusion pumps, electrocardiogram machine, defibrillator, chest X-ray machine, nebulizers, emergency trolley, wheelchair, patient transport trolley and others as per the need of the institution. Peri-establishment work requires a dedicated follow-up to ensure completion of pre-establishment work discussed above as per determined time frames and fulfilling additional unaccounted requirements realised during the said work. Post inauguration role involves regular administrative as well as medical appraisal.

The spectrum of cases in an RICU have varied as per the country, region, healthcare system and administrative management. We did not encounter much difference in gender distribution. Our patient's mean age was in the sixth decade. International studies have revealed diverse results with some suggesting an older age of patient group. The aetiology consisted of chronic respiratory diseases in exacerbation like COPD and ILD in most of our patients due to the parallel ICU type of setup. While chronic respiratory cases were old cases of the department and automatically followed up or were referred to our RICU for ICU care in exacerbations. The acute lung conditions causing respiratory failure like pneumonias and pulmonary thromboembolism are equally referred to the medical ICU as well as RICU and hence account for lower numbers. The good impact of ventilation modality i.e. oxygenation and NIV as compared to IMV was clearly apparent in our patients which consisted of chronic respiratory diseases. Data from studies in the west (6,10) and by Sharma et al (11) from India was concurrent with our findings. The ventilation with NIV mode has been a boon for care in chronic respiratory diseases and our study results depict the same. The critical and chronic nature of illness on IMV mode of ventilation was crucial to determine prognosis though the diagnosis or duration of stay had no impact on outcomes.

Our study had imitations. We focused on very basic aspects of RICU care as a starting point to analyse the practice and management of patients in our newly inaugurated RICU. The various scoring systems and its impact on outcomes was not evaluated.

**CONCLUSIONS**

The salient finding of our study is that the presence of RICU in a tertiary care hospital is propitious from various perspectives. Patient perspectives include abatement in the in-hospital mortality rates, a shorter length of ICU stay, opportune weaning from mechanical ventilation and comprehensive pharmacological as well as non-pharmacological management. The administrative perspectives include a better utilisation of human as well as monetary resources and notification of diseases of public health significance. The post graduate medical student perspectives include acquisition of an expertise in an extremely critical branch. A devoted approach to acute respiratory diseases can thus make a sanguine impact on the patient care and hospital resource systematization.

**REFERENCES**


