

Critical Care

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Lung Protective Ventilation Adherence Rates Among ICUs in a Tertiary Care Medical Center

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PURPOSE: Ventilator-Dependent Respiratory Failure (VDRF) is a common critical care illness with high morbidity and mortality. Lung Protective Ventilation (LPV) with tidal volumes of ≤ 6 cc/kg of ideal body weight (IBW) has been shown to improve outcomes including mortality, ventilator-free days and ICU length of stay. We investigated LPV adherence at our tertiary care medical center and sought to explore potential practice variation by ICU type (e.g. medical, surgical) and associations with duration of mechanical ventilation, length of stay and patient mortality.

METHODS: We performed a retrospective, observational review of patients, diagnosed with VDRF, admitted to the Medical University of South Carolina. To develop our cohort, we extracted all admissions, for patients ≥ 18 years old, to any MUSC ICU from 1/1/2016 through 6/30/2016. Patients with VDRF were identified using ICD codes 96.xx, as the operational definition of VDRF. We then used this patient list to extract outcomes and measures of interest from MUSC's electronic medical record. We retrieved patient demographic characteristics, Sequential Organ Failure Assessment (SOFA) scores and ICU type. We extracted mechanical ventilation variables including: mode, tidal volume, IBW, and plateau pressures. Statistical analysis included descriptive statistics and multiple logistic regression with patient mortality as the outcome. The primary predictor of interest was the percent of recorded tidal volumes falling within 3-6.4 cc/kg IBW.

RESULTS: We identified 1124 unique VDRF patients with a total of 8833 recorded mechanical ventilation observations documenting tidal volumes. Mean patient age was 56.1 years with 40% females, 44% minority race and mortality rate of 29.9%. Overall, LPV adherence rate was 33.7%. When ICU location was considered we found LPV adherence rates to be higher among Medical and Med-Surgical ICU patients than those in Surgical-Trauma ICU with the proportions of LPV tidal volumes of 36.6, 38.1, and 17.2. Clinical outcome of observed duration of mechanical ventilation was shorter among the MICU and MSICU (mean 6.8 and 6.9 days) compared to STICU (mean 8.9). ICU length of stay was decreased in the MICU and MSICU (7.2 and 8.0) compared to STICU (8.8). Hospital LOS was decreased in MICU and MSICU (10.4 and 11.3) compared to STICU (16.1). Logistic regression analysis identified a positive association between proportion of tidal volume measures adherent to LPV and survival with a 10% increase in adherence associated with a 9% reduction in risk of mortality.

CONCLUSIONS: Despite widely accepted guidelines, and robust research showing improved outcomes among patients with VDRF treated with LPV, adherence remains disappointing with our highest performing ICU having 38.1% of all tidal volumes adherent to LPV. We found our STICU to have significantly lower adherence than our two ICUs with medically critically ill population. Future investigation should focus on identifying underlying barriers to LPV adherence and strategies to overcome them.

CLINICAL IMPLICATIONS: LPV is underutilized in our tertiary medical center. Furthermore, logistic regression analysis suggests that patient outcomes are improved with closer adherence to known best practice pattern of lung protective ventilation.

DISCLOSURE: The following authors have nothing to disclose: Adam Kouns, Andrew Goodwin, Annie Simpson, Kit Simpson, Dee Ford

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