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Arterial Line Use for Acute Type 2 Respiratory Failure

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Abstract : Introduction: Acute type two respiratory failure (T2RF) has become a common presentation over the last two decades primarily due to an increase in the prevalence of chronic lung disease. Acute exacerbations can be managed either medically or in combination with non-invasive ventilation (NIV) which should be monitored with regular arterial blood gas samples (ABG). Arterial lines allow more frequent arterial blood sampling with less patient discomfort. We present the experience from a teaching hospital emergency department (ED) and level 2 medical high-dependency unit (HDU) that together form the pathway for management of acute type 2 respiratory failure. Methods: Patients acutely presenting to Charing Cross Hospital, London, with T2RF requiring non-invasive ventilation (NIV) over 14 months (2011 to 2012) were identified from clinical coding. Retrospective data collection included: demographics, co-morbidities, blood gas numbers and timing, if arterial lines were used and who performed this. Analysis was undertaken using Microsoft Excel. Results: Coding identified 107 possible patients. 69 notes were available, of which 41 required NIV for type 2 respiratory failure. 53.6% of patients had an arterial line inserted. Patients with arterial lines had 22.4 ABG in total on average compared to 8.2 for those without. These patients had a similar average time to normalizing pH of (23.7 with arterial line vs 25.6 hours without), and no statistically significant difference in mortality. Arterial lines were inserted by Foundation year doctors, Core trainees, Medical registrars as well as the ICU registrar. 63% of these were performed by the medical registrar rather than ICU, ED or a junior doctor. This is reflected in that the average time until an arterial line was inserted was 462 minutes. The average number of ABGs taken before an arterial line was 2 with a range of 0 – 6. The average number of gases taken if no arterial line was ever used was 7.79 (range of 2-34) – on average 4 times as many arterial punctures for each patient. Discussion: Arterial line use was associated with more frequent arterial blood sampling during each inpatient admission. Additionally, patients with an arterial line have less individual arterial punctures in total and this is likely more comfortable for the patient. Arterial lines are normally sited by medical registrars, however this is normally after some delay. ED clinicians could improve patient comfort and monitoring thus allowing faster titration of NIV if arteral lines were regularly inserted in the ED. We recommend that ED doctors insert arterial lines when indicated in order improve the patient experience and facilitate medical management.

Keywords : non invasive ventilation, arterial blood gas, acute type, arterial line
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