Hypercapnic Respiratory Failure; Clinical Audit and Application of a Novel Human Factors Approach to Improve Recognition and Management

HJ Pick[1], P Cull[2], E Mullaney[3], S Smith[1], N Taylor [4], G Lowrey[1]

1 Department of Respiratory Medicine, Royal Derby Hospital; 2 Department of Emergency Medicine, Royal Derby Hospital;

3 Department of Acute Medicine, RoAyal Derby Hospital; 4 Hu-Tech Human Factors Ergonomics

Background

Acute hypercapnic respiratory failure (AHRF) is a medical emergency.[1, 2] Data from National COPD Audit Programme identified that median time from admission to Non-Invasive Ventilation (NIV) is 4.1 hours and only 42.7% of patients requiring ventilatory support receive it in under 3 hours. 45% of patients admitted nationally had no prescription for oxygen.[3]

Aims

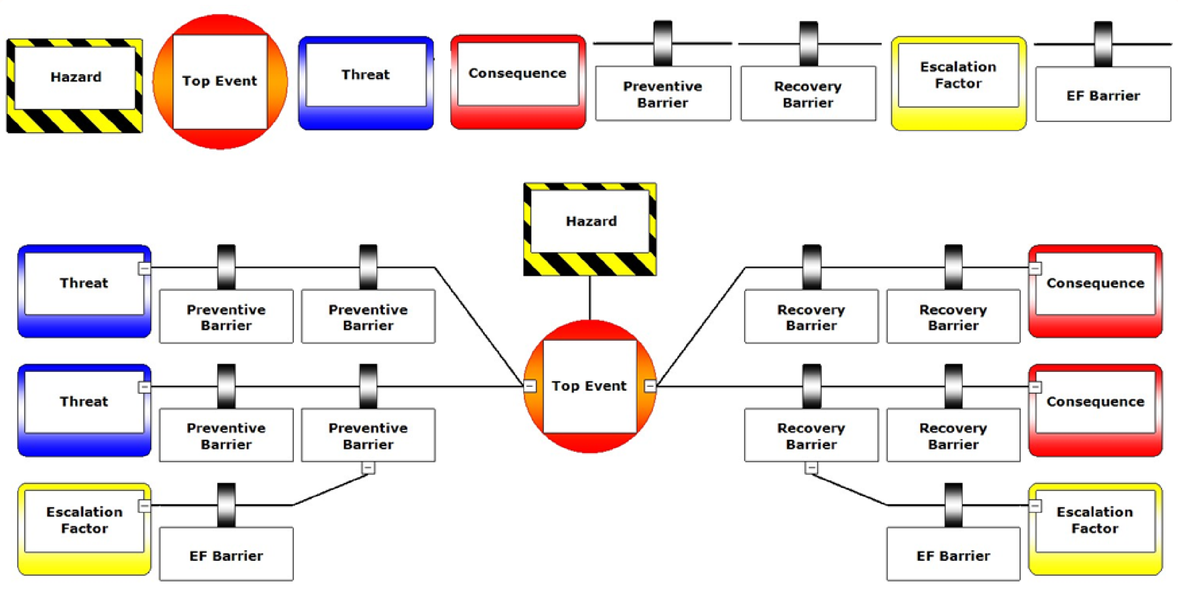
To audit cases of AHRF against standards derived from national guidelines and quality standards.

To apply a novel human factors approach to review current systems and develop interventions to improve the recognition and management of AHRF.

Methods

Patients admitted from 1st July 2016 to 31st August 2016 with AHRF (pH <7.25, pCO2 >6.5) on blood gas analysis were eligible for retrospective casenotes review. Cases were audited against national society guidelines and quality standards.[4-7]

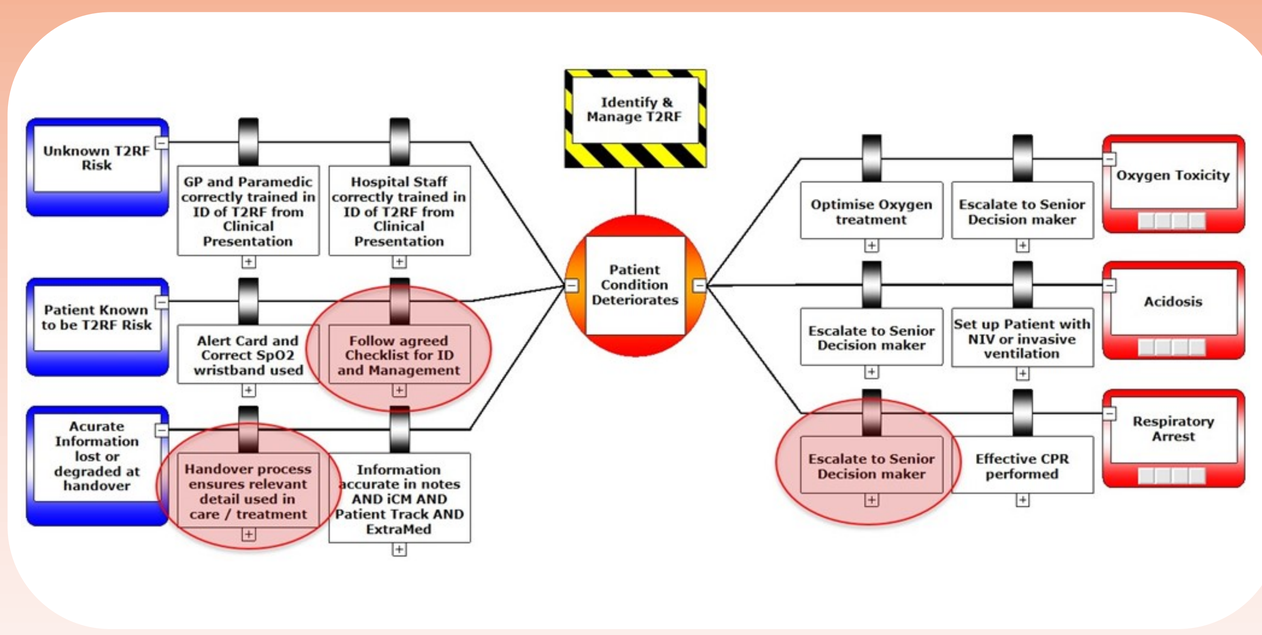
Concurrently, multi-disciplinary workshops were undertaken to discuss case studies of AHRF. These workshops informed the development of a Bow-Tie analysis to review current systems in AHRF (see Figures 1, 2 & 3.)

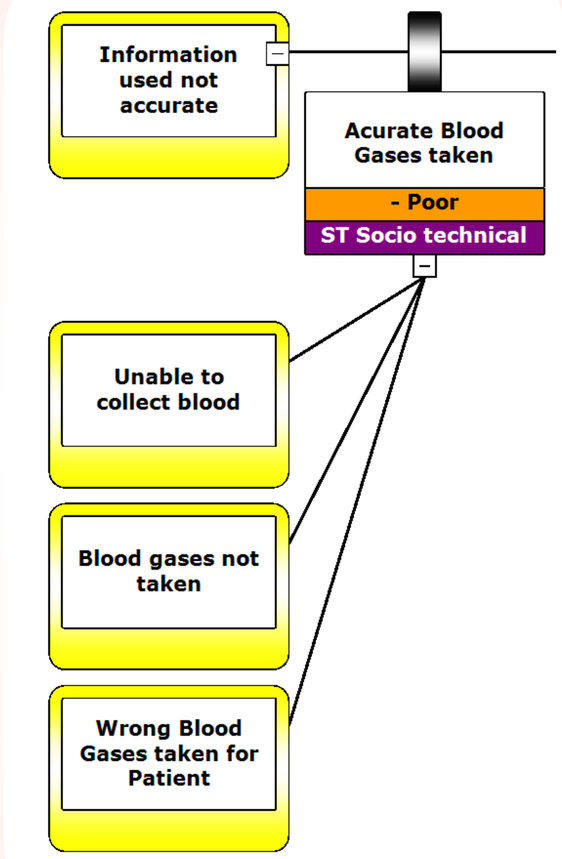


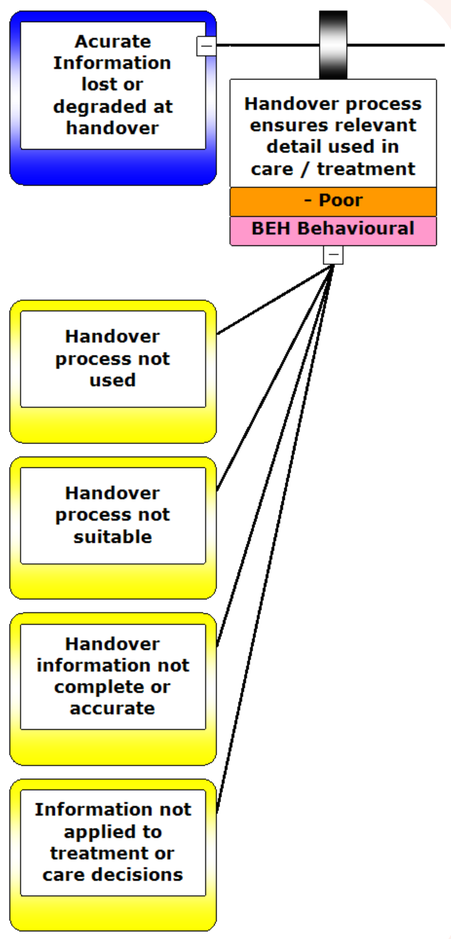
Outcome / Results

We identified 112 cases, with 48 casenotes available for review. Mean age was 74.6 years (range 46 to 93) and 44 of 48 cases were admitted through the Emergency Department. AHRF was recognised in 34 patients (71.7%). Average time from admission to NIV was 3.7 hours (220 minutes.) Oxygen was prescribed in 55.3% of patients. Inpatient mortality was 48.9% and 30-day mortality 62.5%.

Interventions resulting from the multidisciplinary workshops and Bow-Tie analysis (Figures 2 & 3) included: automated flag of results showing AHRF; management and referral checklists; multifaceted training of teams (simulation training, capillary blood gases training, ward based training).







Conclusions

AHRF represents a significant burden of morbidity and mortality. The application of a human factors approach allowed the development of interventions to strengthen barriers and improve patient outcomes.

Re-audit following introduction of interventions is planned.

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