Iatrogenic Anaemia: An Audit.
The Effect on Pre-operative Patients In Critical Care

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What is it?

Anaemia is a condition in which the number of red blood cells (RBC) is insufficient to meet physiological needs.[1]

Iatrogenic Anaemia (IA) is caused by large or frequent removal of blood in order to perform blood samples. [2] IA is prevalent in critically ill patients with a major influence on this being blood lost from frequent blood sampling, such as Atrial blood gas sampling (ABGs). [3 4]

Frequent blood sampling on a patient on an Intensive Care Unit (ICU) can result in a mean daily loss of up to 70mls (490mls a week). The normal daily production of red blood cells in healthy adults is about 0.25mLs per kilogram.[5] Research has exposed nearly half (47.5%) of ABG samples taken by nurses from patients in ICUs were taken routinely with no rationale or indication. [6]

Implications

Reduction in RBC affects the bodies ability to absorb and carry O2, initially leading to hypoxia and lethargy. Untreated, this can lead to organ dysfunction or damage. The combination of anaemia and heart failure can increase the risk of death by 30 - 60%. [7]

Inflammatory cytokines after surgery cause a decrease in iron uptake from the gastrointestinal tract and macrophages, along with decreasing erythropoietin production a major factor in RBC production. Wide spread haemodilution is also apparent due to fluid replacement before, during and after surgery. If a patient is already anaemic preoperatively due to IA, this results in mechanisms that maintain RBC and the transportation of blood to ensure adequate myocardial and tissue oxygenation and perfusion are further compromised and can even fail put patients further at risk. [8]

Postoperatively, patients with a haemoglobin (Hb) level of <80g/L were found to have their stay in hospital last 2.3 days longer than those who had an Hb of ≥120.[9] Patient's found to be already anaemic preoperatively are more likely to suffer from postoperative delirium [10] and an increased 30 day re-admission rate.[11]

Preoperative anaemia is associated with an increased need for transfusion.[12] Risks of receiving a blood transfusion include anaphylaxis, fluid overload, lung injury, haemolytic reactions and contraction of a blood born virus'.[13] Preoperative anaemia has also been linked to adverse outcomes after surgery, including morbidity and mortality.[12] It is estimated that one third of patients undergoing elective hip and knee surgery are anaemic preoperatively (Hb level of <130 g/L) due to preopertive blood testing. [14]

Recommendations

- The use of paediatric ABG syringes and blood bottles, reducing the physical amount of blood able to be taken for sampling. [3 4]
- The use of ABGs blood conservation sampling devices with a reservoir or circuit that allows blood normally discarded pre-sample to be flushed back in to the patient. [3 4]

- **Exploring Continuous ABG Monitoring such as:**

The CDI System 500 is able to continuously monitor a patient's PaO2, PaCo2, pH and potassium levels without blood sampling https://goo.gl/LwCg6B

Screening for and highlight at risk patients for IA preoperatively has reduced perioperative transfusion, hospital length of stay and readmission rates after elective surgeries highlighting a need to screen for IA in preoperative patients.[15]

Audit

Aims:
To undertake a baseline audit of current practice for discarding ABG waste blood in critical care.

Image: 16

Inclusion Criteria:
- Level 2 and 3 patients in SRH ICU between 22/3/17-22/6/17.
- Patients with indwelling arterial line requiring ABGs.
- Patients with an ICU stay of ≥72 hours.

Sample Size : 34.

Method: Data recorded onto Trust ICIP electronic data tool by nurses.

Limitations
- Non-compliance/nurses forgetting to document discarded blood total.
- Hawthorn effect - nurses knowing practise being audited and discarding less or more blood than recorded.
- Doctors performing ABGs and not recording the amount.

Findings & Discussion:
- 66% of the amount of discarded Arterial blood from ICU patients was 3mls, although waste amounts ranged from 0mls-20mls. [See Pie Chart 1]
- The mean total of blood taken from a patient including aspirate & waste = 125mls (half a unit of blood).
- The mode total of blood taken as a sample = 1ml.
- The largest total amount of blood including the waste & sample taken from a patient during their ICU stay was 487mls. (Equivalent to 2 units of blood).
- There was no correlation between a patient's length of stay in ICU & the amount of blood taken for ABGs. [See Chart 2]

Chart 1: **Percentage of Recorded Waste**

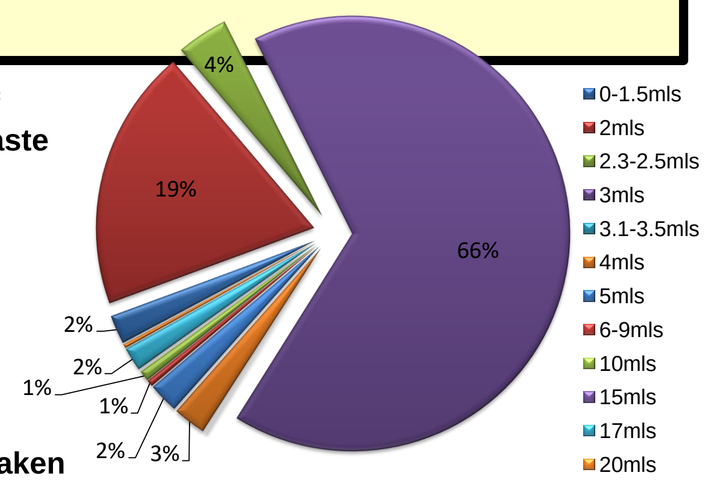
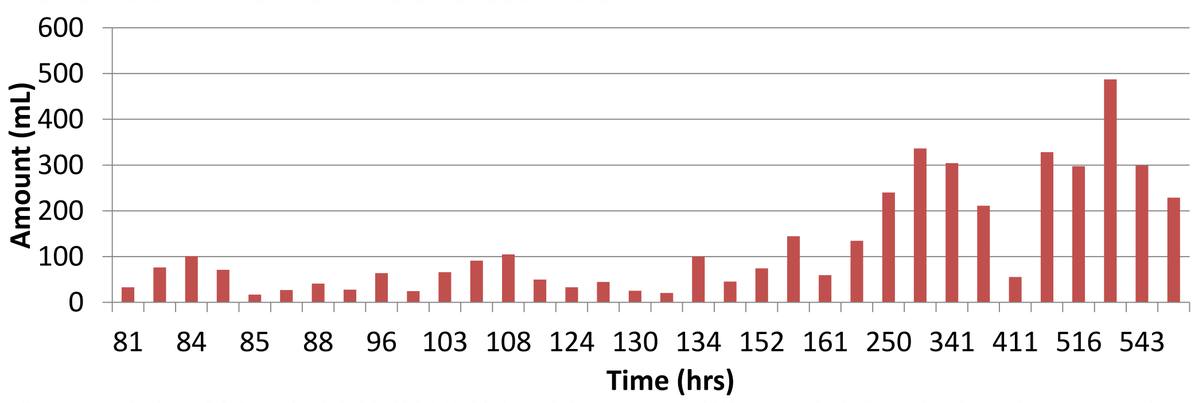


Chart 2 :
Time Patient Spent on ITU vs Total Amount of mls of Blood Taken



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