The influence of preoperative anemia on 30-day mortality and perioperative myocardial infarction among older patients undergoing non-cardiac surgery: A retrospective cohort study

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Background/Introduction

Preoperative anemia is common among older patients undergoing major non-cardiac surgeries and is associated with increased risk of postoperative mortality and morbidity. We aim to investigate the relationship between **preoperative anaemia** with **30 day mortality rate** and **perioperative myocardial infarction (PMI)** among older patients who underwent non-cardiac surgery. We defined PMI based on the European Perioperative Clinical Outcome consensus statement.

Methodology

- **Retrospective single center cohort study** with 24,579 patients above 65 years who underwent index surgery between 1 Jan 2012 – 31 Oct 2016. Excluded cardiac, neurosurgery, burns, transplant, minor surgery not requiring GA/RA.
- **Data analyzed:** Preoperative anemia according to WHO classification, RCRI score, ASA score, type of anaesthesia, priority and severity of surgery (ESA classification), perioperative blood transfusion, post operative baseline and highest serum troponin T within 30 days.
- **Outcomes:** **30-day mortality** obtained from eHINTS which is synced with the National Death Registry and **30-day perioperative myocardial infarction (PMI)** defined as a baseline increase of $\geq 20\%$ and $\geq 30\text{ng/ml}$ in serum troponin T
- **Sensitivity analysis:** Effect of perioperative blood transfusion

Results

Overall results

- Prevalence of preoperative anemia in cohort was **39.5%**, of which 21.4% was mild, 17.5% moderate and 0.6% severe.
- Incidence of 30-day mortality was 1.4%
- Incidence of 30-day perioperative myocardial infarction as defined as a baseline increase of $\geq 20\%$ and $\geq 30\text{ng/ml}$ in troponin T was 1.8%.

Variables that independently **increase** 30-day mortality and PMI

- Higher ASA score (≥ 3)
- Age ≥ 76 years
- **Presence of anemia**
- Emergency surgery (c.f. elective surgery)
- Repeat surgery during admission
- RCRI scores ≥ 1

Perioperative transfusion

- Significantly associated with both outcomes
 - 30-day mortality: 1 unit (aOR 1.59, 1.07 – 2.37, $p=0.02$); 2 or more units (aOR 2.84, 1.74 – 4.63, $p<0.001$)
 - 30-day PMI: 1 unit (aOR 2.25, 1.66 – 3.06, $p<0.001$); 2 or more units (aOR 1.67, 1.01 – 2.77, $p=0.046$)

Preoperative anaemia

- **Greater anaemia severity** associated with **worse** 30-day outcomes of mortality and 30-day PMI
- Anaemia is associated with greater incidence of perioperative blood transfusion (mild anemia aOR 3.26, 2.75 – 3.87, $p<0.001$; mod/severe anemia aOR 12.83, 10.98 – 14.99, $p<0.001$)
- After adjusting for perioperative transfusion in table 1, anaemia still has a **reduced but independent** effect on 30-day outcomes

Table 1. Odds of the anemia severity on 30-day mortality and perioperative myocardial injury (PMI)

	*aOR of 30-day Mortality		*aOR of 30-day Myocardial Infarction	
		Adjusted for transfusion		Adjusted for transfusion
Mild anemia	1.82 (1.61 – 2.85), p=0.009	1.70 (1.07 – 2.64), p=0.025	1.52 (1.09 – 2.11), p=0.014	1.37 (0.98 – 1.92), p=0.065
Mod/severe anemia	2.78 (1.87 – 4.14), p<0.001	2.12 (1.39 – 3.25), p=0.001	1.83 (1.35 – 2.48), p<0.001	1.41 (1.01 – 1.97), p=0.042

* Corrected for ASA status, gender, age, surgery risk category, grade of preoperative kidney disease, repeat surgeries done during admission, RCRI score, ASA score, type of anaesthesia, surgery priority, race

Conclusions

Pre-operative anaemia in the elderly significantly increased the odds of 30-day in-hospital mortality and perioperative myocardial infarction, and this effect is independent of perioperative blood transfusion.