

# Hospital-Acquired Anaemia Secondary to Phlebotomy in Elderly Patients

Divya Tiwari, Caroline Rance

Elderly Care Medicine, Royal Bournemouth Hospital, Bournemouth, UK  
Email: [caroline.rance@doctors.org.uk](mailto:caroline.rance@doctors.org.uk)

Received 16 February 2014; revised 2 April 2014; accepted 21 April 2014

Copyright © 2014 by authors and Scientific Research Publishing Inc.  
This work is licensed under the Creative Commons Attribution International License (CC BY).  
<http://creativecommons.org/licenses/by/4.0/>



Open Access

---

## Abstract

**Introduction:** Anaemia contributes to increased morbidity and mortality in hospitalised patients, yet unnecessary blood tests from inpatients may actually induce a “hospital acquired anaemia” (HAA). This study examines the incidence of phlebotomy-induced anaemia during a hospital admission. **Methods:** Patients admitted to the Royal Bournemouth Hospital between 2009 and 2011 for a period of more than two weeks were identified. Those with normal haemoglobins on admission (Hb > 130 g/dL in men; Hb > 120 g/dL in women) were selected to be included in the study. One hundred and sixty two patients were randomly selected from this group and their admission and discharge haemoglobin was recorded, and the change in Hb was calculated. The number of blood tests taken during admission was calculated from each patient from which volume of blood lost was determined. Age, sex and co-morbidities, bleeding complications and blood transfusions were noted. T-test for unequal variance was used for analysis. **Results:** Of the 162 patients, 69 (42.5%) developed a HAA (defined as haemoglobin drop from normal to <110 g/dL). The average number of blood tests taken in the anaemia group was 37, compared to only 23 in the “no-anaemia” group. *i.e.* 132 mls in the anaemia group vs. only 80.2 mls in no-anaemia group. Further analysis of the anaemia group revealed that 40 patients developed a “mild anaemia” (defined as drop in Hb from normal to <110 g/dL) and 29 developed a moderate/severe anaemia (drop from a normal Hb at admission to <100 g/dL). Significantly higher volume of blood was withdrawn from this moderate/severe anaemia group compared to those that developed a mild anaemia 177.9 mls vs. 121.34 mls (p-Value 0.007, F = 0.001) 95% CI 2.08 to 9.22. **Conclusion:** This study suggests that patients admitted for inpatient stays of more than two weeks may be at high risk of HAA as a consequence of diagnostic blood loss. This anaemia in turn may have detrimental consequences, especially in patients with pre-existing cardio-respiratory disease. There needs to be increased awareness of the risk posed to patients as a result of diagnostic phlebotomy and further studies are required to study its impact on LOS, morbidity and mortality outcomes.

## Keywords

Hospital Induced, Anaemia, Phlebotomy

---

## 1. Introduction

It is well documented that anaemia contributes to increased morbidity and mortality in hospitalised patients [1]. It is proposed that unnecessary blood tests may in fact contribute to anaemia. The incidence of phlebotomy-induced anaemia during a hospital admission has not been well defined [2]. This retrospective cohort study aims to clarify whether blood tests taken during hospital admission contribute to a drop in haemoglobin concentration, hence creating a Hospital Acquired Anaemia (HAA).

## 2. Methods

All patients admitted to Royal Bournemouth Hospital between 2009-2011 for inpatient stay of 2 weeks or greater were identified. Those with normal haemoglobins on admission (Men = Hb > 130 g/dL; Women Hb > 120 g/dL) were selected to be included in the study. One hundred and sixty two patients were selected from this group using a random number generator, and their admission and discharge haemoglobin was recorded. Any change in their haemoglobin concentration was calculated at this time. For each of the 162 patients, reason for admission, co-morbidities, bleeding complications, need for transfusion, and the number of blood samples taken during admission, from which the total volume of blood withdrawn was recorded.

The dependent variables measured were age, sex and occurrence of anaemia.

The independent variable was the number of blood tests, hence volume of blood lost through phlebotomy and change in Hb during admission. T-test for unequal variance was used for analysis.

## 3. Results

Data from one hundred and sixty two patients was analysed. Seventy male patients and ninety-two female patients were included in the study with an average age of eighty two years (range = 60 - 99). 69 patients (42.5%) developed a Hospital Acquired Anaemia (defined as haemoglobin drop from normal to <110 g/dL). This group was designated the “anaemia” group. Analysis revealed that the average number blood tests taken in this anaemia group was 37, compared to only 23 in the “no anaemia” group *i.e.* the group of patients who did not experience a significant drop in haemoglobin during admission. This amounted to an average of 132 mls blood loss in the anaemia group compared with 80.2 mls in “no anaemia” group.

Further analysis revealed that 40 of the 69 patients developed a “mild anaemia” (Hb from normal to <110 g/dL) but in fact 29 developed a moderate/severe anaemia (drop from normal admission Hb, to <100 g/dL). A significantly higher volume of blood was withdrawn from this moderate/severe anaemia group compared to those that developed a mild anaemia 177.9 mls vs. 121.34 mls (p-Value 0.007, F = 0.001) 95% CI 2.08 - 9.22.

## 4. Conclusion

This study suggests that patients admitted for inpatient stays of 2 weeks or more may be at high risk of hospital acquired anaemia as a consequence of diagnostic blood loss. This anaemia in turn may have detrimental consequences, especially in patients with pre-existing cardio-respiratory disease. There needs to be increased awareness of the risk posed to patients as a result of diagnostic phlebotomy and further studies are required to study its impact on length of stay, morbidity and mortality outcomes.

## References

- [1] Salisbury, A.C., Reid, K.J., Alexander, K.P., *et al.* (2011) Diagnostic Blood Loss from Phlebotomy and Hospital-Acquired Anemia during Acute Myocardial Infarction. *Archives of Internal Medicine*, **171**, 1646-1653. <http://archinte.jamanetwork.com/article.aspx?articleid=1105956>
- [2] Wong, P. and Intragumtornchai, T. (2006) Hospital-Acquired Anemia. *Journal of the Medical Association of Thailand*, **89**, 63-67. <http://www.ncbi.nlm.nih.gov/pubmed/21824940>