PREOPERATIVE HEMOGLOBIN LEVELS AS A PREDICTOR OF POSTOPERATIVE LENGTH OF STAY IN ORTHOPEDIC PATIENTS AT MUHAMMADIYAH PALEMBANG HOSPITAL

UNDERGRADUATE THESIS

As one of the requirements to obtain a
Bachelor of Medicine degree (MBBS)

By:
AISYAH FADHILAH KURNIA
NIM : 702022059

BACHELOR OF MEDICINE STUDY PROGRAM
FACULTY OF MEDICINE UNIVERSITAS MUHAMMADIYAH PALEMBANG
2026

APPROVAL SHEET

PREOPERATIVE HEMOGLOBIN LEVELS AS A PREDICTOR OF POSTOPERATIVE LENGTH OF STAY IN ORTHOPEDIC PATIENTS AT MUHAMMADIYAH PALEMBANG HOSPITAL

Prepared and Authored by:
Aisyah Fadhillah Kurnia
NIM: 702022059

As a one of the requirements to obtain a
Bachelor of Medicine degree (MBBS)

On 2nd of January 2026

Approve:

dr. Yanti Rosita, M. Kes
Primary Advisor

dr. Susi Handayani, Sp. An. M.Sc, MARS
Secondary Advisor

Dean
Faculty of Medicine

dr. Liza Chairani, Sp. A, M.Kes
NBM/NIDN: 1129226/0217057601

STATEMENT OF ORIGINALITY

I hereby declare that :

1. My undergraduate thesis is original and has never been submitted to obtain an academic degree at Muhammadiyah Palembang University or at any other higher education institution.
2. This thesis is purely my own idea, formulation, and research, carried out independently without assistance from any other parties, except for guidance provided by my supervisors.
3. There is no work or opinion written or published by another person included in this thesis, except where properly cited as a reference in the text and listed in the bibliography with the author's name.
4. I affirm that this statement is true and accurate. and if in the future any deviation or inaccuracy is found in this declaration, I am willing to accept academic sanctions or other penalties in accordance with the regulations applicable at this university.

Palembang, 20 December 2025

The Declarant,

(Aisyah Fadhilah Kurnia)

NIM : 702022059

STATEMENT OF PUBLICATION APPROVAL SCIENTIFIC WORK FOR ACADEMIC PURPOSES

By submitting the manuscript and soft copy entitled : Preoperative Hemoglobin Levels as a Predictor Of Postoperative Length of Stay in Orthopedic Patients at Muhammadiyah Palembang Hospital.

To the Medical Study Program, Faculty of Medicine, Muhammadiyah Palembang University (FK-UM Palembang), I hereby declare that:

Name : Aisyah Fadhilah Kurnia

NIM : 702022059

Study Program : Medicine

Faculty : Faculty of Medicine Muhammadiyah Palembang

Type of Scientific Work : Undergraduate Thesis

For the development of science, I agree to grant royalty-free copyright and publication rights for the above scientific work, manuscript, and soft copy to the Faculty of Medicine, Muhammadiyah Palembang University. With these rights, FK-UMP is entitled to store, convert media/formats, manage the work in database form, distribute, display, and publish it on the internet or other media for academic purposes without requiring further permission from me. I also authorize FK-UMP to designate one of my supervisors as the corresponden author for publication purposes. Any legal claims arising from copyright violations related to this scientific work shall be entirely my personal responsibility.

This statement is made truthfully and with full awareness.

Prepared in : Palembang

Date : 20 Desember 2025

Approved by,

Aisyah Fadhilah Kurnia

NIM 702022059

iv Universitas Muhammadiyah Palembang

ABSTRAK

Nama : Aisyah Fadhilah Kurnia

Program Studi : Kedokteran

Judul : Kadar Hemoglobin Praoperatif sebagai Prediktor Lama Rawat Inap Pascaoperasi pada Pasien Ortopedi di Rumah Sakit Muhammadiyah Palembang

Anemia praoperatif merupakan kondisi yang sering ditemukan pada pasien bedah ortopedi dan dapat memengaruhi proses pemulihan pascaoperasi. Kadar hemoglobin yang rendah berhubungan dengan penurunan kapasitas pengangkutan oksigen, gangguan penyembuhan luka, serta peningkatan risiko komplikasi pascaoperasi. Penelitian ini bertujuan untuk mengetahui hubungan antara kadar hemoglobin praoperatif dengan lama rawat inap pascaoperasi pada pasien ortopedi di Rumah Sakit Muhammadiyah Palembang. Penelitian ini merupakan penelitian analitik observasional dengan desain retrospektif kohort menggunakan data rekam medis pasien ortopedi yang menjalani pembedahan pada periode tahun 2021–2024. Jumlah sampel penelitian sebanyak 145 pasien yang dipilih dengan teknik consecutive sampling. Data kadar hemoglobin praoperatif dan lama rawat inap pascaoperasi dianalisis secara univariat dan bivariat. Uji statistik yang digunakan adalah Mann–Whitney U test. Hasil penelitian menunjukkan bahwa 49% pasien mengalami anemia praoperatif. Rerata lama rawat inap pascaoperasi adalah 5,66 hari. Analisis bivariat menunjukkan terdapat hubungan yang bermakna antara kadar hemoglobin praoperatif dengan lama rawat inap pascaoperasi ($p < 0,001$), di mana pasien dengan anemia praoperatif memiliki lama rawat inap yang lebih panjang dibandingkan pasien tanpa anemia.

Kata kunci: hemoglobin praoperatif, anemia, lama rawat inap, bedah ortopedi

ABSTRACT

Name : Aisyah Fadhilah Kurnia

Study Program : Medicine

Title : Preoperative Hemoglobin Levels as a Predictor Of Postoperative Length of Stay in Orthopedic Patients at Muhammadiyah Palembang Hospital

Preoperative anemia is a common condition among orthopedic surgical patients and may affect postoperative recovery. Low hemoglobin levels are associated with reduced oxygen-carrying capacity, impaired wound healing, and an increased risk of postoperative complications. This study aimed to analyze the relationship between preoperative hemoglobin levels and postoperative length of stay in orthopedic patients at Muhammadiyah Palembang Hospital. This study was an observational analytical study with a retrospective cohort design, using medical record data of orthopedic patients who underwent surgery from 2021 to 2024. A total of 145 patients were included using a consecutive sampling technique. Preoperative hemoglobin levels and postoperative length of stay were analyzed using univariate and bivariate analyses. The Mann–Whitney U test was used for statistical analysis. The results showed that 49% of patients had preoperative anemia. The mean postoperative length of stay was 5.66 days. Bivariate analysis demonstrated a statistically significant relationship between preoperative hemoglobin levels and postoperative length of stay ($p < 0.001$), with anemic patients experiencing longer hospitalization compared to non-anemic patients.

Keywords: preoperative hemoglobin, anemia, length of stay, orthopedic surgery

FOREWORD

Assalamu'alaikum Warahmatullahi Wabarakatuh

I am grateful to Allah SWT for His blessings and mercy, which have allowed me to complete this undergraduate thesis. This thesis is necessary for my Bachelor of Medicine degree at the Faculty of Medicine, Universitas Muhammadiyah Palembang. I recognize that without the assistance and guidance of various individuals, it would have been difficult to finish this thesis. Therefore, I would like to thank:

1) dr. Yanti Rosita, M.Kes dan dr. Susi Handayani, Sp.An., M.Sc as the primary and secondary advisors who have given their time, energy, and thoughts to guide me in compiling this thesis. I also extend my appreciation to Mr. Rex R. Villavelez for his insightful feedback and contributions as the examiner.
2) Family who have provided material and moral support, especially both of my parents Sudarto and Erna Niza; and
3) My friends who have provided a lot of support in helping me complete this undergraduate thesis.

Lastly, I hope that Allah SWT will repay all the kindness of all parties who have helped. Hopefully this undergraduate thesis will bring benefits to the advancement of science.

Wassalamu'alaikum Warahmatullahi Wabarakatuh.

Palembang, 20 December 2025

Aisyah Fadhilah Kurnia

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

CHAPTER I
INTRODUCTION

1.1 Background of the Study

Orthopedic surgery is one of the most common surgical procedures worldwide, especially in low- and middle-income countries. In 2017, approximately 22.3 million orthopedic procedures were performed globally (Salamanna *et al.*, 2022). Major orthopedic surgeries, such as total hip and knee replacements, often involve significant blood loss up to 1 liter per procedure even with advanced surgical techniques(Steuber *et al.*, 2016). This blood loss can lead to preoperative anemia, which has been reported in 15–48% of patients undergoing major orthopedic surgery (Endeshaw *et al.*, 2024).

Preoperative anemia is a major clinical concern because it increases the risk of perioperative transfusions, postoperative complications, delayed wound healing, and prolonged length of stay (LOS). Even mild anemia is associated with higher readmission rates and increased mortality (Kansagra & Stefan, 2016; Endeshaw *et al.*, 2024). A study in Ethiopia found that patients with preoperative anemia had 1.77 times greater odds of prolonged LOS compared to those without anemia (Endeshaw *et al.*, 2024). Similarly, Duarte et al. (2021) demonstrated that preoperative anemia in hip and knee arthroplasty patients increased transfusion risk, LOS, and ICU admission rates, particularly in women.

Length of hospital stay is an important indicator of surgical outcomes, resource use, and healthcare system efficiency (British Orthopaedic Association, 2023). Prolonged stays are linked to higher hospital costs, reduced bed availability, and increased risks of nosocomial infections and thromboembolic events (Salamanna *et al.*, 2022). These risks are even more critical in Type C hospitals like Muhammadiyah Palembang Hospital, where facilities and resources are more limited compared to Type A or B hospitals. Thus, optimizing perioperative care and minimizing unnecessary hospitalization are crucial for improving service efficiency and patient safety.

In Indonesia, few studies have specifically examined the relationship between preoperative hemoglobin levels and postoperative care duration in orthopedic patients, particularly in Type C hospitals. Therefore, this study aims to analyze the relationship between preoperative hemoglobin levels and the length of postoperative orthopedic care at Muhammadiyah Palembang Hospital. The findings of this study are expected to provide evidence that can be used as a basis for routine preoperative screening and early correction of anemia, as well as support better clinical decision-making to improve patient outcomes and hospital efficiency.

1.2 Problem Formulation

What is the relationship between preoperative hemoglobin levels and the duration of postoperative orthopedic care at Muhammadiyah Palembang Hospital?

1.3 Objectives of the Study

1.3.1 General Objectives

To analyze the relationship between preoperative hemoglobin levels and the duration of postoperative orthopedic care at Muhammadiyah Palembang Hospital.

1.3.2 Specific Objectives

1. To determine the distribution of preoperative hemoglobin levels in orthopedic patients at Muhammadiyah Palembang Hospital.
2. To determine the average duration of postoperative orthopedic care in orthopedic patients at Muhammadiyah Palembang Hospital.
3. To analyze the relationship between preoperative hemoglobin levels and the duration of postoperative orthopedic care.

1.4 Benefits of the Study

1.4.1 Theoretical Benefits

Improving the understanding of how preoperative hemoglobin levels affect the prognosis of postoperative patients, particularly in orthopedic medicine.

1.4.2 Practical Benefits

1.4.2.1 For Researchers

This study can serve as a reference and foundation for further research on the role of hemoglobin levels in the perioperative management of orthopedic patients, as well as enriching scientific research in the fields of medicine and healthcare.

1.4.2.2 For Hospitals

The results of this study can be used to evaluate and improve the preoperative care protocol for orthopedic patients, especially in terms of detecting and treating anemia before surgery, to reduce the risk of complications and shorten the length of stay.

1.4.2.3 For Medical Staff

The findings of this study can serve as a basis for clinical considerations in daily practice, especially in the screening of hemoglobin levels, operative decision-making, and comprehensive and standardized patient orthopedic management planning.

1.4.2.4 For Patients and the Public

This study can improve patient’s understanding of the importance of hemoglobin levels before surgery, encouraging them to get early health screenings and improve their nutritional status before undergoing surgical procedures.

1.5 Research Originality

Table 1.1. Research Originality

No.	Authors	Title	Research Design	Result	Differentiator
1	Endeshaw, A., Diress, F., & Endeshaw, M.	The relationship between preoperative anemia and length of stay in the hospital for patients undergoing orthopedic surgery at a teaching hospital in Ethiopia.	*Retrospective cohort*	Of the 212 patients who underwent long-term hospitalization, 124 (58.49%) experienced anemia, compared to 88 (41.51%) who did not. The odds of a prolonged stay after orthopedic surgery were 1.77 (AOR = 1.77, 95% CI 1.25, 2.50) times higher among patients with preoperative anemia compared to those without.	Place of research, category of independent and dependent variables
2	Suyanti & Faizah, K..	The relationship between preoperative anemia and increased risk of blood transfusion and length of hospital stay in adults undergoing hip and knee arthroplasty	*Restrospective observasional*	Preoperative anemia was significantly associated with a higher rate of blood transfusions (34.5% vs. 5.6%; P = 0.001), a longer hospital stay (6.48 days vs. 3.36 days; P = 0.001), and a higher rate of admission to the intensive care unit (47.2% vs. 29.6%; P = 0.009).	Place of research, number of variables, and categories of independent and dependent variables.
3	Abdullah, H., Sim, Y., & Hao, Y.	The relationship between preoperative anemia and length of stay for patients undergoing primary total knee arthroplasty in Singapore.	*Restrospective cohort*	preoperative anemia significantly increases LOS (mild anemia, adjusted odds ratio (aOR) 1.71, p<0.001; moderate/severe anemia, aOR 2.29, p<0.001). A similar effect was observed when anemia was defined as having a hemoglobin (Hb) level below 13 g/dL, regardless of gender.	Place of research, number of variables, category of dependent variables.

Table 1.1. Research Originality (Continued)

No.	Authors	Title	Research Design	Result	Differentiator
4	Nicolas, A., Morrison, R., & Casson, C.	Screening and intervention for anemia with low iron stores in elective hip and knee arthroplasty	*Prospective cohort*	In the intervention group, transfusions decreased significantly (108 [6%] vs. 63 [4.1%], p 5 0.005), as did readmissions (81 [4.5%] vs. 48 [2.3%], p 5 0.020), and critical care admissions (23 [1.3%] vs. 9 [0.5%], p 5 0.030). LOS decreased significantly from 3.9 days to 3.6 days (p = 0.017).	Place of research, number of variables, category of independent variables.

BIBLIOGRAPHY

Adriani, D. & Fadilah, T. 2023. Peran Kadar Hemoglobin Pada Kebugaran Jasmani Remaja. *Jurnal Penelitian Dan Karya Ilmiah Lembaga Penelitian Universitas Trisakti* 8: 199–214.

British Orthopaedic Association 2023. *Orthopaedic Elective Surgery*. NHS, .

Burton, B.N., A'Court, A.M., Brovman, E.Y., Scott, M.J., Urman, R.D. & Gabriel, R.A. 2018. Optimizing Preoperative Anemia to Improve Patient Outcomes. *Anesthesiology Clinics* 36: 701–713.

Endeshaw, A., Diress, F. & Endeshaw, M. 2024. The relationship between preoperative anemia and length of hospital stay among patients undergoing orthopedic surgery at a teaching hospital in Ethiopia: a retrospective cohort study. *Perioperative Medicine* 13.

Fadlilah Universitas Respati Yogyakarta, S. 2018. *Faktor-Faktor Yang Berhubungan Dengan Kadar Hemoglobin (Hb) Pada Mahasiswa Keperawatan Angkatan 2013 Universitas Respati Yogyakarta Factors Associated With Hemoglobin (Hb) Levels in Nursing Class 2013 Respati Yogyakarta University*.

Ghaderi, A., Sharafi, A., Mirghaderi, P., Ghaseminejad-Raeini, A., Shafiei, S.H., Esmaeili, S., Rahimian, A. & Fallah, Y. 2024. Determinants of prolonged length of hospital stay in patients undergoing surgery due to extremity fractures: A retrospective cohort study. *International Journal of Surgery Open* 62: 208–213.

Indra, M.F., Masfuri, M. & Yona, S. 2024. Faktor Mobilisasi Dini, Obesitas dan Usia Tua Sebagai Prediktor Lama Rawat Inap Pasien Fraktur Femur Pasca Bedah. *Journal of Telenursing (JOTING)* 6: 1500–1509.

Irfannuddin 2019. *Cara Sistematis Berlatih Meneliti, Merangkai Sistematika Penelitian Kedokteran Dan Kesehatan*. Rayyana Komunikasindo, Palembang.

Kansagra, A. & Stefan, M. 2016. Preoperative Anemia Evaluation and Treatment. *Anesthesiology Clin* 34.

Kashkooe, A., Yadollahi, M. & Pazhuheian, F. 2020. What factors affect length of hospital stay among trauma patients? A single-center study, Southwestern Iran. *Chinese Journal of Traumatology - English Edition* 23: 176–180.

Lin, Y. *Preoperative Anemia-Screening Clinics*. 2017.

Muñoz, M., Gómez-Ramírez, S., Kozek-Langeneker, S., Shander, A., Richards, T., Pavía, J., Kehlet, H., Acheson, A.G., Evans, C., Raobaikady, R., Javidroozi, M. & Auerbach, M. 2015. 'Fit to fly': Overcoming barriers to preoperative haemoglobin optimization in surgical patients. *British Journal of Anaesthesia* 115: 15–24.

Rozi, I.F., Tekwan, G. & Nugroho, H. 2021. Hubungan Usia Pasien, Jenis Fraktur dan Lokasi Fraktur Tulang Panjang Terhadap Lama Rawat Inap Pasca Bedah di RS Ortopedi Prof. Dr. R. Soeharso Surakarta. *Jurnal Sains Dan Kesehatan* 3: 661–666.

Salamanna, F., Contartese, D., Brogini, S. & Visani, A. 2022. Key Components, Current Practice and Clinical Outcomes of ERAS Programs in Patients Undergoing Orthopedic Surgery: A Systematic Review. *Journal of Clinical Medicine* 11.

Simamora, A.S., Faizal, K.M., Berti, R., Program, A., Keperawatan, S.I. & Keperawatan, F. 2024. Hubungan Antara Usia, Lokasi Dan Jenis Fraktur Dengan Durasi Perawatan Pada Pasien Bedah Tulang Di Poli Ortopedi Rsud Depati Bahrin Sungailiat Kabupaten Bangka Tahun 2023. *Jurnal Kesehatan Masyarakat*.

Steuber, T., Howard, M. & Nisly, S. 2016. Strategies for the Management of Postoperative Anemia in Elective Orthopedic Surgery. *Annals of Pharmacotherapy*.

Sugiyono 2017. *Metode Penelitian Kuantitatif, Kualitatif, Dan R&D*. Alfabeta, Bandung, .