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Prevalence of Anemia in Hospitalized Internal Medicine Patients: A Cross-Sectional Study

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Abstract

Background

This study aimed to determine the prevalence of anemia and characterize its distribution among patients admitted to the Department of Medicine of Satkhira Medical College Hospital, Satkhira, Bangladesh. The secondary objectives were to describe selected erythrocyte-related hematological characteristics and to characterize anemia-related interventions, hospital course, complications, and discharge outcomes within this clinically diverse inpatient population.

Methods

A hospital-based descriptive cross-sectional study was conducted over four months among 384 patients admitted to the Department of Medicine of Satkhira Medical College Hospital and selected through purposive sampling. Patients aged ⩾18 years who provided informed consent were included. Data were collected using a pretested structured case record form, and venous blood samples were analyzed using a Sysmex XN-1000 (Henry Schein, Inc., Melville, NY, USA) automated hematology analyzer.

Results

The study included 384 patients with a mean age of 54.76 ± 15.33 years, of whom 53.9% were male and 92.45% were from rural areas. The mean hemoglobin concentration was 7.1 ± 0.14 g/dL, hematocrit was 20.4 ± 0.56%, and mean corpuscular volume was 63.6 ± 3.68 fL. Anemia was present in 69.79% of participants. Most patients required no anemia-related intervention (84.89%), while blood transfusion was the most frequent intervention (8.85%). The mean hospital stay was 5.5 ± 2.12 days, and 90.62% developed no documented complications. At discharge, 77.86% had improved, 13.54% were referred, 5.21% left against medical advice, and in-hospital mortality was 0.26%.

Conclusion

Anemia was common among hospitalized internal medicine patients in this study. Despite the high prevalence, most patients experienced an uncomplicated hospital course and were discharged in an improved condition. The findings support routine identification and appropriate evaluation of anemia among patients admitted to internal medicine wards.

Categories: Hematology, Internal Medicine
Keywords: anemia prevalence, hematological parameters, hemoglobin, iron deficiency anemia (ida), symptomatic anemia

Introduction

Anemia is characterized by a reduction in red-cell mass or hemoglobin concentration below physiological thresholds (WHO sex-specific hemoglobin cutoffs as hemoglobin <13.0 g/dL in males and <12.0 g/dL in non-pregnant females), thereby compromising the blood's oxygen-carrying capacity [1-3]. Its clinical significance extends well beyond diagnosis, as anemia is associated with fatigue, disability, prolonged hospitalization, readmission, increased morbidity, and mortality [4,5]. Globally, anemia remains a major health problem, affecting approximately one-third of the world's population [2]. The burden is particularly concentrated in low- and middle-income countries, especially across South Asia, while Bangladesh continues to experience a substantial prevalence of anemia [3,6].

Within hospitals, internal medicine patients commonly present with multiple acute and chronic illnesses, creating a clinically complex setting in which anemia may develop or coexist [5,7]. Nutritional deficiencies, chronic kidney disease, infections, chronic inflammation, malignancy, and chronic blood loss are common contributors, often interacting through multifactorial mechanisms [4,8,9]. By compromising tissue oxygenation, anemia may contribute to fatigue, diminished physical function, and cardiovascular

deterioration [2,3]. Among hospitalized patients, these physiological consequences may translate into impaired recovery, prolonged hospital stay, readmission, greater morbidity, functional decline, and increased mortality [4,5].

Assessing the prevalence of anemia is therefore important for defining its clinical burden, supporting routine screening and etiological evaluation, guiding targeted treatment, and helping hospitals prioritize limited resources to improve inpatient care [3,4,9]. Despite this recognized burden, local hospital-based evidence remains limited, particularly among heterogeneous internal medicine inpatients with multiple comorbidities, restricting context-specific understanding and evaluation of anemia [7,9].

This study aimed to determine the prevalence of anemia among hospitalized internal medicine patients and to characterize its distribution. The secondary objectives were to further characterize the hematological profile of these patients by describing selected erythrocyte-related parameters while also examining the patterns of anemia-related management, hospital course, complications, and discharge outcomes observed during hospitalization.

Materials And Methods

A hospital-based descriptive cross-sectional study was conducted in the inpatient Department of Medicine of Satkhira Medical College Hospital over a period of four months (from December 16, 2025, to April 15, 2026). Ethical approval was obtained from the Ethics Committee of Satkhira Medical College Hospital, Satkhira (approval/reference no. 2670(2); approval date: December 15, 2025).

The study population comprised adult patients admitted to the internal medicine ward during the study period. A total of 384 participants (calculated using the single-population proportion formula, $n = \frac{Z^2 p(1-p)}{d^2}$, assuming 50% prevalence in the absence of a reliable setting-specific estimate, 95% confidence, and 5% absolute precision) were enrolled using a non-randomized purposive sampling technique, whereby eligible admitted patients were selected according to the predefined selection criteria during the data collection period.

Patients aged ⩾18 years who were admitted to the internal medicine ward and provided informed consent were included; when a patient was unable to provide consent, consent was obtained from the legal guardian. Patients admitted for surgical, obstetric, or pediatric conditions, those who had received a blood transfusion before admission, critically ill patients, patients with active bleeding, and those who refused to participate were excluded.

Data were collected by trained medical personnel using a structured case record form (CRF), which was pretested before the commencement of formal data collection to ensure its suitability for the study (Appendix A). Relevant information was obtained through face-to-face interviews and recorded systematically in the CRF.

For laboratory assessment, 4 mL of venous blood was collected from each enrolled patient by venipuncture under aseptic conditions according to the World Health Organization protocol. Each blood specimen was transferred into an ethylenediaminetetraacetic acid (EDTA) tube and gently mixed by repeated inversion to prevent clot formation. The collected samples were subsequently analyzed using an automated hematology analyzer (Sysmex XN-1000; Henry Schein, Inc., Melville, NY, USA). Hematological parameters measured included hemoglobin, hematocrit, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC), providing the laboratory data required for assessment of anemia among the hospitalized internal medicine patients.

Data were entered, cleaned, and analyzed using IBM SPSS Statistics for Windows, Version 32.0 (Released 2026; IBM Corp., Armonk, NY, USA). Continuous variables were summarized as mean ± standard deviation, while categorical variables were expressed as frequencies and percentages. Anemia prevalence was calculated as the proportion of participants meeting the predefined hemoglobin criteria. As the study was descriptive, no inferential hypothesis testing was performed.

Results

A total of 384 patients were included in the final analysis. The findings are presented according to sociodemographic characteristics, lifestyle and dietary characteristics, anthropometric and hematological profiles, anemia prevalence, hospital course, and discharge outcomes.

Sociodemographic characteristics

Table *1* shows that the respondents were predominantly middle-aged to older adults, with a slight male predominance. Most participants came from rural areas, and housewives and farmers represented the major occupational groups. The socioeconomic profile was largely characterized by lower monthly family income,

smaller household size, and limited educational attainment, with more than half having no formal education.

Variables	Results
Age	54.76±15.33
Gender	
Male	207 (53.9%)
Female	177 (46.1%)
Residence	
Rural	355 (92.45%)
Urban	29 (7.55%)
Occupation	
Housewife	154 (40.1%)
Farmer	82 (21.35%)
Service	34 (8.85%)
Business	22 (5.73%)
Student	12 (3.12%)
Laborer	20 (5.21%)
Unemployed	28 (7.29%)
Other	32 (8.33%)
Monthly family income	
<10,000	161 (41.93%)
10,001-20,000	157 (40.88%)
20,001-50,000	64 (16.67%)
>50,000	2 (0.52%)
Prefer not to say	0 (0%)
Number of household members	
≤5 members	235 (61.2%)
>5 members	149 (38.8%)
Education level	
No formal education	206 (53.64%)
Primary	85 (22.13%)
Secondary	63 (16.41%)
Higher	30 (7.81%)

TABLE 1: Distribution of respondents according to sociodemographic characteristics.

Lifestyle, dietary, and household characteristics

Table *2* shows that most respondents had access to sanitary latrines and predominantly followed a non-vegetarian diet, while vegetarian dietary patterns were uncommon. Betel quid use and antibiotic exposure were frequent lifestyle and clinical characteristics, whereas a smaller proportion reported a history of smoking.

Variables	Results
Access to sanitary latrine	312 (81.25%)
Diet type	
Non-vegetarian (regular meat, fish, eggs, dairy)	339 (88.28%)
Semi-vegetarian/Flexitarian (occasional meat/fish)	42 (10.94%)
Vegetarian	3 (0.78%)
Strict vegetarian	(0%)
History of smoking	115 (29.95%)
History of betel quid	217 (56.51%)
Use of antibiotic	231 (60.16%)

TABLE 2: Distribution of respondents according to lifestyle, dietary, and household characteristics.

Anthropometric and hematological characteristics

Table 3 demonstrates a generally low anthropometric profile alongside marked hematological abnormalities among the respondents. Hemoglobin, hematocrit, and red-cell indices reflected a substantial burden of anemia with predominantly microcytic features, while the elevated erythrocyte sedimentation rate (ESR) suggested the presence of considerable inflammatory or disease-related activity within the study population.

Variables	Results
Height (inch)	60±1.41
Weight (kg)	48.25±2.47
MUAC (cm)	20.75±0.35
ESR (mm/hr)	85±49.5
Hb (g/dL)	7.1±0.14
Hematocrit (%)	20.4±0.56
MCV (fL)	63.6±3.68
MCH (pg)	22.45±0.64
MCHC (g/dL)	33.85±1.2
RDW-CV (%)	15.9±0.14

TABLE 3: Distribution of respondents according to anthropometric and hematological characteristics.

MUAC: mid-upper arm circumference; ESR: erythrocyte sedimentation rate; Hb: hemoglobin; MCV: mean corpuscular volume; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration; RDW-CV: red cell distribution width-coefficient of variation

Prevalence of anemia

Table 4 reveals that anemia was highly prevalent among the hospitalized internal medicine patients, affecting the majority of the study population and underscoring its substantial clinical burden within this inpatient setting.

Presence of anemia	Results
Present	268 (69.79%)
Absent	116 (30.21%)

TABLE 4: Distribution of respondents according to prevalence of anemia.

Intervention, hospital course, and complications

Table 5 shows that most respondents did not require anemia-specific intervention during hospitalization, while blood transfusion was the most frequently used treatment among those who received therapy. The overall hospital stay was relatively short, and most patients experienced no documented complications, although infections and heart failure exacerbation emerged as the more common adverse events.

Variables	Results
Need of intervention	
Oral iron	16 (4.17%)
IV iron	2 (0.52%)
Vitamin B12/folate	3 (0.78%)
Blood transfusion	34 (8.85%)
Erythropoietin	1 (0.26%)
Others	2 (0.52%)
No intervention	326 (84.89%)
Hospital Stay (days)	5.5±2.12
Complications	
Infections	18 (4.69%)
Heart failure exacerbation	10 (2.6%)
Renal failure	1 (0.26%)
Others	7 (1.82%)
No complications	348 (90.62%)

TABLE 5: Distribution of respondents according to need of intervention, hospital course and complications.

IV: intravenous

Discharge outcomes

Table 6 demonstrates a generally favorable discharge profile, with most patients leaving the hospital in an improved condition. Referral represented the next most frequent outcome, whereas leaving against medical advice and other outcomes were comparatively uncommon, and in-hospital mortality was rare.

Outcome status at discharge	Results
Discharged improved	299 (77.86%)
Referred	52 (13.54%)
LAMA	20 (5.21%)
Other	12 (3.12%)
Death	1 (0.26%)

TABLE 6: Distribution of respondents according to outcome status at discharge.

LAMA: left against medical advice

Discussion

The present study population was predominantly middle-aged to older, with a slight male predominance, an overwhelmingly rural background, and a socioeconomic profile characterized by housewives and farmers, lower family income, smaller household size, and limited formal education. The observed age pattern was comparable with one study that reported a mean age of 51.28 ± 16.17 years, while another study included a considerably older population with a mean age of 87.2 ± 7.3 years [10,11]. Another research found that anemia prevalence was highest among patients aged >65 years, reaching 78.33% [8]. Regarding sex, the slight male predominance in the present study was similar to one research in which 50.8% of participants were male and another study where males constituted 59.5% of the population [7,10]. Female predominance was observed in two other studies, where females represented 54.3% and 69.7% of participants, respectively [12,13]. The marked rural representation in the present study is also noteworthy in the context of previous Bangladeshi evidence. One study reported anemia prevalence of 77% in rural and 64% in urban populations, while another research documented prevalence of 43.5% and 37.2% in rural and urban areas, respectively [1,14]. Another study population comprised 64.4% urban and 35.6% rural residents [6]. Occupational comparisons were less direct; one research reported a prevalence of 53% among garment factory workers, whereas another study observed anemia in 43.6% of working women compared with 40.9% of non-working women [1,14]. The predominance of lower-income households in the present cohort was consistent with previous observations of socioeconomic differences in anemia. One study reported prevalences of 47.5%, 42.1%, and 36.0% among poor, middle-income, and rich households, respectively, while another research documented a mean monthly income of Rs 22,098 ± 18,711 [4,14]. Household composition may also be relevant, as one study found that anemia prevalence increased from 37.7% among women with no children to 51.0% among those with seven or more children, while another research showed that having ⩾3 children significantly increased the odds of mild anemia [6,14]. The low educational attainment observed in the present study contrasted with one study where 12.3% of participants were illiterate, 36.4% had primary education, and 37.4% had secondary education, while another research reported illiteracy in 19.4% of participants [4,12]. A further study reported anemia prevalence of 70.7% among those unable to read and write and 75.0% among those able to read and write [9].

Our study showed that most respondents had access to sanitary latrines and predominantly followed a non-vegetarian diet, while smoking was reported by a smaller proportion; betel quid use and antibiotic exposure were comparatively common. Regarding sanitation, one study reported anemia prevalence of 70% among individuals with safe water and sanitation facilities and 73% among those without such facilities [1]. Another study observed anemia prevalence of 43.3% among individuals using unhygienic toilets and 39.5% among those with hygienic facilities [14]. The dietary pattern in the present cohort differed from one research in which anemia was observed in 42.6% of vegetarians, 38.6% of semi-vegetarians, and 25.5% of non-vegetarians [15]. Smoking prevalence also varied across previous studies. One study reported smoking in 64.5% of participants, while another documented a comparable proportion of 64.3% [9,12]. A separate study reported smoking among 40% of men and none of the women, while 35.7% of participants were exposed to secondhand smoke at home [13]. Betel quid use in the present study showed a broadly comparable pattern with previous findings. One research reported betel quid use in 54.8% of participants, another documented 52.8%, and a further study reported 54.6% [9,12,13]. Antibiotic-related exposure showed greater variation across clinical populations, with one study reporting 27.7%, another reporting 30.94%, and a further study documenting 87.3% [4,8,10].

The present study demonstrated a markedly reduced hematological profile, characterized by low hemoglobin and hematocrit levels together with reduced red-cell indices, while ESR was considerably elevated and red cell distribution width-coefficient of variation (RDW-CV) suggested increased variation in erythrocyte size. The mean hemoglobin level in the present study was notably lower than that observed in previous research. One study reported a mean hemoglobin concentration of 10.05 ± 1.87 g/dL, while another documented 11.6 ± 2.6 g/dL, and a further study reported 10.85 ± 3.5 g/dL [4,7,9]. A similar difference was observed for MCV, as

one researcher reported a mean value of 78.14 ± 12.04, whereas another study found low MCV in 32.1% of patients [4,10]. Regarding MCH, one study documented a mean value of 26.5 ± 8.3, while another research reported low MCH in 5.3% of participants [4,10]. The inflammatory profile of the present cohort was closely comparable with one study that reported a mean ESR of 82.64 ± 46.80 mm/hr [10]. Regarding red-cell size variability, the same study found elevated RDW in 78.63% of patients and low RDW in only 0.76%, supporting the frequent presence of altered erythrocyte morphology in comparable clinical populations [10].

The present study demonstrated a high prevalence of anemia among hospitalized internal medicine patients, indicating a substantial clinical burden within this inpatient population. One study reported an anemia prevalence of 70.7%, which was closely comparable with the present finding [4]. Another research documented a prevalence of 64.2%, while a separate study found a similar prevalence of 64.8% [9,12]. A slightly higher prevalence of 74% was reported in another study [1]. Lower prevalence rates were documented in other clinical populations, with one research reporting 52.17% and another study reporting 36.4% [8,11].

This study showed that most patients did not require specific anemia-related intervention, hospital stay was comparatively short, and the majority experienced no documented complications; among those requiring treatment, blood transfusion was the most frequent intervention, while infections and heart failure exacerbation were the more notable complications. This relatively limited requirement for intervention contrasted with one study in which 49.4% of admitted patients had moderate-to-severe anemia requiring direct clinical management, while another research reported that 36.6% received specific anti-anemic treatment during hospitalization [5,12]. A separate study documented oral iron supplementation in 8.3% of men and 9.0% of women, whereas only 0.2% received intravenous iron therapy [16]. The duration of hospitalization in the present study was also shorter than that observed in previous research. One study reported a mean hospital stay of 27.3 ± 31.8 days, while two other studies documented median stays of 10 and 11 days, respectively [5,7,11]. Regarding complications, one study reported infection in 51% of patients, while other studies documented rates of 30.94%, 18.5%, and 13.4%, respectively [4,5,8]. Heart failure exacerbation was reported in 59.7% in one research and in 75% in another study [5,16]. Renal failure also varied considerably across previous studies, with reported rates of 3.1%, 7.9%, and 31.2%, while another research documented renal failure in 47.5% of men and 43.6% of women [4,5,9,16].

Our study demonstrated a generally favorable discharge profile, with most patients leaving the hospital in an improved condition, while referral and discharge against medical advice were less frequent and in-hospital mortality was rare. One study reported that 29% of patients were discharged, whereas another research documented an in-hospital mortality rate of 9.2% [5,11]. Compared with these findings, the present cohort showed a higher proportion of favorable discharge outcomes and a markedly lower mortality burden, suggesting a comparatively better short-term hospital outcome within this study population.

This study had several limitations. Its single-center design and purposive sampling may limit generalizability and introduce selection bias. The cross-sectional design did not permit assessment of temporal or causal relationships, while exclusion of critically ill, actively bleeding, and previously transfused patients may have underestimated anemia burden among the sickest inpatients. Detailed etiological investigations such as iron studies, ferritin, vitamin B12, folate, and reticulocyte assessment were not systematically evaluated, limiting etiological classification of anemia. Leukocyte and platelet parameters were not included in the predefined analysis because the study was primarily focused on anemia and erythrocyte-related hematological characteristics; future studies incorporating all hematological cell lines may provide a more comprehensive picture of abnormalities among hospitalized medical patients.

The findings confirm that anemia remains a substantial burden among hospitalized internal medicine patients, with prevalence broadly comparable to several previous hospital-based studies. The cohort was characterized by notable sociodemographic vulnerability and marked hematological abnormalities, yet most patients experienced a relatively uncomplicated hospital course with limited need for anemia-specific intervention. These findings highlight the importance of routine recognition and evaluation of anemia within internal medicine wards to support timely, context-appropriate inpatient care.

Conclusions

Anemia was highly prevalent among hospitalized internal medicine patients, reflecting a substantial clinical burden within this setting. The affected population was characterized by marked hematological abnormalities and considerable sociodemographic vulnerability, although most patients experienced a relatively uncomplicated hospital course and favorable discharge outcome. The findings highlight the importance of recognizing anemia as a common and clinically relevant condition among medical inpatients. Routine screening, appropriate etiological evaluation, and timely management may help improve inpatient care and support better clinical outcomes.

Appendices

Appendix A

Data Collection Sheet Title: Prevalence of Anemia in Hospitalized Internal Medicine Patients

Researcher's name: Dr. Sanjoy Kumar Ray

Date of data collection:

Section A: Patient Identification

Study ID: _____ Hospital ID / Admission No: _____ Bed No: _____ Gender: 1=Male 2= Female Name: _____ Age (years): _____ Contact mobile No:_____ Date of Admission: _____

Section B: Sociodemographic Information

01. Residence: 1= Rural 2= Urban

02. Occupation: 1= Farmer 2= Housewife, 3=Service 4= Business 5= Student, 6. Labourer 7= Unemployed 8= Other_____

03. Monthly Family Income (in BDT): 1= 50,000 5= Prefer not to say

04. Household members: 1= ⩽5 members 2= >5 members

05. Education level: 1= No formal education 2= Primary 3= Secondary 4= Higher

06. Sanitary Latrine: 1= Yes 2= No

Section C: Lifestyle and personal history

07. Dietary history:

Diet type: 1 = Non-vegetarian (regular meat, fish, eggs, dairy) 2 = Semi-vegetarian/Flexitarian (occasional meat/fish) 3 = Vegetarian 4= Strict vegetarian.

08. Smoking status: 1= Yes 2= No 3=Former

09. Betel nut/betel quid/tobacco chewing: 1=Yes 2=No

10. Alcohol consumption: 1=Yes 2=No

11. Usually drink tea/coffee immediately after meals: 1=Yes 2= No

12. For female only: ☒ Number of parity: _____ ☒ Menstrual history: Menstruation occurs: 1= Yes 2= No (non-pregnant amenorrhea) ☒ If yes, duration of menstrual period: 1= less than 5 days 2= more than 5 days ☒ Regarding breast feeding: Are you currently breastfeeding? 1= Yes 2= No o If yes, duration of breast feeding: 1= 12 months Section D: Clinical Information

13. Reason for admission / Primary complaint: _____

14. Present or past medical history: _____

15. Current Medications: _____

Section E: Anthropometry & Nutrition

16. Height (Inch): _____ 17. Weight (kg): _____ 18. BMI (kg/m^2): _____ 19. MUAC (cm): _____

Section F: Laboratory Data

20. CRP: _____

21. ESR: _____

22. Hemoglobin (g/dL): _____

23. Hematocrit (%): _____

24. MCV (fL): _____

25. MCH (pg): _____

26. MCHC (g/dL): _____

27. RDW-CV: _____

28. Peripheral blood smear: 1= Normocytic normochromic 2= Microcytic hypochromic 3= Macrocytic normochromic 4= Mixed 5= Other: _____

29. Iron profile: Serum Iron: _____ Ferritin: _____ TIBC: _____

30. Stool for OBT: _____

31. Vitamin B12: _____ Folate: _____

32. TSH_____ T4 _____

33. Liver function: ALT= _____ Bilirubin= _____ Albumin: _____

34. Renal function: Urine R/E: _____ S. creatinine _____

35. RBS/FBS_____

36. S. Electrolytes: _____

37. HbA1c_____

38. ECG/Echo_____

39. CXR: _____

40. USG of abdomen: _____

41. Another test (if any): _____

Section G: Anemia Classification (WHO Criteria)

42. Anemia present: 1= Yes 2= No

43. Etiology (probable/confirmed): select all that apply 1= Nutritional deficiency: 1A =Iron deficiency 1B = Vit B12/folate deficiency 2= Infection-related: _____ 3. Anemia of chronic disease (Infection, CKD, CLD, COPD, RA, chronic IHD, HF, DM, malignancy etc.) : _____ 4 = Gastrointestinal blood loss 5 = Genitourinary blood loss 6 = Malignancy 7= Hematological disorder 8= Neurological: _____ 9 = Endocrine/DM 10 = Autoimmune: _____ 11= Unexplained/Others: _____

Section H: In-Hospital Course & Outcomes

44. Interventions received: 1= Oral Iron 2= IV Iron 3= Vitamin B12 / Folate 4= Blood transfusion 5. No 6. Erythropoietin 7. Others: _____

45. Length of hospital stay (days): _____

46. In-hospital complications: 1= Infections 2= Heart failure exacerbation 3= Renal failure 4 = No complication 5. Other: _____

47. Outcome at discharge: 1= Discharged improved 2= Referred 3= Death 4. Left against medical advice (LAMA) 5. Other: _____

Section I: Follow-Up

48. Readmission within 30 days: 1= Yes 2= No

49. If yes, reason: _____

Signature of the data collector: _____

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. Satkhira Medical College Hospital issued approval 2670(2). **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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