

# Prevention and Management of Hospital-Acquired Anemia

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## KEYWORDS

• Hospital-acquired anemia • Iron deficiency anemia • Transfusion

## HOSPITAL MEDICINE CLINICS CHECKLIST

1. Anemia can be categorized as severe (hemoglobin [Hgb] level <9 g/dL), moderate (Hgb 9.1–11.0 g/dL), and mild (Hgb >11.0 g/dL).
2. Hospital-acquired anemia (HAA) is prevalent in the intensive care unit as well as on the wards.
3. Every patient who is admitted to the hospital is at risk of developing HAA. Those who are anemic before admission are at risk of worsening anemia during hospitalization.
4. Causes of HAA include blood draws, erythropoietin (EPO) (Amgen Inc, Thousand Oaks, CA, USA) suppression caused by increase in inflammatory markers from acute illness, and downregulation of iron.
5. HAA recognition and treatment affect patient outcomes.
6. Prevention and management of HAA demand a team approach and a culture that supports recognition and reduction of unnecessary laboratory testing and procedures.
7. Pharmacologic treatment continues to evolve, and evidence-based use of intravenous iron and EPO may have a role in supporting erythropoiesis to help prevent transfusion.

## INTRODUCTION

It is an exciting time to be in health care, but there are many challenges. National attention to health care reform has reinforced the push for quality and value. The increasing cost of health care has health systems reassessing their efficiency and current business models. However, our population continues to age, with ever-growing comorbidities that require chronic medical care.

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The Affordable Care Act is expected to increase hospital admissions once it is in full effect, as the number of insured individuals increases. This demand for health care must be met not only with a supply of physicians to provide medical treatment but a health system capable of delivering high-quality medical care. Hospital-acquired anemia (HAA) was first recognized in the late 1970s as a consequence of the numerous tests and procedures that patients endure during their stay. Almost 4 decades later, we still struggle to recognize and manage the detrimental effects of HAA in our patients. It is the aim of this review to discuss and understand the importance of recognizing HAA and effectively compose a treatment plan to improve patient outcomes.

## DEFINITIONS

### 1. What is the definition of anemia?

Anemia is defined as a reduction in 1 or more of the major red blood cell (RBC) measurements, which are obtained by a serum complete blood cell count: hemoglobin (Hgb) concentration, hematocrit, or RBC count. There has been some debate in defining the normal range. The World Health Organization (WHO) defines the criteria for men as Hgb levels less than 13 g/dL, and for women, less than 12 g/dL.<sup>1</sup> Various other investigators have proposed different lower limits, as shown in [Table 1](#).

It is apparent when looking at these levels that there is debate regarding which parameters define the normal range. Several variables may affect baseline Hgb concentration, such as volume status, altitude of residence, level of physical activity, ethnicity, and advanced age. So, the first challenge becomes how to define anemia.

The WHO standard is widely used in epidemiologic studies, but is now more than 4 decades old. Beutler and Waalen<sup>3</sup> argued that the WHO criteria were mere approximations. Moreover, current laboratory testing eliminates many of the potential limitations of previous methodologies, thus making current laboratory testing more accurate. These investigators compared the 2 largest databases: NHANES III (the third US National Health and Nutrition Examination Survey) and the Scripps-Kaiser database, which collected data in San Diego between 1998 and 2002. Thus, in most recent research studies, anemia is defined using these criteria, highlighted in [Table 1](#), which take under consideration age, sex, and ethnicity.

	Men (g/dL)	Women (g/dL)
Revised WHO/National Cancer Institute <sup>2</sup>	<13	<12
NHANES (National Health and Nutrition Examination Survey) III and Scripps-Kaiser studies <sup>3</sup>	White men	White women
	Age 20–59 y <13.7	Age 20–59 y <12.2
	Age ≥60 y <13.2	Age ≥50 y <12.2
	Black men	Black women
	Age 20–59 y <12.9	Age 20–59 y <11.5
	Age ≥60 y <12.7	Age ≥50 y <11.5
Beutler et al, <sup>3</sup> 2006	13–14.2	11.6–12.3
Jandi, <sup>4</sup> 1996	14.2	12.2
Lee et al, <sup>5</sup> 1998	13.2	11.7
Tietz, <sup>6</sup> 1995	13.2	11.7
Hoffman et al, <sup>7</sup> 2004	13.5	12.0

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