

Introduction: The Complexity and Challenge of Preventing, Treating, and Managing Blood Diseases in the Developing Countries



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KEYWORDS

• Hematology • Anemia • Sub-Saharan Africa • Eosinophilia • HIV • Dengue

KEY POINTS

- The diagnosis and management of hematologic disorders in developing countries pose a number of problems not encountered in advanced Western societies.
- The usual clinical features of hematologic disease may be modified to a varying degree by the coexistence of malnutrition, chronic bacterial infection, or parasitic illness.
- Iron deficiency is the major factor in anemia worldwide; numerous other diseases that exacerbate anemia are often operating in the setting of low body iron stores.
- The spectrum of hematologic complications associated with human immunodeficiency virus (HIV) and the high prevalence of infection make HIV testing an essential part of the investigation of cytopenias.
- The pattern of distribution of primary disorders of the blood varies considerably among different populations and some disorders are unique to certain parts of the world.

The diagnosis and management of hematologic disorders in developing countries pose a number of problems that are not encountered in advanced Western societies.^{1,2} Although all hematologic conditions can be seen in any population, their clinical features may be modified to a varying degree by the coexistence of malnutrition, chronic bacterial infection, or parasitic illness. Furthermore, many of the common killers, particularly in the tropics, produce their own complicated hematologic

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manifestations. It is often very difficult to define the clinical features and pathophysiology of a single hematologic disorder in this setting. It, therefore, follows that the study of hematologic disease in these populations presents a particular challenge for hematologists.

The human and material resources available to prevent, diagnose and treat hematologic disease vary widely, not only between countries, but also within countries. In many countries, particularly but not exclusively in newly industrialized countries, there is a long tradition of specialist training and a corresponding breadth and depth of expertise to treat patients with hematologic disease. However, there is a realization that in many parts of the world, there is a gap in knowledge and skills required not simply to treat hematologic problems, but also limited expertise to establish effective polices and training programs for clinical and laboratory hematology. The wider hematologic and scientific community and major donor agencies have responded with a series of initiatives to enhance training and the transfer of skills across the world.

In recent years, it has been possible to start to understand the pathogenesis of some of the hematologic manifestations of systemic disease in children in the Developing World. In this issue of *Hematology/Oncology Clinics of North America*, some of the progress that has been made in understanding and managing the wider aspects of hematology across the world or “global hematology” is reviewed.

PREVALENCE AND MULTIPLE CAUSES OF ANEMIA IN THE DEVELOPING WORLD

Numerous surveys have been conducted to determine the prevalence of anemia in tropical populations. Until recently, it has been very difficult to interpret the results and compare one study with another. It is clear that in many populations the prevalence of anemia in preschool children is extremely high, and in some locations almost 100% of the population is affected. Twenty years ago, the attributable disability-adjusted life-years lost from anemia was estimated to be 35 million healthy life-years.³

We now have much more geographically and etiologically defined data on the burden of anemia. Using publicly available data, Kassenbaum and colleagues estimated mild, moderate and severe anemia from 1990 to 2010 for more than 180 countries by sexes and well-defined age groups and attributed the cause of anemia using data from the Global Burden of Diseases, Injuries and Risk Factors 2010 Study⁴ and have summarized and updated the findings of this seminal study (in his article on [The Global Burden of Anemia](#), in this issue).

It is certainly difficult to determine the relative importance of different causes of anemia in the tropics. Most surveys have concentrated on only 1 mechanism, such as iron or folate deficiency. However, to get a true picture of the cause of anemia in a particular population, it is necessary to obtain consecutive data over a substantial period ([Table 1](#)). For example, studies in The Gambia have shown that mean hemoglobin levels in children vary significantly at different times of the year; anemia is much more common in the wet season when malaria transmission is at its highest ([Fig. 1](#)). This is also the time when diarrhea and malnutrition are most common because heavy rains after many dry months have profound effects on the community, sanitation measures are disrupted and food stores are at a low point in the annual cycle.⁵ Although these observations emphasize the multifactorial etiology of anemia, it is clear that iron deficiency, which affects at least 20% of the world's population, is the major factor and that the numerous other diseases that may exacerbate anemia are often operating in the setting of low body iron stores.

The body's response to infection may also reduce iron stores and iron use. Hepcidin is regulated by proinflammatory mediators such as tumor necrosis factor and

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