WORLD HEALTH ORGANIZATION HAEMOGLOBIN COLOUR SCALE
A practical answer to a vital need

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This article is based on WHO information regarding the Haemoglobin Colour Scale which is a simple, reliable and inexpensive tool developed by the WHO to screen for anaemia in the absence of laboratory-based haemoglobin measurement.

Anaemia is the most serious complication of iron deficiency and a significant cause of death. More than half of the pregnant women in developing countries suffer from anaemia. The accurate estimation of haemoglobin levels is an essential prerequisite in a variety of other health issues, such as trauma care, selection of blood donors, epidemiological studies, and general primary health care.

Detection and management of anaemia

The measurement of haemoglobin has long been recognized as a fundamental in routine health checks, for the diagnosis and treatment of disease and, given the global incidence of anaemia, in public health care.

The measurement of haemoglobin in blood as an indicator of anaemia has traditionally relied on the services of a well-equipped clinical laboratory. Simple techniques do of course exist, but even these are relatively expensive and require commercial reagents, a good degree of technical skill and are not readily available in peripheral health clinics or at point of care for clinicians and midwives.

When laboratory facilities are not available, anaemia is usually diagnosed from clinical signs (pallor of the conjunctiva, tongue, palms and nail beds), although accurate interpretation of these signs depends a great deal on effective training and remains imprecise. However, in rural areas where anaemia is common and where appropriate prevention and treatment strategies may be most beneficial, an alternative, less sophisticated method is needed to screen for anaemia easily and economically.

Revisiting colour scales

The idea of a colour scale is not new. Tallqvist, among others, tried in vain as long ago as 1900 to substantiate the theory that the colour of a drop of blood could reliably indicate anaemia. The blood would be matched against predetermined shades of red, telling the health care worker whether the patient is anaemic and, if so, the severity of the condition. The colour printing technology and test-strip paper available at those times were such that the results were inaccurate and the concept shelved.

It has taken modern technology to perfect the material on which blood can be absorbed, and computerized spectrometric analysis to identify colours that can accurately match shades of haemoglobin at different concentrations.

Following many years of development by WHO, the Haemoglobin Colour Scale has been developed and produced as a simple and effective medical device for the accurate estimation of haemoglobin levels in blood.

How does it work?

The scale (Figures 1) comprises a small card with six shades of red that represent haemoglobin levels at 4, 6, 8, 10, 12 and 14g/dl respectively. The device is simple to use:

- place a drop of blood on the test strip provided
- wait about 30 seconds
- match immediately the colour of the blood spot against one of the red shades on the scale.

This will indicate whether the patient is anaemic and, if so, the severity of anaemia in clinical terms (see diagram below). It will not identify, minor changes in haemoglobin during treatment, but rather assist in the management of any patient with suspected anaemia, e.g. to decide whether a patient may require a blood transfusion, or further laboratory tests.

Validation in the field

Since the early series of studies carried out by WHO in 1995 and the first published data describing the device in the same year, extensive testing and field trials have been carried out on the performance of the scale. An international validation study and recent published papers have confirmed its reliability when used in general health centres and antenatal clinics, and in blood transfusion centres for donor selection (see comprehensive bibliography).

Sensitivity and specificity of the Scale to screen for anaemia

For severe anaemia, the Scale shows a sensitivity of 95% and a specificity of 99.6%. To distinguish normal Hb levels from mild anaemia, the sensitivity and specificity are 98% and 86% respectively, results that are well above the reliability of any clinical measurement. Using the Hemocue (see Update in Anaesthesia number 13) as a reference, the Scale correctly identified 98% of anaemic donors in 2,800 potential blood donors.

Training

In a validation study, Most results were accurate to within 1-1.5g/dl. Further analysis showed that incorrect results were largely due to incorrect technique from a lack of training e.g. not waiting for 30 seconds, reading in a shadow or not having an adequate sized drop of blood.

The technique requires about 30 minutes of instruction for health workers to estimate haemoglobin to within 1g/dl, and assess levels of anaemia much more effectively than by traditional clinical diagnosis.

How much is it?

The Starter Kit with approved test strips for 1,000 tests will cost about US$ 20. This works out at less than 2c per test!
Haemoglobin Colour Scale starter kit contains:

- Booklet of 6 shades of red;
- Instructions for use;
- Dispenser of 200 specially absorbent test strips in handy box,
- Refill kits contain dispenser boxes of test strips only.

N.B. It is essential to use only the approved test strips provided. Packs of refills are readily available at low cost.

Summary

After several years of development and field trials, the Haemoglobin Colour is now in production and distribution, primarily to assist developing countries in the detection and management of anaemia. The device is not intended to compete with existing laboratory haemoglobinometry, but rather increase access to health technology for peripheral health services in resource-poor settings.

The clinical utility of the Scale has been demonstrated in the screening of blood donors for anaemia, malaria management, antenatal and child health programs, iron therapy control, in hookworm infection and in decisions to refer severely anaemic patients for hospital treatment. It will also be an extremely useful tool for anaemia checks anywhere, mainly for women and children suspected of being anaemic.

Use of this medical device does not depend on electricity or batteries and needs no maintenance. It is portable and the results are immediate. The training required is minimal, but nevertheless important.

The Haemoglobin Colour Scale is a practical answer to a vital need, a need contained in the first strategic direction of WHO: to reduce mortality and morbidity, particularly of the world’s poor and marginalized populations.

For further information on how to procure the Haemoglobin Colour Scale, please contact Blood Transfusion and Clinical Technology, WHO, 1211 Geneva 27, Switzerland or direct from the manufacturers.

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Bibliography


Figure 1

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