Haemoglobin Colour Scale

...a practical answer to a vital need

The Haemoglobin Colour Scale
is a simple, reliable and inexpensive tool developed by the World Health Organization to screen for anaemia in the absence of laboratory-based haemoglobinometry.

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 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.

In primary health care centres, when laboratory facilities are not available, anaemia is usually diagnosed from clinical signs (pallor of the conjunctiva, tongue, palms and nail beds, using anaemia recognition cards if available), although accurate interpretation of these signs depends a great deal on effective training. However, in rural areas where anaemia is common and where appropriate prevention and treatment strategies may be most beneficial, an alternative method is needed to screen for anaemia easily and economically. The less sophisticated the device, the more easily we can respond – in a sustained way – to the needs of primary health care centres in developing countries.

Revisiting a powerful concept

The idea 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 hues 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 that time 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 is now available as a simple and effective medical device for the accurate estimation of haemoglobin levels in blood.

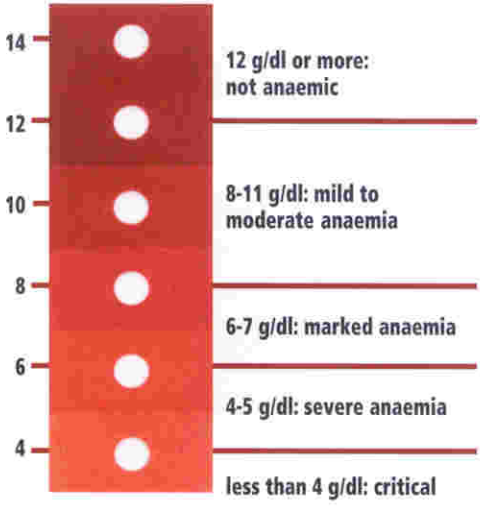
How does it work ?

The Haemoglobin Colour Scale comprises a small card with six shades of red that represent haemoglobin levels at 4, 6, 8, 10, 12 & 14 g/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 hues on the scale.

The less sophisticated the device, the more easily we can respond...

This will indicate whether the patient is anaemic and, if so, the severity of anaemia in clinical terms. 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,[9] a blood count, laboratory tests, or be referred to a hospital or clinic for treatment[7].



N.B. Colour and size of the Scale are approximate and for illustration only. Whilst g/l is acknowledged as the standard measurement, g/dl is still in common use for clinical and public health purposes.

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[1], extensive testing and field trials have been carried out. Recent studies in Africa comparing the performance of the Scale with estimations from clinical signs showed the Scale to be far superior in detecting both mild and severe forms of anaemia. Significantly, even the best results from the clinical examination could not match the lowest levels of performance using the Scale.

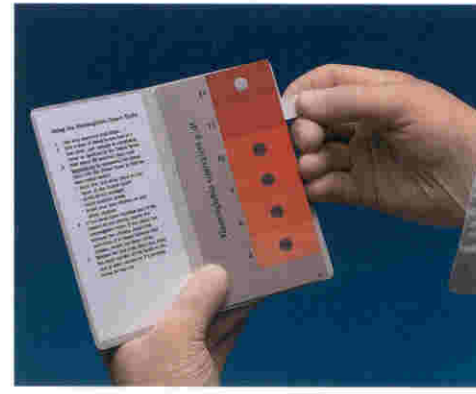
Sensitivity and specificity of the Scale to screen for anaemia

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.[4,8]

Using a photometer (HemoCue©) as a reference, the Scale was compared with the copper sulfate specific gravity method that is traditionally used to screen blood donors for anaemia. The scale was accurate to 98% in distinguishing among 2,800 volunteer blood donors those with normal Hb from those rejected because of anaemia. The Scale was more reliable than copper sulfate, the tests giving 2.4% and 5.4% false readings respectively[9]. Moreover the copper sulfate presents a potential environmental hazard in the disposal of used solutions.

Training

In a validation study, most results were accurate to within 1-1.5 g/dl. Further analysis showed that the discrepancies in the results of the original study were largely due to a lack of training and thus incorrect technique, e.g. not waiting for 30 seconds, reading in a shadow or not having an adequate sized drop of blood.[7,8]



As a result, it was shown that a half-hour training session was sufficient for health workers to estimate haemoglobin to within 1g/dl, and assess levels of anaemia much more effectively than by traditional clinical diagnosis. The importance of safe blood collection will be part of the training and the Starter Kit.

Haemoglobin Colour Scale Starter Kit:

- booklet of 6 shades of red;
- instructions for use;
- dispenser of 200 specially absorbent test strips in handy box;
- 4 spare dispensers (800 tests).

Available in English, French and other languages as required.

Important:

- **instructions for use must be followed**
- **use only approved test strips provided** (refill dispensers available)

Quality control

A WHO Collaborating Centre continues to assure quality control for the validation of the printing and accuracy of the six colour shades and the test strips.

How much is it?

The Starter Kit with approved test strips for 1,000 tests costs about US$ 20. This works out at less than 2¢ per test – cheaper than copper sulfate and considerably less than a laboratory test – with the cost per test falling at each purchase of refills.

The Scale was much more reliable than copper sulphate

Summary

After several years of development and field trials, the Haemoglobin Colour Scale is now commercially available, 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 programmes, iron therapy control, in hookworm infection and in decisions to refer severe anaemia patients for hospital treatment. It will also be an extremely useful tool for point of care anaemia checks anywhere, mainly for women and children suspected of being anaemic.

Use of this medical device requires no specialized training. It doesn't depend on electricity or batteries and needs no maintenance. It is portable and the results are immediate.

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.

The Haemoglobin Colour Scale requires no specialized training, electricity or battery ... It's portable, and the results are immediate

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The Scale does not replace a laboratory test. It is a clinical device for use near the patient at point of care, where no immediate laboratory facility exists

Find out more...

For further information on how to procure
the Haemoglobin Colour Scale,
please contact the WHO Secretariat
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Web page: www.who.int/bct/

Order code for copies of this information leaflet: WHO/BCT/DCT/02.01