

A PERSPEX ICTEROMETER FOR NEONATES

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THE icterometer is a simple device for estimating quickly the depth of jaundice in newborn babies at the cotside without taking a blood specimen. The principle is to blanch the baby's skin by pressure, and match the resulting shade of yellow against a colour scale.

The device is valuable as a means of (1) following the depth of jaundice in individual babies from day to day,

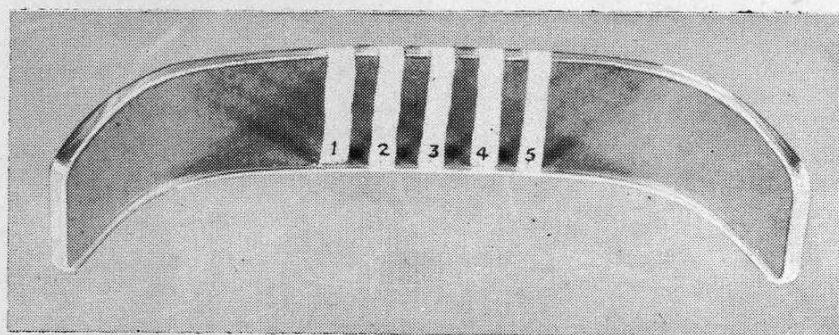


Fig. 1—The icterometer.

and (2) indicating which babies ought to have their serum-bilirubin estimated.

The icterometer (fig. 1) is a strip of transparent perspex, $\frac{1}{8}$ in. thick, $1\frac{1}{4}$ in. wide, and 7 in. long, curved at both ends for ease of handling. On its convex surface are painted five transverse yellow stripes, in slightly different shades.* These stripes and the spaces between them are $\frac{3}{16}$ in. wide. The stripes are numbered 1-5, the lightest in colour being 1, and the darkest 5.

Method of Use

When the icterometer is used, the painted (convex) side is pressed against the tip of the baby's nose until the skin becomes blanched (fig. 2). The yellow colour of the skin can then be matched with the yellow stripes on the scale. The reading is recorded according to the number of the best match; or, if the colour falls half way between two stripes, as $1\frac{1}{2}$, &c.

The nose is the obvious place for the test, because it is so easily accessible. I have tried using other parts of the body but have found that readings were quite different.

The instrument is washed with soap and water

* These were of 'Robbialac Colorizer' paint no. 501, shades A, B, C, D, and E, made up in robbialac grey base undercoat.

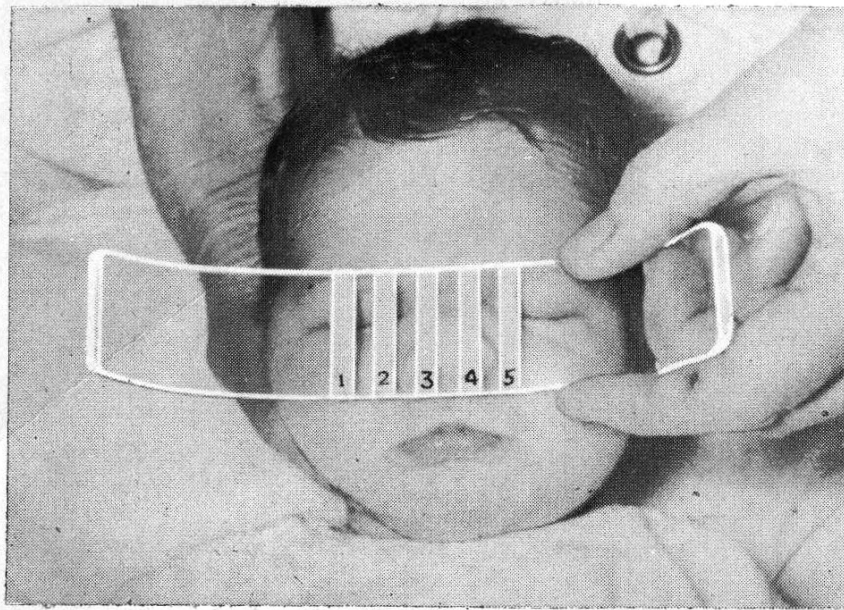


Fig. 2—The icterometer in use.

before being used on another baby. Disinfectants or boiling could damage the perspex or discolour the yellow paint.

The icterometer was originally devised in March, 1954, as a means of following the depth of jaundice in a baby from one day to the next. In this it has been highly successful, for it shows at once whether the baby's skin is more or less jaundiced than it was the day before. This is often all one wants to know. It also enables the depth and duration of the jaundice to be permanently recorded, which may be invaluable later on.

Correlation with Serum-bilirubin

In order to see how far the icterometer reading could be correlated with the serum-bilirubin level, a series of 229 comparative readings was made. The results (fig. 3) show broad agreement between the two methods, but the scatter is fairly wide, and one cannot deduce from a given icterometer reading what the serum-bilirubin level will be. This is not surprising, because the series comprises many different babies, and the icterometer is influenced not only by jaundice but also by slight variations in skin colour between one baby and another.

Fortunately one is much more concerned in practice with the interpretation of serial readings in single babies than with random sampling of the kind shown in fig. 3; and my experience has been that when serial observations are made on individual babies from day to day, the serum-bilirubin levels and icterometer readings do in fact tend to rise and fall together.

A Screening Test

Recording the intensity of jaundice in premature babies

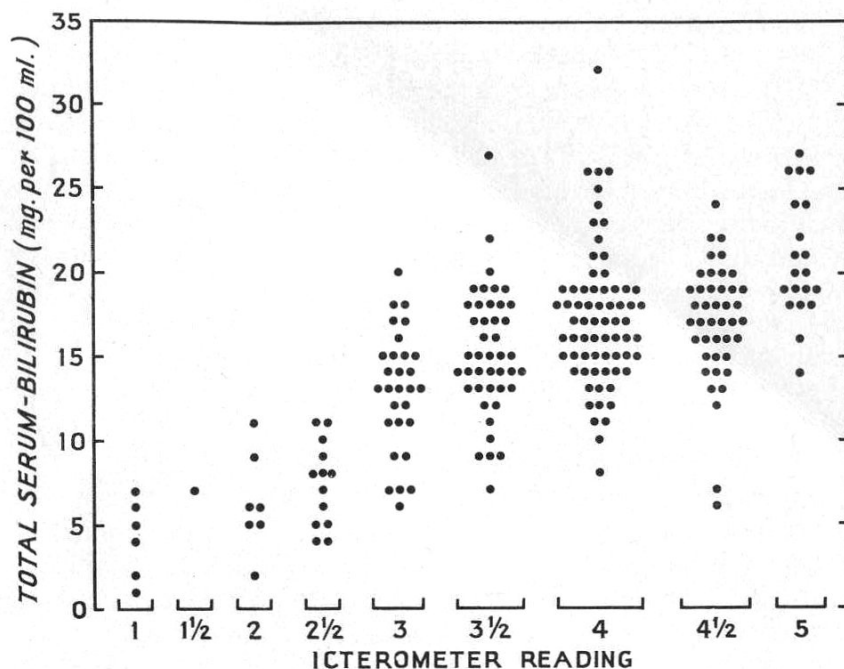


Fig. 3—Icterometer readings compared with total serum-bilirubin levels (estimated by Molloy and Evelyn's method). Each dot indicates one reading.

during the first week of life is important because an exchange transfusion may be necessary to prevent kernicterus. Because the depth of jaundice cannot be judged by simple inspection, a great many babies are subjected to serum-bilirubin estimations to make sure of detecting the few at risk. By using the icterometer as a preliminary screening test, some of these serum-bilirubin estimations can be avoided.

At Northampton General Hospital we take 24 mg. per 100 ml. of total bilirubin (using the method of Molloy and Evelyn) as our threshold for replacement transfusion. It follows that an accurate laboratory estimation of the serum-bilirubin is needed as soon as a level of about 20 mg. per 100 ml. is exceeded. But fig. 3 shows that in comparative tests no serum-bilirubin levels over 20 mg. per 100 ml. were encountered in babies with icterometer readings of 3 or less. We have therefore made it our practice for the past 2½ years not to ask for serum-bilirubin estimations until the icterometer reading is 3½ or over; and we have no reason to believe that we have missed a case of kernicterus.

Disadvantages

The icterometer is so simple that there are obvious snags:

(1) The yellow stripes do not always give a perfect match with the baby's skin, but in practice this does not seem to matter, because different observers get closely comparable results.

(2) It may not be reliable in artificial light.

(3) It cannot be used for babies with bruised noses (e.g., following face presentation).

(4) Its use is limited in black-skinned or yellow-skinned babies, in whom it will merely show whether or not the jaundice is increasing from day to day. A Siamese baby, for example, had at birth an icterometer reading of 3, which rose gradually during the next few days to 5, and then fell back again to 3 and stayed there. This enabled us to spot her jaundice, and to say when it had passed its peak, but we had to invoke the laboratory to determine the extent of jaundice, because our scale was not calibrated for Siamese babies.

(5) Milia on a baby's nose are a nuisance, but do not prevent the use of the icterometer.

(6) When neonatal jaundice develops rapidly (as in blood-group incompatibility) the serum-bilirubin can rise so fast that the skin colour lags behind. Hence babies developing jaundice within 36 hours of birth should always have their serum-bilirubin estimated, for in these circumstances it would be dangerous to rely on the icterometer as a screening test.

(7) Cross-infection is an obvious possibility, but after more than 4 years the icterometer has not yet been incriminated. The risk could be reduced by having a separate icterometer for each baby.

(8) All the icterometers that I have used so far have been painted from five tins of robbialac paint made up in 1954. The colour shades of icterometers made from different batches of paint may not be identical with those I have described in this paper, although the makers of robbialac claim that their colorizer paints are standardised. The same general principles will apply, however, and the colour differences are unlikely to interfere with the usefulness of the icterometer as a rapid cotside test.

My thanks are due to the staff of the premature unit in the Barratt Maternity Home for testing and using the icterometer; to Dr. D. Phillpott and his laboratory technicians for their cooperation in calibrating it against the serum-bilirubin; to Mr. J. Pameley for fig. 1; and to Dr. W. J. A. Hall Turner for his help in collecting the data for fig. 3.

Icterometers are now manufactured (using the original tins of paint) by Thos. A. Ingram & Co., Ltd., Santon Works, Prescott Street, Birmingham, 18, at a cost of 9s. 6d. each for quantities of a dozen. For larger quantities the price will be lower.