

TRANSCUTANEOUS BILIRUBIN (TCB) MEASUREMENT IN THE MATERNITY WARD

AIM

1. To provide guidance on bilirubin measurement by Transcutaneous Bilirubinometer.
2. To use TcB measurement to select more accurately babies who require further evaluation of jaundice with a serum bilirubin (SBR).

INTRODUCTION/BACKGROUND

The incidence of clinical jaundice in newborn infants is reported to be as high as 60 to 80 per cent during the first days following birth. For most term infants, jaundice is safe, but high levels of unconjugated bilirubin can be neurotoxic and cause bilirubin encephalopathy in susceptible newborns. Therefore preventative, screening and management strategies remain a significant clinical practice issue during the early postnatal period.

Visual assessment of jaundice is an inaccurate means to ascertain if the level of jaundice is clinically important and requires treatment. If an infant appears jaundice or is at risk of hyperbilirubinemia the jaundice level needs to be measured. This can be done either by blood sample or transcutaneous means.

Serum bilirubin (SBR) is a laboratory test and is the gold standard for measuring levels of jaundice. Capillary blood gas samples (CAP) analysed by the blood gas analyser can also be used for measuring bilirubin and are acceptable alternative. On the maternity ward use of CAP samples allows for quick, convenient, and timely sampling and measurement of bilirubin levels. However if results do not fit the clinical picture a serum bilirubin sample should be taken and sent to the laboratory.

Jaundice levels can also be measured transcutaneously (in the skin) using a transcutaneous bilirubinometer. When serum bilirubin levels are at the lower spectrum, studies have demonstrated transcutaneous bilirubin (TcB) measurements allow for a relative prediction of serum bilirubin.

TcB measuring can therefore be used as **screening tool** for jaundice in certain infants in certain circumstances. It does not replace the SBR, but helps to determine more accurately than visual assessment if an SBR/CAP specimen is required.

TRANSCUTANEOUS BILIRUBINOMETER (TCB) USE

Transcutaneous measurement of bilirubin in this hospital uses a Konica Minolta JM-103[®] bilirubinometer. The Bilirubinometer is a non-invasive, painless, time-sparing and cost-effective screening device. The meter measures the yellowness of the subcutaneous tissue of the infant by measuring the difference in optical density of two different wavelengths of light through the skin.

Transcutaneous bilirubin measurements are taken either on a baby's forehead or sternum. The forehead is the preferential site used in this hospital.

Accuracy is dependent on correct usage of the device, therefore all staff are required to be accredited in use and completed Point of Care (POC) training if using and the meter is used in accordance with manufacture guidelines.

INFANT CRITERIA FOR TCB SCREENING

TcB measurements may be performed as an initial screen for jaundice to determine the need for an SBR/CAP in the following babies:

- ≥ 35 weeks gestation
- More than 24 hours of age

SERUM BILIRUBIN TESTING (SBR) OR BILIRUBIN CAPILLARY BLOOD GAS TESTING (CAP)

Because of the risk of hyperbilirubinemia in certain circumstances, and early, severe jaundice, TcB measurement is not suitable for all infants that present with jaundice. SBR/CAP is still required in the following situations:

- Infants in whom jaundice presents less than 24 hours of age
- Preterm infants – gestational age less than 35/40
- Significant bruising over the forehead where the TcB will be measured
- During or after phototherapy

SBR/CAP will also be required if:

- TcB result inconsistent with baby's clinical context or anticipated result
- TcB measurement outside range for age (see chart below)
- TcB reads '-0-' which indicates reading is too high to be measured, an SBR urgently required

TCB MEASUREMENTS AND ACTIONS

If transcutaneous bilirubinometer measurement indicates a bilirubin level is greater than a certain level (as indicated below), an SBR/CAP measurement is required. This is because TcB have only been shown to give a linear correlation with SBR at lower levels, so when TcB readings reach certain levels SBR/CAP will still be required to ensure clinically significant jaundice levels are identified.

Jaundice Onset	TcB	Action	
< 24 hours	---	Perform/Plot SBR/CAP	Contact Neonatal
24-48 hours	> 140 μ mol/l	Perform/Plot SBR/CAP	Contact Neonatal if Phototherapy is required or there is a rapid rise
48-72 hours	> 200 μ mol/l	Perform/Plot SBR/CAP	
> 72 hours	> 250 μ mol/l	Perform/Plot SBR/CAP	

- Record all measurements in clinical notes and plot on the phototherapy chart with notation 'TcB' with recorded level.
- If TcB level requires SBR/CAP to be performed and level requires phototherapy (or you have any other clinical concerns) contact Neonatal Ward Registrar/CNS for clinical plan.

Note: If serial bilirubin samples are to be performed it is recommended to take follow up samples using same method, eg. SBR (lab) or CAP. The transcutaneous bilirubin is unreliable following the commencement of phototherapy. A SBR/CAP should be performed to track progress once phototherapy is instigated.

TRANSCUTANEOUS BILIRUBIN (TCB) MEASUREMENT IN THE MATERNITY WARD INSTRUCTION SHEET

Store in neonatal observation room, Level 5 Maternity and ensure meter is placed into the charger unit (plugged in).

PERFORMANCE CHECK

- Daily performance must be undertaken prior to use.
 - To be undertaken by CCO/team leader on morning shift.
 - Press 'reset' button and hold down while turning power switch to 'on'.
 - 'CHE' will be displayed indicating that checking function is ready.
 - Open checker cover and place probe flat to checker surface and press down.
 - The display will alternate between two numbers: compare with L & S reference values that are displayed inside checker cover. The '•' appears in upper left corner of display when L value is displayed.
 - Document readings on TcB daily check form beside the machine.
 - If readings are not within ± 1.0 of reference value, clean probe and checker and repeat performance check.
 - If still outside range do not use TcB and report to maintenance.

NOTE: For further information refer to jaundice meter instruction manual which is to be stored in the neonatal observations room next to charger unit.

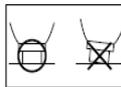
MEASUREMENT PROCEDURE

- Always ensure the instrument daily check has been done before taking a measurement.
- Check infant suitability for TcB prior to use: age, gestation, risk factors

1.  Remove the meter from the charger. 
Clean probe with alcohol prep pad.
2.  Switch POWER on. The READY lamp will light up after a few seconds.
Check meter is set to take a single measurement 'n-1' and measuring unit $\mu\text{mol/L}$.
(If not refer to instruction manual).

3.  When using the meter **TWO single** readings need to be taken.

To take a measurement, hold the device vertically on the forehead with the measuring probe flat and flush with the baby's skin, below the hairline. Avoid any bruised, swollen or discolored areas of skin (this will give an inaccurate reading).
Apply gentle downward pressure until a click sounds. The devices will flash momentarily and the measured value appears in the display.



Note: If the measuring probe is at an angle it may result in an inaccurate measured value, ensure probe is perpendicular with the measuring point then push down.

When ambient light is too strong an accurate measurement may also not be obtained.

4. Press 'reset' and repeat as above to take new reading. Document the higher reading. If there is a difference in readings of greater than $\pm 40 \mu\text{mol/L}$, then a third reading needs to be taken.
5. If the third reading is also greater than ± 40 when compared to the first reading, then a serum bilirubin sample must be performed (blood sample taken and sent to lab).
6. Check Transcutaneous Bilirubinometer reading does not require an SBR/CAP to be performed.
7. Record result on point of care lab form and forward to CDHB laboratories. The result will be registered and updated into patient electronic records.
8. Record and PLOT the results on phototherapy chart (Ref 8692 or 86930), writing TcB above result. Ensure correct chart for gestation is used. Document TcB result in clinical record.

NOTE: If TcB level requires SBR/CAP to be performed and SBR/CAP measurement requires phototherapy (or you have any other clinical concerns) contact Neonatal Ward registrar/CNS for clinical plan.

CLEANING



Clean the measuring probe with alcohol prep pad before and after use.

Clean instrument with detergent wipe after use, wipe off gently with dry cloth and return to charging unit.

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Maternity Guidelines

Christchurch Women's Hospital

Christchurch New Zealand