Health problem addressed
In healthy full-term neonates, bilirubin can rise to peak levels of 5 to 13 mg/dL between the second and fifth days of life before decreasing to normal levels between the fifth and seventh days. This produces jaundice, a yellowish discoloration of the skin, eyes, and mucous membranes. Monitoring bilirubin concentration is also important in children and in adults where elevated levels may indicate a pre-hepatic, hepatic, or post-hepatic metabolic disorder.

Product description
These devices come in a variety of physical configurations. They may be relatively small, single-purpose hand-held instruments that are simple to operate and are designed to measure the concentration of bilirubin in the blood. They are often located in neonatal intensive care units for rapid on-site bilirubin analysis, which is essential for determining a proper treatment method. Bilirubinometers may also be configured as larger benchtop analyzers or stand-alone units.

Principles of operation
Bilirubin concentrations are determined either by whole blood or serum analysis using spectrophotometric methods or by skin-reflectance measurements. The three methods of spectrophotometric analysis are the direct spectrophotometric method, the Malloy-Evelyn method, and the Jendrassik-Grof method.

Operating steps
Blood samples are required for spectrophotometric analysis. The analysis technique depends on both the type or types of bilirubin being measured and the age of the patient (neonate versus child or adult). Cutaneous bilirubinometers do not require a blood sample. A light-emitting sensor is placed on the infant’s skin (optimally on the forehead or sternum). The reflected light is split into two beams by a dichroic mirror, and wavelengths of 455 nm and 575 nm are measured by optical detectors.

Reported problems
Rapid changes in hydration (body water content) during therapy can cause fluctuations in blood bilirubin concentrations, making assay results uncertain. Photo-oxidation (light-induced breakdown) of bilirubin occurs if samples are exposed to light for more than a few hours. Therefore, blood samples should be protected from exposure to light.

Use and maintenance
User(s): Operator, medical staff
Maintenance: Medical staff; technician; biomedical or clinical engineer
Training: Initial training by manufacturer and manuals

Environment of use
Settings of use: Hospital; clinic
Requirements: Stable power source

Product specifications
Approx. dimensions (mm): 110 x 150 x 200
Approx. weight (kg): 3.4
Consumables: NA
Price range (USD): 3,100 - 7,000
Typical product life time (years): 6 to 8
Shelf life (consumables): NA

Types and variations
Benchtop; stand-alone; handheld