Unit 10

EQUIPMENT USED IN THE NEONATAL INTENSIVE CARE UNIT

In the neonatal intensive care unit (NICU), there are many machines and other types of equipment used to care for sick babies with many different problems.

Bililights

The bright blue fluorescent lights placed over a neonate's incubator are used to treat jaundice (yellowing of the skin and eyes). Babies with jaundice usually receive this phototherapy treatment for three to seven days.

Blood pressure monitor

A blood pressure monitor is a machine connected to a small blood pressure cuff wrapped around neonate's arm or leg. The cuff automatically takes neonate's blood pressure at regular times and displays the numbers on a screen.

Cardiopulmonary monitor

This machine tracks neonate's heart and breathing rates. It's attached to neonate with small adhesive monitoring pads placed on chest. The monitor displays information on the screen, which can be printed on paper. An alarm will sound if neonate's heart or breathing rate becomes too fast or too slow.

Central line

This is a small plastic tube inserted into a large blood vessel. Blood can be drawn through the central line or use it to give neonate medicine or fluids.

A PICC (peripherally inserted central catheter) line is a type of central line placed in one of the major blood vessels.

Continuous positive airway pressure (C-PAP)

Air is delivered to a neonate's lungs either through small tubes in the neonate's nose or through a tube inserted into her windpipe. The tubes are attached to a ventilator (respirator), which helps neonate breathe but does not breathe for her.

Endotracheal tube

This small plastic tube is inserted through a neonate's nose or mouth down into the trachea (windpipe). The tube is attached to a ventilator (respirator), which can either help a neonate breathe (as in C-PAP) or breathe for her.

Incubator

Babies are placed in this clear plastic box, which keeps them warm and protects them from germs and noise.

Intravenous (IV) line

Most premature and sick babies cannot be fed immediately, so they must receive nutrients and fluids through a vein (intravenously)..

Nasal cannula or nasal prongs

These small plastic tubes fit into neonate's nostrils and deliver oxygen. They often are used with a treatment called continuous positive airway pressure (C-PAP), which uses a ventilator to deliver pressurized air to a neonate's lungs.

Oxygen hood

This is a clear plastic box that fits over the neonate's head and supplies her with oxygen. This is used for babies who can breathe on their own but still need some extra oxygen.

Oxygen hood

Pulse oximeter

A pulse oximeter is a small U-shaped device that's wrapped around r neonate's foot or hand and secured with a stretchy bandage. It uses a light sensor to measure the level of oxygen in r

neonate's blood. This sensor doesn't hurt r neonate at all. It helps doctors and nurses determine whether neonate needs more or less oxygen, while reducing the need for painful blood tests.

Radiant warmer

This open bed has an overhead heating source that provides heat to neonate. A warmer may be used instead of an incubator if neonate needs to be handled frequently.

Radiant warmer

Respirator

Umbilical catheter

Neonate's umbilical cord has two arteries and one vein. A thin tube (catheter) can be inserted into one of these vessels and threaded to the aorta, the largest artery supplying oxygen to the body.

Through this catheter, doctors and nurses can painlessly draw blood, so they don't have to repeatedly stick the neonate with needles. They can give her fluids, blood, nutrients, and medications through this tube. A small device can be attached to the catheter to continuously monitor a neonate's blood pressure.

Ventilator

A ventilator (also called a respirator) is a mechanical breathing machine that delivers warmed and humidified air to a neonate's lungs. The sickest babies receive mechanical ventilation, meaning that the ventilator temporarily breathes for them while their lungs recover.

The air is delivered to the neonate's lungs through an endotracheal tube (a small plastic tube that's inserted through a neonate's nose or mouth down into the windpipe). The amount of oxygen, air pressure, and number of breaths per minute can be regulated to meet each neonate's needs.

Indications for Assessment

• Patients respiratory function is objectively deteriorating due to:

– Retained secretions

– Increase in WOB

– Atelectasis / decreased lung volume

Handle with extra caution

• F O R – First few hrs of admission – period of ‘stabilisation’ –

Those with high oxygen indices – Poor handlers

– Neonates

– Cardiac history

• Pulmonary HT

• Shunts

– Inotrope

Assessment on PICU

• Follow your normal respiratory assessment outline BUT things to consider – PMH

D H

– Mucolytics e.g. DNAase, Hypertonic NaCl

– Bronchodilators e.g. salbutamol, atrovent

– Antimuscaric drugs e.g. hyoscene, glycopyronium bromide

– Analgesia

– Anti seizure meds

– Cardiac meds

SH / Birth History / FH

– Labour / delivery history

– APGAR score

-Premature

-Family structure / siblings / main carer

– Development history ; Delayed for age

• Prematurity – ? presence of CLD / BPD

Subjective

– specific for PICU

– HANDLING

– bradycardias/desats?

– F e e d s

– Sedation –

Need bolus before handling ?

– Positioning

– Parents

Observation

– Signs of respiratory distress

– Respiratory pattern

– Colour

– Position

– Expansion

-Abdomen

– ETT position / security

– Lines / drains

– Activity

C N S

– Sedation / Analgesic

– Midaz / Morphine

– Sedation score

– Paralysing agents

– Vecuronium

• C V S

– Know normal values for age / paeds responses

• Infusions

- Fluid balance

• Blood results – Be aware of thrombocytopenia

Sedation Score at PICU UHW

Under

– Fully awake & alert

– Frightened & unco-operative

– Fights ventilator, choking, biting, gagging on ETT

– Vigorous movt risking dislodging ETT & lines

– Lifting head / torso

– Demonstrating frowning & grimacing

Sedation Score Cont

• W e l l – Lightly asleep / drowsy

– Awake at times but co-operative

– Spontaneous respiration / not fighting ventilator/ occ coughing

– Occ movts of limbs

– Occ purposeful movts

– Occ facial movts

• O v e r

– Deeply asleep

– Calm and totally relaxed

– No coughing / response to suctioning

– No movt

– Facial muscles totally relaxed

R e s p i r a t o ry

– Vent settings

– R e s p d r i v e

– ETCO2

– O 2 s a t s

– Gases

– consider what type ?

Art line ?

– Variable objective markers on ventilator

• T V

• P I P

Tidal Volume in Paediatrics

• Use as objective marker if on pressure control ventilation

• Work out through weight

• Aim for 6 – 8 mls / kg

Palpation

– Very useful tool as auscultation can be difficult

– Feel for equal expansion / tactile secs / areas of pain.

– Make sure warm hands up!

Auscultation

– Can be difficult due to high resp rate and transmission of sounds.

– Always take note of what you can hear from the upper airways first.

– If possible get appropriate sized stethoscope and warm this up

Paeds CXR

Carina – situated at T3 in the neonate, T4/5 in the child and T6 in the adult.

• Thymus gland larger – at 2 years of age

• Flattened ribs

• ETT position – not uncommon for it to slip down the right main bronchus

• Heart size – 50% ratio, 2/3rd seen to the left and 1/3rd to the right

AIMS OF CHEST PHYSIOTHERAPY IN NEWBORN INFANT

The aim of chest physiotherapy in the newborn infant is to increase the clearance of lung secretions and maintain lung expansion with the potential benefit of

1. Reducing need for ventilatory support

2. Improving oxygenation

3. Prevention of endotracheal tube obstruction, need for endotracheal tube changes and resultant hypoxia

4. Prevention of extubation failure. chest physiotherapy.

Chest physiotherapy

Positioning • Manual hyperinflation • Manual techniques • Instillation • Lavages • Suction • Nebulisers • Mucolytics

Usual active physiotherapy includes gentle active vibrations and suctioning.

• Frequency of treatment: Treatments are given according to individual need and assessment. Usually 4th to 6th hourly treatments are adequate.

• Assess infant: Auscultate and palpate baby's chest for location of coarse crepitations.

• Monitoring: The principal of chest physiotherapy is to not adversely impact on the cardiorespiratory status. Oxygen desaturations can be compensated for by a small increase in inspired oxygen supply or inspiratory pressure.

Prior to commencing active chest physiotherapy treatment the physiotherapist must note baseline heart rate, mean blood pressure, oxygen saturation, as well as the ventilator mode, rate and pressures. The baby's flow chart should be noted for any fluctuations in the previous few hours and the correlation of the blood gas with the monitor readings. The flow loops on the respiratory mechanic monitor (Evita screen) should be monitored during treatment.

• Drainage positions: These are not usually required in the newborn infant. The side lying position is indicated when coarse crepitations are greatest on one side, or unilateral disease is indicated on CXR. Only perform side lying if the infant can tolerate it and avoid excessive neck flexion / extension. Contralateral head support should be used. For upper lobe collapse/consolidation, the crib may be tilted to 15-25 degrees head elevation. With severe unilateral lung disease such as pulmonary interstitial emphysema, the neonate should lie on the affected side as this may hasten the disappearance of interstitial gas when tolerated.

• Active gentle vibrations: These are given by the fingers of one hand moulded to the shape of the baby's chest wall, with contra-lateral thumb support. Vibrations are at a rapid rate (approximately 120 / minute, with minimal compression pressure), and within the baby's tolerance. The physiotherapist's other hand is cupped and supports the baby's head for the duration of treatment. During unilateral vibrations the head should be supported in the physiotherapist palm. Drain only one area per treatment.

Suctioning: This is performed after the use of active gentle vibrations. The endotracheal tube may be suctioned using a 5 to 8 Fg Y-suction catheter with up to 60- 80 mmhg low flow suction. Repeat suction as tolerated by infant until clear return. If secretions are excessively tenacious, consider saline instillation. The physiotherapist instils up to 0.25 mls nacl and stabilises the

endotracheal tube. The nurse performs the endotracheal suction. Any "wet" suction is concluded by a final dry suction. Repeat suction as tolerated by the infant until clear return

. • Reduction or cessation of physiotherapy: Cessation of physiotherapy should be considered when there is evidence of re-expansion of collapsed / consolidated lung plus there is a significant reduction in the production of excessive or tenacious secretions. There should be consultation with the attending physiotherapist, prior to cessation.

.