Introduction

- The BrainZ monitor is a two channel electroencephalograph that monitors electrical signals from each hemisphere of the brain. The device records the signals in real time and as compressed data over time for later analysis and interpretation (Brainz instruments Ltd, 2004)
- The Brainz monitor is used as a screening device and not a diagnostic tool. A formal 12 lead EEG and MRI are used for formal diagnostic measures and to assist with prognosis (de Vries & Hellstrom-Westas, 2005: 201).
- Monitoring can be used on infants following:
  - a hypoxic event at birth with low Apgar scores & cord pH, who required resuscitation - see policy Hypothermia for HIE.
  - cooling for hypoxic ischaemic encephalopathy (HIE)
  - abnormal movements or suspected of having/high risk of seizures
  - monitor anticonvulsant therapy
  - muscle relaxation in at risk infants where clinical signs of seizure activity cannot be observed (Brainz instruments Ltd, 2004)

Nursing responsibilities

The registered nurse is responsible for ensuring correct application of the sensors/electrodes and maintenance of the signal. The nurse should also mark interventions such as suction or nursing care and events such as unusual movements. The nurse should also have a fundamental knowledge regarding basic recognition and interpretation of events such as seizure activity. Notify fellow if there are changes on tracing or there are unresolved difficulties with signal acquisition.

BrainZ Monitor

Procedure for application of needle electrodes for infants >35 weeks

- Items include:
  - bandage/hat to secure sensors
  - marker pen
  - Tegaderm
  - Steristrips
  - Olympic Medical needle electrodes pack
  - 1x hydrogel sensor
  - Dressing pack
  - Kidney dish
  - 0.015% Chlorhexidine solution
  - Sensor position aid (Originals from neonatal sensor kit)
Application of sensors

- **Step One**: Ensure you have a term sliding scale sensor positioning aid found inside the neonatal sensor pack. Open dressing pack and set up equipment.

- **Step Two**: Measure the same letter at the ear tragus as at the sagittal suture/midline as shown in the diagram below.

- **Step Three**: Position the scale vertical. You do not want the leads near the infant’s temple. The diagrams on the positioning aid can be used as a guide.

- **Step Four**: Using the marker pen, mark the lead position measured with the positioning aid.

- **Step Five**: To remove the needle from the plastic, push the wire up from the base. It may be necessary to squeeze the distal end of the plastic to remove the needle. If this is difficult - use the tweezers from the dressing pack to free the needle electrode from the plastic safety housing you are going to use and place into the kidney dish and bring to the bedside.

- **Step Six**: Clean the site indicated by the marker pen with 0.015% Chlorhexidine solution and allow to dry.

- **Step Seven**: Insert the sub-dermal needle electrode at a 30 degree angle into taut skin and ensure the sensor wire is facing upwards (see picture below).
• **Step Eight:** Secure the needle with 2 x steristrip as picture below indicate

• **Step Nine:** Further secure electrode with tegaderm

• **Step Ten:** Place the reference hydrogel sensor behind the shoulder or ear. Ensure you do NOT use a needle electrode for the reference sensor.

• **Step Eleven:** Repeat above steps for the other sensor. Ensure the connections correlate with the placement. The needle electrodes are no longer colour coded, however ensure the back sensor goes into the black connection and into either the left or right side as indicated, eg. Black to back, purple to front and green is the grounding lead.
• **Step Twelve:** When one side of the head is secure wrap and plug the connection into the purple port on the Brainz monitor called the Data Acquisition Unit (DAU).

• **Step Thirteen To start the monitor & log on.** Plug the monitor into a power supply and turn the monitor on (back of monitor). Ensure the green light is present on the DAU once power is connected. The BrainZ monitor is a touch screen. Touch the white field which is located next to the *User name* to display the onscreen keyboard. Both, the log on & password is *NICU*. Press *enter* after entering both log on and password.

• **Enter patient details.** Enter the infant’s details including name, weight, MRN, DOB and gender prior to monitoring as it cannot be changed once monitoring has commenced. This is done on the *Main Menu* screen by touching *Assess patient* to display *New Patient* screen.

• Enter each appropriate detail by touching the white field to display the onscreen keyboard

• **Step Fourteen: Check contact quality.** Apply pressure to the sensors once connected. If you get an impedance reading ensure the correct measurement of the needle electrodes before proceeding.

• **Step Fifteen: Repeat and follow steps to the other side of the head.**

• If the impedance levels are satisfactory four green dots will be displayed on the screen. Press *ok* once all dots are green.

• If the impedance is yellow or red check with the corresponding lead and ensure the sensor is secure

• Signal quality can be checked on the **Signal Status** screen.
• Hit **start** on the screen once stabilised.
• Secure the baby’s head with securing bandage/hat if applicable.

Data acquisition will start automatically after five minutes if all electrodes are correctly applied, even if the **start** has not been selected.

**TIPS AND TROUBLE SHOOTING TIPS FOR THE NEEDLE ELECTRODES:**
• To ensure smooth removal of the needle from the plastic safety housing squeeze the plastic and the needle will advance.
• The cable wire can become bent from excess removal of the needle from the safety plastic housing and insertion into the housing.
• Although the plastic safety housing is to minimise needle stick injury, ensure you are mindful of others when handling the needle electrodes. Use a kidney dish for transport and removal and ensure needles are disposed of in the sharps container.
• When the needles are removed place the plastic safety housing back over the needle before transport in a kidney dish as an extra safety measure.
• It may be necessary to shave hair before the insertion of the needle electrodes
• If it is particularly difficult to secure needle electrodes it might be necessary to use KY jelly or other lubricating gel to the site AFTER the needle electrodes have been inserted. Lubricating gel can be applied to the area around the needle insert. Dry lubricating gel is a secure adhesive of tegaderm.
• **NEEDLE ELECTRODES MAY REMAIN INSITU FOR UPTO 4 DAYS**

**Procedure for application of sensor electrodes**
- **Items include:**
  • cotton applicators
  • non-woven gauze swabs (not from a dressing pack)
  • skin prep gel (*Nuprep™*, *DO Weaver & Co*)
  • conductive paste (*Ten 20™*, *DO Weaver & Co*)
  • neonatal sensor set (includes hydrogel leads and sensor positioning aid)
  • bandage/hat to secure sensors
  • marker pen
  • sterile water
  • Brainz monitor

**Application of sensors**
• **Step One:** Carefully open the neonatal sensor set and using the sliding scale sensor positioning aid found inside the neonatal sensor pack, select preterm (< 35 weeks) / term scale as applicable.

• **Step Two:** Measure the same letter at the ear tragus as at the sagittal suture/midline as shown in the diagram below.

- **Step Three:** Position the scale vertical. You do not want the leads near the infant’s temple. The diagrams on the positioning aid can be used as a guide.

- **Step Four:** Using the marker pen, mark the lead position measured with the positioning aid.

- **Step Five:** Wet the non-woven gauze with the sterile water. This will make it easier to part the infant’s hair.

- **Step Six:** Ensure your part of hair is running with the electrode. Clean outwards from the marked position.

- **Step Seven:** Clean over the marked point one at a time. This is to ensure you do not lose your markings.

- **Step Eight:** Use the Nuprep™ and brace the infant’s skull as you apply firm pressure to exfoliate the skin.

- **Step Nine:** Wet the gauze with sterile water and remove the Nuprep™. Pat dry with a dry gauze to ensure you don’t lose the part you have made.

- **Step Ten:** The sensors are marked L and R. Black goes to the back of the infants head, purple to the front and green is the grounding lead. The grounding lead can be placed behind either ear to fit in a securing bandage or placed on either shoulder.
• **Step Eleven**: When one side of the head is secure wrap and plug the connection into the purple port on the Brainz monitor called the Data Acquisition Unit (DAU).

• **Step Twelve**: **To start the monitor & log on.** Plug the monitor into a power supply and turn the monitor on (back of monitor). Ensure the green light is present on the DAU once power is connected. The BrainZ monitor is a touch screen. Touch the white field which is located next to the User name to display the onscreen keyboard. Both, the log on & password is **NICU**. Press **enter** after entering both log on and password.

• **Enter patient details.** Enter the infant’s details including name, weight, MRN, DOB and gender prior to monitoring as it cannot be changed once monitoring has commenced. This is done on the **Main Menu** screen by touching **Assess patient** to display **New Patient** screen.

• Enter each appropriate detail by touching the white field to display the onscreen keyboard.

• **Step Thirteen**: **Check contact quality.** Apply pressure to the sensors once connected. If you get an impedance reading try reapplying sterile water over the sensor (do not use saline as it perishes the gel on the sensors).

• **Step Fourteen**: Repeat and follow steps to the other side of the head.

• If the impedance levels are satisfactory four green dots will be displayed on the screen. Press **ok** once all dots are green.
• If the impedance is yellow or red check with the corresponding lead and apply water and reapply sensor. If this doesn’t work you may need to follow the steps adding the conductive paste with lead application.

• It is important to note the electrodes conform to the infants head as they warm up so impedance may improve approximately fifteen minutes after application. Signal quality can be checked on the Signal Status screen.

• Hit start on the screen once stabilised.

• Secure the baby’s head with securing bandage/hat if applicable.

Data acquisition will start automatically after five minutes if all electrodes are correctly applied, even if the start has not been selected.

**Brainz Monitor Display**

![Brainz Monitor Display Image]

- Guidelines for use are in the instruction manual which is attached to the BrainZ monitor if problems arise. If unsure of any application or reading seek the assistance of neonatal fellow/specialist or senior registered nurse/clinical nurse specialist.

- By pressing CHECK SIGNAL which is displayed at the bottom of the screen, it will display the signal status screen. You will find any technical problems displayed on the box across the bottom of the screen.

- To MARK EVENT which is important to do after performing a procedure on the infant eg. Cares, suctioning, to note an observed abnormal movement, simply touching the screen and using the touch pad keyboard you can enter the event and confirm by hitting ok. The event will be stored in the EEG as a number and can be rechecked at a later date if necessary.
• **CHANGE DISPLAY** (change index) option allows operators to change the view of what trace is being recorded. By repeatedly touching the *change display* button it allows you to change the screen display until you have the desired screen.

• **REVIEW ASSESSMENT** allows the operator to examine the real time recording in detail.

• **TOOLS** button allows the operator to access additional information which includes help, software details, view a patient’s details, change current log in, copy data files, print summaries, screen and events. This can be accessed while recording continues.

• **SUSPEND** will store the current session until you resume. Suspending a session can be done if the infant requires an MRI this is done by hitting the *stop* button then suspend.

• **STOP** will end a current session. If a sensor lead is reading with high impedance monitoring should continue and steps taken to rectify the problem.

• **TURN MONITOR OFF** To shut down the BRM2 you must stop the current session. This can be done on the menu choose *shut down* then confirm by pressing *yes* on the confirmation screen. When the message appears shutdown complete, it is now safe to reboot your computer you may turn off the AC power supply. Remove the sensors from the infant. It may be necessary to wet the sensor gel with water to assist removal.

**Terms, Abbreviations and Interpretation of Sample Traces**
See BRM2 BrainZ monitor interpretation guide - *see link to terms and interpretation of traces*
REFERENCE LIST:

Brainz Instruments Ltd, 2004 BRM2 Brain monitor interpretation guide. Auckland, New Zealand


ScanMedics, nd, ‘Needle electrode placement and hints handout’, Available URL: www.scanmedics.com