Practical Recommendations for Implementation of BADGERNET in Neonatal Units across Wales

Compiled by Dr Arun Ramachandran, Consultant Neonatologist for the Audit and Research Subgroup of the Welsh Neonatal Network in September 2011. My sincere thanks to all members of the Audit and Research subgroup and the Badgernet audit teams from Singleton hospital and UHW who helped us develop the audit tools for Badgernet.

BADGERNET has been implemented across all Neonatal Units across Wales from January 2011. The Welsh Neonatal Network has requested that all babies should be admitted and discharged via BADGERNET. It is our belief that this tool will enable better understanding of the amount of clinical activity undertaken by various Neonatal Units across the Welsh Neonatal Network. This might aid in developing and reorganising the Neonatal Network. There might be opportunities to use this data for audit and research purposes once the quality improves. Data entered into BADGERNET could also be used for benchmarking the quality of care against other units especially through the Neonatal Audit Project.

A new version of BADGERNET was implemented in Wales. This and the fact that this was a new product for Wales have increased the challenges for implementing BADGERNET across various units. This document aims to aid various units to develop a practical process of using the BADGERNET optimally. We agree that local changes have to be made to this pattern for adapting the system to the needs of each individual neonatal unit. We will look into implementation of BADGERNET along the sub headings of:

1. Infrastructure
2. Data entry
3. Training
4. Audit
5. Unit reports

Infrastructure

Easy access to computers for Doctors, Nurses, Ward Clerks and Secretaries are essential for good data entry and appropriate use of the system. We believe that at least one or two computer access points each with BADGERNET installed on to it should be available in every room of the Neonatal Unit in addition to the Ward Clerks desk, Doctors office and Secretaries office. All these computer access points should be linked to a printer. If it is busy in NICU at least two printers should be available in this network within the NICU in order to ensure smooth operation.

The IT team should be closely involved with the implementation of BADGERNET. A named IT Lead for BADGERNET would be useful. In addition to managing the infrastructure the IT team should also be available to advise regarding data protection. The BADGERNET system needs occasional updates and IT support will be essential for this. A system for centrally monitoring all computers operating BADGERNET would be ideal.
Some units have found that a small mobile laptop with wireless connectivity might be useful for easy data entry in addition to the fixed units.

**Data Entry**
It is beneficial to allocate designated tasks to groups regarding BADGERNET. This will ensure that responsibility is fixed and monitoring of data quality can be more easily done. Training can also be more streamlined.

**Medical team**
All babies should be admitted and discharged via the BADGERNET. The medical team is primarily responsible for admitting and discharging the baby via BADGERNET. The junior Doctor admitting the baby on to the Neonatal Unit should also be responsible for completing the BADGERNET admission. The admission summary from BADGERNET should be printed and filed in the notes. This should be the primary and only admission document. Ideally no other predesigned admission document should be required so that duplication of tasks for the junior Doctors can be avoided. This improves compliancy and also live data entry will ensure better data entry. Continuation sheets could be used for adding in any other additional notes entry. The junior Doctor admitting the baby should systematically go through and complete all areas of BADGERNET including the neonatal examination.

The medical team is also responsible for regular updates on the BADGERNET on areas such as cranial ultrasound, suspected necrotising enterocolitis, details of sepsis, details of ROP screening, details of immunisations, and echocardiography. Details of hearing tests and ROP screen can be entered either by medical or nursing teams. This could be best done by the junior Doctor responsible for writing a daily summary for the baby in the Neonatal Unit. Alternatively it can also be done as part of the ward rounds.

Junior Doctors would be responsible for preparing discharge summary for babies using the BADGERNET. Using the discharge template included with this document might be helpful. Please ensure that the data for NNAP, VON and ‘to do list’, which are unfilled are completed prior to discharge. These are usually flagged up by the BADGERNET system. The daily summary for the date of discharge should be ideally completed by the junior Doctor completing the discharge summary. The Doctor completing the discharge summary should also ensure that appropriate diagnoses are included in the summary. Ideally all discharge summaries should be reviewed by a Consultant prior to being sent out to the G.P. to ensure quality. A system should be established so that a copy of the discharge summary is sent out with the parents, one copy filed in the baby’s notes and one copy each is sent out to the G.P. and other relevant Consultants / Specialist. The Ward Clerks and all Secretaries can assist the junior Doctors in this process. The aim should be to ensure despatch of a completed summary to the GP within 72 hours of the baby being discharged from the hospital.

A Lead Consultant for BADGERNET should be assigned for each Neonatal Unit. The Consultant should allocate a junior Doctor as a junior Doctor Lead for ensuring optimal utilisation of the system. This junior Doctor could also be responsible for auditing data quality on BADGERNET.

**Nursing Team**
There should be designated Nurse Lead for BADGERNET. Ideally this should be a senior nurse. The Lead Nurse for BADGERNET should develop a team of Nurses to support her. Ideally one Nurse from each Nursing Team in the Neonatal Unit should be involved in this group. This key group should be responsible for cascading training on to all the Nurses and also supporting them in the process of using the system and entering data. They should also monitor the quality of data entry.
The Lead Nurse for the Unit in close relation with the designated Lead Nurse for BADGERNET should check if all babies in the Unit have been admitted to the BADGERNET system and the BAPM levels of care allocated by BADGERNET to these babies correspond to the levels allocated by the local Unit. The Unit ‘daily update’ tab on the BADGERNET could aid them in this process. Recording accurate levels of activity occurring on the Unit would be useful for appropriate service plan. It is expected that this data would be available to the Network Lead.

Daily data entry should be completed by the Nurse looking after the baby. A short guide document to aid data entry might be useful. We are currently in the process of developing such a document for the Network. The nurse entering the daily data during the day time should hand over this to the nurse taking over the care of the baby for the night. The night nurse in turn should confirm the data entered and after 10pm click on the red flag on the top right hand corner of the daily summary page so that this flag goes green. This would ensure that the data is confirmed and recorded.

Ward Clerks and Secretaries
Ward Clerks should ensure that the temporary NHS numbers initially allocated to babies on admission are changed to permanent NHS numbers as soon as possible or prior to discharge. They are also responsible for ensuring that babies who are discharged from the Unit receive a copy of the discharge summary to take home and also they should distribute a copy to the G.P. and other relevant Consultants and place a copy in the notes.

Secretaries could be involved in formatting and spell checking the discharge summary if it is felt that the junior medical staff needs help on this front.

Data Managers
We understand that all units may not have a dedicated data manager. But for those neonatal units who have the support of a data manager it should be his or her responsibility to ensure that the data entered on to BADGERNET is of appropriate quality. They should also help to manage the data on the system and help with audit and research using the data. Such units could consider obtaining the data in the raw form so that it can be interrogated better.

Training
Ideally an on line training system will be useful for BADGERNET. But such a training system does not exist as of now.

BADGERNET training for medical staff should be a part of the induction programme. An initial demonstration should be followed by a practical exposure to admitting and discharging a baby on the system. Use of the BADGERNET test system can be helpful for this purpose.

Nurse training for daily data entry and data monitoring should be led by the Lead BADGERNET Nurse. This can be designed to be disseminated using a cascade system to all the Nurses. As mentioned above support should be giving within the individual nursing team.

We should also ensure that all Consultants, Ward Clerks and Secretaries are also trained in the system.

Audit
Developing an audit system to evaluate accuracy of data entry is essential. We should audit

1. Accuracy of unit activity (care days) monitoring via BADGERNET
2. Accuracy of discharge summaries
We should also ensure that NNAP data set is completed to a high standard. It is expected that from early 2012 this data will be used for benchmarking Welsh neonatal units with other neonatal units across the U.K. The quality of data entry to NNAP can be monitored using the ‘data quality’ tab on BADGERNET.

A recommended audit tool, which has been successfully tested in Singleton Hospital is provided at the end of this document as a basis for use by all units.

Unit Reports
Unit reports are useful to obtain output from data entered onto BADGERNET. Several standard Unit reports are currently available. Currently levels of activity based on BAPM levels of care and other parameters can be obtained via the unit reports. This area is being developed further and we would like to hear ideas about what individual units would like to have in their unit reports.

Summary of recommendations:

1. All babies should be admitted and discharged via Badgernet in a neonatal unit.
2. Badgernet admission document should be the primary and only admission document.
3. There should be a medical and nurse lead for Badgernet in each neonatal unit.
4. Medical and nursing teams and supporting staff should have clearly identified duties regarding completing Badgernet data.
5. Mechanisms should be in place to train and support medical and nursing personnel in the use of Badgernet.
6. Adequate infrastructure for access to Badgernet should be provided by each Neonatal Unit.
7. Quality and accuracy of data entered into Badgernet should be regularly audited and monitored. Recommended standards for data entry should be achieved (Annexure 3).
   - 90% accuracy should be achieved in daily data entry by all neonatal units by December 2012.
   - 95% accuracy in entering essential items with regard to discharge summaries as per discharge summary check list to be achieved by December 2012.
Annexure 1

Check list of mandatory areas to be completed before printing final copy of Discharge summaries:

1) Name of the baby
2) Original NHS number
3) Date of birth
4) Gestation at birth
5) Birth weight
6) Discharge destination
7) Date and time of discharge
8) Named consultant
9) G.P details with post code
10) Diagnosis
11) Active problems at discharge
12) Major procedures performed during the stay (Eg: surgery, exchange transfusion, therapeutic cooling)
13) Parents details
14) Details of Antenatal care and resuscitation
15) Newborn check to be completed
16) Brief summary for each system
17) Complete and populate details on: Cranial USS, ROP screening, Hearing test, Immunisation, ECHO and Sepsis
18) Date of next ROP screen
19) Discharge weight and head circumference to be filled
20) Medication at discharge and dosing schedule
21) Clear plan for routine follow up and specialist clinics
22) Fill in the discharge summary text
23) Complete the daily summary for the day of discharge
24) NNAP data to be completed and no reminders to be pending
25) Discharge summary to be reviewed by the consultant before being sent out.
26) Copy of the discharge summary to be given to ward clerk to be distributed.
Annexure 2

Guidance to complete Badgernet daily summary

All areas of the Badgernet summary must be filled but please ensure that special care is given to the following areas.

General information
- Most recent head circumference & weight
- Any speciality review that day
- Any surgery/procedures that day
- Comments regarding parental visiting and discussion with parents (medical/nursing)

Respiratory
- Mode of Ventilation & whether in oxygen or not
- Any significant apnoea that day
- Surfactant given on that day or not

Cardiovascular
- Inotropes used that day
- PDA diagnosed that day and whether currently undergoing any treatment
- Echocardiography done that day – put in free text box.

Gastrointestinal
- NEC diagnosed that day and any medical treatment given
- Any stomas present
- Rectal washouts being given

Neurology
- Please enter tone and consciousness. If no concerns raised by doctors these are usually normal for gestation. But, if in doubt check with medical staff
- Any ventricular dilatation diagnosed
- Any reservoir / VP shunt / ventricular tapping done
- Cranial USS done that day – put in free text box.

Sepsis
- If there are no sepsis concerns please write ‘No concerns’ in the daily comments box
**Fluids/feeding**
- TPN or IV dextrose +/- electrolytes
- Enteral feeds – type & mode
- Additives e.g., Carobel / HMF etc.
- Lines – types – peripheral / central/ Umbilical etc.

**Haematology/Skin/Renal**
- If there are no concerns with these systems, please can you write ‘No concerns’

**Diagnosis, procedures, drugs**
- Whole diagnoses to be put – please take help from daily summary in notes.
  - Any changes to be done accordingly
- Any management / procedure done that day
- Drugs – being given that day
- IV infusions

Always remember to turn the flag green at the end of the entry or vital BAPM data may be missed.

**Comments for Discharge summary box**
If you fill in the box ‘Comments for discharge summary’ it will appear exactly as you wrote it in the discharge summary. It will not say which day you wrote it on. You do not necessarily need to put anything in this box but if you do comments like ‘Suspected NEC day 7, put NBM and triple antibiotics started’ are helpful for the person filling in the discharge letter.
Annexure 3

**Badgernet audit tool:**

**Aims of audit:**

1. Audit the accuracy of unit activity (care levels and care days) monitoring via Badgernet.
2. Audit the accuracy of discharge summaries.
3. Monitor accuracy and compliance to NNAP data entry.

**Type of audit:** Retrospective audit

**Duration of audit:** Minimum of 1 week every 6 months

We believe a minimum of about 70 neonatal care days should be audited every 6 months to maintain quality control of data. Neonatal units with a smaller turnover of patients might have to audit for longer than a week to achieve this on each instance. In Singleton 1 week and 3 week audits of Badgernet were able to achieve similar levels of data monitoring.

**Standards for audit:**

1. Accuracy of unit activity calculation - Neonatal critical care minimum data set (BAPM) and BAPM levels of care 2001.
2. Accuracy of discharge summaries - Check list (Annexure 2) derived from Neonatal critical care minimum dataset.

**Standards to be achieved:**

31\textsuperscript{st} March 2012 – All neonatal units in Wales should complete an audit on Badgernet and feedback to the Clinical Informatics group of the Welsh Network. Systems for regular auditing of Badgernet data should be established.

**Accuracy of unit activity:**

1. 90% accuracy should be achieved in daily data entry by all units by December 2012.
2. 91 to 95% accuracy should be achieved by December 2013.

**Accuracy of discharge summaries:**

1. 95% accuracy achieved by December 2012.
2. 95 – 100% accuracy achieved by December 2013.

**NNAP audit::**

1. System to monitor and improve NNAP data collection established by 31\textsuperscript{st} December 2011.
Methodology:

Auditing the accuracy of unit activity:

Unit activity (care days at each level of care) is calculated by Badgernet based on the ‘daily data summary’ entered into Badgernet for that baby for that day. So quality of data entry covering these criteria has to be audited. The audit should run from Day 0 to Day 8. On Day 1 data entry for Day 0 is checked and accuracy confirmed against the notes. So by Day 8 of audit, 7 days of data will be checked. If this equates to at least 70 care days for all babies in the unit the audit can stop data collection. Or it can carry on for another week or until 70 care days are reached. No baby in the unit should be excluded. The criteria that we recommend auditing from the daily data entry are included in table 1.

BAPM levels of care assigned by Badgernet can be found on the ‘Unit daily update’ tab of Badgernet. The audit should compare the care levels assigned by Badgernet against other data streams providing similar information like data collected locally by nurse managers and/or the cot locator. The audit team should also separately score each baby for each day of the audit using the information in the notes and compare this against Badgernet data. The highest care level for the previous 24 hours should be assigned as the care level of that baby. Data for Day 0 is collected on Day 1 as before. Please note table 2.

Quality of NNAP data entry can be easily audited using the details on ‘Data Quality Check’ tab on Badgernet.

Auditing the discharge summary:

Discharge summaries should be audited during the same period against the discharge summary checklist. We recommend that

1. A copy of discharge summary should be given to parents.
2. A copy should be sent to the GP within 72 hours of the baby being discharged from the unit.
3. It is good practice to have a senior clinician (Consultant / Registrar) checking and signing all discharge summaries.
**Table 1:**

<table>
<thead>
<tr>
<th>Daily data item</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Daily data item</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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</thead>
<tbody>
<tr>
<td>ET tube in situ</td>
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<td>On treatment with an inotrope, pulmonary vasodilator or prostaglandin</td>
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<tr>
<td>Receiving nCPAP</td>
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<td>Receiving 1:1 nursing care</td>
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<td>Surfactant given</td>
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<td>Receiving parental nutrition(partial or total)</td>
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<td>Receiving added oxygen therapy</td>
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<td>On treatment for convulsions</td>
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<td>Current weight</td>
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<td>On treatment for neonatal abstinence syndrome</td>
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<td>Full exchange transfusion done</td>
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<td>Recurrent apnoea requiring frequent (more than 5 in 24 hours) interventions</td>
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<td>Partial exchange transfusion done</td>
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<td>Intra arterial or central venous (including umbilical) line in situ</td>
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<td>Receiving peritoneal dialysis</td>
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</table>

Each item could be scored as

1. Complete (C) - Acceptable
2. Incomplete (I) - Unacceptable
### Table 2:

<table>
<thead>
<tr>
<th>Day of audit</th>
<th>1</th>
<th>2</th>
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<th>4</th>
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<th>6</th>
<th>7</th>
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<tbody>
<tr>
<td>Level of Care by BAPM criteria/audit team</td>
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<td>Level of Care by nursing log</td>
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<td>Level of Care by Cot locator</td>
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<tr>
<td>Level of Care by Badgernet</td>
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**Results:**

Table 3 represents a possible method of demonstrating the results from analysing information in table 2.

### Table 3:

![Levels of care - ITU](image-url)

- Badgernet
- Cot Locator
- Nursing
- Audit Review
Table 4 represents a possible method of demonstrating the results from analysing information in table 1.

**Table 4:**

<table>
<thead>
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<th>BAPM minimum dataset</th>
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<th>63</th>
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<th>52</th>
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</table>

![BAPM minimum dataset chart](chart.png)