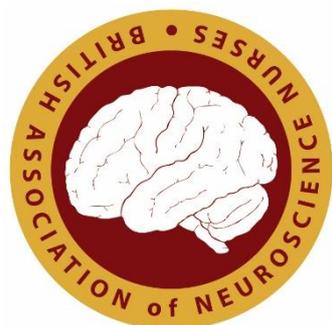


**Benchmark No. 6**  
**Cerebrospinal Fluid Management**  
(2<sup>nd</sup> Edition)



**British Association of  
Neuroscience Nurses**



# Neuroscience Safe Staffing Benchmark Statements

Copyright © 2017 British Association of Neuroscience Nurses. All rights reserved.

First PDF edition printed 2014 in the United Kingdom (available online). This PDF edition (2<sup>nd</sup>) printed 2017 in the United Kingdom (available online).

A catalogue record for this book is available from the British Library.

ISBN 978-1-911059-09-7

No part of this book shall be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information retrieval system without written permission of the publisher.

Published by the British Association of Neuroscience Nurses

For more copies of this book, please email: [info@bann.org.uk](mailto:info@bann.org.uk)

Designed and Set by the British Association of Neuroscience Nurses  
[www.bann.org.uk](http://www.bann.org.uk)

Printed in the United Kingdom

***Although every precaution has been taken in the preparation of this publication, the publisher and authors assume no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of this information contained***



## History

The Neuroscience Nursing Benchmarking Group (NNBG) was established in the 1990`s as a result of increasing concerns over inconsistencies in practices as part of a subsidiary of BANN. The group aims to improve on the quality of care by comparing and sharing practice with each other, and set explicit standards for comparison of current practice against the ideal standard. The group is committed to searching for the best evidence related to specific areas of neuroscience practice. Membership of the group consists of representatives from neuroscience units within the UK and Ireland, together with educational colleagues from both the NHS/HSC and Higher Educational Institutes. The group is further subdivided into regions and the first edition of this benchmark was developed by the North West regional group of the NNBG in 2014.

In 2016, the NNBG consolidated back into BANN and further information about NNBG can be found on the BANN website [www.BANN.org.uk](http://www.BANN.org.uk) . This second edition of the benchmark has been developed by restructured NNBG working group under BANN.

BANN would like to acknowledge the leadership and significant contribution made by the NNBG, and all its contributors, to neuroscience nursing over the years.

## Benchmark No. 6 Cerebrospinal Fluid (CSF) Management

### KEY POINTS

- Always establish correct zero reference to ensure consistency and accuracy in all readings of EVD. Measurement is to be achieved with the use of a spirit level or laser device.
- Ensure all connections and tubing are secured and clearly labelled as EVD to avoid accidental removal, leakage and/or usage.
- There must be a stitch to secure the drain however; a transparent occlusive dressing must be kept in place at all times if possible, change dressing only if required. The wound/ entry site must be continually monitored for signs of infection (leaking CSF, erythema, purulence).
- Medical staff must prescribe the height or pressure level that the drain is to be set at. If a specific amount of drainage is expected, this must be documented on the patient's notes.
- The nursing staff must monitor and promptly report any deviations (e.g. over or under drainage) to the medical staff.
- Neurological observations and vital signs must be recorded in order to ensure early detection of signs of infection within the CSF or raised ICP (i.e. headache, nausea, neck stiffness, pyrexia).
- The amount of drainage & appearance of the CSF (i.e. colour & clarity) must be recorded hourly.
- If the system becomes disconnected, clamp the line, stay with the patient and call for assistance.
- Asepsis must be maintained at all times when handling the drainage system.
- Ensure patient & their relatives/ carers are informed of the rationale for the EVD insertion and the possible risks and side effects.

**FACTOR 1 – Protocol**

STATEMENT OF BEST PRACTICE	POOR ←	LEVEL OF ACHIEVEMENT	→ EXCELLENT
<p><b>1.0</b> There are evidence/research based guidelines/protocols available for the care of a patient with an external CSF drainage system in situ. These include the following:</p> <ul style="list-style-type: none"> <li>• Insertion</li> <li>• CSF sampling</li> <li>• Medication insertion</li> <li>• Changing the bags and the system</li> <li>• Removal of the CSF draining system</li> <li>• Transferring a patient with a CSF drainage system in place</li> <li>• Managing a blocked drainage system/accidental break in the system as per local protocol</li> <li>• Documentation</li> </ul>			
<p><b>1.1</b> Staff are aware of the policy /protocol and there is evidence of application to practice.</p>			
<p><b>1.2</b> The benchmark and local policy has been reviewed within the last two years (DH, 2001) unless there is significant change in practice.</p>			
<p><b>1.3</b> The policy/ protocol is research/evidence based with clear reference to the rationale for practice.</p>			
<p><b>1.4 Insertion</b>                      The drain must be clearly labelled in order to differentiate it from other invasive lines.</p>			
<p><b>1.5</b> Staff should have read the policy /protocol.</p>			

**FACTOR 1 – Protocol**

STATEMENT OF BEST PRACTICE	POOR ←	LEVEL OF ACHIEVEMENT	→ EXCELLENT
<p><b>1.6 Management</b></p> <ul style="list-style-type: none"> <li>• The system is ‘primed’ by a trained and competent practitioner in accordance with local policy.</li> <li>• The insertion site has a transparent adhesive dressing to enable visualisation of the entry site. Observe for signs of infection (i.e. leaking CSF, erythema, induration and purulence).</li> <li>• The CSF drainage system should be attached to an appropriate ‘fixed’ stand, which must be clearly identifiable.</li> <li>• A laser system or appropriate levelling device is available at the bedside.</li> <li>• On insertion medical staff must prescribe the height and pressure level that the drain is to be set at. This must only be adjusted following instruction by a member of the medical team.</li> <li>• If supported by local policy, then the medical team must clearly prescribe and document whether the drain is to be managed via volume led drainage or is pressure led.</li> <li>• If the system becomes disconnected, the line must be clamped and urgent medical attention sought.</li> <li>• The nursing staff must monitor and promptly report any deviations (e.g. over or under drainage) to the medical staff.</li> </ul>			

**FACTOR 1 – Documentation – Evaluation of Care**

STATEMENT OF BEST PRACTICE	POOR ←	LEVEL OF ACHIEVEMENT	→ EXCELLENT
<p><b>1.7 Clamping the drain</b></p> <p>a) Pressure led drainage</p> <ul style="list-style-type: none"> <li>The drain must not be clamped when repositioning a patient on the bed but instead should be re-zeroed to meet the patients' new position.</li> <li>Clamping of the drain is strongly discouraged due to the risk of permanent blockage or inadvertent failure to re-open the drain</li> <li>Clamping of the drain must only be undertaken when a patient is being transferred (e.g. bed to chair) or if the drain needs to be laid on the bed (e.g. transfer to CT scan or theatre).</li> </ul> <p>b) Volume led drainage</p> <ul style="list-style-type: none"> <li>Clamping of the drain as part of volume led drainage is undertaken with caution and by a competent individual.</li> <li>Medical staff must document in the patients records the amount of drainage/hour.</li> <li>If volume led drainage is to be undertaken, then the clamping of the drain is monitored extremely closely by nursing staff and any deviations reported to the medical staff.</li> </ul>			
<p><b>1.8 CSF sampling</b></p> <ul style="list-style-type: none"> <li>CSF sampling is performed under strict aseptic non-touch technique (ANTT) observing local and national infection control guidelines (Pratt et al., 2007).</li> <li>Sampling is undertaken by trained and competent practitioners (as defined within their job description or extended role).</li> <li>Intra-thecal medication is given by trained and competent practitioners as per local policy and documented accordingly.</li> </ul>			

**FACTOR 1 – Protocol**

STATEMENT OF BEST PRACTICE	POOR ←	LEVEL OF ACHIEVEMENT	→ EXCELLENT
<p><b>1.9 Changing bags</b></p> <ul style="list-style-type: none"> <li>• Bags are changed under strict aseptic technique observing infection control measures and in accordance with manufacturer’s guidelines and local policy.</li> <li>• Changing of the bag is minimised to reduce the risk of introducing infection into a closed circuit system.</li> <li>• The bag is changed when ¾ full in accordance with local policy. (Overfilling of the drainage bag impairs drainage).</li> </ul>			
<p><b>1.10 Removal</b></p> <ul style="list-style-type: none"> <li>• The EVD is removed as soon as soon as clinically indicated by a trained and competent practitioner (a suture is recommended to reduce the risk of infection).</li> <li>• (Duration of catheter placement for more than 5 days is known to increase the rate of catheter related infections).</li> </ul>			
<p><b>1.11 Transferring of patients</b></p> <ul style="list-style-type: none"> <li>• Clamping of the drain is only undertaken when a patient is being transferred from bed to chair or if the drain needs to be laid flat on the bed. However, this should be avoided, and the drain should remain upright whenever possible.</li> <li>• If the drain is moved from the prescribed reference point in order to facilitate transport, the CSF drainage system must be: -                         <ul style="list-style-type: none"> <li>○ Clamped for the minimal amount of time and is re-zeroed and unclamped as soon as possible.</li> <li>○ The drip chamber is emptied and the drainage system is clamped, prior to laying the CSF drainage system down (to prevent blocking of the hydrophobic filter).</li> </ul> </li> </ul>			

**FACTOR 2 – Documentation (Assessment and Implementation of Care)**

STATEMENT OF BEST PRACTICE	POOR ←	LEVEL OF ACHIEVEMENT	→ EXCELLENT
<p><b>2.0</b> Following assessment, an individualised care plan is implemented and evaluated specific to all aspects of care relating to the patients CSF management.</p> <p>Documentation supports regular reviews or is updated when their health care needs change.</p> <p>There is documentation to support daily multi-disciplinary clinical reviews of the management plan and the care delivered.</p>			
<p><b>2.1</b> Accurate documentation includes: -</p> <ul style="list-style-type: none"> <li>• The recognised Zero reference point (documented in the nursing and medical records)                             <ol style="list-style-type: none"> <li>I. External lumbar drainage system - level at the exit site (or as indicated by medical instructions)</li> <li>II. External cranial drainage system- tragus (level of foramen of monro).</li> </ol> </li> <li>• Appropriate documentation is used to record:                             <ol style="list-style-type: none"> <li>I. CSF drainage – hourly volume</li> <li>II. CSF description - colour and clarity</li> <li>III. Prescribed chamber level</li> <li>IV. Presence of Oscillation</li> </ol> </li> </ul>			
<p><b>2.2</b> Physiological observations i.e. Local Early Warning Score is recorded at least four hourly for early detection of drain site infection, ventriculitis, meningitis (NICE, 2007).</p> <p>Neurological observations are recorded at least four hourly to detect signs of neurological deterioration or evidence of infection (i.e. neck stiffness, headache, nausea).</p>			

**FACTOR 3 – Education**

STATEMENT OF BEST PRACTICE	POOR ←	LEVEL OF ACHIEVEMENT	→ EXCELLENT
<p><b>3.0</b> All registered nurses involved in the management of external drainage systems are provided with a structured competency based training and education programme.</p>			
<p><b>3.1</b> Formal assessment for competency is undertaken and documented, this includes:</p> <ul style="list-style-type: none"> <li>• Awareness of the rationale for the external CSF drainage system</li> <li>• Identification of the potential risks and safeguard measures when caring for a patient with a CSF drainage system.</li> <li>• Knowledge of the clinical and laboratory parameters that indicate a CSF infection.</li> <li>• The relevant equipment used in managing a patient with a CSF drainage system.</li> <li>• The nurse’s responsibilities in the management CSF drainage systems.</li> <li>• Associated documentation.</li> </ul>			
<p><b>3.2</b> Protocols and guidance and all relevant documentation is easily accessible and visible in the appropriate clinical area.</p>			

**FACTOR 4 – Patient Information**

STATEMENT OF BEST PRACTICE	POOR ←	LEVEL OF ACHIEVEMENT	→ EXCELLENT
<p><b>4.0</b> Written information is available for patients &amp; carers and alternative methods of communication are available.</p>			
<p><b>4.1</b> Patient/ family/carers has access to the following information:</p> <ul style="list-style-type: none"> <li>• Details of the CSF drainage system and how it works.</li> <li>• Details of any associated equipment that they are likely to encounter.</li> <li>• Likely duration of the treatment.</li> <li>• Explanation of the importance of continual assessment.</li> <li>• The importance of checking with healthcare professionals prior to any change in the patients' position.</li> <li>• The importance of reporting any changes in the patient's neurology to a healthcare professional.</li> </ul>			
<p><b>4.2</b> Any information verbal /written that is given to the patient/carers is documented in the patient's records.</p>			
<p><b>4.3</b> The information that is given to the patient is current, evidence based and in accordance with local policy.</p>			
<p><b>4.4</b> Patient information is reviewed in accordance with local policy.</p>			

## References

Arabi Y, Memish ZA, Balkhy HH, *et al.* (2005). Ventriculostomy-associated infections: Incidence and risk factors. *Am J Infect Control* 33: 137-143.

American Association of Neuroscience Nurses (2011). Clinical practice guideline Series: Care of the patient undergoing intracranial pressure monitoring/external ventricular drainage or lumbar drainage. [Online] Available at: <http://apps.aann.org/Default.aspx?TabId=71&returnurl=%2fAccountProfile.aspx>. Accessed on 4th July 2016.

Beer R, Lackner P, Pfausler B, Schmutzhard E. (2008). Nosocomial ventriculitis and meningitis in neurocritical care patients. *J Neurol* 255: 1617-1624.

Bisnaire, D. Robinson, L. (1997) Accuracy of levelling intraventricular collection drainage systems. *Journal of Neuroscience Nursing* 29 (4): 261-8.

Camacho EF, Boszczowski Í, Basso M. (2011). Infection rate and risk factors associated with infections related to external ventricular drain. *Infection* 39: 47-51.

Coplin, W. M., Avellino, A.M., Winn, H.R. and Grady, M.S. (1999). Bacterial meningitis associated with lumbar drains: retrospective study. *Journal of Neurology Neurosurgery and Psychiatry* 67: 227-231.

Fried H., Nathan B. R., Rowe A.S., Zabramski J.M., Norberto Andaluz, Adarsh Bhimraj, Mary McKenna Guanci, David B. Seder, Jeffrey M. Singh. (2016). The Insertion and Management of External Ventricular Drains: An Evidence-Based Consensus Statement. *Neurocritical Care*.24, 1; 61-81.

Horan TC, Andrus M, Dudeck MA. (2008). CDC/NHSN surveillance definition of health care-associated infection and criteria for specific types of infections in the acute care setting. *Am J Infect Control*; 36; 309-332.

Huang C-R, Lu C-H, Wu J-J, (2005). Coagulase-negative staphylococcal meningitis in adults: Clinical characteristics and therapeutic outcomes. *Infection*; 33: 56-60.

Hoefnagel D, Dammers R, Ter Laak-Poort MP, Avezaat CJJ. (2008). Risk factors for infections related to external ventricular drainage. *Acta Neurochir (Wien)*; 150: 209-214.

Korinek A-M, Reina M, Boch AL, Rivera AO, De Bels D, Puybasset L. (2005). Prevention of external ventricular drain – related ventriculitis. *Acta Neurochir (Wien)*; 147; 39-46.

Lyke KE, Obasanjo OO, Williams MA, O'Brien M, Chotani R, Perl TM. (2001). Ventriculitis complicating use of intraventricular catheters in adult neurosurgical patients. *Clin Infect Dis*; 33: 2028-2033.

Leverstein-van-Hall MA, Hopmans TEM, van der Sprenkel JWB, *et al.* (2010). A bundle approach to reduce the incidence of external ventricular and lumbar drain-related infections. *J Neurosurg*; 112: 345-353.

Lozier AP, Sciacca RR, Romagnoli MF, Connolly ES. (2002). Ventriculostomy-related infections: A critical review of the literature. *Neurosurg*; 51: 170-182.

Lyke, K.E., Obasanjo, O.O., Williams, M.A., O'Brien, M., Chotani, R and Peri, T.M. (2001) Ventriculitis complicating the use of intraventricular catheters in adult neurosurgical patients. *Clin Infect Dis* 33, 12: 2028-2033.

Muttaiyah S, Ritchie S, Upton A, Roberts S. (2008). Clinical parameters do not predict infection in patients with external ventricular drains: a retrospective observational study of daily cerebrospinal fluid analysis. *J Med Microbiol*; 57: 207-209.

Muralidharan, R. (2015). External Ventricular drains: management and complications. An open access: *International journal of neurosurgery and neurosciences*.

National Institute for Health and Clinical Excellence (2007) *Acutely ill patients in hospital. Recognition of and response to acute illness in adults in hospital. Clinical guideline 50* London, National Institute for Health and Clinical Excellence.

Pratt RJ, Pellowe CM, Wilson JA, Loveday HP, Harper PJ, Jones SRLJ, McDougall C, Wilcox MH. (2007). epic2: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England. *Journal of Hospital Infection*, 65S:S1-S64.

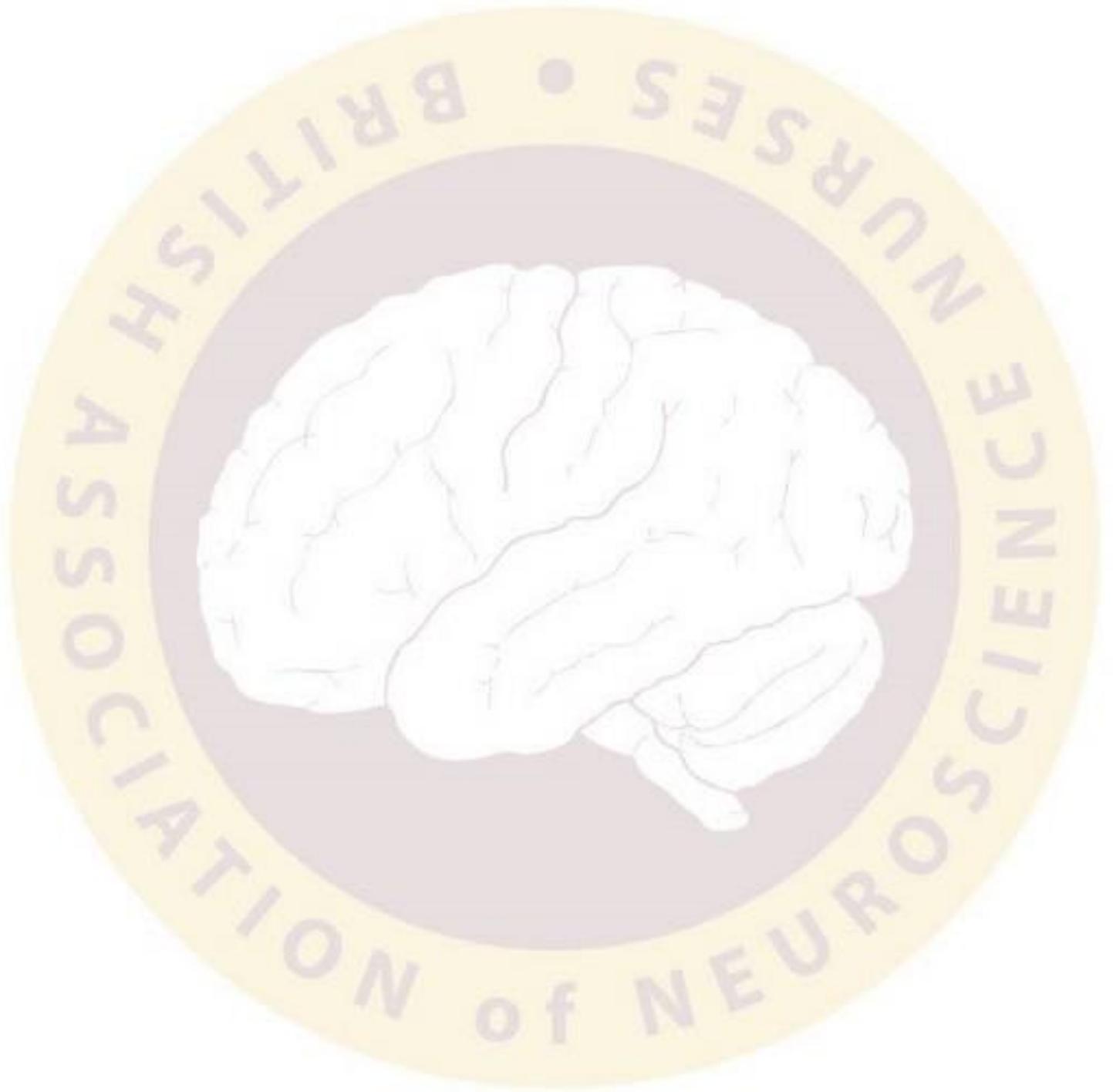
Pfisterer, W., Muhlbauer, M. Czech, T. and Reinprecht, A. (2003) Early diagnosis of external ventricular drainage infection: results of a prospective study. *Journal of Neurology, Neurosurgery and Psychiatry* 74, 4: 929-932.

Sharp, S. A. and Scully, T. (1992) Closed continuous drainage of cerebral spinal fluid via a lumbar subarachnoid catheter for treatment or prevention of cranial/spinal fistula *Neurosurgery* 30, 2: 241-245.

Scheithauer S, Bürgel U, Ryang Y-M *et al.* (2009). Prospective surveillance of drain associated meningitis/ventriculitis in a neurosurgery and neurological intensive care unit. *J Neurol Neurosurg Psychiatry*, 80: 1381-1385.

Woodward S. *et al* (2002) Benchmarking best practice for external ventricular drainage: *British journal of Nursing*, 11,1; 47 -53.

Woodward, S, Mestecky AM (2011). *Neuroscience Nursing Evidence-Based Practice*. Willy-Blackwell.



**Benchmark No. 6 (2<sup>nd</sup> Ed)  
CSF Management**

ISBN 9781911059097



9 781911 059097