

## **Understanding Drain Management (working title)**

In the UK, the regulator of nurses and midwives, the Nursing and Midwifery Council (NMC 2015), stipulate that nurses must practice effectively and preserve patient safety. Nurses play a pivotal role in the swift assessment, identification and escalation of deteriorating patients (Gluyas 2015). Indeed, failure to accurately assess needs and record information has been a consistent factor associated with poor patient outcomes and poor quality of care (National Confidential Enquiry into Patient Outcome & Death 2012, Francis 2013, Neuberger 2013, Scruth 2014). More acute care, such as drain monitoring, is now being delivered in patients' homes - often to those with complex needs and multi co-morbidities (Salim 2014, The King's Fund (TKF) 2014, Millar and Hillman, 2018). Therefore there is a greater need for all nurses to be competent in drain care management to ensure patient safety. Regrettably, of the minimal evidence that examines how nurses assess drains, literature reports that drain monitoring is a frequently undervalued aspect of patient care, and that the delivery of care is often inconsistent and inadequate (Lyons et al 2015).

This article emphasises the importance of understanding the key aspects of drain assessments and management, the importance of holistic care and the significance of associated record keeping. A case study is presented which demonstrates how poor drain monitoring and documentation can negatively impact patient care and safety. Key elements of the case study will be discussed and how these can have far reaching consequences on the patient, nurses and the wider team. Recognition of these elements facilitates initiatives that could be applied to practice to reduce similar events.

### **Background**

Drains are routinely used in post-operative practice as a prophylactic intervention to reduce or eliminate blood, fluid or pus, to remove air or to identify anastomotic leaks (Shrikhande et al 2013, Woodrow 2013, Lyons et al 2015). They are also used in other clinical settings to manage symptoms related to a wide variety of conditions. These include symptoms

associated with biliary obstruction, recurrent abdominal ascites and recurrent pleural effusions (Huang et al 2015). Drains utilised for these purposes are often long-term (and are often termed percutaneous or indwelling tunnelled catheters), and compared to traditional care of frequent large-volume paracentesis, these types of drains are viewed as a less invasive, cost effective, therapeutic intervention to enhance quality of life in palliative care (National Institute for Health and Clinical Excellence (NICE) 2012). For these reasons, the utilisation of such drains within diverse clinical settings, such as palliative care, has increased over recent years as more people are living longer with chronic disease (Lui et al 2016, Stukan 2017, Heedman et al 2018).

There are a wide variety of drains. They can be categorised as open or closed, active or passive (Orth 2018). Open drains flow directly on to gauze pads or into a stoma bag. Closed drains have tubes which are connected to a bag or bottle. Active drains employ negative pressure, whilst passive drains rely on pressure and gradient to drain effectively. Some long-term drains and drainage systems (such as those used to treat recurrent abdominal ascites and recurrent pleural effusions) allow intermittent connection and drainage, thus promoting patient autonomy (Narayanan et al 2014).

Drain safety is vital in all drain management approaches. The potential for poor drain care to lead to patient safety issues was highlighted in 2008 in the UK, where issues involving drain dislodgement, blockage and haemorrhage were reported with chest drains (Sullivan 2008). In response to these incidents, the National Patient Safety Agency made proposals towards safer practice, and clear guidelines for chest drain management and specific documentation were developed (British Thoracic Society (BTS) 2010, Havelock et al 2010), but these were not broadened out to other drain types. The BTS (2010) guidelines are regarded as best practice in chest drain care; hence the remainder of this article excludes chest drains and focuses on general drain care. Nonetheless, it should be noted that the reported issues with chest drains involving drain dislodgement, blockage and haemorrhage are universal to all

drains (Dougherty and Lister 2015). Best practice in all drain care should be a priority for all nurses to maintain patient safety (Akram and Hartung 2009, Dougherty and Lister 2015).

It is known that a wide variety of factors influence the risk of complications with drains. These factors include: patient comorbidities, the time length of surgery, the number, type and anatomical position of drains and length of time the drain(s) are in situ (Yilmaz et al 2014, Chim et al 2016, Mujagic et al 2019). In addition to dislodgement, blockage and haemorrhage, other potential complications include: surgical site infections, infection, reduced skin integrity, damage to surrounding organs/vessels, leakage, drain disconnection, pain/discomfort and increased anxiety (Athwal et al 2015, Dougherty and Lister 2015, Triantafyllopoulos et al 2015, Gavazzi et al 2016). Figure 1. summarises drain-related complications. Interestingly palliative studies report relatively low risks when used for patients with recurrent malignant ascites. However, nurses should not be complacent with drain care because complications such as site leakage and discharge, infection, erythema, pain, dislodgement, abnormal white blood cells and sleep interruption are still noted in palliative settings (Brown et al 2014; Narayanan et al 2014). In line with the NMC's regulatory requirement to keep skills up to date (NMC 2015), nurses should be aware of the potential complications with drains, how to monitor drains efficiently and effectively, and how to document this information.

Dougherty and Lister (2015) report that nurses should ensure that the drain is firmly anchored at the drain site (e.g. with sutures) and at one other point with a suitable fixation device or adhesive tape (to maintain stability) prior to the drainage bottle/bag. Skin integrity and leakage around the drain site should be observed for signs of infection, swelling, haematoma or drain leakage as clinically indicated or according to local protocol. Nurses should also monitor the volume of fluid output and observe for changes in fluid character (e.g. odour, colour, viscosity). Increased sudden, unexpected changes in fluid character and/or volume may suggest infection, haemorrhage, damage to surrounding vessels/organs or anastomotic leaks. Unpredicted reduced fluid output could also indicate drain blockage

(e.g. debris, clot, pus), drain disconnection, dislodgement or migration. The length of the tubing should be measured (from drain exit site) and frequently assessed for migration or withdrawal; tubing and connections should be also observed for twists or kinks to facilitate fluid drainage. Drains should be positioned below the insertion site to further aid drainage and multiple drains should be plainly numbered and correspond with drain documentation to avoid misunderstanding (Dougherty and Lister 2015). Pain and distress should be assessed to promote holistic nursing care using an appropriate, standardised, valid and reliable pain assessment tool (Royal College of Nursing (RCN) 2015). Figure 2 identifies how nursing assessments and observations can identify drain related complications.

### **Case study**

The following case study illustrates how poor drain observations can directly impact upon patient care and safety.

Jim Morgan was a 72 years old gentleman, with advanced cancer, who was discharged home from hospital as this was his preferred place of death. Jim and his family were extremely anxious regarding his end-of-life care. Neither the discharge letter nor referral highlighted that Jim was being discharged with drains in place, and there was no information about how the drains had been managed or assessed in hospital, a drain management plan or indication of any hospital review dates and no contact details if escalation of care was required. Jim was able to inform the community nurses that both drains were flushed daily whilst he was in hospital, yet there was no mention of how this was undertaken and no fluid flushes were prescribed. These issues were resolved through numerous telephone calls between community nurses, and various ward nurses and medical consultants.

Jim was cared for by the community team for several weeks. He had complex needs and a variety of uncontrolled symptoms that required a multidisciplinary approach. Different nurses involved in Jim's care had various levels of experience and knowledge with regard to drain care. From nurse documentation, it became apparent that staff were either performing

inconsistent and “ad-hoc” drain observations and/or providing “ad-hoc” documentation on individual evaluation sheets.

On one occasion, there was no record that Jim’s drain site had been assessed for a week. Moreover, drain output had not been assessed or recorded for two days. It was then noticed that the output from one of the drains had suddenly decreased over these two days and Jim reported that he was experiencing pain when the drain was flushed. On examination, the drain site was found to have extensive excoriation and leakage with purulent discharge. The surrounding area was also warm and tender to the touch with Jim reporting feeling “shivery and unwell for a few days”. Vital signs were taken which indicated potential further systemic infection.

After the nurse spoke with Jim’s General Practitioner (GP) and medical consultant, the decision was made for Jim to be readmitted to hospital. This caused further anxiety for Jim and his family. Upon admission, it was discovered that Jim should have attended the hospital for a drain review the week before but neither Jim, his family or community team were aware of this. Jim was diagnosed with a surgical site infection and drain related complications and sadly died whilst in hospital.

Although Bazzi (2016) highlights that patients expect nurses to preserve their safety, it has been noted that they are concerned about the management of their drain in community settings (Athwal et al 2015). As illustrated in the case study, ad-hoc drain care and documentation can hamper a consistent approach, cause patient harm and further psychological distress (Findik et al 2013, Liddle 2013, Woodrow, 2013).

### **Key Issues Raised**

#### **The importance of nursing knowledge and assessment in drain care**

This case study highlights that inadequate drain assessments and variable, uncoordinated care has the potential iatrogenic consequence of placing patients in jeopardy of developing

undiagnosed surgical site infections and the related danger of sepsis. Orth (2018) highlights how drains (particularly abdominal drains) generate ideal conditions for surgical site infections without appropriate management which can lead to the development of sepsis (Khatoon et al 2015). Evidence regarding surgical site infections has shown that without mandatory “post-discharge surveillance methods” to recognise surgical site infections in the community, between 71% - 93% of surgical site infections go unrecognised, unnoticed and untreated within the community setting (Leaper et al 2013, Public Health England 2016). Surgical site infections are directly linked with sepsis, with as many as 70% of cases arising in the community setting (NHS England 2015a, NICE 2016, UK Sepsis Trust 2016).

An insufficient and non-systematic focus on drain care is associated with late identification of complications, resulting in inappropriate care or emergency hospital admissions which negatively impact patient quality of life and physical functioning (Murnane et al 2015). Failure to accurately assess needs and record information in other aspects of care has been a consistent factor associated with poor patient outcomes and poor quality of care (National Confidential Enquiry into Patient Outcome & Death 2012, Francis 2013, Neuberger 2013, Scruth 2014). Nurses should employ life-long learning and continued professional development to address gaps in drain care knowledge, skills and competence to ensure that they are practicing safely and effectively (RCN 2019), whilst a structured drain assessment framework may also promote quality care through improved data collection, clinical decision making and communication (Banning 2008, Munroe et al 2013). Such a reflective approach can also form part of required revalidation or registration renewal process.

### **The importance of drain assessment skills**

The impact of nurse inexperience, workload, increasing demands and an emotive patient visit may have impaired nurse clinical decision making. This is known as “situational awareness”, and Gluyas and Harris (2016) report of an increased interest of how this directly correlates with patient outcomes within the healthcare arena. Reflection and

acknowledgment of these issues can raise nurse awareness of they can influence patient safety (Beyea 2014), whilst the utilisation of a specific drain assessment chart, with core data requirements, could act as checklist to counteract these effects. Checklists are valuable tools which can offset disturbances and bridge gaps in nurse knowledge, standardise best practice and reduce the danger of failure to identify (and therefore act on) patient deterioration (Thomassen et al 2011, Gan and Tan 2015).

### **The importance of consistent, comprehensive communication and documentation**

Breakdown in communication between healthcare professionals at Jim's hospital discharge is a common phenomenon during transitions in care which leads to adverse events, hospital readmissions and poor patient experience (The Queen's Nursing Institute 2016). Indeed, inadequate communication is known to play a significant role in many clinical errors not just during hospital discharge (Bruton et al 2016).

The lack of documentation illustrated in the case study played a significant role in the miscommunication of patient care and professional clinical decision making (NMC 2015, Massey et al 2016). Unavailable information through poor clinical handovers and drain care documentation impaired clinical decision making and compromised Jim's safety; both of which are preventable causes of harm (Lyons et al 2015, NHS England 2015b, Le Lagadec and Dwyer 2017). Failure in clinical management is also classed as preventable patient harm (Panagioti et al 2017). It could be contended that if staff were aware of the drain management plan and hospital review, any identified issues could have been escalated to the hospital at the review date. The devastating impact of failures in communication of drain management was evidenced in a patient safety alert; a patient died when staff replaced the drainage bottle with a vacuumed bottle - no suction was intended but this information had not been communicated to the nursing team (NHS England 2014b).

On some hospital wards, fluid balance charts are utilised for communicating drain output (NICE 2007), however it is known that these are often poorly completed (Francis 2013,

Jeyapala et al 2015). Similarly, a drain manufacturer produces a drain chart which also focuses on recording output. However, more comprehensive documentation is required (Lyons et al 2015, Tsang et al 2016) (see figure 2). Lyons et al (2015) argue that the information recorded on fluid balance charts is inadequate for drain monitoring purpose, highlighting that there is insufficient space for the required recording of various aspects of drain monitoring such as space for multiple drain documentation, location and type of drain, character of fluid, running total and 24 hour output from the drain/s.

The lack of standardised, comprehensive documentation means that clinicians subsequently have to search through patient notes to retrieve all relevant information, which impacts on patient safety, adds workload to existing clinical demands and wastes time (Degnim et al 2013, Braaf et al 2015, Lyons et al 2015). Inadequate documentation and handovers also increase miscommunication (Lyons and Popejoy 2014, TKF 2017). When systems such as these fail, there is an increased risk of patient harm (NHS England, 2013). A structured clinical system comprising of relevant tools, guidelines and policies may assist in the consistent and fluent transfer of information – improving patient safety and team coordination (NHS England 2013, Gluyas 2015).

### **The importance of coordinated care**

The disjointed handover caused an unnecessary poor patient experience for Jim and his family, and compounded the anxiety they experienced on discharge home for palliative care. The lack of information between organisations also created team inefficacy as time was spent liaising with professionals for missing information. Community nurses report frequent poor communication between professionals and they are often unaware of when patients are to be discharged (The Queen's Nursing Institute, 2016). This impacts proactive planning and is particularly problematic when patients such as Jim require substantial nursing care with working differences between acute and community care.



Dysfunctional multidisciplinary team communication leads to uncoordinated care (Gluyas 2015). The case study evidenced this through missed hospital appointments and inadequate communication about early warning signs and drain complications. It can therefore be assumed that a uniformed approach to drain care, both during and between transitions in care, where relevant, accurate information is encapsulated and cascaded, then the impact on team efficiency, appropriate use of resources and coordinated care extends to the wider NHS (Manias et al 2015).

### **The importance of co-ordinated care and escalation systems**

The lack of suitable, specific documentation was a key issue during Jim's care. The inconsistent information recorded on evaluation sheets impeded swift clinical decision making within the nursing team. The case study highlights how variation in practice and communication can negatively impact patient safety (Royal College of Physicians 2012, Wears 2014). A standardised, robust and comprehensive drain assessment chart could be utilised with drain care guidelines and protocols to escalate concerns between different organisational settings. This approach is central to quality improvement and high on the NHS agenda (TKF, 2017a).

Lyons et al (2015) designed and initiated a chart to monitor drain output in an acute setting in the UK. The intention was to standardise practice, ensure regular, consistent data collection and promote efficiency. The chart yielded positive effects on patient safety through timely removal of drains, improved quality of documentation, patient discharge and ward efficiency and reduced ward round tensions.

Focussing on drain volume, Tsang et al (2016) compared the use of a drain protocol with normal practice for post-operative total joint arthroscopy. Findings demonstrated that the use of a "standardised recording form" for patients with drains promoted efficient drain observation, monitoring and communication between doctors and nurses. This study was undertaken in an acute hospital in Hong Kong.

Literature does not identify any evidence around drain documentation in the community setting. As discussed, this is of increasing importance as more acute nursing, such as drain care, is being delivered in patients' homes – often to patients with multi co-morbidities and complex nursing needs (Salim 2014, TKF 2014, Millar and Hillman 2018).

The paucity of evidence suggests that general drain assessment is rarely documented on specific drain charts. Nevertheless, the limited evidence available highlights the potential for a designated drain documentation and protocol to improve assessments and the accuracy and relevance of data recording. This could positively impact on patient safety, enhance professional communication and team efficiency and promote accountability (Woodrow 2013, NMC, 2015). To have no objective, standardised method for assessing and monitoring patients with postoperative, long term or palliative drains can have negative implications for the patient, the nurse/team, the Trust and wider NHS. More research on the most effectiveness means of drain assessment and recording is required.

### **Implications of sub-standard drain care**

As discussed, sub-optimal drain care has the potential to negatively impact patient safety. However, nurses must also be mindful of how substandard drain care can impact themselves and wider NHS. Nurses are bound by a duty of care and are accountable for their actions or omissions; hence if drain care falls below an acceptable standard, nurses may find themselves facing professional and legal investigations (NMC 2015). Poor patient outcomes and compromised patient safety are correlated with reduced patient experience and more dependency and demands for professional intervention (Anhang Price et al 2014, NHS England 2016). Sub optimal drain care has the potential to interrupt hospital discharges and lead to hospital readmissions.

It can contribute to the associated stigma of poor quality of care and increased financial costs (Panagioti et al 2017, The Health Foundation 2018). It is distressing and expensive for patients and healthcare providers alike. Moreover, organisations are consequently held

accountable for negligence in care alongside damaged reputation (NHS Litigation Authority 2013-2014, NHS England 2014a, TKF 2015, Busby et al 2017, Trueland 2017). Figure 3 classifies the implications of inadequate drain monitoring and documentation for patients, nurses and wider NHS.

## **Recommendations**

There is a real need for more comprehensive and consistent oversight for the care of drains. Nurses should galvanise best practice in drain care to promote patient safety. This article suggests that there is a need to enhance practice through the standardisation of drain assessments and documentation. Moreover, consistent use of drain assessment charts is encouraged to potentially address the issues discussed. Charts should be comprehensive and document all aspects of drain care. It could equally act as a checklist for nurses, improve professional knowledge, standardise best practice and reduce the danger of failure to identify (and therefore act on) early warning signs of drain complications. Together with guidelines and procedures, systems such as these have the potential to improve patient safety through improved communication and coordinated care. Of course, nurses should perform holistic assessments and be aware of how to interpret drain observations in order to act appropriately (Douglas et al 2014).

## **Conclusion**

Drain care is an important but arguably undervalued aspect of nursing care. To prevent harm nurses need to regularly and systematically assess the drain site, skin condition, suction pressure, and drain equipment as well as the colour, characteristic and volume of drainage output. Furthermore, they need to assess the patient experience including pain and anxiety levels associated with the drain. The lack of appropriate documentation may be contributing to poor care and more attention to the topic has the potential to enhance patient care.

Word count: 3500

**Figure 1: Drain Related Complications (excluding chest drains)**

➤ Reduced skin integrity
➤ Surgical site infection
➤ Infection
➤ Haemorrhage
➤ Damage to surrounding vessels/organs
➤ Leakage – drain site, tubing
➤ Reduced vacuum suction
➤ Moveable drain
➤ Drain retraction
➤ Damaged drain
➤ Drain fall out or dislodgment
➤ Drain disconnection
➤ Drain obstruction
➤ Pain or discomfort
➤ Sleep disturbance
➤ Anxiety

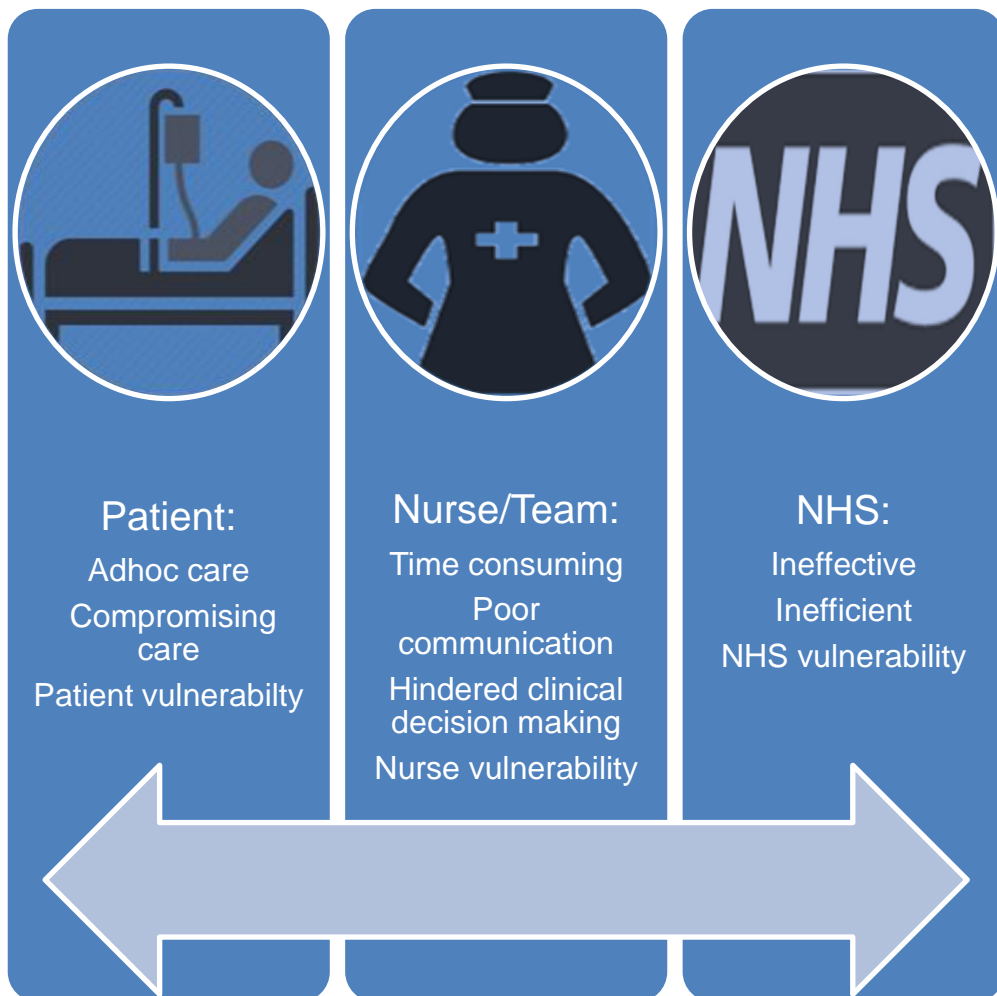
(Kwiatt et al 2014, Narayanan et al 2014, Dougherty and Lister 2015)

**Figure 2. Nursing Drain Assessments, Signs of Complications and Potential Complications.**

<b>Nursing Drain Assessment</b>	<b>Signs of Complications</b>	<b>Potential Complication</b>
<ul style="list-style-type: none"> <li>➤ Drain site dressing</li> <li>➤ Drain site skin assessments</li> </ul>	<ul style="list-style-type: none"> <li>➤ Purulent exudate on site dressing</li> <li>➤ Reduced skin integrity</li> <li>➤ Odour, purulent discharge and/or other signs of infection at site.</li> <li>➤ Patient reporting feeling unwell</li> <li>➤ Leakage</li> </ul>	<ul style="list-style-type: none"> <li>➤ Reduced skin integrity</li> <li>➤ Surgical site infection</li> <li>➤ Drain leakage</li> </ul>
<ul style="list-style-type: none"> <li>➤ Unexpected fluid output</li> </ul>	<ul style="list-style-type: none"> <li>➤ Uncharacteristic fluid</li> <li>➤ Increased fluid output</li> <li>➤ Tenderness/pain at/around drain site</li> <li>➤ Patient reports of feeling unwell</li> </ul>	<ul style="list-style-type: none"> <li>➤ Infection</li> <li>➤ Haemorrhage</li> <li>➤ Damage to surrounding vessels/organs</li> </ul>
<ul style="list-style-type: none"> <li>➤ Suction pressure</li> </ul>	<ul style="list-style-type: none"> <li>➤ Air leak noted on tubing and/ or connections</li> </ul>	<ul style="list-style-type: none"> <li>➤ Reduced vacuum suction</li> </ul>
<ul style="list-style-type: none"> <li>➤ Drain stability at drain site and 1 other point</li> <li>➤ Length of tubing</li> </ul>	<ul style="list-style-type: none"> <li>➤ Moveable drain</li> <li>➤ Altered drain length from site to drainage collection system</li> </ul>	<ul style="list-style-type: none"> <li>➤ Drain instability</li> <li>➤ Drain retraction</li> <li>➤ Drain dislodgement</li> <li>➤ Drain migration</li> <li>➤ Drain dislodgment or fall out</li> </ul>
<ul style="list-style-type: none"> <li>➤ Intact tubing and connections</li> </ul>	<ul style="list-style-type: none"> <li>➤ Loose fittings and connections</li> <li>➤ Air leaks</li> <li>➤ Drain fluid coating connections/tubing</li> <li>➤ Unpredicted reduction of drain output</li> </ul>	<ul style="list-style-type: none"> <li>➤ Drain leakage</li> <li>➤ Reduced suction</li> <li>➤ Drain disconnection</li> </ul>
<ul style="list-style-type: none"> <li>➤ Tube assessment</li> </ul>	<ul style="list-style-type: none"> <li>➤ Kinks in tubing</li> <li>➤ Clots, debris, pus</li> <li>➤ Resistance when flushed (if flushes are authorised and prescribed)</li> </ul>	<ul style="list-style-type: none"> <li>➤ Damaged tubing</li> <li>➤ Obstruction</li> </ul>
<ul style="list-style-type: none"> <li>➤ Pain</li> </ul>	<ul style="list-style-type: none"> <li>➤ Uncontrolled, un-resolving or escalating pain</li> </ul>	<ul style="list-style-type: none"> <li>➤ Infection</li> <li>➤ Damage to surrounding organs</li> <li>➤ Anxiety</li> </ul>
<ul style="list-style-type: none"> <li>➤ Anxiety</li> </ul>	<ul style="list-style-type: none"> <li>➤ Uneasiness, fear, panic</li> <li>➤ Sleep disturbance</li> <li>➤ Insomnia</li> <li>➤ Palpitations</li> <li>➤ Nausea</li> <li>➤ Dyspnoea</li> </ul>	<ul style="list-style-type: none"> <li>➤ Depression</li> <li>➤ Relationship problems/social isolation</li> <li>➤ Headaches</li> <li>➤ Insomnia</li> <li>➤ Digestion or bowel problems</li> </ul>

(Kwiat et al 2014, Narayanan et al, 2014, Athwal et al 2015, Dougherty and Lister 2015)

**Figure 3. Implications of Inadequate Drain Assessment, Monitoring and Documentation for the Patient, Nurse/Team and NHS.**



(NHS England 2014a, Lyons et al 2015, The King's Fund 2015).

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