Catheters and healthcare-associated infections

Keeping a catheter in too long increases the chances of infection

9 November 2023

It could happen to you too

Event 1

A 50 year old female patient undergoes a left colectomy under coelioscopy for chronic diverticulosis. The procedure is performed without any issues and an Enhanced Recovery After Surgery (ERAS) protocol is prescribed by the surgeon. Two days post-surgery, the patient develops a fever, with no detected clinical sign. The following day, given the increase in her fever, she is prescribed antibiotics, but the fever persists. On day 5 post-surgery, during a specialist follow-up visit, the surgeon observes significant phlebitis on the infusion catheter and removes it. Treatment is adapted and the patient is finally discharged eight days after the initial planned date.

What happened? Immediate cause
The catheter was retained despite the fever.

Why did it happen? Root causes, barriers absent or deficient

• Communication between the surgeon and the care teams with regard to administering the ERAS protocol was deficient. The care procedures prescribed by the surgeon and the instructions of the ERAS protocol proved to be contradictory.
• The ward care team had no experience of ERAS protocols and were not given any training.
• The condition of the skin facing the catheter was not monitored and the duration of use of the catheter was not tracked.
• The event occurred on a public holiday (sensitive period).
PERIPHERAL CATHETER CONTAMINATION LEADING TO DEATH

A 78 year old male patient attends hospital for acute chest pain. On admission, the care team places a peripheral venous catheter on the patient. Infectious complications occur 48 hours post-placement, in the form of phlebitis on the peripheral catheter, followed by Staphylococcus aureus bacteraemia. Later, the patient’s state worsens with the onset of febrile coma followed by numerous septic complications, leading to the patient’s death despite transfer to intensive care.

What happened? Immediate cause
The peripheral venous catheter was contaminated during insertion.

Why did it happen? Root causes, barriers absent or deficient
- The care team were not fully conversant with practice guidelines and protocols pertaining to catheter insertion available in the healthcare organisation, and hence did not follow them.
- The catheter was difficult to insert in this patient on account of poor venous access, increasing the risk of contamination during this stage.
- The catheter was left in place for 96 hours, which was justified in view of the difficult insertion. However, the duration of use and changes in skin condition were not recorded in the patient record.
- The event occurred during a peak in activity in the relevant care unit.

ASEPSIS FAILURE DURING EPIDURAL CATHETER INSERTION LEADING TO SEVERE NEUROLOGICAL ISSUES

During vaginal delivery by a 34 year old woman, an epidural catheter is inserted for pain relief purposes by the anaesthesiologist on duty. Three days post-delivery, the patient returns home with pain relief medication on account of neck and lower back pain. Twenty-four hours later, the situation rapidly deteriorates with the onset of sensory issues in the perineal region and sphincter issues. The patient is hospitalised and an MRI detects the presence of an epidural abscess leading to neurological compression. The patient undergoes emergency surgery performed by a neurosurgeon to drain the abscess, and probabilistic antibiotic therapy is commenced without delay. The procedure helps stabilise the patient’s general condition, but the patient hereafter has chronic severe neurological deficiency.

What happened? Immediate cause
Asepsis failure during the insertion of the epidural catheter.

Why did it happen? Root causes, barriers absent or deficient
- When the healthcare organisation’s asepsis protocol was updated, the entire desloughing phase for procedures on the central nervous system was omitted.
- The aseptic procedure prior to epidural catheter insertion was deficient.

CENTRAL VENOUS CATHETER CONTAMINATION IN PREMATURE NEWBORN INFANT LEADING TO DEATH

A newborn infant, born prematurely at 26 weeks, undergoes a major abdominal surgical procedure via laparotomy. His clinical state necessitates the insertion of a right subclavicular central venous catheter. The newborn infant subsequently presents with motor diarrhoea after surgery, and then contracts severe Klebsiella pneumoniae septicaemia. Despite the administration of adapted treatments, the newborn infant dies.

What happened? Immediate cause
The central venous catheter was contaminated.

Why did it happen? Root causes, barriers absent or deficient
- Frequent and prolonged handling of the newborn infant increased the risk of catheter contamination, but was necessary in order to:
  - change the abdominal dressing of the laparotomy wound;
  - wash the infant several times a day on account of diarrhoea;
  - change the catheter dressings, as they became detached when the infant was washed.
- The washing and dressing change procedure protocols were not followed.
- The healthcare organisation had not drafted a central catheter monitoring protocol; therefore, the care team were not able to refer to one.
- The diagnosis of catheter-related infection in the newborn infant was difficult on account of the changeable presence of local signs, a normal C-reactive protein (CRP) level, and the absence of general infectious syndrome at the time of onset of the local signs.
- The signs of shock were masked and delayed the administration of antibiotics.
Keywords: contamination – healthcare-associated infections – invasive device-related infections – venous catheter – epidural catheter

**So it doesn’t happen again**

In 2022, based on the national survey on the prevalence of healthcare-associated infections (HAI), Santé publique France found that 33% of hospitalised patients are fitted with at least one catheter. Moreover, the HAS evaluates the number of catheters inserted every year in France at 25 million, while the French national invasive device-related infection monitoring and prevention programme reports that 30% of the 9,103 identified cases of healthcare-associated bacteraemia are catheter-related. Therefore, catheter insertion, use and management are extremely common procedures. Far from harmless, these devices may be the source of potentially severe local or systemic infections. Therefore, in order to reduce the number of healthcare-associated infections caused by catheters, all the actors concerned, in both outpatient and inpatient settings, must pay attention to the following guidelines. This approach is incorporated within the framework of the 2002-2025 French national infection and antibiotic resistance strategy led by the French Ministry of Solidarity and Health.

- Systematically assess the relevance and the benefit-risk balance in respect of catheter insertion and reassess these criteria on a daily basis to decide on catheter retention.
- Be vigilant in the presence of any sign of infection, learn to recognise atypical infectious signs in the most vulnerable patients and in particular in newborn infants. In the event of any sign of infection in a patient with a catheter, contamination must be suspected and the catheter removed (good practice guidelines).
- Ensure that catheter-related daily clinical monitoring items are created and tracked in the patient record.
- Make sure that regularly updated good practice guidelines in relation to catheters and relevant protocols are readily accessible for healthcare professionals. The protocols must be validated by the operational hygiene team.
- Always assign catheter insertion, use, maintenance and removal to staff whose theoretical and practical skills are regularly assessed.

**Focus on patient safety collection**

The “Focus on patient safety” collection aims to draw the attention of and raise awareness among healthcare professionals as to risk management. Each focus covers a specific and recurrent risk based on care-related adverse events, identified and selected from national care-related serious adverse event reporting databases or doctors’ accreditation. This focus on patient safety relates care-related serious adverse events associated with catheter use. For this specific focus on patient safety, and given the complex nature of the healthcare pathway, the events are not described in their entirety and the analyses reported focused on poor catheter management.

**Find out more**

Peripheral vascular and subcutaneous catheter-related infection prevention, May 2019.

Healthy skin antisepsis before invasive procedures in adults, May 2016.

Peripheral venous catheter insertion and maintenance.

National invasive device-related infection monitoring report for 2022.

Reporting care-related serious adverse events.

Focus on patient safety: tool to improve professional practice.

The HAS points out that care-related serious adverse event reports in respect of healthcare-associated infections meeting the criteria of Decree No. 2017-129 must also be reported via the e-SIN portal.