Nursing care and management of patients with a nephrostomy

Care and management of patients with a nephrostomy is a fundamental aspect of nursing, but information for nurses is poor and there is a lack of evidence and guidance. This article addresses this gap and outlines what nurses need to know about a nephrostomy and its management.

What is a nephrostomy?
A nephrostomy tube is a narrow-gauge pig-tail drain inserted into the renal pelvis for the purpose of draining urine (Fig 1). The percutaneous nephrostomy tube diverts urine away from the ureter and bladder into an externalised drainage bag (Wildberger and Günther, 2010). It is usually inserted by an interventional radiologist under direct vision using fluoroscopy, ultrasound or computerised tomography (CT) guidance, while using local anaesthetic and often sedation. Nephrostomies are used in a range of situations (Box 1).

Usually a nephrostomy is temporary and removed when the obstruction has resolved or can be bypassed with an internalised ureteric stent, or when the therapeutic intervention is complete. However, in rare cases, in which bypassing the obstruction is not possible or is inadvisable (for example, in advanced cancer or retroperitoneal fibrosis), a nephrostomy may be permanent or semi-permanent (Dougherty and Lister, 2015).

Insertion procedure
Insertion of a nephrostomy tube involves passing a needle, guidewire and then a pig-tail drain through the skin, subcutaneous tissue, muscle layers and the renal parenchyma into the renal pelvis (McDougal et al, 2015). The drain is attached to a drainage bag and the system is secured to the skin with a suture and, usually, a drain fixation dressing. The nephrostomy can be unilateral, with the tube and drainage bag on one side, and the other kidney continuing to drain through the ureter into the bladder. Alternatively, bilateral tubes may be inserted, with a tube and drainage bag on each side, and minimal urine draining through the ureters into the bladder. In both cases, urine may continue to drain into the bladder.
Alternatives to a nephrostomy include:
- Retrograde stent insertion (stent insertion from below);
- Ureteroscopy (investigation into the patency of the ureter). Both are performed under general anaesthetic and the urologist guides the medical/surgical team in deciding which course to take (Dougherty and Lister, 2015).

If feasible for the patient, a retrograde stent is preferable as it has a lower associated morbidity and does not require a nephrostomy. Contraindications and cautions to the procedure include:
- Coagulation conditions that increase the tendency to bleed;
- Anticoagulant use (Patel et al, 2012).

**Principles of care**
The key risks of nephrostomy tube insertion are listed in Table 1. Nurse management of the main risks along with patient self-care and community support are discussed below.

**Fluid management**
If the kidney has been obstructed after initial nephrostomy tube insertion, the patient may enter a phase of diuresis, characterised by high-volume outputs from the tube (polyuria). This requires close monitoring of the patient’s fluid balance and vital signs. Each drainage route should be monitored separately and an overall total fluid output calculated (usually left/right/urethral and total). The patient’s intake (intravenous or oral) should closely match the output. A closely monitored and adjusted fluid balance will prevent patient deterioration associated with rapid fluid loss (Jairath et al, 2017; Hsu et al, 2016).

**Infection risk and wound care**
Patients with a nephrostomy are at risk of pyelonephritis (inflammation of the kidney, usually due to infection) from the foreign body puncturing the kidney (Hsu et al, 2016). They should be monitored for signs of infection/sepsis, for example:
- Loin pain;
- Elevated temperature;
- Fever/chills;
- Purulent urine output or deterioration in vital signs (Dougherty and Lister, 2015).

If infection is suspected, nurses should take a urine sample and seek medical advice on how treatment should proceed. If possible, flushing the nephrostomy should be avoided to prevent infection and, potentially, pyelonephritis. When flushing is required, trained staff should carry it out using 5ml of 0.9% sodium chloride and an aseptic non-touch technique.

**Box 1. Indications for nephrostomy**
Urinary obstruction is the most common reason for a nephrostomy, and is indicated by any of the following symptoms:
- Imaging demonstrating obstruction nephropathy
- Rising creatinine
- Acute renal failure
- Loin pain
- Nausea and vomiting
- Fever
- Urosepsis

Nephrostomy tubes are also inserted for urinary diversion, for example in the following situations:
- Following a ureteral injury
- Ureteral fissure/fistula
- Haemorrhagic cystitis
- Stenosis of urostomy
- Herniation of urostomy

They can be used to provide access for therapeutic interventions, such as:
- Stone removal
- Antegrade stent insertion
- Removal of foreign body, such as a broken ureteric stent
- Delivery of medications
- Ureteral biopsy

Nephrostomies are also used in some diagnostic testing, for example:
- Antegrade pyelography
- Ureteral perfusion tests (Dagli and Ramchandani 2011; Geng et al, 2009)

<table>
<thead>
<tr>
<th>Table 1. Main risks associated with percutaneous nephrostomy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem</strong></td>
</tr>
<tr>
<td>Severe bleeding</td>
</tr>
<tr>
<td>Vascular injury requiring nephrectomy or embolisation</td>
</tr>
<tr>
<td>Tube misplacement</td>
</tr>
<tr>
<td>Tube occlusion</td>
</tr>
<tr>
<td>Serious infection</td>
</tr>
<tr>
<td>Damage to adjacent structures</td>
</tr>
<tr>
<td>Death</td>
</tr>
<tr>
<td>Allergic reaction to contrast agent</td>
</tr>
</tbody>
</table>

Source: Koukounaras and Lyon (2017)
Clinical Practice

**Box 2. Nursing interventions in nephrostomy care**

When patient returns to ward after interventional radiology
- Check nephrostomy is on free drainage
- Ensure fluid-balance chart is in progress, with urine measurements taken once or twice an hour; if urine output is <30ml/hour, inform member of medical team
- Ensure nephrostomy tube is secured at exit site with suture and drain fixation dressing
- Place transparent film dressing over site for extra security/water resistance
- Monitor dressings for strike-through at least twice daily
- Make observations every 30 minutes for two hours, then once every hour for two hours (including blood pressure, pulse, temperature, respiration and oxygen monitoring)
- Advise bed rest for 4-6 hours

Daily management of equipment and patient comfort
- Ensure nephrostomy is secure at all times with drain fixation dressing (and secondary film dressing if required)
- Check drainage tubing is patent and not kinked/twisted
- If urine output is <30ml/hour, inform member of medical team
- Apply drainage bag at insertion
- Replace with NephSys bag before discharge and attach to Velcro waistband, positioned below kidney level to ensure dependent drainage
- Empty drainage bags using clean technique when no more than three-quarters full and record volume on a fluid balance chart
- Ensure pain is well controlled and, if necessary, administer prescribed analgesia (for example, paracetamol +/- tramadol/codeine)
- Unless otherwise directed by interventional radiology/medical team, advise patient to drink fluids and eat light diet post procedure
- Mobilise patient from bed to chair
- Check insertion site daily for bleeding, infection signs (pain, redness, swelling, leakage)

Nephrostomy care and discharge advice
If appropriate, teach patient/carer how to:
- Check drainage bag, leg bag and/or night bag
- Manage drainage bags effectively, without unnecessary pulling on tubing and avoidable kinking/twisting of tubing
- Carry out weekly changes of drain-fixation dressing and drainage bag; if patient/carer cannot do this, refer to community nurses for dressing changes
- Apply and change body-worn belt as required
- Apply night bags each evening for overnight urine drainage
- Empty leg bag when two-thirds/three-quarters full
- Open and close drainage tap on catheter bag for emptying
- Recognise signs/symptoms of catheter-related/wound infections
- Re-order supplies
- Ensure patients also:
  - Know how to contact community nurses
  - Understand plan of follow-up care

Post-discharge follow-up
- Arrange community nurse referral for nephrostomy care and wound care
- Advise patient nephrostomy should be changed every three months and to plan appointments with referring team
- Advise patient to contact treating team/GP if not heard about follow-up appointment

Source: Dougherty and Lister (2015)

Good wound-site care is essential to avoid exit-site infection, and should include keeping the drain site clean and dry. Dressings need to support the nephrostomy tube to prevent accidental tugging, and secure it to the patient’s skin. Several recommended drain-specific dressings are available, including Drain Guard, Drain-Fix and OPSITE Post-Op Visible. When selecting the dressing, it is important to consider patient comfort, as the exit site is directly on the patient’s back and can cause discomfort on lying down or sitting against a chair. If recommended dressings are unavailable or unobtainable, the nephrostomy can be dressed with a simple gauze-and-tape method, but it is vital to suture the tube in position.

Management of the tube and bags
Drainage bags should be changed every 5-7 days, while good hand hygiene is vital when handling the drain and exit site and emptying the drainage bag. Nephrostomy tubes should be routinely changed every three months as recommended by the manufacturer. The nephrostomy bag should be emptied when it becomes three-quarters full and, where appropriate, the patient or carer should be taught how to do this. At night, the patient and/or carer should be taught to attach a larger-volume night drainage bag to ensure a comfortable night’s sleep.

Note that the nephrostomy drainage bags supplied in hospital vary; in addition, some are not widely available in the community and, often, are not designed to be comfortable body-worn products. An example of a comfortable body-worn product is the Manfred Sauer NephSys drainage system – currently, it is the only product available on an FP10 community prescription.

Self-care and community support
For a long-term nephrostomy, the patient and/or carer should be taught to change the drain-site dressing and the drainage bag on a regular basis. If self-care and independence are not possible, the patient should be referred to the community nursing team. To perform the dressing and drainage-bag changes, patients should sit upright on a stool, couch or a bed with their back to the practitioner. The dressing change and drain removal are best performed from behind, so good preparation and communication with patients is essential (Nursing and Midwifery Council, 2018). If patients are unable to sit upright, positioning them on their side with their back facing towards you in the bed is an alternative.

All patients discharged from hospital with a nephrostomy need to be referred to the community nursing team for support and help as required. They should receive information on when and how to obtain clinical supplies, such as dressings and bags, and a written follow-up plan of review and/or planned date for change of nephrostomy tube or dressing. Some manufacturers produce a ‘nephrostomy passport’, which is a useful patient-held tool for recording and monitoring...
such information. On discharge, patients should be:
- Taught self-care where possible and/or have instructions given to carers;
- Referred to the community nursing team for support;
- Given adequate supplies for weekly dressing changes;
- Given information on where to access future supplies, such as trusted home dispensary services or the local pharmacy;
- Offered written information on how to manage their tube and details of future review/planned tube changes;
- Given details of who to contact with queries or concerns.

Box 2 provides a practical guide to nephrostomy care, including discharge advice and follow-up. Table 2 is a useful trouble-shooting guide.

### Table 2. Nursing interventions in nephrostomy care

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause</th>
<th>Prevention</th>
<th>Suggested action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nephrostomy site infection</td>
<td>Foreign body puncturing skin</td>
<td>Monitor patient for signs of infection (such as purulent discharge, exit-site erythema, pain/itching, elevated temperature) Send swab for microscopy, culture and sensitivity test if indicated Seek medical advice; treat patient accordingly</td>
<td>Maintain exit-site care Change dressing and check site at least every seven days Maintain good hand hygiene</td>
</tr>
<tr>
<td>Pyelonephritis</td>
<td>Foreign body in renal pelvis</td>
<td>Monitor patient for signs of infection (such as elevated temperature, raised inflammatory markers, purulent urine output, loin/groin pain, burning/stinging when passing urine)</td>
<td>Follow nephrostomy care advice Change tubing and bags at least every seven days Maintain aseptic technique</td>
</tr>
<tr>
<td>Nephrostomy tube falls out</td>
<td>Failed drain locking mechanism Loose retaining suture Drain-fixation dressing has fallen off</td>
<td>Seek urgent medical assistance - nephrostomy tube will need to be replaced by a physician</td>
<td>Check all elements securing nephrostomy tube are well situated Check locking mechanism on drain is in lock or drain position Check retaining suture is intact during weekly dressing changes; if broken/missing, escalate to medical team for replacement Correctly apply and secure drain-fixation dressing</td>
</tr>
<tr>
<td>Nephrostomy tube stops draining</td>
<td>No urine output Blocked tube Kinked tube</td>
<td>Check patient’s vital signs; seek urgent medical assistance if patient is unwell Check patient is well hydrated Ensure no kinks in tube occlude flow of urine; straighten tube If tube is blocked with debris, flush it with 5ml of normal saline 0.9%, using aseptic technique to unblock</td>
<td>Monitor urine output and vital signs Escalate concerns to medical team Carefully secure drain and tubing to prevent kinking</td>
</tr>
<tr>
<td>High nephrostomy outputs</td>
<td>Diuresis from previously obstructed kidney</td>
<td>Strict fluid-balance monitoring Weigh patient daily Ensure patient is cannulated for intravenous hydration</td>
<td>Check patient’s vital signs; seek medical assistance if needed Carry out strict fluid-balance monitoring Seek medical assistance to match fluid input/output Weigh patient daily Monitor blood daily</td>
</tr>
</tbody>
</table>

**Conclusion**

The nephrostomy tube offers alternative access to the kidney where a retrograde stent is not possible. Care and management of a long-term nephrostomy should include giving patients and/or their carers sufficient instruction to self-manage if they are able, or referring them to a well-informed community team if they are not. Nurses should also ensure patients have sufficient supplies and equipment, a plan for routine change or removal of their tube and know who to contact if problems arise.

### References


