

Perspectives

Recovery Strategies From the OR to Home

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By 2050, an estimated 27 million people will need some type of long-term care. Home healthcare and hospice agencies are the major providers of community based long-term care. Currently, about 7.6 million people receive community-based care for post-acute and chronic conditions, often with multiple co-morbidities. This number is expected to increase as the population ages. This issue of *Perspectives* focuses on best practices in the management of home care patients, in particular patients with either an indwelling catheter or a tracheostomy.

Although there is ample research-based evidence regarding indwelling urinary catheter management in acute and long-term care settings, there is limited home care information. Dr. Wilde's and Mr. Zhang's article describes the application of evidence-based practices for the home care patient.

Care of the tracheostomy in the home is a growing trend due to the increased efforts to transition patients to less costly points of care, along with the technologic advances that allow caregivers to deliver limited forms of medical care in the home.

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Best Practices in Managing the Indwelling Urinary Catheter for the Homecare Patient

By *Mary H. Wilde, RN, PhD and Feng Zhang, RN, BS*

Indwelling urinary catheters can be used for short periods of time, such as post-hospitalization, or indefinitely for persons with chronic urinary retention. Long-term catheters (LTC) are reserved for people who cannot perform intermittent catheterization, have no one to do it for them, or cannot manage any other way. Also, in certain individuals a catheter might be a quality of life decision making it easier to travel or work. Nevertheless, use of an indwelling urinary catheter puts the person at risk for persistent catheter-related problems. The purpose of this article is to address the nursing management of people with indwelling urinary catheters, primarily those with long-term catheters, and to suggest best practices based on evidence to minimize or prevent catheter related problems.

Short and Long-term Catheters Defined

Short-term catheters are defined as catheters that are used for less than one month. In actual home care practice, this time frame could be extended to a few months before the catheter is discontinued. Sometimes a "trial without a catheter" by removal and monitoring voiding and residual urine is not successful and the catheter is reinserted. Short-term catheter users need to keep a closed system, which can minimize or delay bacteria in the urine (bacteriuria) and possibly symptomatic catheter-associated urinary tract infection (CAUTI);¹

however all with a catheter will have bacteriuria after 30 days.² Irrigations should not be done unless they are prescribed by a physician for a specific purpose such as removal of blood clots. The catheter type can include polytetrafluoroethylene (PTFE or Teflon)-coated latex, which is soft but provides some protection from latex. It can be used for up to a month. Coatings on catheters, such as silver alloy—but not silver oxide—might be of value in decreasing bacteria in urine for short-term use up to 2 weeks, but neither silver alloy nor antimicrobial catheters have prevented symptomatic CAUTI.^{3,4}

Long-term catheter use requires different considerations. First, the decision should be made about whether the catheter will remain in situ, and whether other options would be better. Persons with persistent retention, hand dexterity and mental capacity can be taught to use intermittent catheters, as well as family or caregivers. For men with severe incontinence and no retention, an external catheter could be an option. Sometimes a catheter has been placed inappropriately in the hospital,⁵ and the home care nurse should ask the physician about removing the catheter if the indication is unclear. Catheter valves, which clamp off the catheter until time for voiding, are not FDA-approved and thus not available in the U.S.; however

Tracheostomy Care in the Home Care Patient

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Tracheostomy, the creation of an opening in the neck into the trachea, is performed in the event of airway obstruction, prolonged endotracheal intubation, and for tracheobronchial hygiene.¹ In adults, tracheostomy is done by traditional surgical opening of the trachea in the operating room and by the more recent percutaneous dilational tracheostomy technique at the bedside, usually in the intensive care unit. At a local hospital in south Alabama, it was reported that a total of 191 tracheotomies had been performed in 2010 and 2011. Of those, 79 (41%) patients were discharged with the tube in place. It may be common for a patient to be discharged with the tube in place, putting the burden for care on the family and the responsibility for preparing the family for this task on hospital educators. Care of the tracheostomy in the home is a growing trend due to increased economic pressures on acute-care medical facilities, efforts to transition patients to less costly points of care, technologic advances that allow caregivers to deliver limited forms of medical care in the home, and the growing social acceptance of persons with disabilities.² When the tracheostomy is no longer indicated, the tube is removed (decannulation), and the patient resumes ventilation through the native airway.

Information from a large database of pediatric patients revealed that in 2009, 4341 tracheotomies were performed on children in the 46 states participating in the Healthcare Cost and Utilization Project (HCUP) Kid's Inpatient Database, sponsored by the Agency for Healthcare Research and Quality.³ While data on the number of children discharged with a tracheostomy are unavailable, many children are discharged to home with a tracheostomy, as evidenced by the numbers of health care workers engaged in teach-

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ing caregivers how to care for children with tracheostomy in the home.

Indications for Tracheostomy

Tracheostomy is indicated for upper airway obstruction, prolonged mechanical ventilation, and neuromuscular disease. Airway obstruction may be caused by or related to infection, trauma, tumor, foreign body, obstructive sleep apnea, or tracheal stenosis. Once the upper airway obstruction is bypassed by the tracheostomy, the tracheostomy tube is inserted and the patient may be able to ventilate spontaneously. After a period of time (2 days to several weeks of oral intubation) a tracheostomy is considered for patients requiring prolonged mechanical ventilation, the timing of which is a topic of considerable controversy.⁴ In patients with respiratory failure, the tracheostomy facilitates tracheobronchial hygiene and may speed the ven-

tilator liberation process, since airway patency is better assured. Likewise in neuromuscular disease, a tracheostomy facilitates airway access for hygiene and attachment of oxygen and ventilatory devices. The long-term presence of a tracheostomy is dictated by the failure of an acute tracheostomy situation to resolve. For example, a post-trauma comatose patient may not regain consciousness and therefore has a chronically compromised airway. Attempts to decannulate such a patient often results in the need for recannulation.

In premature infants, tracheostomy has been reported in approximately 2.8% of very low birthweight infants (361-1500 g), or about 1500 children/year.⁵ This is to facilitate long-term mechanical ventilation, often associated with bronchopulmonary dysplasia. Tracheostomy is also indicated in infants born with severe maxillofacial abnormalities or neurologic deficiency. Most children requiring a tracheostomy are younger than 1 year of age. In these children, tracheostomy is associated with better growth and development, better development of facial expression and phonation, and improved ability to learn sucking and swallowing. They are also able to be cared for in the home environment as opposed to patients who remain orally intubated. Other indications include trauma (usually closed head injury and need for mechanical ventilation), postoperative complications following major cardiothoracic surgery, and infection/sepsis-related disease.

Issues in the Care of a Patient with a Long-Term Tracheostomy

There are several issues in the care of the patient with a long-term tracheostomy. These issues are central to the airway itself and those pertaining to the mechanical ventilation that often accompany the presence of the tracheostomy tube. Mechanical ventilation issues are beyond the scope of this presentation. However, when considering the tracheostomy alone, cuff pressure, cuff leak, tube dislodgement, tube occlusion, infection, changing the tube, suctioning, and promoting communication are important issues for the patient and caregiver.

Cuff pressure and cuff leak are

most pertinent to patients receiving mechanical ventilation. In those patients, cuff pressure should be kept between 20 and 25 cm H₂O to prevent air leaks and aspiration of oropharyngeal contents. If the cuff is actually leaking, the tube/cuff should be changed, as continued leak is likely to allow aspiration and promote nosocomial infection. In patients who are not being ventilated, the cuff may be left deflated if the patient has good upper airway control. (e.g. Since the patient is spontaneously ventilating, the tube is placed for airway patency.) Tube dislodgement means that the tube has either fallen out or has migrated into the pretracheal space. If the tube falls out, or is coughed out, it should not be difficult to insert a clean tube provided that the track is mature. A tube in the pretracheal space should be promptly repositioned into the trachea, to prevent suffocation. This problem should be prevented by using appropriate securement. Tube narrowing or occlusion by inspissated secretions causes a significant increase in work of breathing or suffocation. In this event, the inner cannula must be removed and replaced, or the entire tracheostomy tube replaced. Thereafter, proper suctioning technique and inhaled gas humidification must be reinforced. Stoma site infection is common. The stoma is kept clean with hydrogen peroxide. Since there is no proven benefit to changing the tracheostomy tube, it should only be changed if there is a need to do so. A potential hazard of tube replacement is placement of the tube into the pretracheal space. Most patients with a tracheostomy tube require suctioning, so the equipment necessary for this procedure must be available to all home tracheostomy patients. In the home, suctioning is done with a clean technique – a nonsterile catheter and clean gloves.⁶ Suctioning should be done as needed, and to a depth where the tip of the catheter is just beyond the end of the tube. Closed suction catheters are useful for patients who are being ventilated. Routine use of saline lavage is not recommended. Appropriate humidity must be provided with a heated humidifier, aerosol nebulizer, or heat and moisture exchange humidifier. A full description

In patients who are not being ventilated, the cuff may be left deflated if the patient has good upper airway

of this issue is beyond the scope of this paper. Speech is facilitated by partial deflation of the cuff during mechanical ventilation. In patients who are not being ventilated, a fenestrated tracheostomy tube can facilitate speech during exhalation. A speaking valve, such as the Passy-Muir valve allows airflow through the tube during inspiration, then routes the air through the vocal cords during expiration. A referenced, full explanation of these issues can be found elsewhere.⁴

Patient and Caregiver Education for Children with a Tracheostomy, from the Therapist's Perspective

Note: Please refer to the "Parent Guide to Trach Care" at the following website: www.perspectivesinnursing.org. Most of these comments on care for the child with a tracheostomy also apply to care of the adult with a tracheostomy.

The teaching of home tracheostomy care should ideally begin prior to the procedure. Consideration should be given to the family's level of education and their feelings of apprehension or anxiety regarding the impending procedure. Talking with the family about "what is a tracheostomy" and assuring them of their ability to care for their child is extremely important. Answer their questions truthfully and honestly and in the simplest manner possible. Be positive in all interactions with the family. Try not to overwhelm the family at this time with too much information—there will be plenty of time after the surgery to emphasize skills.

Some parents/caregivers wish to see another child with a tracheostomy. If there is another child in the hospital

with a tracheostomy, you must get the parent's permission before bringing your new parents into the room. Also, be especially cautious with what type of patient you present to the parents. A parent with a child with an acute upper airway obstruction who is fairly normal in other aspects might become distressed at seeing a child in a chronic vegetative state with a continuously bubbling tracheostomy.

Leave educational booklets and information and encourage the parents to look over and write their questions down prior to watching the tracheostomy care video. It is very important during this anxious period for the therapist to be available to answer questions and offer reassurances. Encourage the review of all training materials. If parents have access to a computer, make them aware of Aaron's Tracheostomy Page at www.tracheostomy.com.

During the first 24 hours after the surgery, parents may or may not be able to hold the child (usually not if on ventilator). Encourage parents to observe care during this time, but do not force this issue. Remember, to the parents the tracheostomy looks like a big, gaping, oozing hole through which a plastic tube has been inserted. Give the parents time to adjust and accept the tracheostomy.

During the first week postoperatively, encourage parents to observe and participate in tracheostomy care/tracheostomy tube tie changes/suctioning/manual ventilation. Remember it is a scary thought to have to insert something inside your child, especially if it makes the child cry while you are doing it.

Once the surgeon has changed the tracheostomy tube after at least 1 week, training for parents and caregivers should be increased. Meet with the social worker at this time to coordinate training schedules, prepare an equipment list for home care companies, arrange rooming-in requirements and target a discharge date. Ideally, we would like to be able to discharge the patient within 1 week of the surgeon's initial tracheostomy tube change or 2 weeks from the placement of the tracheostomy if that is the only apparent problem for the patient.

One of the first things to teach the parent is tracheostomy care and

changing the tracheostomy tube ties or commercially available securement device. Work toward having the caregiver perform with your help in holding the tracheostomy tube and the child. Once the parents are comfortable donning sterile gloves, the goal is to work toward independent suctioning of the tracheostomy tube. Since there is only one glove in the home suction kit, it is easy for the parents to know the difference between their clean suction catheter hand and their dirty hand, which will be the manual resuscitator hand. Until the parent is comfortable suctioning, the therapist will be the second person to manually ventilate. While suctioning, the parent should know when saline instillation is indicated, as this should not be done routinely. If the secretions are thick upon suctioning, encourage saline instillation until the secretions are easily removed by the suction catheter. Always tell the parent that the last time they pass the catheter will be a dry pass. While suctioning, it is important to show the parent proper use of the manual resuscitation bag. Show the parents/caregiver how to check for bag function (including the pressure pop-off), how to ventilate the child and to look for chest rise. Chest rise is the most important thing to emphasize.

If the patient is to receive some form of therapy, medication treatments or chest physiotherapy, now is the time to stress the importance of this. Parents should be shown the medications, dosage, and frequency of therapy. This would be a good time to coordinate with the nursing staff and create a medication therapy schedule or chart to hang at the patient's bedside.

Parents should be made aware that humidity is important for a tracheostomy patient because the child is no longer breathing through their mouth and nose. The mouth and nose usually warms and filters the air we breathe so we must do this for the child with a tracheostomy. Humidity should be used at least 12 hours per day or while the child is sleeping.

Continue working on the above technical and decision-making skills. Coordinate with social services a discharge planning meeting to occur dur-

Parents/caregivers should be taught how to assess their child's respiratory status and what signs or symptoms may indicate respiratory

ing this time to involve parents and all disciplines (social services, respiratory therapy, physical and occupational therapy, speech therapy, nutritionist, physicians and home care coordinators, nursing and durable medical equipment [DME] providers). Have a final equipment list prepared for the DME provider. Finalize rooming-in requirements (coordinate with the DME for delivery of their equipment and of their training needs) and set a discharge date.

Parents should be now ready to change out the tracheostomy tube. It is probably best to let them change the tracheostomy tube with your assistance. Teach the parents to gather all the equipment and prepare the new tracheostomy tube. Once equipment has been gathered and the tracheostomy tube change has been performed, the child should be monitored for color and/or respiratory distress. If there is ever any question about where the tube is, ventilate the patient and look for chest movement. If in doubt, remove the tube and replace it. Once the tracheostomy is in, the tracheostomy tube ties are fastened, the tube is suctioned as needed and the tracheostomy site cleaned. The primary caregiver should change the tracheostomy tube 3 times before discharge and the secondary caregiver should do the same at least once.

Parents/caregivers should be taught how to assess their child's respiratory status and what signs or

symptoms may indicate respiratory distress. If the child is experiencing signs of respiratory distress, the child may need to be ventilated and suctioned, the tube may need to be changed, a breathing treatment may be indicated, or the child may need to be transported to the hospital. Once parents have changed the tracheostomy tube at least once and can state or recognize signs of respiratory distress, begin teaching what to do in an emergency if the tube were to become plugged. Emergency tracheostomy tube procedures are probably the most important training the parents will receive. Review them daily with the parents/caregivers until the child is discharged. Caregivers need to be able to tell you what to do and do it without hesitation.

Once parents are comfortable with emergency tracheostomy procedures, you may begin teaching them CPR using a mannequin for practice. The hospital educator is responsible for teaching and checking off CPR skills. Always make them do the 4 steps in emergency tracheostomy procedures as their initials steps of CPR. It does absolutely no good to do compression if the airway is not patent.

Review the contents of the travel bag with parents and emphasize the importance of taking the bag everywhere the child goes. This should be a completely different bag than the diaper bag. Parents should be able to state the contents of the bag.

If the child is old enough to begin making sounds (usually 6-to-9 months), they should be considered for a speaking valve. Consult with ENT and speech therapy before placing the valve. (A physician order is necessary to use a valve.) Because it is a 1-way valve with the patient breathing in through the tracheostomy and out through the mouth there must be a leak present around the tracheostomy tube for air movement. Ideally we would like to place the valve in the hospital before the patient is discharged, but the patient can be brought in as an outpatient for valve placement.

Parents should be encouraged to treat the child as normally as possible. Parents may obtain hints for daily living from the reading materials, talking with other parents or children with a tracheostomy, or going online to Aar-

on's Tracheostomy Page, cited above.

Once you have insured that all training has been completed and documented, it is now time to send the baby home. Answer any questions the parent/caregivers may have or address any problems that may have arisen during rooming in. Contact the DME home therapist to make sure all equipment is in place and nothing else is needed. Work with the social worker, resident and nursing to write prescriptions for equipment and therapy. Review home nursing orders to ensure respiratory concerns are addressed. Congratulate the caregivers, wish them well and walk the patient and family to the door.

Securement and Decannulation of the Tracheostomy Tube

Three materials are used for securing the tracheostomy tube to the patient: cotton twill tape, commercially available Velcro® and felt (fabric) tracheostomy securement devices, and a beaded chain. An American Thoracic Society committee looking into the use of these three devices in children made the following observations.⁶

Cotton twill tape may trap moisture, becomes soiled frequently, may unravel, and subsequently irritate the skin. Velcro devices have less tendency to abrade the skin, as does twill tape. They are convenient and easily adjusted. One-person tie changes are easier with Velcro ties than with other tie materials (Figure 1). They are wider than cotton twill and chain, so they have less tendency to abrade the skin. They are easily adjusted and because of their padding material, should be quite comfortable. There is third party coverage for these securement devices. A stainless steel beaded chain is durable, does not trap moisture, and

maintains a constant tension. Any securement device is kept tight enough to allow slipping a finger between the neck and device material. The consensus was that the most important aspect of choosing a tracheostomy tie is how well the tie can be secured, rather than the material it is made from.⁶ While there does not seem to be any similar data available for tracheostomy securement in adults, these same principles should apply.

The removal of the tracheostomy tube is referred to as decannulation. This implies that it is the intention to not reinsert the tube, as is the case with a tube change. Because of equipment concerns and the potential for a need for emergency airway management, decannulation is usually not done at home.⁷ None of the references recommended home decannulation.

Special Tracheostomy Issues for Children

Like adults, children sometimes require placement of a tracheostomy when there is a need for a short term or permanent airway, or if there is a need for long-term invasive ventilation. The indications for tracheostomy in children differ from adult patients and are widespread. Of the 16 characteristic indications for pediatric tracheostomy, the most common are airway obstruction, need for airway protection due to aspiration or inability to manage secretions, evidence of subglottic stenosis, chronic lung disease patients requiring long term mechanical ventilation, and the presence of congenital abnormalities.⁸ Unlike adult patients who may be considered candidates for tracheostomy after approximately 1 week of invasive mechanical ventilation, children

are often not considered candidates for tracheostomy until much later in their course, with the exception of those with anatomic airway abnormalities. Davis indicated that the average time of tracheostomy insertion in children was at about 65 days following initial intubation; and is often longer in some cases.⁸ Despite the variation in length of time a tracheostomy is needed, about two-thirds of pediatric patients are eventually decannulated.⁸ Because of the unpredictable duration of pediatric tracheostomy, patients and families/caregivers begin preparations for transition to home as soon as feasibly possible.

Children often remain in the intensive or specialized care units until the first tracheostomy change is completed: around 5-7 days after insertion.¹ Close observation is required because a large number of pediatric tracheostomy tubes are small and uncuffed, and there is a greater chance for dislodgement or decannulation. It is recommended that specialized trained caregivers such as respiratory therapists or nurses trained in tracheostomy care assist the surgeon during the initial tracheostomy tube change, as described in the previous section.¹ Patients are typically transitioned to a lower level of care and an organized approach to patient and caregiver training begins.

Hospital stays for children with a tracheostomy vary amongst institutions. Some programs report length of stay at 5 to 472 hospital days while others are 14 to 280 days from initial admission.^{6,8} Causes for these variations are multifactorial. Proactively preparing the tracheostomy patient and family for discharge and care in the home setting is highly recommended.¹ Successful discharge planning programs have had positive outcomes if education initiatives were started before the initial surgery.¹ Because patient's medical issues, or family social concerns often create barriers and play a role in delaying discharge, attempts are made to keep caregivers on an education and training timeline. This allows time for home assessment, equipment selection, repetition of skills and retention of concepts presented.⁶ The need for nursing care in the home frequently contributes to a prolonged



Figure 1. Dale Tracheostomy Tube Holder (Pediatric)



Figure 1a. Dale Tracheostomy Tube Holder

hospital stay. Pediatric patients requiring home nursing care are on mechanical ventilators, have an unstable airway or have multiple complex medical needs in addition to tracheostomy care. In some cases, an average of 8-24 hours of nursing care may be granted based on these requirements.⁶ The level of nursing care varies based on degree of medical complexity, medical insurance benefits or state-based resources. Orchestrating these services is the greatest challenge and may consume a significant amount of time in this phase. In addition, complex training requirements and patient and family education require additional resources. Most importantly, coordinated care, streamlined education and training and shortened the length of stay from tracheostomy insertion to discharge are primary objectives of these programs.

In 2000, discharge planning programs for pediatric patients were initially created based on prior recommendations from the American Thoracic Society's Care of the Child with Chronic Tracheostomy.⁶ Since then, much attention has been focused on standardizing care of the pediatric tracheostomy patient prior to discharge. Graf et al attempted to emulate this by implementing a family education program for pediatric tracheostomy patients. The Texas Children's Hospital program reduced the length of stay following tracheostomy to a mean of 6.5 days following an educational program (5-114 days total length of stay).^{9,10} In 2012, the American Academy of Otolaryngology-Head and Neck Surgery created a clinical consensus statement to provide updated recommendations for pediatric and adult patients with a tracheostomy.¹ Some recommendations have been tested and have since become expectations of care for these patients. To prepare families or caregivers for caring for the pediatric tracheostomy patient at home, 2 caregivers are identified as soon as the decision is made to proceed with the procedure.⁶ Basic education is disseminated to caregivers via handouts, such as a specialized tracheostomy care booklets (or electronic versions if desired) as described above. Upon gradual completion of these compo-

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nents, the caregiver is tested to assess knowledge and competency. The most unique element of a pediatric discharge planning program is a requirement for families to "room in," or spend a 24-hour or other designated period of time taking care of the child independently as if they were in a home setting while having the ability to raise any final questions and calm their fears or uncertainties prior to discharge.

Pediatric tracheostomy patients are cared for by families and nurses in the home and monitored on a regular basis by respiratory therapists. Physicians assess the airway to determine if changes in airway size is necessary, make modifications in mechanical ventilator settings or verify the time for liberation from all components. If decannulation is being considered, the patient must be free of aspiration episodes, not require mechanical ventilator support, have completed a tracheostomy capping trial if appropriate, and have been evaluated by bronchoscopy within a few months of considering decannulation. Pediatric tracheostomy-ventilator clinics provide a vehicle to assess changes in the patient's condition and allows for further evaluation. Streamlining pedi-

atric tracheostomy care is an ongoing challenge and a unique opportunity to make a difference!

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they are commonly used in select patients in the United Kingdom (UK) and Europe.⁶⁻⁸ When a catheter is expected to be used indefinitely, it can be with the person for many years. In one study of 202 long-term catheter users, the mean duration of use was 6 years (SD 7) and the median was 3.25 years.⁹ Therefore, patients and their families need to learn how to manage the catheter between nurse visits.

Catheter Selection

For long-term catheter patients, the catheter type should be hydrophilic or coated with silicone.¹⁰ Pure silicone is not as pliable but it has a larger inner lumen which is of value for people with large amounts of sediment that blocks and causes frequent catheter changes. However, in one study, half the water evaporated within 3 weeks and 85% within 8 weeks.¹¹ This can cause the catheter to “slip down,” causing irritation to the opening of the bladder and/or leaking (bypassing of urine). Latex allergy is of concern to many with long-term catheters as this can develop gradually over time,¹² but latex softness can be of value. In one long-term care facility, the staff attempted to create a latex-free environment, but in doing so, they inadvertently contributed to penile erosion of the urethra in men newly using rigid silicone catheters.¹³

For short- or long-term catheter patients, the catheter should be the smallest size diameter that permits good urine flow.² This should be 12-16 Fr for men and 12-14 Fr for women. Children’s sizes can range from 5-6 Fr on newborns to 5-10 Fr on toddlers to children up to age 12.¹⁴ If a larger diameter was used to facilitate passage of blood clots, the size can be decreased by 2-4 Fr per catheter change until the optimal size is reached. Likewise, balloon sizes should be small, with 5- or 10-mL balloons, reserving the 30 mL only for bleeding episodes, usually postoperatively. Balloons of 2.5-5 mL can be used in children.¹⁴ Patients and their families should know the catheter and balloon size and the amount

Latex straps, which are used to hold the drainage bag in place on the leg, often twist and pull on the leg hair, and the latex can cause skin irritation or

of water instilled to promote continuity of care. In a study of 202 persons, 8% did not know their catheter size, and 23% did not know the balloon size.⁹

Catheter Securement

Patients who use long-term indwelling urinary catheters commonly use catheter securement devices to prevent urethral and bladder trauma and inadvertent catheter dislodgement. Post-hospitalization, securement is used to control postoperative bleeding or to protect a surgical anastomosis. Securing a catheter might also increase comfort and reduce CAUTI.¹⁵ Over time, traction of the catheter can cause erosion of the urethra, and in men this damage can spread to the length of the penis.¹⁵ Therefore, all long-term catheters should be secured—in women to the thigh and in men to the lower anterior abdomen or high on the thigh.¹⁴ Suprapubic catheters also should be secured. In a case report, a non-secured suprapubic catheter balloon made its way to the outside of the bladder and caused a urine-carrying fistula to the skin surface.¹⁶ Although nurses might say they believe catheter securement is desirable, they may not always do it. In a survey of 82 nurses, including 8 continence specialists, 98% indicated they favor catheter securement, but in a previous prevalence study, only 4% had secured their patients’ catheters.¹⁷

Catheter securement devices can be improvised or manufactured, in-

cluding adhesive and non-adhesive devices. (See Table 1. Catheter Securement Devices.) Improvised devices are made with adhesive tape, sometimes with safety pins and rubber bands; however, tape can be irritating to the skin and hard to apply and remove. An early randomized clinical trial (RCT)¹⁸ with 59 patients showed that the manufactured device is easier to apply and remove and can stay in place 2 days longer than tape.

Adhesive-backed devices are available and these are particularly useful in short-term catheter use or for individuals prone to dislodgement. However, adhesive-backed devices also can irritate the skin and cause pain when removed. This should be an important consideration for geriatric patients or others with fragile skin. When using adhesive-backed securement devices, alcohol-based or other special wipes need to be used for removal to decrease skin damage.




Most non-adhesive devices use a stretch band and a Velcro locking system to hold the catheter to the thigh. While these devices have adjustability and can even be used with large/obese patients, they still need to be used according to the manufacturer’s instructions to be sure that blood flow is not restricted. Latex straps, which are used to hold the drainage bag in place on the leg, often twist and pull on the leg hair, and the latex can cause skin irritation or allergy. Placing a thin cloth underneath the strap can minimize irritation. Nurses should instruct patients not to put any strap too tight and carefully monitor the skin condition, and this especially true for patients with peripheral vascular disease. Non-adhesive types also include holster-like devices hung from the waist or netting/cloth supporting bags,¹⁹ which can be ordered through urological supply companies online.

Drainage Bags




Urine drainage bags are available as leg bags, in sizes from 270-1000 mL,¹⁴ which permit more freedom in movement and travel. Large sized overnight bags (2000-4000 mL) are often used in the hospital or for people who are bedridden, e.g., at end of life. A “belly bag” has a 1000-mL capacity,

Table 1. Catheter securement devices

Adhesive devices

Manufacturer	Product		Advantage
Bard	StatLock® Foley Stabilization Device		Stable and easy to release catheter by opening the button
Dale Medical	Hold-n-Place® Adhesive Patch		Transparent and can be used up to 3 days; underlying skin is visible
Hollister	Horizontal Tube Attachment Device (HTAD)		Stable, and may be left in place up to 5 days

Non-adhesive devices

Manufacturer	Product		Advantage
Bard	Bard Catheter Leg Strap		Prevents skin irritation. Can be used for long-term catheterized patients. Are washable and can be reused. (Dale Medical has adjustable bands for very large patients)
Dale Medical	Hold-n-Place® Leg Band		
Posey	Posey Catheter Tube Holder Straps		

and clothing adjustments need to be considered. Since women do not stand to void, they might feel embarrassment in public toilet stalls as this bag is often emptied standing. This bag also is recommended only for people with normal bladder pressure (not those with flaccid bladders) as pressure is required for drainage.¹⁴

Privacy and covering the bags—even simply covering it with a bag or cloth—is important aesthetically and in promoting feelings of well-being.²⁰ Hand dexterity should be considered as some drainage ports are easier to use, such as ones that twist or flip open. The bag should be kept off the floor²² and below the bladder level,

but not more than about 12 inches to prevent excessive suction of the catheter eyes into the bladder mucosa. Connecting tubes can be used to attach the bag at the lower leg area and permit easier emptying, but regular attention is needed to prevent traction or twisting of the tubing in this position. Attaching a leg bag continuously

to the catheter and then adding a bag at night has not been studied, though some people advocate for this believing that the system is more “closed” this way.

Cleaning and reusing drainage bags, while not ordinarily recommended, is common practice in long-term catheter users in the U.S.; whereas changing it at least weekly is done in the U.K.²³ In a recent U.S. study, over half of the 202 long-term catheter users, cleaned and reused drainage bags, using simple household solutions such as soap and water or vinegar and water.⁹ If using a dilute bleach solution (1 part household bleach to 10 parts water),^{24,25} care is needed to avoid splashing on the eyes, skin, or clothing.

Sometimes the catheter bag can become discolored, bluish purple (purple urine bag syndrome [PUBS]) because of bacterial colonization and conversion to tryptophan which produces indigo (blue) or indirubin (red) color in the urine. This can be embarrassing, and it can be eliminated by treating the offending organism²⁶ or by changing the drainage bag when discoloration occurs.

Catheter Insertion

While there are no set guidelines for fixed intervals for catheter changes, other than for alleviating blocked urine flow or in relation to treatment for a UTI,² most catheters are changed about once a month. Some people need them to be changed more often if encrustation occurs after 2-3 weeks or it becomes hard to remove if left too long. For people without problems, the interval can be gradually increased to 6-8 weeks.²⁸ Careful observation of a pattern of “catheter life” to identify when it might block and then planning pre-emptively is advised.¹⁰

Inserting and removal of catheters in the home can be challenging because of working alone. For a trouble-free insertion, prepare all equipment ahead, including connecting the catheter to the drainage tubing. Use of sterile technique is required. Secure good lighting by moving lamps or asking a caregiver to hold a flashlight. Placing a female on her side can provide a better view of the urinary meatus, and it can minimize spasticity in

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the legs. For females after urine flows, insert 1-3 inches.¹⁴ Fill the balloon with sterile water, usually 7-8 mL in a 5-10-mL balloon. If the balloon is easily dislodged, such as with coughing, filling can be increased gradually to a maximum of 10-15 mL, depending on manufacturer guidelines. If the patient has a 30-mL balloon to control bleeding, do not fill it part way as it can fill asymmetrically and erode into the bladder.¹⁴ Decrease the size to a 5-10-mL balloon as soon as feasible.

For males, lubricate the catheter well by sliding the entire surface of the catheter through one hand with a lubricated sterile glove. Inflate the balloon when it has been inserted to the bifurcation, and then gently withdraw until resistance indicating that the balloon is in the bladder neck. If the catheter does not move in and out when gently moved, it can be “stuck” in the



Angle for catheter insertion, Male

urethra, and it should be removed and replaced as it can cause severe trauma to the urethra within a short period of time which can result in CAUTI and/or scarring. In one retrospective case review of catheter trauma in 6 boys (aged 1 month to 16 years), balloon inflation while in the urethra caused significant damage,²⁹ and lubrication and insertion to the bifurcation of the catheter was advised by the authors. If the catheter does not go in, spasticity at the entrance to the bladder can be the problem. Waiting, asking the patient to breathe deeply, and distraction (such as counting) can facilitate insertion. While removal of the catheter is usually not an issue, it can be, especially with suprapubic catheters which can develop a “deflation cuff” which interferes with easy removal, and is often painful. If this happens, the next time, after removing the water with a syringe, return about 1 mL water into the balloon. This will smooth out the cuff and make the removal easier.³⁰ Sometimes a balloon will not deflate, and this requires medical assistance as guide-wires can be used to break up crystals in the balloon.

Preventing Catheter Problems

The key catheter problems are CAUTI, blockage, leakage, and dislodgement.^{9,31} There are no proven methods to prevent these problems, and long-term catheterized patients will undoubtedly have bacteria in the urine,² often several flora which change over time.³²

Catheter Encrustations Causing Blockage or Leakage.

Although irrigations are not recommended, they are often used in practice.^{9,31} In one study of 202 catheter users, 42% irrigated, many of whom (18%) did so once or more daily.⁹ Irrigations will not decrease CAUTIs, and the encrustations and sediment usually persist because of urea splitting bacteria—particularly *Proteus mirabilis*—which increase pH and causes calcium, magnesium and phosphorus minerals to precipitate into the urine in what is usually called “sediment” (struvite and hydroxyapatite).³³ Unfortunately, a high pH (more alkaline) will persist as long as urea-splitting bacteria are present,³⁴ therefore,

an often suggested method to lower urine pH (acidify) with vitamin C is not likely to be of benefit. However, increased fluid intake can dilute the urine and sometimes helps in decreasing blockage and premature catheter replacement even when the pH is high because the pH point of mineral precipitation is not the same as the urine pH.³⁵ Bladder stones, often caused by the same minerals, need to be removed by cystoscopy, and if possible the offending organism should be eliminated through antibiotics. Nevertheless, bacteria living in biofilms and protected by a crystalline matrix are not easy to eradicate.³⁶ Some people, with healthcare provider approval, might be helped by taking cranberry juice tablets because it keeps bacteria from adhering to the bladder lining,³⁷ but research in catheterized patients is limited and evidence of cranberry juice efficacy in other populations is also unclear.³⁸ Moreover, the juice may be unacceptable to patients over long periods of time.³⁸

Leakage (bypassing of urine) can be minimized by proper positioning of the catheter so that traction is not pulling the balloon against the bladder opening, antispasmodic medication, and by treating constipation.³⁹ Smaller size catheters and balloons also cause less irritation to the bladder sphincter and thus less leakage.

Paying Attention.

There is some research indicating that paying attention to fluid intake and preventing accidental dislodgement can be of benefit.^{40,41,42}

Nurses can teach their patients to be more aware of their catheter position during transfers and instruct caregivers/family to keep the drainage bag from being run over by a wheel chair or pulled out when turning in bed. Noticing early signs of CAUTI could bring earlier treatment. Changes in the color or character of urine (odor, sediment) as well as malaise or weakness are the most common symptoms in long-term catheter patients.⁹ A pilot study teaching self-management, including optimal fluid intake and preventing dislodgement was effective, but further research is needed.^{41,42} Appropriate fluid intake levels vary, and while 30 mL/kg of body weight has been recommended,⁴³ what is right for

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an individual should be mutually determined with the patient and provider.

In conclusion, home care nurses often manage care for patients with indwelling urinary catheters, many of whom have the device for years. Knowing catheter-related best practices is essential for their patients' health.

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After reading these articles, the learner should be able to:

1. Identify correct catheter and balloon sizes for adults and children.
2. Describe different types of catheter securement.
3. List the indications for tracheostomy in adults and children.
4. Identify the issues concerning care of the tracheostomy and tracheostomy tube for the patient at home.

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 9. Faculty disclosures: No conflicts were disclosed.
- * Approval does not imply ANCC or endorsement of any product.

1. **Catheters for short-term use:**
 - a. Include silver oxide coated types.
 - b. Should not include use of coated latex catheters, such as those with PTFE coatings.
 - c. Are used with a closed system.
 - d. Are used for over 1 month.
2. **Long-term catheter users:**
 - a. Have persistent urinary retention and no other alternatives
 - b. Should irrigate the catheter to prevent CAUTI
 - c. Need to use a large size overnight bag and avoid leg bags to prevent bacteriuria
 - d. Are mostly people with severe incontinence
3. **Pure silicone catheters:**
 - a. Have a smaller internal lumen and thus promote better urine flow
 - b. Are softer than other catheter types
 - c. Have been known to contribute to erosion of the urethra in men
 - d. Can hold the water in the balloon longer than coated latex catheters
4. **Catheter securement:**
 - a. Is not likely to be of benefit because patients don't like it
 - b. Contributes to excessive latex allergy
 - c. Is expensive as the devices are single use and need to be changed daily
 - d. Can prevent urethral or bladder damage
5. **Drainage bags:**
 - a. Should never be covered
 - b. Are available in a wide range of sizes with different types of emptying ports
 - c. Evidence indicates that leg bags must be connected to overnight bags
 - d. Tend to turn purple because of environmental conditions
6. **When inserting a catheter in a male:**
 - a. Insert the catheter about 2 inches after urine is returned
 - b. Removed if resistance is met at any time
 - c. Inserted to the bifurcation
 - d. Use a minimum of lubricant which could be irritating to the urethra
7. **What percentage of tracheostomy patients has been reported as discharged to home with the tracheostomy in place?**
 - a. 12%
 - b. 28%
 - c. 41%
 - d. 53%
8. **What is a recommended tracheostomy tube cuff pressure?**
 - a. 10-15 mm Hg
 - b. 16-18 cm H₂O
 - c. 20-25 cm H₂O
 - d. 28-32 mm Hg
9. **Securement devices are commonly made of all of the following EXCEPT?**
 - a. Cloth adhesive tape
 - b. Cotton twill tape
 - c. Beaded chain
 - d. Fabric with Velcro
10. **Why are tracheostomy tubes in children more easily dislodged?**
 - a. The child moves a lot
 - b. The tube is uncuffed and small
 - c. Securement is difficult
 - d. Ventilator tubing pulling on the tracheostomy tube

Participant's Evaluation	Questions																																																																																																																								
<p>What is the highest degree you have earned (circle one) ?</p> <p style="text-align: center;">1. Diploma 2. Associate 3. Bachelor's 4. Master's 5. Doctorate</p> <p>Indicate to what degree you met the objectives for this program: Using 1 = strongly disagree to 6 = strongly agree rating scale. Please circle the number that best reflects the extent of your agreement to each statement.</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 10%; text-align: center;">Strongly Disagree</th> <th style="width: 10%;"></th> <th style="width: 10%;"></th> <th style="width: 10%;"></th> <th style="width: 10%; text-align: center;">Strongly Agree</th> </tr> </thead> <tbody> <tr> <td>1. 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