Transcatheter Aortic Valve Implantation: Alternative Access, Post Procedure Care

Site Applicability

PHC: Cardiac Surgery ICU (CSICU) and Cardiac Ward (5B)

Practice Level

RN: Advanced Skill

- Cardiac monitoring skills, critical care nursing skills required for immediate post-operative period.

Need to Know

Clinical Indication:

This guideline is intended for the care and management of patients who undergo Transcatheter aortic valve implantation (TAVI) using an alternative access approach.

- Aortic stenosis (AS) is a narrowing of the aortic valve orifice. Valve replacement is the treatment of choice of severe AS. Surgical aortic valve replacement using open-heart surgery technique is the established surgical approach.
- TAVI is a minimally invasive option that can be performed using a transfemoral approach (through the femoral artery) or alternative access approach (transapical, transaortic, trans-subclavian or axillary artery).
- An alternative access approach is used for patients who do not meet clinical criteria for the femoral approach such as small, tortuous or calcified iliofemoral vessels.
- The prosthetic aortic valve is delivered via an arterial sheath and is either placed within a native aortic valve or within a previously replaced aortic valve known as a valve-in-valve.
- Alternative access TAVI is performed in the operating room either under general anesthesia (GA) or awake with local anesthetic with sedation. The type of anesthesia will depend on clinical factors and which alternative access is used.
- Patients will recover in the CSICU for a minimum of 2 to 24 hours before transfer to 5B. This will depend on type of alternative access used, clinical factors and patient status.
- Staffing ratio on 5B as per usual care of post-operative surgical patients at 4:1.

ALTERNATIVE ACCESS APPROACHES

Apical	Access to the aortic valve is achieved through a small incision made at a left intercostal space with the pericardium being incised and opened near the left ventricular apex.
Subclavian/Axillary Artery	Access to the aortic valve is achieved through the left subclavian or axillary artery with an infra-clavicular incision.
Aortic	This approach uses a right mini-thoracotomy or upper partial sternotomy to directly access the distal ascending aorta.

Protocol

CSICU: POST-PROCEDURE

INITIAL NURSING ASSESSMENT	INTERVENTIONS
Immediately following patient's arrival into CSICU, assessment as per B-00-13-10025 - Cardiac Surgery Post Op Care If Epidural or Perineural Analgesia in place; assessment as per B-00-13-10003 – Epidural Analgesia or B-00-13-10033 - Perineural local Anesthesia Continuous Infusion Protocol. Assess all wound dressing and catheter sites: • Characteristics of any percutaneous sheath introducers in situ and/or procedural puncture sites • Determine whether sheath(s) and/or puncture sites are arterial or venous • Observe for signs of bleeding (blood at sites, swelling or palpable hematoma, bruising) • If chest tubes present; assessment as per BD-00-07-40011- Chest Tubes and Chest Drainage Systems: Patient Assessment and Interventions.	AV blocks are the most severe arrhythmia associated with TAVI. Monitor for conduction abnormalities; notify most responsible physician (MRP) if new onset AV block occurs Avoid opioids and sedative-hypnotics to minimize risk of delirium; refer to B-00-13-10025 - Cardiac Surgery Post Op Care

ONGOING NURSING ASSESSEMENT	INTERVENTIONS
Vital Signs: • **For transapical/transaortic:** Monitor VS Q15 min X 4, Q30 min X 2, Q1H until transfer • **For trans-subclavian/axillary approach:** Monitor VS Q15min X 4, Q30min X 2, Q1H x 4 hours then Q4 hourly until transfer. Neuro Assessment: • Monitor NVS Q1H X 4 and then Q4. Vascular Assessment: • Assess vascular access sites and extremities Q15min X 4, Q30min X 2; Q1H X 4, and then Q4 hourly until transfer. If Epidural or Perineural Analgesia in place; assessment as per B-00-13-10003 – Epidural Analgesia or B-00-13-10033 - Perineural local Anesthesia Continuous Infusion Protocol.. Physical assessment: • Q4H as per B-00-13-10025- Cardiac Surgery Post Op Care	Notify the cardiac surgeon, anesthesia or most responsible physician immediately if post-procedure assessment findings reveal: • Diminishing LOC, asymmetrical physical responses that are changes from baseline • Hemodynamic instability • New arrhythmias including AV block • Distant or muffled heart sounds • Labored respiratory efforts, increasing supplemental oxygen requirements, and/or asymmetrical chest expansion • Urine output less than 0.5 mL/kg/hour or urinary retention not responsive to nursing interventions • Active bleeding or expanding hematoma at any percutaneous sheath insertion and/or puncture site(s). If chest tubes present; follow removal criteria and guidelines as per B-00-12-10061– CSICU Chest Tube Removal Facilitate voiding by offering commode or urinal. If still unable to void after 6 hours of admission, notify the CSICU anesthetist

Criteria for Transfer to Cardiac Surgery ward

The following criteria must be met for patient transfer to 5B:

- Minimum of 2 to 24 hours of critical care monitoring (unless order written by surgeon for earlier transfer).
- Hemodynamic stability and SBP less than 140 mmHg (transapical or transaortic) or 160 mmHg (trans-subclavian/axillary)
- Absence of new conduction delay
- Physician's agreement that patient is safe for transfer to cardiac surgery ward

CARDIAC SURGERY WARD POST-PROCEDURE

INITIAL and ONGOING NURSING ASSESSEMENT	INTERVENTION
Upon admission; assessment as per B-00-13-10096 – Physical Assessment of patient on a Cardiac Ward and B-00-13-10011 – Cardiac Monitoring. • Cardiac rhythm- print and analyze Q4H • Monitor for conduction abnormalities If Epidural or Perineural Analgesia in place; assessment as per B-00-13-10003 – Epidural Analgesia or B-00-13-10033 - Perineural local Anesthesia Continuous Infusion Protocol. Neurological Status: (GCS, Cincinnati Stroke Scale) • On admission and then Q4H x 24HRS, then TID and PRN • Ask patient to smile; inspect for facial symmetry or changes from baseline • Note speech characteristics; look for slurring • Ask patient to raise arms and grip; screen for asymmetrical weakness/numbness Vascular Access Site: • On admission and then Q4H x 24HRS, then TID and PRN • Observe for signs of bleeding(blood at vascular access sites, swelling and palpable hematoma, bruising) • **Limb Perfusion:** colour, warmth, movement. sensation; palpable peripheral pulses (or use Doppler) Genitourinary: • Recording urine output for at least 24 hours	Notify Nurse Practitioner (NP) or most responsible Physician (MRP) immediately if assessment findings reveal: • Diminishing LOC, asymmetrical physical responses that are changes from baseline * Follow Code Stroke Protocol if stroke is suspected. • Hemodynamic instability or SBP greater than 140 mm Hg (transapical or transaortic) • Arrhythmias including AV block • Decreasing QRS amplitude • Distant or muffled heart sounds • Labored respiratory efforts, increasing supplemental oxygen requirements, and/or asymmetrical chest expansion • Active bleeding or expanding hematoma at any percutaneous sheath insertion and/or puncture site(s) • Signs of diminished peripheral circulation or limb ischemia (e.g. diminished pulse strength, cool skin, pale/dusky skin pallor, new sensory changes such as numbness and tingling) If bleeding and/or hematoma occurs after hemostasis achieved: • Apply manual pressure 1 to 2 cm above skin puncture site for 15 minutes. If bleeding stops, continue bed rest as ordered. • If bleeding does not stop- notify MRP/NP If signs/symptoms of urinary retention, perform bladder scan (see B-00-12-10100 – Bladder Scanner)

Post-Procedure Clinical Pathway

	0 to 6 hours	6 to 12 hours	12 to 18 hours	18 to 24 hours	24 to 36 hours
Goals	Promote early mobilization Consider removal of all invasive lines if clinically stable		Ambulation		
	Transfer out of critical care as soon as clinically indicated. Consider transfer POD 0 evening or early POD 1 (complete form NF384 and fax to 5B). This may be dependent on which alternative access was used.				
Cardiac Monitoring	Vital signs and telemetry as per Cardiac Surgery: Post-Operative Care Protocol	Vital signs per Physical Assessment of patient on a Cardiac Ward Cardiac monitoring for 5 days or until discharge: Class 1 x 72 hours; Class II until POD 5 or discharge.			
Pain/Discomfort	Provide pain management per nursing assessment and keep patient reported pain score less than 3.				
Respiratory	Extubated in operating room. Or, if still intubated; plan to extubate within 1 to 2 hours as per mechanical ventilation protocol.	O_2 therapy to maintain oxygen saturation above 92 % in patients without COPD Aim to discontinue O_2 therapy after 24 hours			
Activity	Encourage patient to sit up/dangle patient (if sheaths removed and hemostasis achieved) if hemodynamically stable. *Subclavian/axillary access: mobilization within 3 to 4 hours.	Transfer to chair or commode. Mobilize short distance in room.	Up in chair frequently and for meals Mobilize/ambulate frequently (at least every 4 hours) during daytime Encourage self-care behaviour Facilitate uninterrupted rest/sleep and return to diurnal cycle.		

	0 to 6 hours	6 to 12 hours	12 to 18 hours	18 to 24 hours	24 to 36 hours
Central lines and Arterial lines	Monitor arterial line and CVC per unit/nursing standard. If no evidence of heart block or cardiac arrhythmias, and hemodynamically stable; consider (in discussion with physician) removal of central and arterial lines. *** Subclavian/axillary access**; consider removal within 2 to 4 hours of admission to CSICU. Once drinking, saline lock and maintain peripheral IV		Saline lock and maintain peripheral IV		
Chest tube	Chest tube must be in minimum 6 hours (as per protocol) *check with MD.* Consider chest tube removal if criteria met (to promote comfort and mobility)		No chest tube removal between 1700 and 0700 hours (unless ordered by the surgeon).		
Arterial/Venous Sheaths	If arterial and/or venous sheaths in situ and not being used hemodynamics are stable: discontinuous in order to promote mobility as per: SPH: B-00-13-10063 - Cardiac Cath Lab: Post Procedure.	Observe for signs of bleeding (blood at vascular access sites, swelling and palpable hematoma, bruising)			

<table>
<tr><th></th><th>0-6 hours</th><th>6-12 hours</th><th>12-18 hours</th><th>18-24 hours</th><th>24-36 hours</th></tr>
<tr><td>Elimination:

Voiding

Urinary Catheter</td><td colspan="5">Avoid indwelling catheter to reduce complications; To promote elimination, assess hydration status and monitor for signs of dehydration
(e.g. decreased urinary output, concentrated urine, dry mouth, thirst, headache)</td></tr>
<tr><td></td><td>Facilitate voiding within 4 hours of end of procedure. If unable to void and expressing discomfort:

If signs/symptoms of urinary retention, perform bladder scan (see B-00-12-10100 for directions)</td><td colspan="4">Mobilize to commode and/or washroom with assistance
For men, consider facilitating voiding in standing position</td></tr>
<tr><td></td><td colspan="2">If procedural urinary catheter in situ: when urine output greater than 30 mL/hour for 6 hours, remove urinary catheter (do not interrupt sleep to D/C catheter; remove by 2200 POD 0 or 0700 POD 1, at the latest)</td><td colspan="3"></td></tr>
<tr><td>Diet/Nutrition and Hydration</td><td>Keep NPO until clinically stable and then encourage PO intake.</td><td>Encourage PO intake
Up in chair for meals</td><td colspan="3">Continue to assess hydration status. Encourage nutritional intake and preferred foods.</td></tr>
<tr><td>Patient Teaching</td><td colspan="5">Provide ongoing patient teaching
• Reconditioning interventions (set mobilization goals, importance of early mobilization)
• Pain management and management modality
• Deep breathing and coughing
• Initiate “Discharge Guidelines Transcatheter Heart Valve Patients” checklist</td></tr>
</table>

Discharge Planning

Confirm discharge plan with patient and family Refer to pre-admission planning, and client's baseline prior to procedure	Assess readiness for discharge Communicate anticipated challenges with MRP Review TAVI: Alternative Access Approach pamphlet and discharge guidelines with patient/family (received prior to procedure) At time of discharge ensure patient has: • Discharge instructions • Prescriptions and/or lab requisitions

Documentation

Document all assessments, interventions and outcomes on:

- Critical Care 24 hour Flow sheet
- Nurse's notes
- Medication Administration Record
- ECG Flow sheet
- Heart Centre Care Map
- CSICU Assessment Record
- Patient transfer report form
- Vital Signs (MEWS) Flowsheet
- 5 A/B Physical Assessment Flowsheet (MEWS)
- Discharge Guidelines Transcatheter Heart Valve Patient

Related Documents

1. B-00-13-10025- Cardiac Surgery Post Op Care
2. B-00-13-10003– Epidural Analgesia or
3. B-00-13-10033 - Perineural Local Anesthesia Protocol
4. BD-00-07-40011 - Chest Tubes and Chest Drainage Systems: Patient Assessment and Interventions
5. B-00-12-10061– CSICU Chest Tube Removal
6. B-00-13-10096– Physical Assessment of patient on a Cardiac Ward
7. B-00-13-10011 – Cardiac Monitoring
8. B-00-12-10100 – Bladder Scanner
9. BD-00-12-40065 - Transfemoral, Transcatheter Aortic Valve Implementation, Post procedure care

References

1. Kolkailah, A. A., Hirji, S. A., Ejiofor, J. I., Ramirez Del Val, F., Lee, J., Norman, A. V., ... & Nyman, C. B. (2018). Novel fast-track recovery protocol for alternative access transcatheter aortic valve replacement: application to non-femoral approaches. *Interactive cardiovascular and thoracic surgery*, *26*(6), 938-943.
2. Papadopoulos, N., Ahmad, A. E. S., Thudt, M., Fichtlscherer, S., Meybohm, P., Reyher, C., ... & Zierer, A. (2016). Successful fast track protocol implementation for patients undergoing transapical transcatheter aortic valve implantation. *Journal of cardiothoracic surgery*, *11*(1), 55.
3. Sidebotham, F., McKee, A., Gillham, M., Levy. (2007). Cardiothoracic Critical Care. Philadelphia: Butterworth-Heinemann.
4. St. André, A., DelRossi, A. (2005). Hemodynamic management of patients in the first 24 hours after cardiac surgery. Critical Care Medicine, 33(9): 2082-2093.
5. Urden Linda D,Stacy Kathleen M, Lough Mary E. (2010) Critical Care Nursing Diagnosis and Management 5 th ed, St Louis Missouri: Mosby Elsevier.
6. Wiegard Lynne-McHale, D.J., Carlson, K.K. (Ed) (2016) AACN Procedure Manual for Critical Care. 7th Ed. Philadelphia: W.B. Saunders company.

Persons/Groups Consulted

Interventional Cardiologists
Cardiac Surgeon
Nurse Educator CSICU
Nurse Educator 5B
5B CNLs
CSICU CNLs
5B NPs

Developed by

Clinical Nurse Specialist, Heart Rhythm and Transcatheter Heart Valve Program

Effective Date:	12-FEB-2019
Posted Date:	12-FEB-2019
Last Revised:	
Approved By:	PHC
	Professional Practice Standards Committee
Owners:	PHC
	Cardiology