

Protocol 13 · Sternal wound infection and post-sternotomy mediastinitis

Evidence position: **Guarded** · Source: NPWT Evidence Library, www.wondsortg.co.za/NPWT.html, content as at 2026-10-04

Indication

Sternal wound infection and post-sternotomy mediastinitis.

Evidence position: Guarded. No high- or moderate-certainty trial in sternal wounds; the two largest prophylaxis trials were null.

What this means

A sternotomy is the cut through the breastbone used for heart surgery. If it becomes deeply infected, the infection reaches the space around the heart (mediastinitis), which is life-threatening. NPWT is the method of choice for managing the open infected sternal wound after debridement, stabilising the chest, removing fluid and preparing the bed for closure with a muscle flap. A closed-incision device can also be used to prevent infection over a high-risk sternotomy closure, for example in an obese patient.

Why NPWT is used here

No high- or moderate-certainty trial has been done in sternal wounds, so the evidence position is Guarded. In 150 obese cardiac patients, a closed-incision device cut sternotomy infection from 16 to 4 percent. A South African case closed an infected post-valve sternal wound as an outpatient with NPWT plus mechanical skin creep. Where the bed is heavily contaminated, instillation before flap closure shortened time to closure and drain duration in a 30-patient comparison.

Patient selection

- Deep sternal wound infection or mediastinitis after cardiac surgery, after surgical debridement, in a patient who is haemodynamically stable.
- The heart, great vessels and any bypass grafts can be protected by a barrier layer; the surgeon has confirmed the sternum is stable or has been re-wired.
- Prevention: a closed-incision device over the sternotomy in a high-risk patient (obesity, diabetes, bilateral internal mammary artery harvest, re-operation).
- Post-flap: a closed-incision device over the closed flap incision.

For all NPWT

- The patient must be compliant and compos mentis: able to understand what the device does, keep the seal, protect the tubing and pump, report bleeding, pain or alarms, and attend or receive dressing changes.
- The patient's circle of care must be included: family, carers, home-nursing service or ward team, whoever will be present when the seal fails at night. Document who was told what and who is responsible for the device between visits.

Contraindications

Specific to this indication

- Haemodynamic instability.
- Exposed heart, great vessels or bypass grafts with no protection: the open sternum with exposed vulnerable structures is not an indication.
- Uncontrolled bleeding or a suspected bleeding vessel graft.

For all NPWT: do not apply if

- Active bleeding beyond capillary ooze. Stop it first; NPWT does not control bleeding.
- An uncorrected clotting disorder.
- An exposed vessel, graft, anastomosis, organ or nerve with no barrier between it and the foam.
- Dead tissue not yet debrided, untreated bone infection, or cancer in the wound bed.

Proceed with caution and record the decision

- Blood thinners: a caution, not a bar. Lowest effective pressure, barrier over any vessel, inspect at every change, record the decision.
- Pacemaker or defibrillator: the pump of the canister-free single-use device (PICO) holds a magnet. Keep it 10 to 15 cm from the device, away from the chest, and record where it sits.
- Fragile surrounding skin or adhesive allergy. Children: no NPWT system was cleared for them as at 2011; treat as a hard limit unless current labelling says otherwise.

Potential risks and side-effects

- Cardiac rupture under suction: the origin of the rule to always interpose a layer. In the animal study, rupture occurred at minus 120 mmHg over an unprotected heart and a soft paraffin layer alone did not protect; a rigid barrier did.
- Bleeding from a vessel graft against the foam. Two patients bled even with PVA foam correctly placed; the barrier reduces but does not remove the risk.
- A cardiac series claiming less mediastinitis but no change in superficial infection fails a mechanism test; do not quote it for effect.
- Bleeding: the serious harm. All six deaths in the regulator's first two-year series, and nine of twelve overall, were bleeds in patients whose bleeding risk had been missed (12 deaths, 174 injuries).
- Skin blistering: about 3.5 times more likely than with an ordinary dressing (risk ratio 3.55, 95% CI 1.43 to 8.77).

- Pain at changes (pre-medicate; soak a stuck sponge with saline) and anxiety in the first days, which settles. Say so beforehand.
- Retained foam, the regulator's commonest injury: count every piece in and out, and never cut foam over the wound. Adhesive damage to skin.

Treatment protocol

Open sternal wound: pressure	Minus 75 to minus 100 mmHg continuous once the barrier is in place: the heart, great vessels and bypass grafts lie beneath, and this library's setting is minus 100 mmHg or less over vessels and grafts (reasons in protocol 1). Minus 100 is a ceiling.
Barrier	A rigid or semi-rigid protective layer over the heart and grafts (a fenestrated silicone sheet or purpose-made disc), preferred over a soft paraffin layer alone.
Interface	Black foam above the barrier, between the sternal edges. Count and record every piece.
Change interval	Every 48 to 72 hours, in theatre while the mediastinum is open.
Instillation; prevention	Heavily contaminated bed before flap: minus 125 mmHg, Dakin's or saline, 10 to 20 minute dwell, 2 hours suction (protocol 11). Prevention or post-flap: closed-incision device at its own pressure, six to seven days (protocol 3).

Step by step

1. Debride in theatre, culture, and confirm haemostasis. Involve cardiothoracic surgery for sternal stability.
2. Lay the protective barrier over the heart and grafts so no foam can reach them; check its edges are tucked under the sternal margins.
3. Place foam above the barrier. Seal. Set the pressure. Confirm draw-down and watch the canister for blood over the first hours.
4. Change in theatre every 48 to 72 hours; re-debride as needed. Watch the haemoglobin, not only the canister.
5. When the bed is clean and granulating, plan flap closure (pectoralis or omentum) with plastic or cardiothoracic surgery, and apply a closed-incision device over the flap incision.

When to stop and call for help

- Fresh bleeding into the canister or dressing: pump off, pressure on, call the surgeon.
- New or rising pain, spreading redness, fever or a foul smell: review the same day.
- A seal that cannot be held for more than two hours.
- No progress at four weeks: stop and re-plan.

Outcome measures

- Days from debridement to definitive flap closure.
- Bleeding events with volume and action.
- Sternal stability and re-infection at 30 days and three months.
- Length of ICU and hospital stay.
- For prevention: deep sternal wound infection at 30 and 90 days, superficial infection recorded separately.

What to document at every change

- Indication; which contraindications were checked and excluded.
- Pressure, mode, interface, and the number of foam pieces placed and removed.
- Wound length, width and depth, a dated photograph, exudate, any bleeding, and the pain score.
- The planned review date and the endpoint (closure, graft or flap).

A point worth knowing

Manufacturer meta-analyses exist for the sternum and each sponsor's synthesis favours its own product. No device-superiority claim is supportable in either direction, and no dollar figure from them should be shown to a funder. Cite the independent guideline and trial evidence instead.

Funding note (South Africa)

ICD-10: T81.4 (lead) or T81.3. **PMB:** Via the cardiac-surgery emergency; life-threatening, 48-hour decision.

References

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