


Developed in collaboration with the Wound Care Clinicians from: 	
TITLE	Guideline: Assessment & Treatment of Surgical Wounds Healing by Primary and Secondary Intention in Adults & Children
Practice Level	<ul style="list-style-type: none"> • Nurses in accordance with health authority / agency policy. • Clients with surgical wounds require an interprofessional approach to provide comprehensive, evidence-based assessment and treatment. This clinical practice guideline focuses solely on the role on the nurse, as one member of the interprofessional team providing care to these clients.
Background	<ul style="list-style-type: none"> • Surgical wounds normally heal by primary intention or closure using sutures, staples or tapes. • Sutures and staples should be left in place long enough to ensure there is sufficient tissue strength to hold the incision together without support. Timing of suture and staple removal varies based on the stage of healing and the location and extent of the incision. However, sutures left in too long can cause scarring and infection. • Wounds may heal by secondary intention if there is a risk of severe contamination or if tissue loss is such that skin edges cannot be approximated. • Surgical wounds left to heal by secondary intention have a healing pattern similar to chronic wounds and healing is evaluated using similar criteria. • Wounds may also heal by delayed primary intention when there is a known risk of infection or the client's condition prevents primary closure, e.g. edema at the site. • Surgical wounds are classified as clean, clean-contaminated, contaminated and dirty-infected. • Surgical site infections (SSI): <ul style="list-style-type: none"> ○ Are the 3rd leading cause of hospital-acquired infections in Canada. ○ Can be classified as superficial (skin & subcutaneous tissue), deep (muscle & fascia) or involving organs / spaces that were opened or manipulated during surgery. ○ Can occur up to 30 days following surgery without an implant or up to 1 year if an implant has been inserted. ○ Factors associated with an increased risk of SSI include other infections not related to the surgical site, diabetes, smoking, systemic steroid use, obesity, advanced age, poor nutritional status and peri-operative transfusion of certain blood products. • 1 – 3% of clients with surgical site infections experience wound dehiscence. <ul style="list-style-type: none"> ○ Dehiscence occurs more often following procedures for colon diseases, peptic ulcer disease and emergency laparotomy. ○ Risk factors for dehiscence include age (≥ 65), systemic and local wound infection, obesity, steroid use, hemodynamic instability, and protein malnutrition. ○ Most dehiscence occurs 4 – 14 days following surgery when collagen fibers are not strong enough to hold the incision together without sutures or staples. ○ The first indications of dehiscence may be a gaping wound, change in wound contour, a sudden pulling pain; viscera visible at the skin surface, abnormal serous or sero-sanguineous discharge, or tachycardia. Complete dehiscence leads to evisceration. • The general principles of wound healing and wound management are relevant for surgical wounds.
Indications / Contraindications	Use this guideline for children and adult clients with surgical wounds healing by primary, secondary or delayed primary intention.
Definitions	Acute inflammatory response – A normal tissue reaction to injury that may include pain, swelling, itching, redness, heat, and loss of function at the site of injury; involves dilation of blood vessels and consequent leakage of fluid, causing edema; leukocytic exudation; and release of plasma proteases and vasoactive amines such as histamine that

	<p>stimulate healing.</p> <p>Aseptic Technique - the purposeful prevention of the transfer of microorganisms from one person to another by keeping the microbe count to a minimum and for assuring that cross-contamination does not occur. The technique chosen is based on dressing procedure, client setting and agency policy:</p> <ul style="list-style-type: none"> ○ Sterile Technique – the use of sterile gloves, field, tray, instruments solutions and dressings ○ No Touch Technique – the use of clean gloves and sterile field, tray, instruments, solutions; sterile instruments are used for direct contact with the wound; dressings are to be sterile ○ Clean Technique – the use of sterile solutions, clean gloves and clean dressings <p>Clean wounds - An uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or urinary tracts are not entered; wounds heal by primary intention and, if necessary, are drained using closed drainage, e.g. Penrose or Hemovac drain (See Appendix A).</p> <p>Clean-contaminated wounds – Wounds in which the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions and without unusual contamination; involves the biliary tract, appendix, vagina, and oropharynx; there is no evidence of infection or a major break in technique.</p> <p>Contaminated wounds – Open, fresh, surgical wounds involving major breaks in sterile technique or gross spillage from the GI tract; incisions in which acute, non-purulent inflammation occurs are included in this category.</p> <p>Dehiscence – Separation of the layers of a surgical incision or rupture of a wound closure.</p> <p>Delayed primary closure – The wound is initially left open and the wound edges are closed after approximately 4 – 6 days before granulation tissue is present; used most often with dirty-infected wounds.</p> <p>Dirty-infected wounds – Wounds that retain devitalized tissue or involve preoperative infection or perforated viscera, e.g. drainage of abscess or fecal peritonitis; the organisms causing postoperative infection may be present in the operative field before surgery.</p> <p>Dysreflexia - A syndrome affecting persons with a spinal cord lesion above the mid-thoracic level; characterized by hypertension, bradycardia, severe headaches, pallor below and flushing above the cord lesions, and convulsions; is caused by simultaneous sympathetic and parasympathetic activity; may occur with bowel or bladder distension, pain or pressure ulcers.</p> <p>Eschar - Devitalized tissue caused by cell death; is commonly black but may be other colors; it is typically thick and leathery, must be removed before healing can occur; if eschar is dry and stable it is often left intact in non healable wounds.</p> <p>Evisceration – The separation of a surgical incision typically caused by wound dehiscence, with the protrusion of abdominal organs through the wound layers.</p> <p>Healing ridge - A normal part of the healing process; an area of swelling and hardness under the incision line indicating deposition of new collagen in the wound; starts post-op day 2- 4, and should cover the entire incision line by post op day 5 - 9; softens and flattens 2-3 weeks following surgery and resolves 5 - 6 weeks following surgery; lack of a healing ridge can lead to wound dehiscence or infection.</p> <p>Primary intention – Wound margins are approximated with sutures, tape or staples and wounds heal without the need for granulation.</p> <p>Secondary intention –Surgical closure is not possible and wounds must heal by granulation.</p> <p>Superficial surgical site infection – Occurs within 30 days of the operation; involves only the skin and subcutaneous tissues of the incision and has at least one sign or symptom of a surgical site infection (See page 3).</p> <p>Deep surgical site infection – Occurs within 30 days of the operation if no implant is in place or within 1 year if an implant is in place; involves the fascial and muscle layers of the incision and has at least one sign or symptom of a surgical site infection (See page 3).</p>
<p>Related Documents</p>	<p>Guideline Summary: Surgical Wounds</p>

Assessment and Determination of Treatment Goals

Assessment

To develop a comprehensive plan of care and determine treatment goals, assess the following:

1. Client Concerns:
 - a. Client's level of understanding about the wound, healability and risk factors.
 - b. Impact of the wound on client's daily life and body image.
 - c. Social and financial concerns and availability of support systems to address concerns.
 - d. Emotional, cognitive, behavioural or mental health concerns and availability of support systems to address concerns.
 - e. Quality of life issues that could impact treatment.
 - f. Impact of client's current environment on client care.
 - g. Client / family preferences for treatment of the wound / risk factors and the goals of care.
 - h. Client and family ability and motivation to comprehend and adhere to the treatment plan.

2. Risk Factors for Delayed Healability:
 - a. Impaired nutritional status
 - i. Poor glycemic control, low body weight, obesity, unplanned weight loss, appetite changes, cachexia, dehydration and edema.
 - ii. Adequacy of nutritional intake including % of intake at meals, protein / calorie¹ intake and fluid intake.
 - iii. Possible causes of poor intake, e.g. difficulty swallowing or poor dentition.
 - iv. Assess renal function if increased protein intake is indicated for the client.
 - b. Surgery lasting longer than 2 hours and/or excessive blood loss during surgery.
 - c. Medical conditions, e.g. anemia, cancer / radiation treatment, CAD, CHF, diabetes mellitus, hypotension, autoimmune diseases, renal disease, and jaundice.
 - d. Oxygenation status of the skin and underlying tissues, e.g. COPD, CHF anemia.
 - e. Lifestyle factors that interfere with healing, such as smoking (& motivation to quit), poor hygiene and substance use.
 - f. Advanced age.
 - g. Poor mobility / physical activity.
 - h. Medications that interfere with wound healing, e.g. NSAIDs, antineoplastics, systemic corticosteroids, anticoagulants.

3. Pain
 - a. Type, location, frequency and quality of pain at the wound site or as a result of treatment.
 - b. Pain severity using client self report, observation of non verbal cues and/or a pain scale, e.g. Wong Baker FACES Scale, Visual Analog Scale.
 - c. Onset & duration of pain, and precipitating / alleviating factors.
 - d. Impact of pain on function, sleep and mood.
 - e. Autonomic dysreflexia and/or increased spasticity in clients with a spinal cord injury
 - f. Current analgesic regimen and effectiveness.

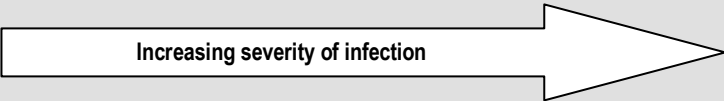
4. Lower Limb Assessment (link to Lower Limb Assessment DST).
 - a. If there is a wound on the lower extremities complete a lower leg assessment.

5. Assessment for wound healing by primary intention
 - a. Location of incision.

¹ Wound healing is impaired in clients with an albumin of less than 35 g/l or a pre-albumin of less than 180 mg / L (female) or less than 215 mg / L (male).

- b. Length of incision.
 - c. Closure methods, e.g. sutures, staples, tape, steri-strips or tissue adhesives.
 - d. Approximation of incision.
 - e. Presence of exudate and description.
 - f. Acute inflammatory response & edema; should be present 1 – 4 days following surgery.
 - g. Presence of the healing ridge; should be present 2 - 4 days following surgery.
 - h. Assess for signs of internal ² or external hemorrhage (hematoma) especially for surgery in the post nasal passages, lungs, spleen, liver, stomach & uterus.
 - i. Presence of drains (See Appendix A).
6. Assessment for wounds healing by secondary intention
- a. Location of wound(s).
 - b. Wound measurements and check for undermining, tunnelling or sinus tracts.
 - c. Wound(s) probing to bone.
 - d. Appearance of wound bed, noting percentage of tissue type.
 - e. Amount & type of exudate.
 - f. Presence of odour, after cleansing.
 - g. Description of wound edge and peri-wound skin.
7. Surgical Site Infection (SSI)
- a. Primary Intention - for several days following surgery monitor for:
 - i. Localized swelling, inflammation / erythema and heat in surrounding tissues (Superficial SSI).
 - ii. Pain or tenderness that is present or increases (Superficial or Deep SSI).
 - iii. Hemopurulent or seropurulent drainage from the wound, especially foul smelling drainage or pus 48 hours following surgery (Superficial or Deep SSI).
 - iv. Presence of an abscess or breakdown at the incision site (Deep SSI).
 - v. Unexplained increase in white cell count or signs of sepsis (Deep SSI)
 - vi. Purulent drainage from a drain (Deep SSI).
 - vii. Fever and/or spontaneous dehiscence (Deep SSI).

b. Secondary Intention

Clinical Signs and Symptoms of Wound Infection		
		
Increased Bacterial Bioburden	Localized Infection	Systemic Infection
Non-healing (minimal change in wound measurements after 3 weeks of care)	Onset of wound pain or increasing pain	General malaise (predominantly in clients who are elderly, immunocompromised & children)
Non-granulation tissue (pink to bright red non-pebbly tissue)	Peri wound induration greater than/equal to 2cm	Fever (may be muted in clients who are elderly or immunocompromised)
Friable or hypergranulation tissue	Peri wound erythema greater than/equal to 2cm	Rigor / chills

² Signs and symptoms of internal hemorrhage may include low blood pressure, rapid shallow breathing, rapid weak pulse, cold clammy skin and dizziness.

New areas of necrotic slough	Increased peri wound warmth	Change in behaviour or cognition (especially in elderly clients)
Increased amount of exudate	Increased wound size and / or the development of sinus tracts and / or satellite wounds	Unexplained high blood sugar (in clients who are diabetic)
Change in characteristics of exudate from watery and serous to purulent	Purulent exudate	Septic shock potentially leading to multi organ failure
Odour after wound cleansing	Increased dysreflexia / spasticity in clients with spinal cord injury	
	Wound that probes to bone	
3 or more of the following S & S are sufficient for a clinical diagnosis of potential or actual wound infection.		

Adapted from: Sibbald, G., et al. (2006). Increased bacterial burden and infection: The story of NERDS and STONES. *Advances in Skin and Wound Care*, 19(8): 158.

- c. If there are 3 or more signs and symptoms of an infection and the infection is not currently being treated, take a swab for culture and sensitivity (C & S)
 - d. Refer to a physician / NP if C & S results are abnormal.
8. Investigations (where these are available) based on the results from the assessments could include
- a. Measure ABI³ or refer to a wound care clinician for same if client has incision on the lower limbs and signs and symptoms of arterial compromise.
 - b. Albumin or pre-albumin testing if nutritional concerns are present.
 - c. HgA1c and blood glucose testing if client has diabetes.
 - d. Radiology studies to r/o osteomyelitis if the wound probes to bone.
9. Ensure an order is obtained for suture or staple removal.

Determination of Treatment Goal

1. Determine the treatment goal based on:
 - a. The client and family willingness and ability to participate in and adhere to the care plan.
 - b. The overall assessment findings.
 - c. The client's potential for healing (if the client is palliative or at the end of life)
 - d. Available resources and supplies.
2. Chose the appropriate treatment goal:
 - a. To Heal
 - b. To Maintain/Non-healable (wound is non-healable but is in a stable state; little or no deterioration)
 - c. To Maintain/Palliative (wound is deteriorating, e.g. Kennedy Terminal Ulcer)

³ Registered nurses must successfully complete additional education before carrying out ankle brachial pressure index testing. Agency / health authority policy and standards should be in place to support practice.

Interventions

Develop the plan of care, in conjunction with the client / family that addresses client concerns, treatment of risk factors, wound management, client education, discharge plans and intended and unintended outcomes.

Client Care Management

1. Client Concerns

- a. The plan of care should take into account client / family abilities, concerns, preferences and motivation for treatment.
- b. Refer to Social Work, if available for financial or psychosocial concerns and for emotional support and counselling as needed.

2. Risk Factors for Healability

- a. Nutritional Care:
 - i. Maximize the client's nutritional status through adequate calorie intake and high protein supplements, ⁴ if compatible with goals of care.
 - ii. Encourage 1500 – 2000 mL of fluid daily; offer fluids q 2 hr for all clients but especially those with dehydration, fever, vomiting, profuse sweating, diarrhea or heavily draining wounds, unless contraindicated.
 - iii. Reassess the need for protein supplements and additional fluids as the client's condition changes.
 - iv. Refer to the appropriate professional if client has difficulty swallowing or poor dentition.
 - v. Refer to a dietitian, if available, to determine the need for nutritional supplements and vitamin / mineral preparations if:
 - Nutritional risk factors exist (weight loss or poor intake) or albumin / pre albumin values are abnormal.
 - The wound is not healing.
 - The client is obese, has a low body weight and/or is dehydrated.
- b. Encourage client to monitor pre-existing illnesses such as stroke, peripheral vascular disease, diabetes mellitus, renal disease, or cardiac disease and consult a physician / NP if changes occur.
- c. Encourage client to take medication as prescribed.
- d. Support client to stop smoking and discuss referral to a smoking cessation program; refer for harm reduction / substance use management if client consents.
- e. Refer client to Physiotherapy to determine an appropriate mobility and exercise plan, if required.

3. Pain Relief

- a. If client has wound pain or treatment-related pain, organize care to coordinate with analgesic administration allowing sufficient time for the analgesic to take effect.
- b. Administer analgesic medication regularly and in the appropriate dose to control pain; refer the client to a physician / NP if pain is not well controlled.
- c. Refer to wound care clinician or physician / NP to determine need for a topical analgesic (e.g. morphine) or local anaesthetic (e.g. EMLA) if wound pain not well controlled.
- d. Encourage client to request a "time-out" during painful procedures.
- e. Use dressings that are less likely to cause pain & trauma on removal, e.g. non adherent dressings, and dressings which require less frequent changes.
- f. Encourage repositioning as a means to reduce pain; consider support devices to reduce pressure.

⁴ Clients with a surgical incision may receive 1.5 - 1.8 g of protein / kg of body weight per day based on client's assessed needs unless the client requires a protein restriction for an unrelated health concern.

- g. Reassess pain at regular intervals and note any increase in severity.
- h. When appropriate, use reassurance, music, distraction, conversation, or guided imagery to reduce pain during dressing changes.

Wound Care Management

1. A wound care clinician and / or physician / NP must be notified if wounds healing by secondary intention do not show signs of healing after 2-4 weeks of treatment or if the wound deteriorates.
2. The wound care clinician or physician / NP may consider other therapies including but not limited to negative pressure wound therapy, bio-debridement or electrical stimulation if the wound is not healing or is deteriorating
3. Refer client to a wound care clinician or physician / NP if wound is on the lower leg and eschar is present in the wound or if signs and symptoms of arterial compromise / venous insufficiency are evident. (Link to Lower Limb DST).
4. Dressing product selection is based on whether the wound heals by primary or secondary intention.
5. If client haemorrhages, notify physician / NP immediately or call 911 depending upon the care setting situation.
6. Abdominal wound dehiscence/evisceration:
 - a. Assess the client and the wound for the following signs and symptoms:
 - i. Bruising at the incision site
 - ii. Localized pain
 - iii. Incisional inflammation
 - iv. Incisional exudate
 - v. Peri-incisional skin breakdown
 - vi. Nausea and vomiting
 - b. If an abdominal wound eviscerates:
 - i. Place client in low fowler's position (less than/equal to 20 degrees) with the knees bent
 - ii. Cover any exposed tissues with a moistened dressing soaked in warm sterile normal saline to keep exposed tissues moist.
 - iii. Do not attempt to push exposed viscera back into the abdomen.
 - iv. Depending upon the care setting, call 911 or notify physician /NP immediately
 - v. Remain with the client to monitor for shock and vital signs until client is seen by a physician / NP or ambulance arrives.
7. Wound Treatment – Primary Intention
 - a. Use appropriate aseptic technique (based on client need, care setting and agency policy,) during a dressing change to prevent infection.
 - b. Unless otherwise indicated, the surgical dressing should remain in place for 48 hours; reinforce if breakthrough drainage occurs.
 - c. Monitor for incisional dehiscence; notify physician / NP or wound care clinician if dehiscence occurs.
 - d. After 48 hours, a dry sterile dressing may be reapplied if necessary depending on wound healing, the type of surgery, the comfort of the client with an exposed incision and agency policy.

8. Wound Treatment – Secondary Intention
 - a. Debridement
 - i. Autolytic debridement with moist interactive dressings is the recommended first line approach if necrotic slough is evident in the wound and circulation is not impaired if wound is on the lower extremity.
 - ii. If autolytic debridement is not effective within 1 week of treatment, refer to a wound care clinician or physician / NP to determine the need for other methods of debridement
 - b. Goal of treatment – Moist wound healing
 - i. Adhere rigidly to hand washing during dressing changes.
 - ii. Use appropriate aseptic technique (based on dressing procedure, care setting and agency policy) during the dressing change to prevent infection.
 - iii. Methods of wound cleansing / irrigating:
 1. Use body temperature sterile normal saline or water.
 2. Cleansing may be carried out with a squeezable normal saline or sterile water container intended for wound cleansing that is held 10 - 15cms (4 – 6 inches) from the wound.
 3. If wound irrigation is required, irrigate using a 30 – 35 mL syringe with either a wound irrigation tip catheter or an 18 - 19 gauge device.
 4. When irrigating the wound, use personal protective equipment to protect from back-splash.
 - iv. Loosely fill dead space without putting pressure on healing tissue
 - v. Keep the peri wound skin dry & intact; use skin sealants, protectants or moisture barriers as needed.
 - vi. Apply appropriate dressing that will maintain moisture balance within the wound and Protect the wound, especially during the final stages of healing
 - vii. Hydrate the surrounding skin with moisturizer as needed
 - viii. Dry or moist plain gauze, when used on wounds healing by secondary intention, does not promote moist wound healing and has been shown to result in higher infection rates.
 - c. Determine the dressing change frequency based upon the wound assessment including the client's risk for infection, the dressing product used to control the bacterial load, the effectiveness of the cover dressing to manage the amount of drainage anticipated and balanced with the need to minimize wound disturbance to allow for healing.
 - d. Reassess the wound at every dressing change and do a full wound reassessment as per the client's care plan.
9. Manage wound drains, if present. (See Appendix A for types of drains)
10. Wound Infection
 - a. Implement strategies to prevent infection, e.g. hand-washing, appropriate aseptic dressing technique.
 - b. Refer to a wound care clinician or physician / NP if signs and symptoms of infection are present and / or the wound probes to bone; any infection in a diabetic foot must be treated aggressively (Link to Diabetic Ulcer DST)
 - c. Use non-sensitizing broad spectrum antimicrobial dressings for wounds with significant bioburden.
 - d. Debride non viable tissue if not contraindicated using a debridement method that is appropriate to the wound.
11. Notify the wound care clinician or physician / NP if the following occur:
 - a. There is an acute onset of pain or increasing pain.
 - b. The client haemorrhages.
 - c. The wound dehisces.
 - d. The wound shows signs of infection.
 - e. The wound probes to bone if this is a new finding.

Client Education and Resources

1. Teach client and/or family the following prior to discharge and reinforce in the community if required:
 - a. Wound dressing technique if client / family caring for the wound.
 - b. The signs and symptoms of surgical site infection and who to contact if infection occurs.
 - c. To support the incision when changing position, coughing or sneezing and to avoid lifting for 6 weeks post-operatively.
 - d. To monitor for & recognize signs of dehiscence, including bruising at the wound site, localized pain, wound inflammation & exudate, skin breakdown around the wound area and nausea/vomiting.
 - e. Not to bathe for 48 hours post-operatively and after 48hr that a shower is preferable to bathing.
 - f. The benefits of smoking cessation if needed.
 - g. Strategies for improving nutrition, especially increasing protein and fluid intake.
2. Provide any written materials that will support / reinforce teaching.
3. Teach client / family about the roles of the interdisciplinary health team members in wound care.

Discharge Planning

1. Discharge planning should be initiated during the initial client encounter and should support timely discharge and optimal client independence.
2. If the client's care is being transferred across sectors (acute care, community care or residential care), ensure that the receiving site / facility is provided with a care plan that outlines the current client care and wound management strategies.

Client / Family Outcomes

1. Intended
 - a. Hemorrhage and dehiscence are not present in the incision / wound.
 - b. The incision / wound heals, if healing is the goal.
 - c. The incision / wound is infection free.
 - d. The client and family understand their role and participate in supporting incision / wound healing.
2. Unintended
 - a. The incision / wound haemorrhages, dehisces or eviscerates.
 - b. The incision / wound does not heal when healing is the goal.
 - c. The incision / wound shows sign and symptoms of infection.
 - d. The client and family do not understand their role or participate in supporting incision / wound healing.

Documentation

1. Document wound assessment with each dressing change as per agency guidelines.
2. Document clinical outcomes and care plan revisions, as necessary.

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Appendix A: Types of Acute Wound Drain Devices

Penrose Drain	<ul style="list-style-type: none"> • Soft tube that applies no suction. • Drain is held in place with safety pin. • Removed with a surgeon's order; may be pulled out in stages.
Jackson-Pratt Drain	<ul style="list-style-type: none"> • Portable self-contained unit that provides constant low pressure suction and collects drainage. • Drainage collection unit is shaped like a bulb • Used when small volumes of exudate (100 – 200 mL / 24 hours) are expected. • Drain is held in place with a suture. • Removed with a surgeon's order; usually when the drainage has decreased to less than 20cc in 24hrs
Hemovac Drain	<ul style="list-style-type: none"> • Portable self-contained unit that provides constant low pressure suction and collects drainage (similar to Jackson Pratt) • Used for larger amounts of exudate (up to 500 mL / 24 hours). • Drainage collection unit is shaped like a disc. • Drain is held in place with a suture. • Removed with a surgeon's order; usually when the drainage has decreased to less than 20cc in 24hrs