

Developed by the BC Provincial Nursing Skin and Wound Committee in collaboration with Wound Clinicians from:



<b>TITLE</b>	<b>Procedure: Swab for Culture &amp; Susceptibility (C &amp; S) in Suspected Wound Infection</b>
<b>Practice level</b>	<ul style="list-style-type: none"> <li>• Nurses in accordance with health authority / agency policy.</li> <li>• Taking a swab for culture and susceptibility is not a restricted activity according to the Nurse's (Registered) and Nurse Practitioner Regulation and therefore does not require an order for a nurse to carry it out.<sup>1</sup> However, agency / health authority policy may require an order.</li> <li>• Registered nurses must successfully complete additional education in Conservative Sharp Wound Debridement and follow an established guideline/procedure if this method is used to expose an area of viable tissue prior to collecting a swab for C &amp; S.</li> <li>• Agency / health authority policy and standards must be in place to support this nursing practice.</li> <li>• Clients<sup>2</sup> with an actual or suspected wound infection require an inter-professional approach to provide comprehensive, evidence-based assessment and treatment. This clinical procedure focuses solely on the role of the nurse, as one member of the inter-professional team providing care to these clients.</li> </ul>
<b>Background</b>	<ul style="list-style-type: none"> <li>• The diagnosis of a wound infection is determined by clinical assessment not by culture results.</li> <li>• Wounds can be classified as contaminated, colonized, bioburden / localized infection, deep infection and systemic infection.</li> <li>• A Culture &amp; Susceptibility (C&amp;S) swab provides information on the type of microorganism present in the wound and the susceptibility of the microorganism to specific antibiotics.</li> <li>• Chronic wounds have colonized microorganisms but this does not necessarily mean that the wound is infected. Wounds should only be cultured when signs and symptoms of a deep infection are present.</li> <li>• Wound culture and susceptibility testing may be done using a swab, tissue biopsy or needle aspiration. Needle aspiration and tissue biopsy are preferred methods of specimen collection, however swab cultures are acceptable as they are practical, commonly used, non – invasive and cost effective, and provide accurate results when compared to the results of other methods.</li> <li>• The wound must be cleansed with sterile normal saline or sterile water to swabbing the wound to avoid contaminating the swab with skin flora, necrotic tissue or pus.</li> <li>• Wound infection occurs in viable wound tissue; therefore viable wound tissue must be swabbed rather than necrotic tissue or pus. At least 1 cm<sup>2</sup> area of viable tissue is required to do a C&amp;S swab.</li> <li>• Swabbing necrotic tissue or pus may produce false results which can lead to inappropriate antibiotic treatment.</li> <li>• No-touch technique is used to take a wound swab for C &amp; S.</li> <li>• The Levine method is used as it directs the staff to swab only viable tissue. This method is superior to the zig-zag method when collecting a wound swab for C &amp; S. <sup>5, 6, 14, 15</sup></li> </ul>
<b>Indications / Precautions/ Contraindications</b>	<p><b>Indications</b></p> <ul style="list-style-type: none"> <li>• Wounds with 3 or more signs and symptoms of deep infection.</li> <li>• Infected wounds that do not respond to or are deteriorating despite antimicrobial and / or antibiotic treatment.</li> <li>• As required by local surveillance protocols for drug resistant organisms.</li> </ul> <p><b>Precautions</b></p> <ul style="list-style-type: none"> <li>• Consider other factors that may be impacting healing before re-culturing a wound that is not responding to treatment.</li> </ul>

<sup>1</sup> College of Registered Nurses of British Columbia. (2010). Scope of practice for registered nurses: Standards, limits and conditions. Vancouver: Author.

<sup>2</sup> The term "client" includes recipients of care in the community (clients), residential care (residents) and acute care (patients).

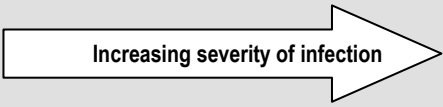
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	<p><b>Contraindications</b></p> <ul style="list-style-type: none"> <li>• Wounds that have been cultured within the last 24 – 72 hours.</li> <li>• Inability to transport the culture within 24hrs of taking the swab.</li> <li>• The absence of signs of infection or delayed healing unless screening for drug resistant organisms is required.</li> <li>• Wounds covered with necrotic eschar or slough.</li> </ul>
<p><b><u>Definitions</u></b></p>	<p><b>Antibiotics</b> – Agents that act selectively against bacteria and can be used topically (not usually recommended) or systemically. Development of resistance to systemic and topical antibiotics is an increasing problem.</p> <p><b>Aerobic bacteria</b> – Bacteria that survive in an oxygenated environment.</p> <p><b>Anaerobic bacteria</b>—Bacteria that survive in an environment with little or no oxygen. They are usually found in deeper wound tissue. Superficial C &amp; S swabs are not used for anaerobic bacteria.</p> <p><b>Bacterial bioburden / Localized infection</b> – Replicating microbial burden in the wound surface compartment with subtle clinical signs if host injury.</p> <p><b>Colonization</b> – The presence of bacteria within the wound which may multiply but do not cause damage to the host tissues or cause a wound infection.</p> <p><b>Contamination</b> – The transient presence of bacteria within a wound which does not cause a delay in wound healing.</p> <p><b>Culture</b> – Placing material from a wound in growth medium to optimize the recovery and identification of microorganisms.</p> <p><b>Debridement</b> – The removal of non-viable tissue. Debridement supports the development of granulation tissue which is necessary for wound healing to occur.</p> <p><b>Deep infection</b> – Microbial burden or virulence that has overwhelmed the host responses. Microorganisms cause clinical injury by invading deeper tissue below the wound base.</p> <p><b>Levine method</b> – The most accurate method of determining the presence of infection using a swab. The area swabbed is clear of pus, slough and necrotic tissue as infection resides in viable tissue.</p> <p><b>Needle aspiration</b> – A procedure whereby a needle is inserted into wound tissue to aspirate fluid. Needle aspiration determines the type and number of microbes below the surface of the wound. It offers reliable results but is invasive and can be painful.</p> <p><b>No-Touch Technique</b> – The use of clean gloves and a sterile field, sterile dressing tray, sterile instruments, sterile solution and sterile dressings; only sterile instruments are used for direct contact with the wound.</p> <p><b>Susceptibility Testing</b> – Susceptibility testing is carried out to determine which antibiotics are most likely to be effective in eradicating a bacterial wound infection.</p> <p><b>Slough (necrotic)</b> – Soft, spongy necrotic tissue that is black, brown, tan, yellow or gray in colour. It may be thin or thick and the consistency may be fibrous, stringy or mucinous. It is firmly or loosely attached to the wound edges and wound base. Fluctuance and drainage may be present.</p> <p><b>Systemic infection</b> – Presents with pyrexia or hypothermia, tachycardia, tachypnea and / or an elevated white cell count. If not treated it can lead to multiple organ dysfunction, hypotension and death.</p> <p><b>Viable tissue</b> – Tissue that is healthy and capable of living. Necrotic tissue is described as non-viable because it is dead and care focuses on removing it from the wound in order to support healing.</p> <p><b>Wound cleansing</b> – The use of sterile normal saline or water to gently remove adherent contaminants and devitalized tissue from the wound surface.</p>
<p><b><u>Related Documents</u></b></p>	<p>Guideline: Wound Bed Preparation          Guideline: Wound Infection          Procedure: Wound Cleansing</p>

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## Clinical Assessment for Wound Infection

Table 1: Clinical Signs and Symptoms of Wound Infection <sup>13, 16</sup>

		
Bacterial Bioburden / Localized Infection	Deep 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 elderly, immune compromised or pediatric clients)
Increased volume of exudate	Increased volume of exudate	Fever (may be muted in elderly or immune compromised clients)
Red friable tissue	Peri wound warmth 2 cm or more	Rigor / chills
Necrotic debris in the wound	Peri wound edema & erythema 2 cm or more	Change in behaviour or cognition (especially in elderly clients)
Odour present after wound cleansing	Odour present after wound cleansing	Unexplained high blood sugar (in clients who are diabetic)
	Increased wound size and / or the development of sinus tracts and / or satellite wounds	Rapid heart rate and respirations
	Wound that probes to bone or exposed bone	Elevated white cell count
		Septic shock potentially leading to multi organ failure
<b>2 or more of the above S &amp; S are sufficient for a clinical diagnosis of potential or actual wound infection.</b>		

1. If the wound is not healing and 2 or more signs of bioburden / localized infection are present, treat with an antimicrobial dressing. (Link to Wound Infection DST, Appendix C)
2. If antimicrobial dressings are not effective after 10 – 14 days and signs of localized or deep infection are present, consult with a physician / NP to determine if a swab is indicated. Notify the physician / NP if results are abnormal.
3. For infected wounds that are not improving or are deteriorating despite antimicrobial and / or antibiotic treatment, consider other factors affecting healing before re-culturing.
4. For clients with diabetes and / or arterial insufficiency, 1 or 2 signs and symptoms of infection, especially if there is a sign of new or increasing pain, is sufficient to warrant a C & S swab. Diabetes and arterial insufficiency may mute any visible evidence of localized infection due to compromised arterial blood flow, blunting of the inflammatory process and / or diminished sensation.

### Equipment and Supplies

- Sterile dressing tray
- 2 sets of clean gloves for cleansing the wound and taking the swab
- 1 set of clean or sterile gloves depending on the technique used to apply the new dressing
- 60-120ml sterile normal saline or sterile water plus equipment and supplies needed to cleanse the wound (Link to [Wound Cleansing DST](#)).
- Sterile swab for culture and susceptibility (culture for aerobic bacteria only). If there are 2 or more wounds in the same location, use a separate swab for each wound.
- Biohazard transport bag and requisition
- Appropriate supplies to redress the wound

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**Procedure**

Steps	Key Points
1. Ensure that transport of the swab can be done within 24hrs.	Specimens should be transported to the lab as soon as possible (same day) for best results. If transport within 24hours is not possible, do not take the swab until it can be delivered to the lab within 24 hours.
2. Gather necessary supplies.	
3. Assess for the presence of pain and pre-medicate if necessary.	
4. Prepare a clean work surface.	
5. Explain to the client why the swab is being taken and what the procedure involves.	
6. Position the client. If needed, use a blue pad or kidney basin to catch the cleansing solution.	
7. Perform hand hygiene with soap and water or water free antiseptic hand rub.	Follow agency guidelines for hand hygiene.
8. Set up a dressing tray using the appropriate type of aseptic technique required for the dressing change.  No-touch technique is used to take a swab for C & S.	
9. Put on clean gloves.	
10. Remove the soiled wound dressing, if present.	
11. Remove the gloves and perform hand hygiene then put on clean gloves.	
12. Prior to taking the culture, thoroughly cleanse the wound with at least 60 – 120 mL sterile normal saline or sterile water and ensure that the peri-wound skin is cleansed.  Use sterile gauze to remove excess saline or water from the wound surface.	This amount of cleansing solution provides moisture to the wound bed to improve the yield of bacteria. Larger amounts of saline or water are required for larger wounds.
13. A 1 cm <sup>2</sup> area of viable wound bed tissue <b>must be visible</b> in the wound in order to continue with the procedure.  If a 1 cm <sup>2</sup> area of viable wound bed tissue <b>is not visible</b> , do not take the culture and notify the physician/NP or wound clinician.	This ensures that the swab is collected from viable tissue and not necrotic slough, purulent material or eschar that is heavily contaminated with bacteria.  If a 1 cm <sup>2</sup> area of viable wound bed tissue is not present then debridement is required before the swab can be collected.  Conservative Sharp Wound Debridement (CSWD) is the quickest non-surgical debridement method (Link to <a href="#">Wound Bed Preparation DST</a> )

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<p>14. Rotate the tip of the swab over 1 cm<sup>2</sup> area of viable tissue for 5 seconds (Levine method).</p> <p>Use sufficient pressure to extract fluid from the wound tissue.</p> <p>Avoid touching the wound edge or peri-wound skin with the swab.</p>	<p>If the wound surface is dry, the swab can be pre moistened in the transport media before swabbing the wound.</p> <p>If there are 2 or more wounds in the same location, use a separate swab for each wound.</p>
<p>15. Immediately place the swab into the tube with medium and twist the lid closed.</p>	<p>Avoid touching the surface of the swab on the tube opening.</p> <p>Ensure the swab tip is in contact with the liquid transport medium at the base of the tube.</p>
<p>16. Remove gloves. Perform hand hygiene.</p>	
<p>17. Put on clean or sterile gloves that are appropriate for the technique required to complete the dressing change.</p>	
<p>18. Apply the wound dressing as per the client's care plan.</p>	
<p>19. Clean the work surface.</p>	
<p>20. Remove gloves and personal protective equipment.</p> <p>Perform hand hygiene.</p>	
<p>21. Document the following on the specimen container and requisition:</p> <ul style="list-style-type: none"> <li>• Client identification</li> <li>• Client diagnosis</li> <li>• Initials of the person who collected the specimen</li> <li>• Wound location, type and etiology</li> <li>• Antibiotics the client is currently receiving</li> <li>• Collection date and time</li> </ul>	<p>If there are two or more wounds in the same location, specify the wound by documenting the location or another identifier on the specimen container, e.g. noting the relative positions of wounds in the same location, such as right ankle, proximal wound and right ankle, distal wound, <u>or</u> Wound A and Wound B <u>or</u> Wound #1 and Wound #2.</p> <p>Specific identifiers help others to attribute the C &amp; S results to the appropriate wound.</p>
<p>22. Place a specimen in a biohazard transport bag and transport to the lab as soon as possible.</p> <p>If the specimen is collected for aerobic bacteria, store it in the refrigerator at 2 - 8<sup>o</sup> C until it can be transported.</p> <p>If the swab cannot be sent to the lab within 24 hours discard it and collect a new C &amp; S swab.</p>	<p>Delays in getting the specimen to the lab for analysis may alter the C &amp; S results as some bacteria may die and others may be overgrown by more rapidly growing strains.</p> <p>For community clients, follow Health Authority policy on the transportation of dangerous goods; this governs the transportation of all C &amp; S swabs.</p>

**Documentation**

1. Document the wound assessment for infection and the C & S collection procedure.
2. Label the tube as indicated in the procedure and complete the requisition.
3. Document the date and time that the swab was sent to the laboratory.

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## References

1. Angel, D., et al. (2011). The clinical efficacy of two semi-quantitative wound-swabbing techniques in identifying the causative organism(s) in infected cutaneous wounds. *International Wound Journal*. 8(2): 176 – 185.
2. Bonham, P. (2009). Swab cultures for diagnosing wound infections. A literature review and clinical guideline. *Journal of Wound Ostomy Continence Nursing*. 36(4): 389- 395.
3. Cooper, R. (2010). Ten tips for taking a wound swab. *Wounds International*. 1(3) 1-4. Retrieved from <http://www.woundsinternational.com/practice-development/ten-top-tips-for-taking-a-wound-swab/page-2&print>.
4. Davies, C., et al. (2007). A prospective study of the microbiology of chronic venous leg ulcers to re-evaluate the clinical predictive value of tissue biopsies and swabs. *Wound Repair and Regeneration*. 15: 17 – 22.
5. Gardner, S., et al. (2006). Diagnostic validity of 3 swab techniques for identifying chronic wound infection. *Wound Repair and Regeneration*. 14(5): 548 – 557.
6. Harding, K., et al. (2008). International consensus document: Wound infection in clinical practice. *International Wound Journal*. 5(suppl. 3): 1 – 11.
7. Ketel, J. (2007). Culture and susceptibility. Retrieved from <http://www.nursingtimes.net/nursing-practice/clinical-zones/wound-care/culture-and-sensitivity/201122article>.
8. Levine, N., et al. (1976). The quantitative swab culture and smear: A quick simple method for determining the number of viable aerobic bacteria in open wounds. *Journal of Trauma*. 16(2): 89 – 94.
9. Miller, C., et al. (2010). Assessing bacterial burden in wounds: Comparing clinical observation and wound swabs. *International Wound Journal*. 8(1): 45 – 55.
10. Northern Sidney Central Coast Health. (2008). Wound Swab guideline. Retrieved from <http://www.hschealth.nsw.gov.au/services/wound.care/woundswabguideline.pdf>.
11. Rondas, et al., (2013). Swab versus biopsy for diagnosis of chronic infected wounds. *Advances in Skin and Wound Care*. 26(5): 211 – 219.
12. Sibbald, G., et al. (2003). Preparing the wound bed 2003: Focus on infection and inflammation. *Ostomy Wound Management*. 49(11): 24 – 51.
13. Sibbald, G., et al. (2007). Increased bacterial burden and Infection: NERDS and STONES. *Wounds UK*. 3(2): 25 - 46.
14. Snyder, R. (2007). Clinical evaluation of wound swabbing versus tissue biopsy to diagnose infection. *Podiatry Management*. 26(6): 217 – 223.
15. Uppal, S., et al. (2007). Comparative evaluation of surface swab and quantitative full thickness wound biopsy culture in burn patients. *Burns*. 33(4): 460 – 463.
16. Woo, K., et al. (2009). A cross-sectional validation study using NERDS and STONEES to assess bacterial burden. *Ostomy Wound Management*. 55(8): 40 – 48.

## Document Creation/Review

This procedure has been reviewed and approved by the British Columbia Provincial Infection Control Network Management Office for use within the province of British Columbia.

<b>Created By</b>	British Columbia Provincial Nursing Skin and Wound Committee in collaboration with the Wound Clinicians from across all Health Authorities
<b>Publication Date</b>	June, 2015
<b>Revision Date(s)</b>	
<b>Review Date(s)</b>	

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