

Clinical question What are accurate and effective methods to assess the presence of infection in a pressure injury?

Recommendation 13.1

Have a high index of suspicion of local infection in a pressure injury in the presence of:

- Persistence for a longer duration
- Lack of signs of healing in the preceding two weeks despite appropriate treatment
- Larger size and/or depth
- Wound breakdown/dehiscence
- Necrotic tissue
- Friable granulation tissue
- Pocketing or bridging in the wound bed
- Increased exudate, or change in the nature of the exudate
- Increased warmth in the surrounding tissue
- Increased pain
- Malodor.

Option: Suspect local infection based on clinical signs and symptoms

Comparison: Other diagnostic techniques

Background: Pressure injuries have a high susceptibility to the development of infection.¹ Classic and secondary signs of infection can be evident in a pressure injury. These signs and symptoms can alert a health professional to the potential of local wound infection that might require treatment or further investigation if it remains unresolved with appropriate management.²

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
BENEFITS & HARMS OF THE RECOMMENDED PRACTICE	What is the overall certainty of the evidence of effectiveness?	N/A <input checked="" type="checkbox"/> Very low <input type="checkbox"/> Low <input type="checkbox"/> Moderate <input type="checkbox"/> High <input type="checkbox"/>	<p>Evidence for accuracy of signs and symptoms for identifying local wound infection</p> <ul style="list-style-type: none"> • In chronic wounds (n = 117, 58% pressure injuries), using a checklist of four classic signs and symptoms (heat, erythema, edema and purulent discharge) had 50.4% agreement with diagnosis via swab and microscopy. Sensitivity of classic signs of infection to a positive culture was 0.36, specificity was 0.55, positive likelihood ratio was 0.79 and negative likelihood ratio was 1.17. The positive predictive value of classic signs of infection had a positive predictive value of 0.45 and a negative predictive value of 0.45³ (<i>Level 1, moderate quality</i>). • In chronic wounds (n = 19 pressure injuries, 53% of the wounds), sensitivities for some classic signs of infection confirmed by swab and microscopy were moderate to good: edema (0.64), erythema (0.55) and pain (0.36). For other classic signs sensitivity was low: heat (0.18) and purulent exudate (0.18). Specificities ranged between 0.56 to 1.00⁴ (<i>Level 1, moderate quality</i>). • In chronic wounds (n = 19 pressure injuries, 53% of the wounds), sensitivities for secondary signs of infection confirmed by swab and microscopy were moderate to good: delayed healing (0.81), presence of friable granulation (0.82), 	
	Is there important uncertainty about how much people value the main outcomes?	Important uncertainty or variability <input type="checkbox"/> Possibly important uncertainty or variability <input type="checkbox"/> Probably no important uncertainty or variability <input type="checkbox"/> No important uncertainty or variability <input type="checkbox"/> N/A <input checked="" type="checkbox"/>		

CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<p>How substantial are the desirable anticipated effects?</p>	<p>N/A</p> <p><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p><i>Not substantial</i> <i>Probably not substantial</i> <i>Probably substantial</i> <i>Substantial</i></p>	<p>discoloration (0.64), serious exudate with inflammation (0.55), wound breakdown (0.46), and malodor (0.36). Specificities ranged between 0.56 to 1.00 ⁴ (<i>Level 1, moderate quality</i>).</p> <p>Strength of Evidence: B1 — Level 1 studies of moderate or low quality providing direct evidence, most studies have consistent outcomes and inconsistencies can be explained</p>	
<p>How substantial are the undesirable anticipated effects?</p>	<p>N/A</p> <p><input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p><i>Not substantial</i> <i>Probably not substantial</i> <i>Probably substantial</i> <i>Substantial</i></p>		
<p>Do the desirable effects outweigh the undesirable effects?</p>	<p>No <i>Probably No</i> <i>Uncertain</i> <i>Probably Yes</i> Yes <i>Varies</i></p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p>		

(c) EPUAP/NPIAP/PPPIA Not for reproduction

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS												
RESOURCE USE	How substantial are the resource requirements?	<table border="0"> <tr> <td><i>Not clear</i></td> <td><i>Not substantial</i></td> <td><i>Probably not substantial</i></td> <td><i>Probably substantial</i></td> <td><i>Substantial</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>Not clear</i>	<i>Not substantial</i>	<i>Probably not substantial</i>	<i>Probably substantial</i>	<i>Substantial</i>	<i>Varies</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No evidence available	
<i>Not clear</i>	<i>Not substantial</i>	<i>Probably not substantial</i>	<i>Probably substantial</i>	<i>Substantial</i>	<i>Varies</i>											
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
PRIORITY AND ACCEPTABILITY	Is the option acceptable to key stakeholders?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No evidence available	
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<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
	Is the option a priority for key stakeholders?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No evidence available	
<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>											
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
FEASIBILITY	Is the option feasible to implement?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Health professionals require appropriate skills to identify signs of infection in a wound. In most clinical and geographic settings these skills are accessible (<i>Expert opinion</i>).	
<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>											
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											

Balance of consequences	Undesirable consequences <i>clearly outweigh</i> desirable consequences in most settings <input type="checkbox"/>	Undesirable consequences <i>probably outweigh</i> desirable consequences in most settings <input type="checkbox"/>	The balance between desirable and undesirable consequences <i>is closely balanced or uncertain</i> <input type="checkbox"/>	Desirable consequences <i>probably outweigh</i> undesirable consequences in most settings <input type="checkbox"/>	Desirable consequences <i>clearly outweigh</i> undesirable consequences in most settings <input checked="" type="checkbox"/>
Strength of recommendation	Strong negative recommendation: Definitely don't it <input type="checkbox"/>	Weak negative recommendation: Probably don't do it <input type="checkbox"/>	No specific recommendation <input checked="" type="checkbox"/>	Weak positive recommendation: Probably do it <input type="checkbox"/>	Strong positive recommendation: Definitely do it <input type="checkbox"/>
Justification	One high quality Level 1 study ³ demonstrated for classic signs and symptoms of infection have low sensitivity and specificity for determining conclusive presence of pressure injury infection diagnosed with culture of exudate obtained via percutaneous aspiration. An earlier high quality Level 1 study found secondary signs of infection had stronger sensitivity and specificity for determining presence of infection diagnosed with wound swab and culture than do classic signs of infection. ⁴ These studies suggest that the classic and secondary signs of infection listed in <i>Recommendation 13.1</i> indicate possible local wound infection that should be further investigated and confirmed.				

Clinical question What are accurate and effective methods to assess the presence of infection in a pressure injury?

- Recommendation 13.2**
- Have a high index of suspicion of biofilm in a pressure injury in the presence of:**
- **Failure to heal despite appropriate antibiotic therapy**
 - **Recalcitrance to appropriate antimicrobial therapy**
 - **Delayed healing despite optimal treatment**
 - **Increased exudate**
 - **Increased poor granulation or friable hypergranulation**
 - **Low level erythema and/or low level chronic inflammation**
 - **Secondary signs of infection**

Background: Signs and symptoms have low sensitivity and specificity for demonstrating conclusive presence of infection and biofilm. However, they provide an indication of when additional diagnostic assessment might be required.

SUPPORTING EVIDENCE, WHEN AVAILABLE

Evidence to support the opinion (when available)	The IWII guideline details diagnostic criteria for biofilm, including clinical signs and symptoms that indicate the potential for concern that should be investigated further.
Justification	Clinical signs and symptoms provide clinicians with guidance as to whether the pressure injury is healing. When healing is not occurring as expected, these clinical signs and symptoms can be used to guide the implementation of diagnostic investigations that can confirm presence or otherwise of biofilm.

Clinical question What are accurate and effective methods to assess the presence of infection in a pressure injury?

**Recommendation
13.3**

Consider a diagnosis of spreading infection if the pressure injury has local and/or systemic signs of acute infection including but not limited to:

- **Delay in healing**
- **Erythema extending from the ulcer edge**
- **Wound breakdown/dehiscence**
- **Induration**
- **Crepitus, fluctuance or discoloration of the surrounding skin**
- **Lymphangitis**
- **Malaise/lethargy**
- **Confusion/delirium and anorexia (particularly in older adults).**

Background: Signs and symptoms have low sensitivity and specificity for demonstrating conclusive presence of infection. However, they provide an indication of when additional diagnostic assessment might be required.

SUPPORTING EVIDENCE, WHEN AVAILABLE

Evidence to support the opinion (when available)

The IWII guideline details diagnostic criteria for suspecting spreading infection, including clinical signs and symptoms that indicate potential for concern that should be investigated further.

Justification

Clinical signs and symptoms provide clinicians with guidance as to whether infection could be a consideration. When healing is not occurring as expected or the individual's general health is deteriorating, these clinical signs and symptoms can be used to guide the implementation of diagnostic investigations that can confirm presence or otherwise of infection that might require treatment.

Clinical question What are accurate and effective methods to assess the presence of infection in a pressure injury?

Recommendation 13.4 **Determine presence of bioburden in the pressure injury by tissue biopsy or semi-quantitative swab technique and microscopy.**

Background: The quantity of organisms (microbial load) is believed to be the best indicator of wound infection.

SUPPORTING EVIDENCE, WHEN AVAILABLE

Evidence to support the opinion (when available) The IWII guideline details quantitative culture of viable biopsied wound tissue as the gold standard for confirming and identifying bioburden.

Justification The gold standard method for examining microbial load is quantitative culture of viable biopsied wound tissue. Wound tissue is viewed as the most valid specimen for quantitative tissue culture because tissue biopsies reflect organisms invading the wound, not those contaminating the wound surface.

Clinical question What are accurate and effective methods to assess the presence of biofilm in a pressure injury?

Recommendation 13.5 **Determine presence of biofilm in the pressure injury by tissue biopsy and microscopy.**

Background: The inadequacy of wound swabbing for evaluating the presence of biofilm has been demonstrated in studies of chronic wounds.

SUPPORTING EVIDENCE, WHEN AVAILABLE

Evidence to support the opinion (when available)

- In a diagnostic study, wedge tissue biopsies from chronic wounds (n = 15, n = 5 were pressure injuries). Standard culture identified an average of three bacterial species in each sample compared with an average of 17 species identified using gene sequencing. Epifluorescence microscopy identified biofilm in 60% of samples.⁵
- In a study using culture analysis, light microscopy and scanning electron microscopy (n= 37 chronic wounds of mixed etiology, n = 21 pressure injuries), culture identified eight frequently observed bacteria species compared with 15 frequently occurring species identified used microscopy. Sixty percent of the sample contained biofilm.⁶

Justification Although the gold standard for confirming presence of biofilm, the value and cost effectiveness of using tissue biopsy and higher resolution microscopy in routine clinical evaluation of pressure injuries is yet to be demonstrated. Most geographic and clinical settings have limited or no access to these diagnostic techniques.

Clinical question What are accurate and effective methods to assess the presence of infection in a pressure injury?

Recommendation 13.6 Evaluate the pressure injury for presence of osteomyelitis in the presence of exposed bone and/or if the bone feels rough or soft, or if the pressure injury has failed to heal with appropriate treatment.

Option: Evaluate osteomyelitis

Background: Osteomyelitis has been reported in up to 32% of individuals with pressure injuries.^{7,8}

Comparison: no assessment for osteomyelitis

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS										
BENEFITS & HARMS OF THE PRACTICE	What is the overall certainty of the evidence?	<table border="0"> <tr> <td>N/A</td> <td>Very low</td> <td>Low</td> <td>Moderate</td> <td>High</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	N/A	Very low	Low	Moderate	High	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>Evidence for MRI diagnosis of osteomyelitis</p> <ul style="list-style-type: none"> In individuals being diagnosed for osteomyelitis in conjunction with pressure injury surgery (n=47), a diagnostic preoperative MRI did not differ significantly in rates of pre-operative antibiotic administration compared to those without pre-operative MRI (26.9% versus 23.8% OR 1.2, p=0.81) and there was no significant difference in infection rates post-surgery between those with osteomyelitis diagnosed by MRI and those with osteomyelitis diagnosed by bone culture (7.7% versus 14.3%, OR 0.50, p=0.44).⁹ (Level 3, moderate quality) In individuals receiving MRI pre-operatively and bone sample and culture intraoperatively (n=41), there was a significant association between an intermediate to high probability of osteomyelitis and both cortical bone erosion (sensitivity 90%, specificity 90%, Pearson's r = 0.84) and abnormal bone marrow edema (sensitivity 81% Pearson's r = 0.82).^{10,11} (Level 4, low quality). <p>Evidence for identification of infection of tissue or bone pre-operatively</p> <ul style="list-style-type: none"> In individuals undergoing surgery for repair of a pressure injury (n=77 individuals with n=96 pressure injuries), taking wound cultures pre-operatively to guide antibiotic therapy was part of a treatment plan associated with a rate of a full recovery rate of 100% and rate of primary healing of 89.25%.¹² (Level 4, low quality) In individuals undergoing surgery for repair of a pressure injury (n=143 individuals), conducting a radiogram pre-operatively to identify osteomyelitis, and harvesting bone samples intra-operatively to guide antibiotic therapy was part of a treatment plan associated with an overall complication rate of 22.4%.¹³ (Level 4, moderate quality) In individuals receiving MRI pre-operatively and bone sample and culture intraoperatively (n=41), there was a significant association between an intermediate to high probability of osteomyelitis and both cortical bone erosion (sensitivity 90%, specificity 90%, Pearson's r = 0.84) and abnormal bone marrow edema (sensitivity 81% Pearson's r = 0.82).^{10,11} (Level 4, low quality).
	N/A	Very low	Low	Moderate	High								
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	Is there important uncertainty about how much people value the main outcomes?	<table border="0"> <tr> <td>Important uncertainty or variability</td> <td>Possibly important uncertainty or variability</td> <td>Probably no important uncertainty or variability</td> <td>No important uncertainty or variability</td> <td>N/A</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>	Important uncertainty or variability	Possibly important uncertainty or variability	Probably no important uncertainty or variability	No important uncertainty or variability	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Important uncertainty or variability	Possibly important uncertainty or variability	Probably no important uncertainty or variability	No important uncertainty or variability	N/A									
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How substantial are the desirable anticipated effects?	<table border="0"> <tr> <td>N/A</td> <td>Not substantial</td> <td>Probably not substantial</td> <td>Probably substantial</td> <td>Substantial</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	N/A	Not substantial	Probably not substantial	Probably substantial	Substantial	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
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	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS
	<p>Do the desirable effects outweigh the undesirable effects?</p>	<p>No Probably No Uncertain Probably Yes Yes N/A</p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/></p>	<p>Evidence for identification of infection of tissue or bone intra-operatively</p> <ul style="list-style-type: none"> • In individuals undergoing surgery for repair of a pressure injury (n=119 individuals with n=170 pressure injuries), harvesting bone samples intra-operatively to guide antibiotic therapy was part of a treatment plan associated with a complication rate of 26%.¹⁴ (<i>Level 4, high quality</i>) • In individuals undergoing surgery for repair of a Category/Stage IV ischial pressure injury (n=195 individuals with n=338 pressure injuries), harvesting samples of bone intra-operatively to guide antibiotic therapy was part of a treatment plan associated with a complication rate of 3% and median healing time of 18 days.¹⁵ (<i>Level 4, moderate quality</i>) • In individuals undergoing surgery for repair of a Category/Stage IV ischial pressure injury (n=23 individuals with n=26 pressure injuries), harvesting bacteriological samples of soft tissue and bone intra-operatively to guide antibiotic therapy was part of a treatment plan associated with 61.5% total healing rate.¹⁶ (<i>Level 4, moderate quality</i>) • In individuals undergoing surgery for repair of a pressure injury (n=45 individuals with n=60 pressure injuries), harvesting tissue intra-operatively to guide antibiotic therapy was part of a treatment plan associated with a rate of 3% for ongoing osteomyelitis and 15.6% wound breakdown.¹⁷ (<i>Level 4, moderate quality</i>) • In individuals undergoing surgery for repair of a pressure injury (n=143 individuals), conducting a radiogram pre-operatively to identify osteomyelitis, and harvesting bone samples intra-operatively to guide antibiotic therapy was part of a treatment plan associated with an overall complication rate of 22.4%.¹³ (<i>Level 4, moderate quality</i>) • In individuals undergoing surgery for repair of a pressure injury (n=101 individuals with n=179 pressure injuries), harvesting bone samples intra-operatively to detect osteomyelitis and to guide antibiotic therapy was part of a treatment plan associated with a rate of 2.2% for infection.¹⁸ (<i>Level 4, moderate quality</i>) • In individual undergoing surgical repair of a pressure injury (n=157), a protocol that included bone samples harvested for culture was used to determine post-operative management.¹⁹ (<i>Level 4, moderate quality</i>) <p>Strength of Evidence: B2 - Level 3 or 4 studies (regardless of quality) providing direct evidence, most studies have consistent outcomes and inconsistencies can be explained</p>

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS												
RESOURCE USE	How substantial are the resource requirements?	<table border="0"> <tr> <td>Not clear</td> <td>Not substantial</td> <td>Probably not substantial</td> <td>Probably substantial</td> <td>Substantial</td> <td>Varies</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	Not clear	Not substantial	Probably not substantial	Probably substantial	Substantial	Varies	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> In individuals who underwent surgery for pressure injuries in the Netherlands (n=52) the mean cost of surgery was €20,957 (euros in 2013). However, there is no evidence on costs specifically associated with managing osteomyelitis.²⁰ (Moderate quality economic analysis)
Not clear	Not substantial	Probably not substantial	Probably substantial	Substantial	Varies										
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
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No	Probably No	Uncertain	Probably Yes	Yes	Varies										
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										

Balance of consequences	Undesirable consequences <i>clearly outweigh</i> desirable consequences in most settings <input type="checkbox"/>	Undesirable consequences <i>probably outweigh</i> desirable consequences in most settings <input type="checkbox"/>	The balance between desirable and undesirable consequences <i>is closely balanced or uncertain</i> <input checked="" type="checkbox"/>	Desirable consequences <i>probably outweigh</i> undesirable consequences in most settings <input checked="" type="checkbox"/>	Desirable consequences <i>clearly outweigh</i> undesirable consequences in most settings <input type="checkbox"/>
Strength of recommendation	Strong negative recommendation: Definitely don't it <input type="checkbox"/>	Weak negative recommendation: Probably don't do it <input type="checkbox"/>	No specific recommendation <input type="checkbox"/>	Weak positive recommendation: Probably do it <input checked="" type="checkbox"/>	Strong positive recommendation: Definitely do it <input type="checkbox"/>
Justification	Two moderate quality Level 4 studies ^{12,13} reported protocols that included pre-operative assessment for osteomyelitis and deep infection using tissue cultures and radiograms for all pressure injuries scheduled for surgical repair. Seven moderate and moderate quality studies reported protocols in which bone samples were taken for culture and sensitivity when osteomyelitis was suspected; ¹⁷ when bone was exposed; ¹⁴ when bone rough or felt; or for all pressure injuries. ^{13,15,16,18,19} A high quality Level 2 study ²¹ comparing magnetic resonance imaging (MRI) to bone culture found 86% agreement on the presence or otherwise of osteomyelitis in the pressure injuries scheduled for surgical repair. Three low quality Level 4 studies ^{11,22,23} reported good to excellent agreement on diagnosis of osteomyelitis using MRI scans.				

Clinical question	None
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Recommendation 13.7	Optimize potential for healing by: <ul style="list-style-type: none">• Evaluating the individual’s nutritional status and addressing deficits• Evaluating the individual’s comorbidities and promoting disease control• Reducing the individual’s immunosuppressant therapy if possible• Preventing contamination of the pressure injury• Preparing the wound bed through cleansing and debridement.
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Background: Many systemic factors contribute to the development of pressure injuries. If these same factors can be mitigated or improved, the individual’s intrinsic ability to fight infection can usually increase.

SUPPORTING EVIDENCE, WHEN AVAILABLE

Evidence to support the opinion (when available)	N/A
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Justification	Many systemic factors contribute to the development of pressure injuries. If these same factors can be mitigated or improved, the individual’s intrinsic ability to fight infection can usually increase.
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Clinical question What is the role of topical agents in preventing and treating infection and/or biofilm?

Recommendation 13.8 Use topical antiseptics in tissue appropriate strengths to control bioburden and promote healing in pressure injuries that have delayed healing.

Option: Topical agents with antibacterial properties applied for 1-3 days
Comparison: A contemporary wound dressing without antibacterial properties, or a comparisons with a different type of topical agent.

Background: Although there is limited empirical evidence, it is suggested that bacterial colonization/topical wound infection/biofilm is a cause of delayed pressure injury healing.²⁴ Application of topical antibacterial agents could have an influence on bacterial load and/or pressure injury healing.²⁴

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS										
BENEFITS & HARMS OF THE RECOMMENDED PRACTICE	What is the overall certainty of the evidence of effectiveness?	<table border="0"> <tr> <td>No included studies</td> <td>Very low</td> <td>Low</td> <td>Moderate</td> <td>High</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	No included studies	Very low	Low	Moderate	High	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>Evidence for decrease/irradication/decolonization of infection</p> <p><i>Irradiated honey</i></p> <ul style="list-style-type: none"> 100% of 52 wounds treated with surgical honey gel showed a reduction in bacterial load (p=not reported) (note: 58 wounds were not swabbed).²⁵ (Level 4, low quality) After one week of therapy with topical honey, 100% (20/20) pressure injuries had negative wound swabs for bacterial growth.²⁶ (Level 4, low quality) <p><i>Polyhexamethylene biguanide (PHMB)</i></p> <ul style="list-style-type: none"> Application of PHMB to 30 pressure injuries for seven days via a variety of methods was associated with reductions in Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA), with eradication rates of 86.67% with PHMB-impregnated dressing and 40% for 20 minutes of daily swabbing with topical PHMB.²⁷ (Level 1, moderate quality) Application of PHMB to 30 pressure injuries for 14 days was associated with reductions in MRSA, with eradication rates of 66.67% with PHMB-impregnated dressing and 100% for 20 minutes of daily swabbing with topical PHMB.²⁷ (Level 1, moderate quality) <p><i>Pine resin salve</i></p> <ul style="list-style-type: none"> Bacterial cultures from pressure injuries treated with a topical pine resin salve were more likely to be negative at one month compared to pressure injuries treated with a hydrocolloid dressing (p=not reported).²⁸ (Level 1, low quality) <p>Potential adverse effects</p> <ul style="list-style-type: none"> 7.5% (1/13) of people with a pressure injury treated with a resin salve developed an allergic reaction and ceased using the topical agent.²⁸ (Level 1, low quality) None of 20 individuals with pressure injuries who were treated with topical honey experienced any adverse effects.²⁶ (Level 4, low quality) Cytotoxicity is a recognized issue with antiseptic solutions.^{29,30} (Level 5, indirect) <p>Strength of Evidence: B1 — Level 1 studies of moderate or low quality providing direct evidence, most studies have consistent outcomes and inconsistencies can be explained</p>	In most of the studies, the pressure injuries had either no bacterial colonization before treatment with the topical agent, ²⁸ or bacterial colonization was not tested before treatment commenced. ²⁶
	No included studies	Very low	Low	Moderate	High									
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>									
	Is there important uncertainty about how much people value the main outcomes?	<table border="0"> <tr> <td>Important uncertainty or variability</td> <td>Possibly important uncertainty or variability</td> <td>Probably no important uncertainty or variability</td> <td>No important uncertainty or variability</td> <td>No known undesirable outcomes</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	Important uncertainty or variability	Possibly important uncertainty or variability	Probably no important uncertainty or variability	No important uncertainty or variability	No known undesirable outcomes	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	Important uncertainty or variability	Possibly important uncertainty or variability	Probably no important uncertainty or variability	No important uncertainty or variability	No known undesirable outcomes									
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
How substantial are the desirable anticipated effects?	<table border="0"> <tr> <td>Unclear</td> <td>Not substantial</td> <td>Probably not substantial</td> <td>Probably substantial</td> <td>Substantial</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	Unclear	Not substantial	Probably not substantial	Probably substantial	Substantial	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Unclear	Not substantial	Probably not substantial	Probably substantial	Substantial										
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Unclear	Not substantial	Probably not substantial	Probably substantial	Substantial										
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
Do the desirable effects outweigh the undesirable effects?	<table border="0"> <tr> <td>No</td> <td>Probably No</td> <td>Uncertain</td> <td>Probably Yes</td> <td>Yes</td> <td>Varies</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	No	Probably No	Uncertain	Probably Yes	Yes	Varies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
No	Probably No	Uncertain	Probably Yes	Yes	Varies									
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>									

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS												
RESOURCE USE	How substantial are the resource requirements?	<table border="0"> <tr> <td><i>Not clear</i></td> <td><i>Not substantial</i></td> <td><i>Probably not substantial</i></td> <td><i>Probably substantial</i></td> <td><i>Substantial</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>Not clear</i>	<i>Not substantial</i>	<i>Probably not substantial</i>	<i>Probably substantial</i>	<i>Substantial</i>	<i>Varies</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No evidence available	
<i>Not clear</i>	<i>Not substantial</i>	<i>Probably not substantial</i>	<i>Probably substantial</i>	<i>Substantial</i>	<i>Varies</i>											
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
PRIORITY AND ACCEPTABILITY	Is the option acceptable to key stakeholders?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No evidence available	
	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>										
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
	Is the option a priority for key stakeholders?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	77.5% (297/383) of respondents to a patient/informal caregiver survey who identified as having experienced a pressure injury or being at risk of a pressure injury believed that knowing more about how to help a pressure injury heal is important or very important in caring for themselves. In the same survey, 70.8% (602/850) of informal caregivers believed that how to help a pressure injury heal is important or very important in caring for their family member/friend with or at risk of a pressure injury ^{31,32} (<i>Level 5</i>).	
<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>											
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
FEASIBILITY	Is the option feasible to implement?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Although not all topical antiseptics are accessible in all geographic locations, all locations and settings have access to some broad spectrum topical antipsetics (<i>Expert opinion</i>).	
<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>											
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>											

Balance of consequences	Undesirable consequences <i>clearly outweigh</i> desirable consequences in most settings <input type="checkbox"/>	Undesirable consequences <i>probably outweigh</i> desirable consequences in most settings <input type="checkbox"/>	The balance between desirable and undesirable consequences <i>is closely balanced or uncertain</i> <input type="checkbox"/>	Desirable consequences <i>probably outweigh</i> undesirable consequences in most settings <input type="checkbox"/>	Desirable consequences <i>clearly outweigh</i> undesirable consequences in most settings <input checked="" type="checkbox"/>
Strength of recommendation	Strong negative recommendation: Definitely don't it <input type="checkbox"/>	Weak negative recommendation: Probably don't do it <input type="checkbox"/>	No specific recommendation <input type="checkbox"/>	Weak positive recommendation: Probably do it <input checked="" type="checkbox"/>	Strong positive recommendation: Definitely do it <input type="checkbox"/>
Justification	Recent evidence from one moderate ²⁷ quality and one low ²⁸ quality Level 1 study and three low quality Level 4 ^{25,26,33} studies provides support for microbial effect of various topical antiseptics in reducing microbials of a range of different topical antiseptics in reducing bioburden in pressure injuries. The effect size is difficult to estimate due to the small sample sizes in studies and the failure to diagnose wound infection at the outset in studies. ^{26,28} Additional low quality, older studies conducted in small samples provide support for this recommendation. ^{26,34-39} Many topical antiseptics are toxic to tissues and should be used at the lowest possible concentrations and shortest duration to reduce the risk of adverse effects. Evidence on resource requirements is lacking. Not all contemporary and emerging antiseptics are universally available in all geographic or clinical settings.				

Clinical question How should biofilm be treated?

Recommendation 13.9

Use topical antiseptics that are active against biofilm in tissue-appropriate strengths in conjunction with regular debridement to control and eradicate suspected (or confirmed) biofilm in pressure injuries with delayed healing.

Option: Topical agents with antibacterial properties plus debridement
Comparison:

Background: Although there is limited empirical evidence, it is suggested that bacterial colonization/topical wound infection/biofilm is a cause of delayed pressure injury healing.²⁴ Application of topical antibacterial agents could have an influence on bacterial load and/or pressure injury healing.²⁴

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS										
BENEFITS & HARMS OF THE RECOMMENDED PRACTICE	What is the overall certainty of the evidence of effectiveness?	<table border="0"> <tr> <td>No included studies</td> <td>Very low</td> <td>Low</td> <td>Moderate</td> <td>High</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	No included studies	Very low	Low	Moderate	High	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>In chronic wounds of mixed etiology with clinical signs of biofilm (n = 16) significant increase in granulation was observed (p < 0.04) with deridement plus 0.3% PHMB.⁴⁰</p> <p>In chonric wounds of mixed etiology with clinical signs of biofilm (n = 16), 75% healed within 24 weeks with deridement plus 0.3% PHMB.⁴⁰</p> <p>Strength of Evidence: C — Indirect</p>	
	No included studies	Very low	Low	Moderate	High									
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>									
	Is there important uncertainty about how much people value the main outcomes?	<table border="0"> <tr> <td>Important uncertainty or variability</td> <td>Possibly important uncertainty or variability</td> <td>Probably no important uncertainty or variability</td> <td>No important uncertainty or variability</td> <td>No known undesirable outcomes</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	Important uncertainty or variability	Possibly important uncertainty or variability	Probably no important uncertainty or variability	No important uncertainty or variability	No known undesirable outcomes	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
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	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS												
RESOURCE USE	How substantial are the resource requirements?	<table border="0"> <tr> <td><i>Not clear</i></td> <td><i>Not substantial</i></td> <td><i>Probably not substantial</i></td> <td><i>Probably substantial</i></td> <td><i>Substantial</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>Not clear</i>	<i>Not substantial</i>	<i>Probably not substantial</i>	<i>Probably substantial</i>	<i>Substantial</i>	<i>Varies</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No evidence available	
<i>Not clear</i>	<i>Not substantial</i>	<i>Probably not substantial</i>	<i>Probably substantial</i>	<i>Substantial</i>	<i>Varies</i>											
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
PRIORITY AND ACCEPTABILITY	Is the option acceptable to key stakeholders?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No evidence available	
	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>										
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
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<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>											
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FEASIBILITY	Is the option feasible to implement?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Although not all topical antiseptics are accessible in all geographic locations, all locations and settings have access to some broad spectrum topical antiseptics (<i>Expert opinion</i>). Health professionals require training to undertake debridement (<i>Expert opinion</i>).	
<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>											
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>											

Balance of consequences	Undesirable consequences <i>clearly outweigh</i> desirable consequences in most settings <input type="checkbox"/>	Undesirable consequences <i>probably outweigh</i> desirable consequences in most settings <input type="checkbox"/>	The balance between desirable and undesirable consequences <i>is closely balanced or uncertain</i> <input checked="" type="checkbox"/>	Desirable consequences <i>probably outweigh</i> undesirable consequences in most settings <input type="checkbox"/>	Desirable consequences <i>clearly outweigh</i> undesirable consequences in most settings <input type="checkbox"/>
Strength of recommendation	Strong negative recommendation: Definitely don't it <input type="checkbox"/>	Weak negative recommendation: Probably don't do it <input type="checkbox"/>	No specific recommendation <input type="checkbox"/>	Weak positive recommendation: Probably do it <input checked="" type="checkbox"/>	Strong positive recommendation: Definitely do it <input type="checkbox"/>
Justification	A low quality Level 5 study ⁴⁰ conducted in chronic wounds with biofilm showed significant increase in wound bed granulation after management with debridement and 0.3% PHMB, with 75% of wounds reaching complete healing. Indirect evidence from Level 5 studies has demonstrated biofilm susceptibility to povidone iodine in concentrations of 1% to 10%, ⁴¹⁻⁴³ to cadexomer iodine paste, ⁴⁴ and to a lesser extent, silver sulfadiazine, ^{41,45,46} all in laboratory studies. A laboratory based comparison between iodophors and silver suggested iodophors are more effective in decreasing biofilm. ⁴⁷ These findings are supported by international consensus documents. ^{2,48,49}				

Clinical question None

Recommendation 13.10 **Use systemic antibiotics to control and eradicate infection in individuals with pressure injuries and clinical evidence of systemic infection.**

Background: Pressure injuries are a known cause of sepsis and death.⁵⁰⁻⁵³

SUPPORTING EVIDENCE, WHEN AVAILABLE

Evidence to support the opinion (when available) N/A

Justification Systemic antibiotics can reach infected tissue in the base of the pressure injury, whereas topically applied agents cannot penetrate through necrotic tissue to reach the wound bed below. Systemic antibiotics should be chosen based on confirmed antibiotic susceptibilities of the pathogens.

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