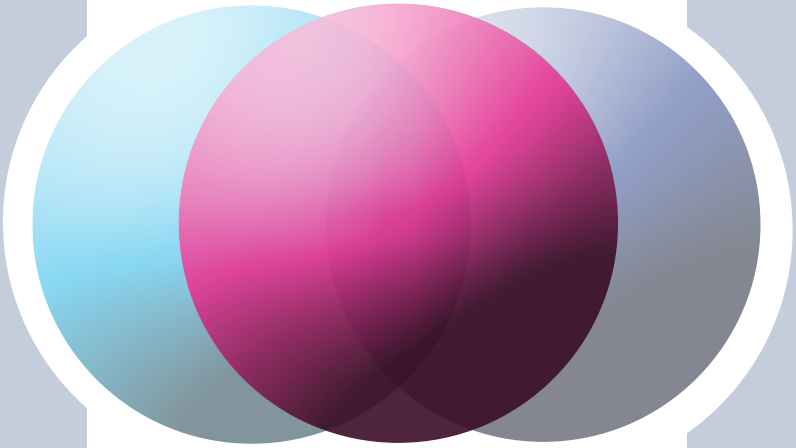
WOUNDS UK

Best Practice Statement

Antimicrobial stewardship strategies for wound management: Recommendations for the UK

2025



What is antimicrobial resistance?

The scale of the problem

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Advantages and barriers

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Practical tips for patients

BEST PRACTICE STATEMENT: ANTIMICROBIAL STEWARDSHIP STRATEGIES FOR WOUND MANAGEMENT: RECOMMENDATIONS FOR THE UK

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Foreword

Antimicrobial resistance (AMR) is a global crisis. The World Health Organization (WHO) has identified AMR as one of the top ten global public health threats, with significant implications for achieving the Sustainable Development Goals (WHO, 2023). Naghavi et al (2024) predict a 68% increase between 2019 and 2050 in deaths attributed to bacterial AMR alone, with AMR-associated deaths increasing by 75% between 2021 and 2050, leading to approximately 8.22 million deaths in 2050 (Naghavi et al., 2024). Projections indicate that, by 2050, rising treatment costs for bacterial infections could push approximately 28.3 million people into extreme poverty, a number that highlights the danger of both a global humanitarian crisis and damage to the world economy (WHO, 2015).

In the words of Dame Sally Davies, the UK Special Envoy for AMR:

> 'The data already shows that more people are dying of AMR than of climate change every year, and it's going to get worse'.
>
> (ITN-Business, 2023)

To manage this urgent and rising global threat, global health authorities including the WHO, the Centers for Disease Control and Prevention (CDC), and the European Centre for Disease Prevention and Control (ECDC) have implemented strategic frameworks to combat AMR.

In wound care, AMR presents a great challenge for acute, chronic and surgical wounds, especially in immunocompromised patients and those with frequent exposure to the hospital environment (Bassetti et al., 2025). Recent studies have indicated that up to 20% of wound microbes may have developed AMR (Mardourian et al., 2023, Guan et al., 2021). The risk of AMR presents a particular concern in chronic wounds due to the vulnerability to infection and the presence of complex microbial communities.

Timely and accurate diagnosis of wound infections is critical to guide appropriate interventions and reduce unnecessary antimicrobial use, thereby reducing the risk of resistance. Antimicrobial stewardship (AMS) strategies are key to reducing the risk of AMR. The National Institute for Health and Care Excellence (NICE) define AMS as an organisational or healthcare system-wide approach to promoting and monitoring judicious use of antimicrobials to preserve their future effectiveness (NICE, 2025a).

AMS is everybody's responsibility, including all healthcare professionals (HCPs), patients and carers, and should be assessed through measurable outcomes such as surveillance and audit. It is paramount that all healthcare professionals and organisations remain informed, and act upon relevant local and national policies and guidelines. A collaborative approach is essential to the success of AMS, with healthcare professionals, support staff, patients, families and carers each playing a vital role in mitigating the impact of AMR. Central to this effort is the prevention of wound infection, which should prioritise the use of products that minimise infection risk without contributing to the development of resistance.

This document is an updated second edition of the 2020 Best Practice Statement on AMS in wound care (Wounds UK, 2020). This new edition is based on updated evidence and the discussions from an expert panel meeting on 10 July 2025. This publication aims to highlight the escalating global and national threat of AMR and its relevance to UK wound care professionals, patients and carers. It presents targeted strategies to support AMS within wound care practice. By revisiting the foundational principles of wound management, the publication offers essential definitions and actionable guidance that healthcare professionals must understand to effectively implement

AMS approaches. It also explores the critical role of multidisciplinary team (MDT) collaboration in wound care and its influence on both AMR reduction and AMS optimisation.

The fast response of the healthcare professionals and organisations to the COVID-19 pandemic demonstrated the speed with which scientific evidence can be collected and published in a time of crisis. In addition to the dearth of evidence regarding the extent of AMR in wound infections, AMS in wound care is rarely, if ever, mentioned in AMR policy publications.

Throughout this document, we have highlighted 'action statements', making this document an urgent call to action to address these unmet needs and highlight the significant danger of AMR that patients with wounds are increasingly facing within the UK and globally.

Jacqui Fletcher, Chair

What is antimicrobial resistance?

Antimicrobials are a group of chemical agents that either kill or inhibit the growth and division of microorganisms (Wounds UK, 2020). They include antibiotics (which act on specific cellular target sites in bacteria), antiviral, antifungal, antibacterial and antiparasitic medicines, antiseptics, disinfectants and other agents, which act on multiple target sites in the target microbe (Wounds UK, 2020).

AMR occurs when the microorganisms that cause disease (including bacteria, viruses, fungi and parasites) are no longer affected by antimicrobial medicines such as antibiotics, antivirals, antifungals and antiparasitics that we use to kill them (NHS, 2025).

AMR can result in patients becoming severely ill as their treatment becomes ineffective. AMR results in disease spread and an increase in serious infections with a prolonged illness, leading to longer hospital stays and increased mortality (Murray et al., 2022). In people with an acute or chronic wound, the increased predisposition to AMR infections is a significant concern because this can have catastrophic consequences for both patients and healthcare systems (Falcone et al., 2021). Currently, AMR has already been detected against almost all classes of antibiotics (Gargate et al., 2025). To prevent further rise in AMR, it is crucial for HCPs to understand its causes and drivers.

The mechanisms of AMR

There are two main mechanisms through which microbes become resistant to antimicrobials.

Genetic causes of AMR spread

The primary function of microorganisms is to reproduce and survive. Therefore microbes continually adapt to their environments to ensure their survival. If something stops their ability to grow, such as an antibiotic, genetic changes can occur that enable the microbe to survive (Reygaert, 2018). Understanding the genetic basis of AMR is paramount in order to develop therapeutic approaches to combat and slow the emergence and spread of AMR (Muteeb et al., 2025). The major genetic mechanisms of AMR development are:

- Mutational resistance caused by a genetic change in the organism that affects the activity of the drug, resulting in preserved cell survival in the presence of the antimicrobial
- Horizontal gene transfer (HGT) caused by the acquisition of foreign DNA material. This is one of the most important drivers of bacterial evolution and is frequently responsible for the development of AMR (Reygaert, 2018).

Human drivers of AMR spread

Human activities and societal pressures can accelerate the increase of AMR. Inappropriate or overuse of antibiotics is one of the biggest causes of AMR spread (Wounds UK, 2020). For example, resistance may develop due to use in both medicinal and agricultural practices: approximately 73% of all antibiotics used for humans are also used in agriculture (Gargate et al., 2025). Other significant AMR drivers include inadequate infection diagnostics, incomplete or imperfect use of antibiotics by patients, poor information recording, prescription of 'just-in-case' antimicrobials or the prescription of a broad-spectrum antimicrobial when a specific antibiotic may be more effective (McGow, 2019, Wounds UK, 2020).

Extensive use of antimicrobials and close contact among sick patients (e.g. critically ill patients in hospitals) is common; this renders patients more susceptible to infections (e.g. via methicillin-resistant *Staphylococcus aureus* [MRSA]) and increases the probability of AMR (El Roz et al., 2025). In low and middle-income countries, poor hygiene, sanitation and lack of access to clean water also drive a rise in AMR (Wounds UK, 2020, WHO, 2023, Ferraz, 2024).

While efforts have substantially decreased the inappropriate use of narrow spectrum antibiotics, the use of broad spectrum

All HCPs, patients and carers should be educated that misuse and overuse of antimicrobials are the main drivers in the development of drug-resistant pathogens (Righi et al., 2024).

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antibiotics (e.g. ampicillin) as a proportion of total antibiotics has increased between 2019-2023 in the UK (Rahman and Sarker, 2020, Browne et al., 2021, UK Health Security Agency, 2024), identifying the importance for continuing HCPs and patient education and a national drive for controlling AMR.

Routes of AMR spread

The routes of AMR spread are complex and highly interconnected [Figure 1]. To reduce the risk of AMR, it is crucial that HCPs are aware of these routes in their respective clinical settings (Graham et al., 2019).

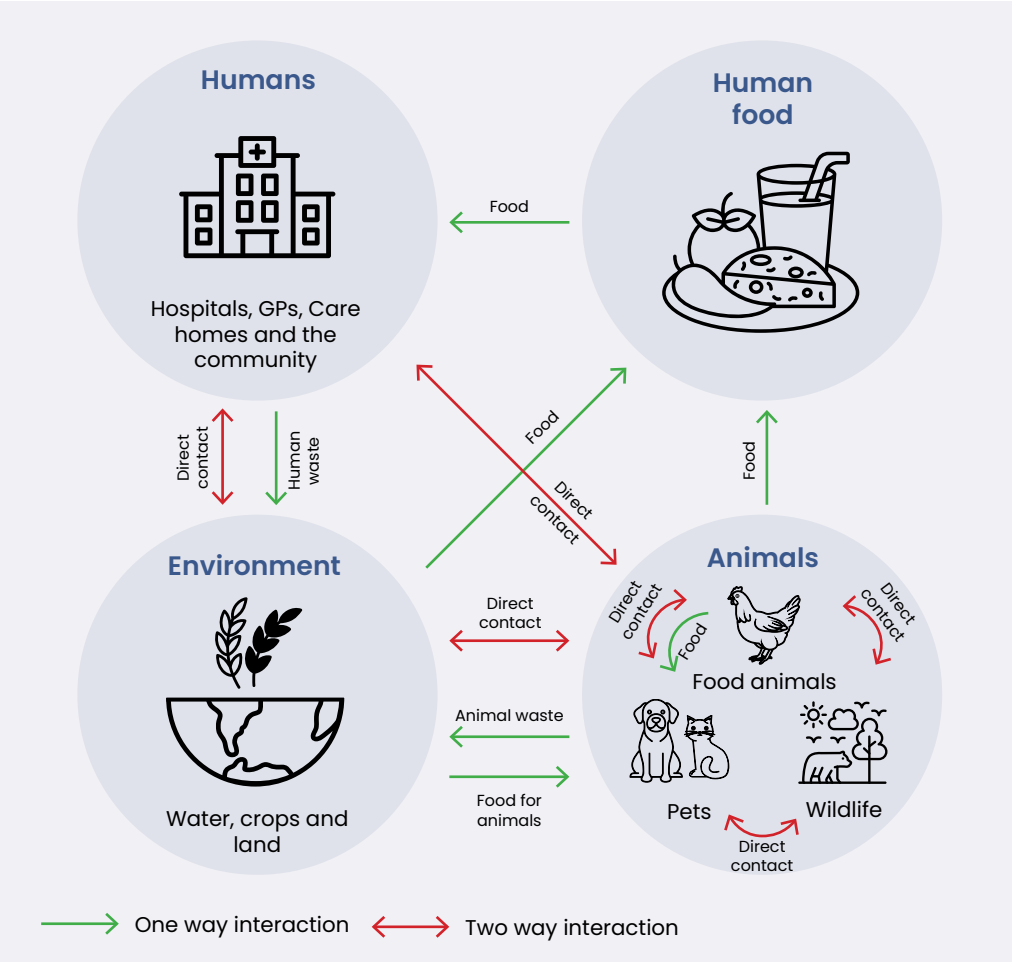

Figure 1. *The routes and interactions involved in the spread of AMR (adapted from Graham et al., 2019, Gov.UK, 2024).*

The scale of the problem

AMR is now considered a silent pandemic and is projected to kill more people by 2050 than cancer and diabetes combined (Gautam, 2022, Laxminarayan, 2022, Naghavi et al., 2024). Figure 2 highlights the urgency required in addressing the global and UK-wide challenges posed by AMR.

If effective AMR containment and prevention measures are not prioritised on a global scale, critical treatments such as wound care, surgery and chemotherapy will increasingly carry high risks, with an otherwise preventable infection often becoming fatal (Salam et al., 2023). Consequently, the high cost of AMR to national economies and health systems will also increase.

HCPs should employ multidisciplinary efforts to effectively manage the multi-faceted problem that AMR is (Graham et al., 2019).

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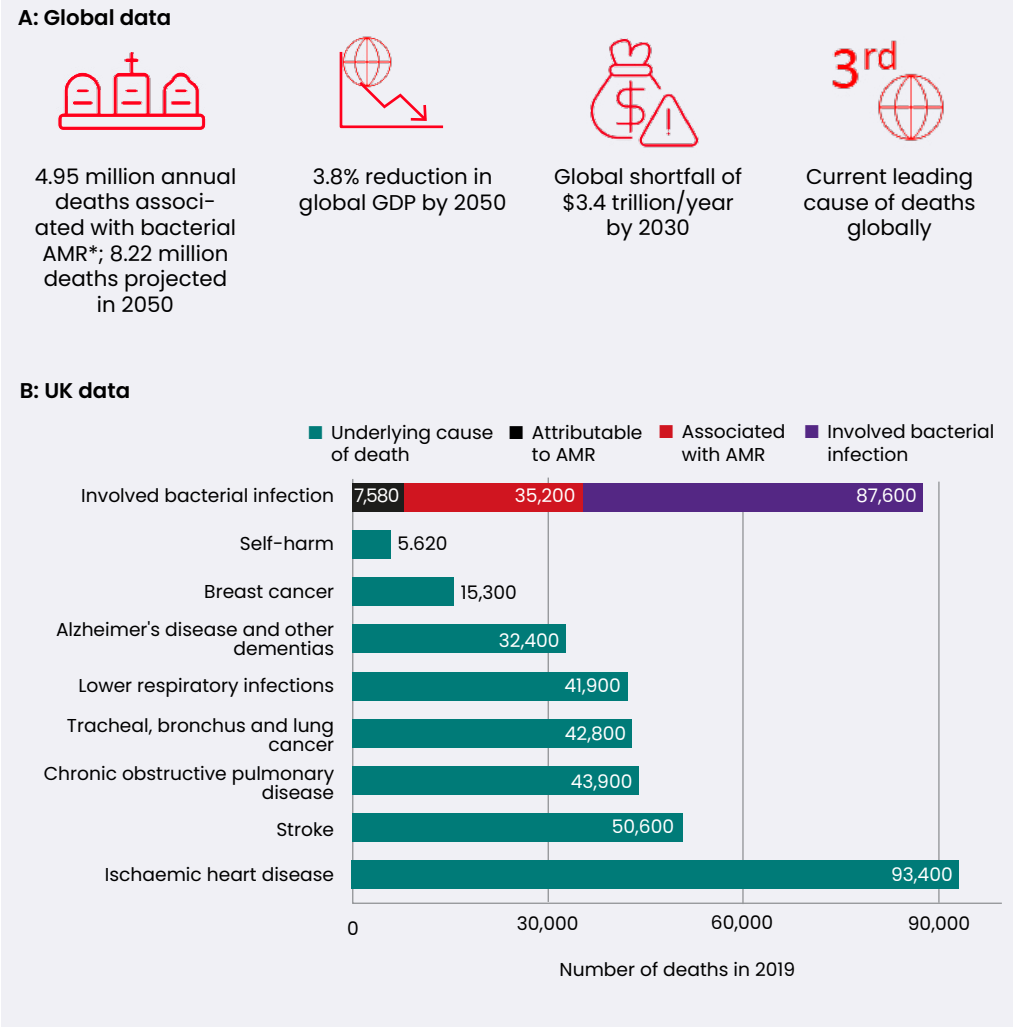

Figure 2. A) *Global data: the global scale of the AMR challenge; *data collected from 204 countries in 2019 (World Bank Group, 2017, Antimicrobial Resistance Collaborators, 2022, Naghavi et al., 2024, Blackburn et al., 2025a, Blackburn et al., 2025b, NHS, 2025).* **B)** UK data: *an estimate of the UK-wide impact of bacterial infections and AMR (adapted from Gov.UK, 2024).*

Antimicrobial stewardship (AMS)

One solution to reducing and preventing further AMR spread is an approach known as 'antimicrobial stewardship' (AMS). The National Institute for Health and Care Excellence (NICE) defines AMS and its objective as: 'An organisational or healthcare system-wide approach to promoting and monitoring judicious use of antimicrobials to preserve their future effectiveness' (NICE, 2025).

In practical terms, this means avoiding over-prescribing and incorrect prescribing of antibiotics; conducting thorough assessment and monitoring patients to ensure that treatment is appropriate and effective.

AMS encompasses infection prevention measures while also improving the safety and quality of patient care (NICE, 2025).

To do so requires a systemic change in the behaviour of societies, institutions and individuals through increased HCP and public awareness and education [Figure 3].

Based on the four components depicted in **Figure 3**, NICE recommends the following interventions for achieving AMS:

- A political commitment to prioritise AMR
- Monitoring antimicrobial use and resistance in microbes
- Development of new drugs, treatments and diagnostics
- Changing individuals' behaviour relating to infection prevention and control, antimicrobial use and AMR
- Changing HCPs' prescribing decisions (NICE, 2025).

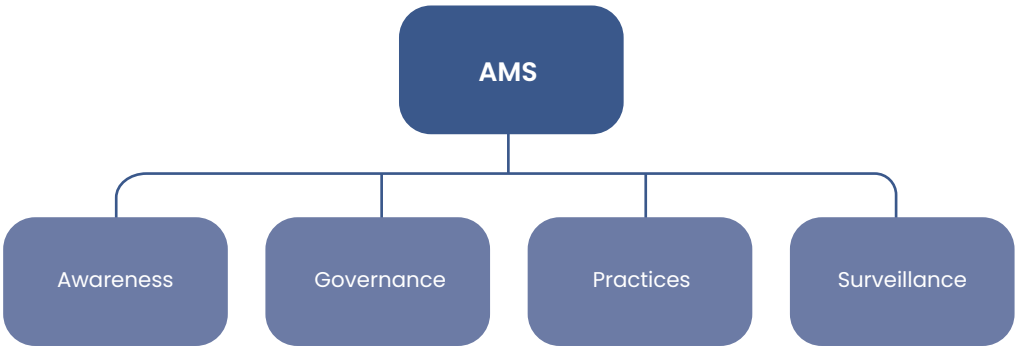

Figure 3. *The four components of AMS (adapted from Pinto Ferreira et al., 2022).*

AMS in wound care: advantages and barriers

To efficiently implement AMS, it is crucial that wound care professionals are aware of its potential benefits across all aspects of practice, as well as potential barriers to achieving it.

Advantages of AMS in wound care

The number of people requiring surgery and those living with non-healing wounds is increasing (Guest et al., 2020, Blackburn et al., 2025b, Gargate et al., 2025). In addition, infection is a major factor involved in stalling normal healing progression and AMR is on the rise in the microbes causing wound infections (Guan et al., 2021, Mardourian et al., 2023). This rise in both wounds and AMR in microbes causing wound infections presents a dire threat to patients' lives and requires proactive measures.

The advantages of practicing AMS in wound care are, therefore, manifold [Figure 4]. However, to address the rising threat of AMR in wound infections, it is crucial to understand and remove the barriers that wound care clinicians experience in their routine practice when aiming to achieve AMS.

Potential barriers to AMS in wound care

Effective implementation of AMS objectives in wound care requires a thorough understanding of the unique challenges faced by HCPs and healthcare systems.

Lack of understanding

Wounds have become increasingly acknowledged as a major global healthcare concern (Ding et al., 2022), with the estimated annual prevalence of acute and chronic wounds increasing by 9% and 12%, respectively (Guest et al., 2017).

Community settings, where the majority of wound care takes place, have now replaced acute care/hospitals as the primary source of patient exposure to resistant microbes (Gray et al., 2018, Blackburn et al., 2025b). With the projected rise in non-healing wounds, which are also at a high risk of infection, this situation presents an increasingly complex and costly challenge to HCPs and healthcare systems (Falcone et al., 2021).

Inadequate AMS education

Alongside rising AMR challenges, wound care HCPs experience several routine barriers driven by the complexity of care and the need for individualised treatment while working in a multidisciplinary environment (Ousey, 2020). With indications that a significant number of HCPs do not receive adequate education on AMS principles, there is a need to improve HCPs' awareness of AMR and the strategies to manage it via AMS using easy-to-apply practices (Satterfield et al., 2020).

It is essential that wound care-focussed AMS education, including clear definitions of relevant AMR-related terminologies and actions specifically outlined for wound care practitioners, is offered to all HCPs. Due to the myriad factors involved in understanding and practicing AMS (scientific, behavioural, societal, economic),

Create and implement wound care-specific AMS education and recommendations for both generalists and specialists involved in wound care.

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Figure 4. *The major advantages of practicing AMS in wound care (Blackburn et al., 2025b).*

it is difficult to develop a one-size-fits-all educational approach; therefore, ideally, tailored educational resources are needed (Castro-Sánchez et al., 2019, Castro-Sánchez, 2024).

Insufficient resources

Despite growing awareness around AMS and its associated guidelines, care settings in remote or underfunded areas may still face significant resource constraints that hinder effective implementation. To strengthen AMS prioritisation across the UK, particularly in community and rural settings, it is essential to ensure access to a well-trained healthcare workforce and the provision of appropriate, evidence-based treatments.

Sub-optimal national focus

The 10-year NHS plan for implementing AMS across the UK (spanning 2019-2029) achieved the following goals by 2025:

- Reduced antibiotic use in food-producing animals
- Improved surveillance systems
- Rehauled the NHS payment schemes for antibiotics (Gov.UK, 2024).

Although this is a significant achievement for combatting AMR in general, there are gaps in the 10-year plan. Notably, there is a lack of focus on wound care. The word 'wound' does not appear in the 10-year action plan, which currently heavily focusses on 'antibacterial measures' in contrast to 'antimicrobial measures'. Including a strategic focus on wound care in the 10-year strategic NHS plan can help improve HCP awareness and be the impetus for developing enhanced educational programmes.

AMS themes and terminologies in wound care

Themes and recommendations from implementing AMS in other disease areas can be adapted for wound care practices (Doyle et al., 2022).

In 2024, the 5-year update to the UK national action plan included the following four themes:

- Theme 1: Reducing the need for unintentional exposure to antimicrobials
- Theme 2: Optimising the use of antimicrobials
- Theme 3: Investing in innovation, supply and access
- Theme 4: Being a good global partner (Gov.UK, 2024).

In accordance with this UK-wide national action plan and the NICE recommendations on AMS (NICE, 2025), strategies in wound care should focus on the following key actions:

- Increase efforts towards effective infection control, identification methods and hygiene practices
- Create a consistent knowledge base and educational opportunities for HCPs on the effective use of antimicrobials – thus reducing variations in practice, diagnostic uncertainty, ritualistic behaviour, clinical fear and patient demand for antibiotics
- Prescribe the appropriate antimicrobial treatment when indicated, minimising the unnecessary use of antimicrobials, overly broad-spectrum treatment regimens and the use of antibiotics for non-infected wounds
- Prescribe the appropriate antimicrobial, at an optimal dose and duration, administered through the most appropriate route for the indicated condition and patient status
- Employ antimicrobial agents with the lowest risk of adverse effects, so patient engagement can be improved (Stryja et al., 2020, Wounds UK, 2020).

Infection-related terminologies

In wound care, early identification of infection and infection risk is an integral part of AMS strategy and the reduction of antimicrobial use (Blackburn et al., 2025b). To facilitate clear identification and diagnosis, it is important to clearly define and standardise infection, and AMS-related terminologies for all HCPs.

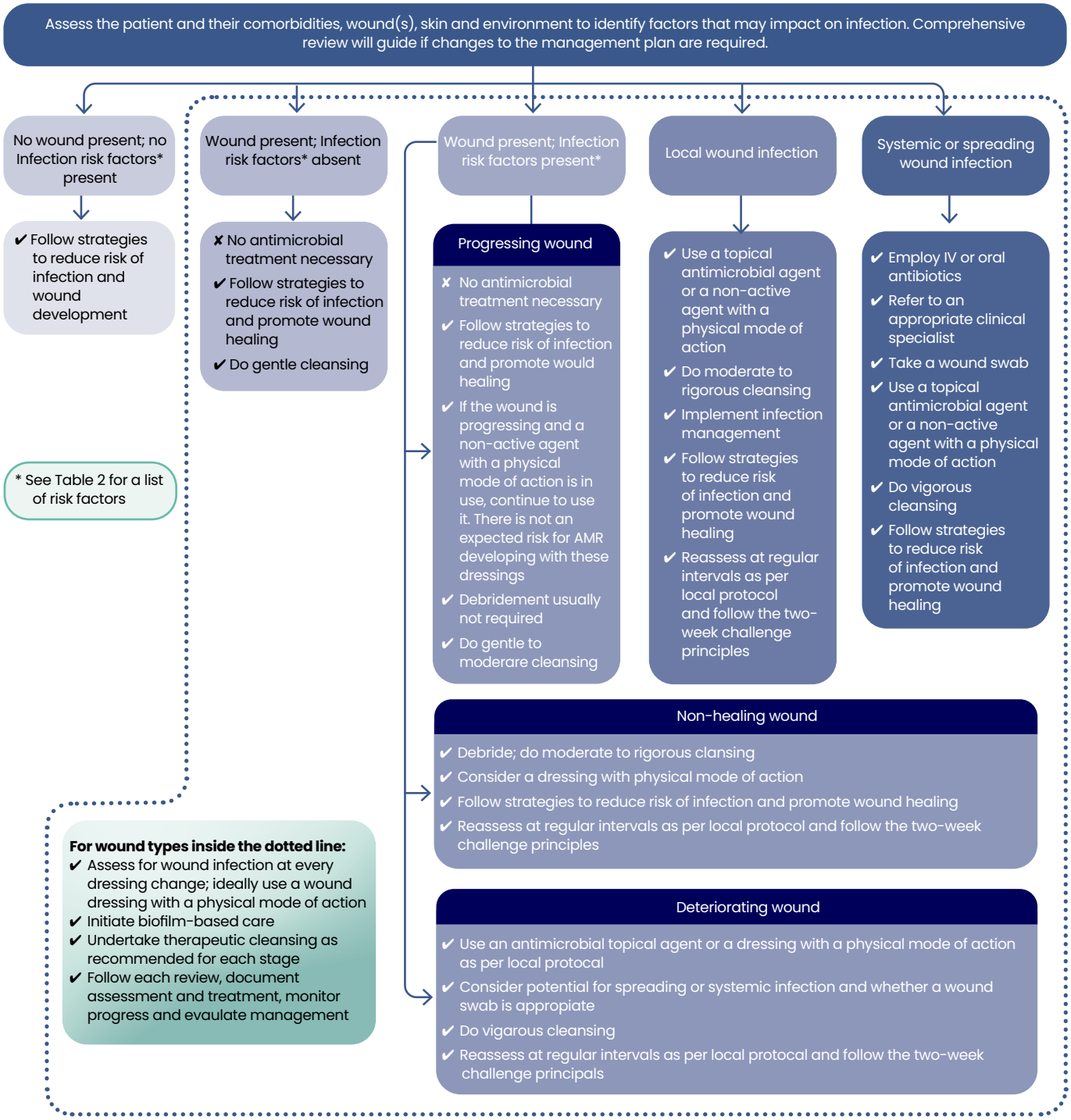
A full list of definitions can be found in **Appendix 1**.

AMS measures in wound care

A patient-centred wound and clinical assessment pathway is essential for enabling timely, targeted interventions that mitigate infection risk. To support this approach, a pathway is provided to guide management of patients with wounds, with or without infection risk [Figure 5].

To implement this pathway effectively, it is crucial that HCPs and prescribers understand their local antimicrobial guidelines and referral pathways where escalation is required.

Figure 5. *Clinical pathway to guide management of patients with wounds, with or without infection risk (Wounds UK, 2020). See page 21 for an explanation of a non-active agent with a physical mode of action.*



Identifying patients at risk

HCPs should be able to prioritise care according to the assessed risk of infection. Documenting this risk is equally important, as it enables the identification of patterns and associations that may inform strategies to reduce infection incidence. Table 1 summarises the key factors linked to an increased risk of wound infection.

Table 1: Factors associated with an increased risk of wound infection (Wounds UK, 2020).

Characteristics of the individual and prior care

- Poorly controlled diabetes
- Prior surgery at the site of the wound
- Radiation therapy or chemotherapy
- Conditions associated with hypoxia and/or poor tissue perfusion (e.g. anaemia, cardiac or respiratory disease, arterial or vascular disease, renal impairment, rheumatoid arthritis, shock)
- Immune system disorders (e.g. acquired immune deficiency syndrome, malignancy)
- Inappropriate antibiotic prophylaxis, particularly in acute wounding
- Protein-energy malnutrition
- Alcohol, smoking and drug abuse
- Presence of significant lymphoedema, skin conditions, haematoma, seroma, abscess, fistula
- A history of self-harm
- A carrier or infected with a multi-drug-resistant organism (i.e. 'alert organism')
- Recent travel (i.e. abroad, between multiple care settings)
- Level of mental capacity, knowledge and understanding.

Characteristics of the wound

Acute wounds	Chronic wounds	Both wound types
• Contaminated or dirty wounds • Trauma with delayed treatment • Pre-existing infection or sepsis • Spillage from gastro-intestinal tract • Penetrating wounds over four hours • Inappropriate hair removal • Operative factors (e.g. long surgical procedure, hypothermia, blood transfusion) • Large wound area; deep wound.	• Degree of chronicity/duration of wound • Large wound area • Deep wound.	• Foreign body (e.g. metal work, drains, sutures) • Haematoma • Necrotic wound tissue • Impaired tissue perfusion • Increased exudate or moisture • Anatomically located near a site of potential contamination (e.g. perineum or sacrum).

Characteristics of the environment and risks associated with inappropriate management

- Hospitalisation or exposure in other care settings (due to increased risk of exposure to antibiotic-resistant organisms)
- Poor hand hygiene and aseptic technique
- Unhygienic environment (e.g. dust, unclean surfaces, mould/mildew in bathrooms)
- Inadequate management of moisture, exudate and oedema
- Inadequate pressure off-loading
- Repeated trauma (e.g. inappropriate dressing removal technique).

Travel and region-related infection risk

- People exposed to/arriving from conflict regions (e.g. Ukraine, Palestine, the Sahel region or the Horn of Africa) or from tertiary, war-related clinics, such as military hospitals (Kumar et al., 2025)
- People from UK regions with high AMR prevalence (e.g. Manchester and Leicester; Gov.UK, 2025a)
- People travelling from countries with high AMR prevalence, including North African and Middle Eastern countries that have a high burden of MRSA (Murray et al., 2022)
- People who have travelled to receive cosmetic surgery abroad (Gilardi et al., 2023).

HCPs should utilise TIMERS (Tissue, Infection/Inflammation, Moisture balance, Edge of the wound, Repair/Regeneration and Social factors), or a similar tool, to identify risk factors when assessing a patient with a wound (Atkin et al., 2019).

Reducing infection risk

Effective infection management in wound care is grounded in core principles of hygiene and microbial load reduction within the care environment. These foundational concepts should encompass the following practices:

1. Hand hygiene/decontamination

Effective hand hygiene practices can help reduce healthcare-associated infections. The worldwide adoption of the WHOs multimodal hand hygiene improvement strategy, alongside sustained efforts to promote alcohol-based hand rubs over traditional soap and water, has resulted in a more rapid and effective approach to hand cleansing (Lotfinejad et al., 2021).

Microorganisms can persist on surfaces such as handrails and tabletops, where they may be transferred to individuals via hand contact. As pathogens commonly enter the body through mucous membranes of the eyes, nose and mouth, and face-touching often occurs unconsciously, regular hand hygiene has become a vital component of everyday life and remains essential within healthcare environments.

The '5 Moments for Hand Hygiene' approach (Wounds UK, 2020) defines the key moments when any person performing healthcare (e.g. HCP, family member or carer) should perform hand hygiene:

i. Before touching a patient
ii. Before clean/aseptic procedures
iii. After body fluid exposure/risk
iv. After touching a patient
v. After touching a patient's surroundings.

Soap and water remove dirt and grime when the hands are visibly soiled or potentially contaminated with body fluids, regardless of whether or not gloves have been worn (Wounds UK, 2020). An alcohol-based handrub destroys most microorganisms and reduces the bioburden. Alcohol gels are very effective at removing certain microorganisms but do not remove *Clostridium difficile* (Wounds UK, 2020).

Maintaining effective infection control can be particularly challenging in certain home environments. Payne and Peache (2021) highlighted non-compliance with guidance regarding the presence and cleanliness of handbasins or sinks in domestic settings, identifying these factors as key barriers. In some cases, homes may lack access to running or warm water altogether (Payne and Peache, 2021). Murphy (2023) noted that community nurses frequently encounter resource limitations in such environments, necessitating the application of infection prevention principles through alternative means, such as alcohol-based handrubs and wet wipes, to uphold hygiene standards in suboptimal conditions (Murphy, 2023).

2. Use of personal protective equipment (PPE)

Selection of PPE must be based on an assessment of risk of transmission of microorganisms to the patient, and the risk of contamination of the healthcare worker's clothing and skin by patients' blood, body fluids, secretions or excretions (Wounds UK, 2020). In wound care, PPE will include clean or sterile gloves, and may include disposable gowns, face masks/shields, and goggles. Single-use PPE should be disposed of as per local protocol. Availability and appropriate use of PPE might vary depending on the care setting.

3. Correct removal of PPE

Gloves, plastic aprons, gowns and single-use masks are single-use items and should be disposed of correctly. If the patient or their family or carer(s) are performing care, they should be advised on the correct handling, storage and disposal of healthcare waste.

Between each step of removing PPE, use alcohol handrub and once all items are removed, wash hands with soap and water. Items should be removed in the following order: gloves, gowns and masks.

Table 2 lists the steps required to correctly remove PPE.

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Wound infections can be prevented.

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It is crucial to remember that, despite adherence to best practices in wound care, it is not possible to fully prevent infection development, especially for people with numerous comorbidities. Instead, the aim should be to reduce the rate of infection and provide appropriate care as soon as an infection is diagnosed.

Diagnose and intervene early if wound chronicity risk is identified: the longer a wound remains unhealed, the higher the likelihood of infection development (Jia et al., 2017).

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Table 2: Correct removal and application techniques for PPE (Wounds UK, 2020).	
PPE equipment	**Correct technique**
Gloves	Pinch the glove at wrist level and pull it away from the skin without touching the forearm. Peel the glove down from the hand so it turns inside out and releases the hand. Hold the glove you just removed in your gloved hand. Peel off the second glove by putting your fingers inside the glove at the top of your wrist. Turn the second glove inside out while pulling it away from your body, leaving the first glove inside the second. Discard immediately in a closed medical waste bin for incineration; clean hands with alcohol-based handrub or soap and water.
Gown or apron	Untie behind the neck and waist (do not touch the front of gown); discard immediately in a closed medical waste bin for incineration; clean hands with alcohol-based hand rub or soap and water.
Mask	Masks are effective only when used in combination with frequent hand hygiene with soap and water or alcohol-based hand rub. Follow the instructions below to correctly apply and remove masks: • Before putting on a mask, clean hands with alcohol-based handrub or soap and water • Cover mouth and nose with mask and make sure there are no gaps between your face and the mask • Avoid touching the mask while wearing it; if you do, clean your hands with alcohol-based handrub or soap and water • Remove mask from behind each ear (do not touch the front of the mask) • Replace mask with a new one as soon as it is damp or at the end of the care provided • Do not reuse single-use masks • Masks should not be worn around the neck.

4. Good waste management
Appropriate waste management should be in place to dispose of waste that contains antimicrobial agents. Additionally, dressings or material that might be contaminated with AMR-containing microbes should be disposed of safely according to local protocols. Infectious waste is defined as anything contaminated with human tissue or bodily fluids (e.g. blood, saliva, pus, faeces, urine and vomit). Not all agents can be removed from waste water systems using current technologies, which can exacerbate AMR (Anjali, 2019). Unused antimicrobials should be returned to the local pharmacy.

5. Comprehensive documentation
Full and comprehensive documented assessment should be carried out for all patients with, or at risk of, a wound. Documentation for all patients should include:

- Wound, skin, limb and patient assessment, including infection risk (as per local guidance)
- Optimisation, management and referral of comorbidities (e.g. diabetes)
- Hydration and nutrition status
- Appropriate skincare
- Wound treatment, where applicable
- Regular review of the patient's treatment and progress to identify lack of progress and/or deterioration quickly (Wounds UK, 2020).

Infection and risk of infection should be documented to identify patterns and associations, which may help to reduce incidence (see **Table 1** for the individual, wound and environmental factors associated with an increased risk of wound infection). See the section on multidisciplinary collaboration (page 22) to understand the importance of comprehensive communication facilitated by documentation.

6. Manage the patient's environment
The patient's environment, in hospital or in the community, should be monitored to ensure infection risk reduction practices are followed. Ensuring that the patient's environment is clean in the community can be a challenge. *Pseudomonas aeruginosa* lives in the environment and can be spread to people in healthcare settings when they are exposed to contaminated water, hands, equipment or surfaces. Microorganisms can exist on surfaces for days (e.g. MRSA) or for months (e.g. gram-positive and gram-negative bacteria) on dry surfaces (Wounds UK, 2020).

See **Appendix 2** for a summarised list of considerations for reducing the risk of infection in line with AMS principles. Review the principles of aseptic techniques for wound dressing procedures (IWII, 2022, page 38).

Timely identification

Wound infection is a clinical challenge that can delay healing. The IWII infection continuum (IWII, 2025) describes the relationship between increasing microbial virulence and the clinical response invoked within the patient. The continuum encourages vigilance to encourage early identification to trigger when intervention is required. **Figure 6** describes the signs and symptoms associated with each stage of the infection continuum.

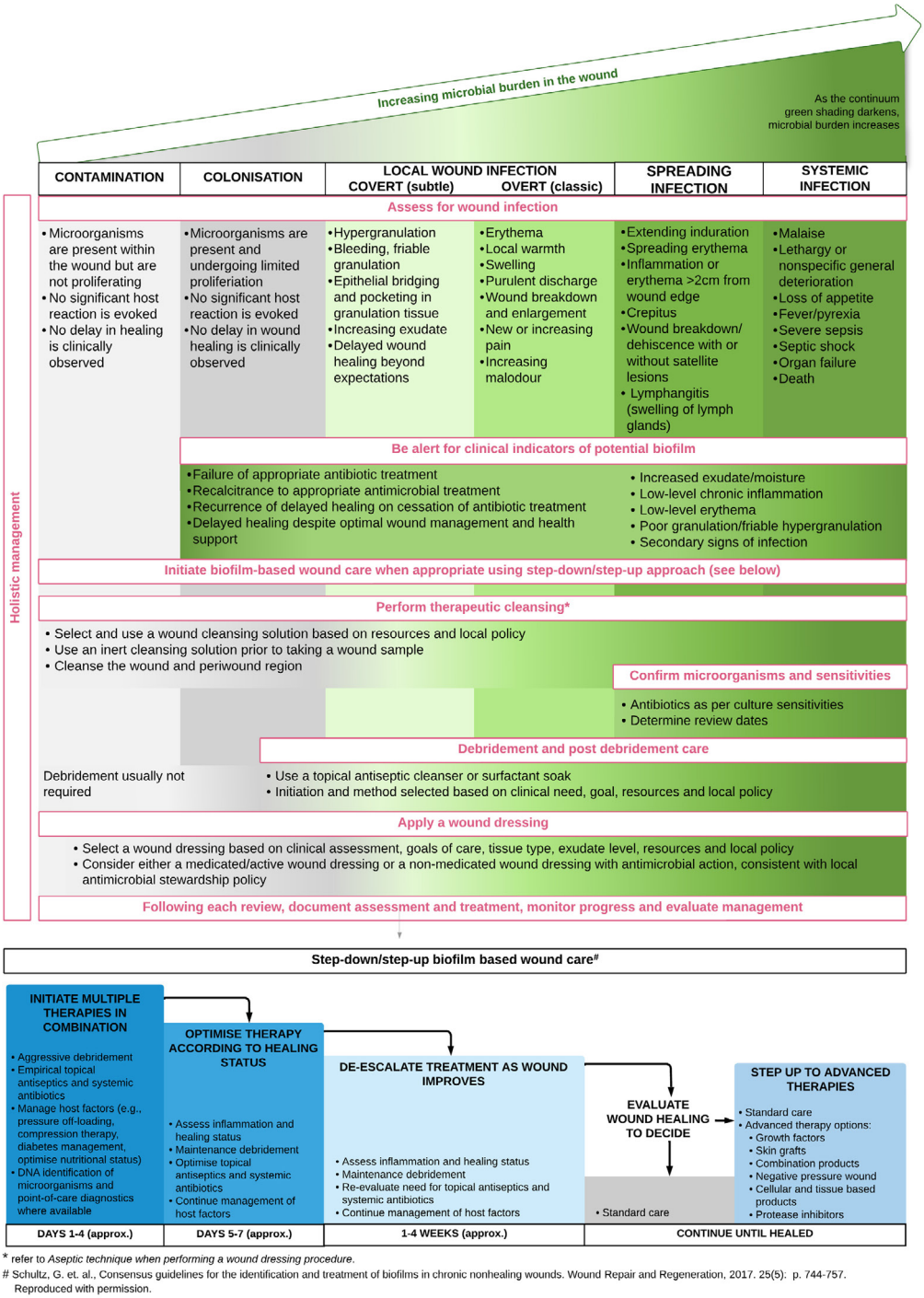

Figure 6. *The IWII Wound Infection Continuum (IWII-WIC); reproduced with kind permission from the IWII (IWII, 2025)*

Box 1. Clinical indicators of biofilm (Wounds UK, 2020).

- Failure to respond to antibiotic/antimicrobial treatment
- Recurrence of delayed healing on cessation of antibiotic/antimicrobial treatment
- Increased exudate/moisture
- Low-level chronic inflammation
- Low-level erythema
- Poor granulation/friable hyper-granulation
- Wound breakdown and enlargement.

All staff caring for people with wounds should be aware of how to assess a wound for infection and be able to distinguish between inflammation and infection.

Action Statement

HCPs should manage wound infection according to their local protocol/guidelines.

Action Statement

Conduct regular routine review of antimicrobial treatment. Frequent comprehensive reassessment of the patient and wound should be undertaken to identify whether changes to management strategies are required.

Action Statement

It is important that HCPs understand each stage of the infection continuum (Wounds UK, 2020):

1. Contamination
Wound contamination is the presence of non-proliferating microorganisms within a wound at a level that does not evoke a host response. All open wounds are contaminated with endogenous and exogenous microbial sources caused by environmental exposure and the patient's natural skin flora (Okur et al., 2020). Unless the host defences are compromised, the host immune system will respond swiftly to destroy bacteria. Vigilance is required, but antimicrobials are not indicated at this stage.

2. Colonisation
Colonisation refers to the presence of microorganisms in the wound that have undergone some proliferation, but there is no host reaction. Microbial growth occurs, but at a level that is non-critical and wound healing is not delayed or impeded (Wounds UK, 2020).

3. Local wound infection
Wound infections are caused by the multiplication of microorganisms in the wound of a susceptible patient at a rate that the host defences are unable to overcome the microorganism in the wound. Intervention is generally required to assist the host defences in destroying invading microorganisms.

Microorganisms can enter into wounds in a number of ways:

- Direct contact – transfer from surgical equipment or the hands
- Airborne dispersal – surrounding air contaminated with microorganisms that deposit onto the wound
- Self-contamination – physical migration of the patient's own endogenous flora, which is present on the skin, mucous membranes or gastrointestinal tract.

4. Biofilm formation
It is now widely accepted that biofilm is present in up to 10% and 60% of all acute and chronic wounds respectively (Cavallo et al., 2024). However, identification and management of biofilm remains a complex task. A biofilm is an aggregated community of slow-growing bacteria that are tolerant to host defences and to antimicrobial treatment (Zhao et al., 2023). Their altered metabolism, umbrella-like protective matrix and altered low-oxygen microenvironment increases their tolerance to antimicrobials (Wounds UK, 2020). Biofilms are often polymicrobial (including bacteria and fungi present as both single cells and aggregates (Jakobsen, 2025); they often involve clusters of different types of bacterial cells growing at different rates, which are challenging to treat. Biofilms are not visible to the naked eye and can be difficult to confirm unless a biopsy is taken and visualised by microscopy, therefore there are subtle clinical indicators of biofilm that are relied upon for diagnosis [Box 1].

5. Spreading and systemic infection
Spreading infection describes the invasion of the surrounding tissue by microorganisms that have spread from the wound to deep tissue, muscle, fascia, organs or body cavities. Microorganisms spread via the vascular or lymphatic system and can travel throughout the whole body. If systemic or spreading infection is present, antibiotic therapy must be started immediately while awaiting culture results. A sample/wound swab must be taken to determine the bacteria present and guide appropriate antibiotic use (Wounds UK, 2020). The therapy should be reviewed and revised based on clinical response and microbiological culture/susceptibility results.

6. Red flag: Acute deterioration or sepsis
Sepsis is a rare, but potentially fatal, condition. Recognising and treating infection early, before sepsis develops, is vital. If the patient looks ill, has triggered the National Early Warning Score (pulse, blood pressure, respiratory rate, oxygen levels, temperature and conscious level), or there are signs of infection – then the patient should be screened for sepsis (IWII, 2022). Patients and their carers and/or families should be made aware of the

symptoms of sepsis so that they can seek urgent medical attention [Box 2]. Urgent action includes immediate, high-level resuscitation with fluids, oxygen and systemic antibiotic therapy (Evans, 2018).

Box 2. Symptoms of sepsis.

Seek medical help urgently if you (or another adult) develop any of these signs:

- **S**lurred speech or confusion
- **E**xtreme shivering or muscle pain
- **P**assing no urine (in a day)
- **S**evere breathlessness
- **I**t feels like you're going to die
- **S**kin mottled or discoloured

Visit the Sepsis Trust website for more information: www.sepsistrust.org.
See also the National Early Warning Score 2 (NEWS2) to identify sepsis (Welch et al., 2022).

7. Diagnosis of infection

Diagnosis using gold-standard methods should be mandatory prior to initiation of antibiotics; however, approaches to infection diagnosis depend on clinical expertise and locally available methods. These may include: bedside assessment of the clinical signs and symptoms of each stage of the infection continuum, surface wound swabbing (e.g. the Levine technique), the use of point-of-care digital devices, or wound biopsy.

There is ongoing debate on the accuracy of available methods. Recent evidence suggests that point-of-care digital diagnostic devices have shown promising outcomes though there are still limitations in their effectiveness (Huang et al., 2024); however, these devices may require clinical expertise and are not always locally available. Diagnosis of wound infection should combine the HCP's professional judgement and the clinical presentation of the wound and patient.

8. Role of swabbing and sampling

Wound swabbing is a simple, convenient, widely available and non-invasive procedure, but it is not a tool that can be used to diagnose in isolation (Wounds UK, 2020). Swabbing guides antibiotic selection against the organisms causing the clinical signs of infection – it does not determine whether an infection is present. Routine swabbing in the absence of clinical indicators of infection is neither helpful nor cost-effective. Therefore, careful consideration of whether swabbing should be conducted is paramount. Box 3 outlines questions to consider when deciding whether to swab the wound bed.

If swabbing is indicated, the Levine technique is recommended (IWII, 2022). The Levine technique involves rotating the swab whilst pressing lightly over a 1cm^2 area of the wound. Other techniques include the Z technique which involves rotating the swab between the fingers in a zigzag fashion across the wound, without touching its edge.

Once the sample has been collected, it should be labelled with the patient identification details, date and time of the sample and wound site and sent as quickly as possible to the laboratory as per local protocol.

9. Interpreting results

Most laboratories will provide information on the bacteria cultured from a wound swab, the number of organisms grown (either quantitatively or semi-quantitatively), and the antibiotic susceptibility of the grown organisms, which should guide treatment. This is very helpful when the swab is taken from an acute wound, where a single organism (or perhaps two) usually causes the infection. However, in a chronic wound, swabbing is not always helpful as the wound frequently contains a biofilm which often contains numerous bacterial species, potentially pathogens and non-pathogens.

A swab may identify the presence of microorganisms (Wounds UK, 2020). The presence of an organism in an infected wound does not necessarily mean that it has caused the infection and, in practice, it is not possible to differentiate between pathogenic and non-pathogenic organisms. Furthermore, typically, aerobic bacteria

Box 3. Questions to consider when deciding whether to swab (Wounds UK, 2020).

- Is the current therapy appropriate based on the last results?
- Has the therapy had time to work (2–3 days)?
- Is there deterioration? If so, is this deterioration deep (i.e. is a tissue sample required at theatre level)?
- Are there signs of spreading or systemic infection?

Box 4. The 'Five Rights' of topical antimicrobial prescribing in wound care (Wounds UK, 2020).

1. Right patient
2. Right drug
3. Right time
4. Right dose
5. Right route.

are identified and anaerobic microbes embedded deep in the tissue (e.g. in cavity wounds or poorly perfused chronic wounds) may be missed because of the sampling or culturing technique.

Bacterial infection with multiple species can produce a synergistic effect, leading to increased production of virulence factors and greater delays in healing, suggestive of biofilm. The most common causative organisms associated with wound infections include *Staphylococcus aureus*/MRSA, *Streptococcus pyogenes*, *Enterococci* species and *Pseudomonas aeruginosa* (Wounds UK, 2020).

Selecting an appropriate antimicrobial treatment plan

The HCP must undertake and document a holistic assessment of the patient, wound and the wound care environment, in order to guide antimicrobial treatment (Wounds UK, 2020). If a bacterial cause for a spreading or systemic infection is suspected, appropriate microbiological investigations should be started to identify the type of microorganism. Taking a sample of blood and adding to blood culture set may help with the identification of a systemic infection. The use of antibiotics must comply with local AMS policies (Sandy-Hodgetts et al., 2019).

The 'Five Rights' of drug administration are a crucial component in medication safety, particularly antibiotics [Box 4]. Here, the 'Five Rights' have been adapted for the appropriate prescribing of topical antimicrobials in wound care:

- **Right patient – good assessment leading to right diagnosis and care plan**

Comprehensive assessment of the individual and their wound aids early detection and timely and correct treatment of infection. Following diagnosis, the care plan should include the following principles for effective management of wound infection (Wounds UK, 2020):

- Optimisation of the individual host response considering patient factors that increase risk for infection. See Table 1 (page 12) for factors associated with increased risk of infection
- Reduction of the wound microbial load (e.g. wound bed preparation, care to the surrounding skin, antimicrobial and dressing selection)
- Promotion of environmental infection prevention measures
- Regular reassessment.

- **Right drug – right antimicrobial and the right delivery system**

Choice of drug or dressing should be made according to data on pharmacology, microbiology, clinical experience, economy, local availability and local AMS protocol. The NICE guidelines should be followed to select the antimicrobial agent, dosage and duration for leg ulcer infection, cellulitis and erysipelas, and diabetic foot infections (NICE, 2020a, NICE, 2024).

Ensure the prescription is individualised to the patient following thorough assessment of the wound and patient (including any allergies). The patient should understand why treatment has been prescribed (i.e. explain the rationale behind treatment decisions, with a focus on shared decision-making) to encourage engagement with their treatment. Any adverse reactions should be monitored, recorded and reported.

Antibiotic misuse in wound care often occurs because of diagnostic uncertainty concerning the presence of a bacterial infection, lack of knowledge of lower limb infections, HCPs' fear of achieving unfavourable patient outcomes and patient demand (Roberts et al., 2017). Overprescribing of antibiotics should be avoided; an incorrect dosage can lead to release of endotoxins from Gram-negative bacteria and also development of antimicrobial resistance (Husmark et al., 2022).

Systemic antibiotics should be reserved for the treatment of serious bacterial infections in high-risk patients when other treatment options are ineffective or not

available. The antibiotic selected should be specifically focused to the microorganism and administered for the shortest duration possible (Lipsky et al., 2016; Palin et al., 2021).

Switching from intravenous to oral therapy as soon as patients are clinically stable can reduce the length of hospitalisation, thus reducing the risk of hospital-acquired complications and reducing associated costs (Deshpande et al., 2023). The only topical antibiotics that are recommended within dermatology departments for skin/wound infections are mupirocin, fusidic acid, metronidazole, oxytetracycline and neomycin, and these should be used in limited situations, subject to local policy (Wounds UK, 2019). **Box 5** provides practical guidance for patients receiving antibiotic treatment.

Antiseptics: In wound care, antibiotic-resistant bacteria present a serious issue, necessitating the consideration of alternatives to antibiotics, such as topical antiseptics. Recent evidence indicates that antiseptics are currently under-used in reducing AMR, especially in for wound care and surgical site management. Antiseptics can be useful agents in attempts to reduce AMR (Barrigah-Benissan et al., 2022).

Antiseptics are non-selective agents that are applied topically in order to stop growth or kill microorganisms. They are relatively non-toxic and are not significantly absorbed through the skin, as such development of resistance to antiseptics is uncommon. Topical antiseptics are available in dressings, ointments, powders and cleansing solutions (e.g. silver, honey, iodine, octenidine dihydrochloride, PHMB, hypochlorous acid). See the NICE guideline (2025b) for a list of active and non-active agents used in topical antimicrobial dressings for infected leg ulcers.

Products with a physical mode of action: Products with a physical mode of action can help improve bioburden management (e.g. cleansing lotions containing surfactants that loosen and remove debris and microbes from the skin or dressings that can physically bind and remove bacteria (Wounds International, 2025) For more details, see the section 'Dressings with a physical mode of action' on page 21. These dressings are usually non-medicated (i.e do not have an antimicrobial agent added) but work by chemical interaction with the product and the microbe.

• Right time to initiate antimicrobial treatment

The presence of clinical signs and symptoms of infection and indicators of biofilm [**Figure 5** and **Box 1**] and local protocol determine when antimicrobial treatment is initiated. Antimicrobial agents should not be routinely used as a precautionary measure if the wound is not clinically infected. However, there are some instances where antimicrobial treatment is indicated if infection is suspected:

- *Suspected infection in a patient with a diabetic foot ulcer:* NICE recommends to start antibiotic treatment for people with suspected infection in a diabetic foot ulcer as soon as possible (NICE, 2024). Take samples from the base of the debrided wound for microbiological testing before, or as close as possible to the start of antibiotic treatment (NICE, 2020b). If a swab at the base of the wound cannot be obtained, take a deep swab because it may provide useful information on the choice of antibiotic treatment
- *Surgical site infection (SSI):* Prophylactic antibiotic therapy is usually given as a single dose at induction of anaesthesia, but should not be continued after surgery (WHO, 2018). NICE recommends that when a surgical site infection is suspected due to the presence of cellulitis, either by a new infection or an infection caused by treatment failure, the patient should be given an antibiotic that covers the likely causative organisms and considers the results of microbiological tests (NICE, 2020b).

• Right duration of antimicrobial treatment

If antibiotics are prescribed, the course

Box 5. Practical guidance for patients receiving antibiotic treatment (Wounds UK, 2020).

- If you are taking your antibiotics as prescribed and develop symptoms such as fever, rash, upset stomach, lethargy or confusion, you should contact your HCP
- You will need to read the patient information and follow the instructions, such as when to take your medication, if it should be taken with or without food, what to do if you miss a dose, possible side effects, when to seek help
- Complete the prescribed course
- Do not take antibiotics that are not prescribed for you
- If you do not intend to finish the prescribed dose, seek advice from your HCP.

Box 6. The decision to discontinue antibiotic treatment (Wounds UK, 2020).

Appropriate duration of antimicrobial treatment is an area of debate, with longer duration being associated with a heightened risk of inducing microbial resistance. The use of a highly effective antimicrobial is required for shorter-duration treatments to kill bacteria, reduce bioburden (hence enabling the antimicrobial agent to be more effective) and minimise the risk of inducing microbial resistance. Antimicrobial dressings are recommended to be used for a minimum of 2 weeks' duration. After 2 weeks, re-evaluate and either:

- Discontinue if signs and symptoms of infection have resolved
- Continue with the antimicrobial if the wound is progressing but there are still signs and symptoms of infection
- Consider an alternative antimicrobial if there is no improvement and refer to a wound care specialist.

Table 3: Examples of local indicators of improvement/deterioration of chronic wounds and possible indicators of infection (Wounds UK, 2020).

Parameter	Change that may indicate	
	Improvement	**Deterioration**
Wound bed	• Increased amount of granulation tissue • Decreased amount of slough/ necrotic tissue • Reduction in wound area/ volume*	• Increased amount of slough/ necrotic tissue • Decreased amount of granulation tissue • Granulation tissue is friable • Increase in wound area/volume
Exudate	• Levels usually decrease as the wound heals • Change to clear if previously cloudy	• Increased level • Change from clear to discoloured • Change in consistency (e.g. thinner to thicker)
Periwound skin	Reduction, if present, of: • Maceration/excoriation • Erythema • Swelling	Development, or increase in extent, of: • Maceration/excoriation • Erythema • Swelling
Odour	Less noticeable or resolved if previously an issue	Development, change in or worsening of unpleasant odour
Wound-related pain	Reduced level or frequency	Development, change in nature and/or increase in level of pain†

*N.B. Changes in wound area or volume may not be noticeable from one dressing change to the next, and a wound may increase in size when necrotic tissue and slough are removed. Taking photographs and measuring the wound helps to identify if the wound is improving.

†Patients with a diabetic foot ulcer and neuropathy may not experience pain; a patient with sudden onset of pain should be referred urgently.

should be completed to avoid infection reoccurrence and to reduce the risk of the bacteria becoming resistant to the antibiotics. If the patient does not intend to finish the course, they should be advised to contact the prescriber. If there is no response or improvement after the designated duration of antimicrobial treatment, management needs to be reviewed as per local protocol. The 'two-week challenge' guides the appropriate duration of antimicrobial treatment and reassessment [Box 6]. A wound that does not progress and becomes chronic could be indicative of the presence of biofilm. Antimicrobial failure and recurrence of delayed healing on cessation of antimicrobial treatment are well-established clinical indicators of the presence of biofilm (Box 1; IWII, 2022). If clinical indicators of biofilm are present, a different management approach is required, including:

- Debridement to physically disrupt and expose the microorganisms to make them vulnerable to the effects of topical antiseptics and systemic antibiotics
- Cleansing to remove any residual debris and antimicrobial intervention against exposed bacteria and residual biofilm
- Use of an antimicrobial with proven effect against mature biofilms in clinical practice or a dressing with a physical mode of action. Reassessment should also be triggered if the condition of the wound (Table 3; Wounds UK, 2020) or patient deteriorates (e.g. they develop an acute medical condition or an existing comorbidity worsens).

• **Right antimicrobial dose**
Wound care products and dressings may have different amounts of the active ingredient and different release mechanisms, which make them more or less readily available, such as povidine iodine and cadexomer iodine. For oral antibiotics, there are NICE and Public Health England (PHE) guidelines to guide prescription for common infections, including diabetic foot infections, leg ulcers, and cellulitis and erysipelas (NICE, 2020a, PHE, 2021, NICE, 2024). The recently published Best Practice Statement on osteomyelitis in pressure ulcers is a good source for relevant AMS recommendations (Fletcher et al, 2025). Local protocols and pathways should be in place to advise based on product availability.

Figure 5 (page 11) provides a step-wise approach to guide the use of antimicrobial treatments for patients with wounds with or without infections.

Surgical site infections (SSIs)

AMR can render crucial, life-saving interventions such as surgery complicated, as these procedures heavily depend on concomitant antibiotic use (Gargate et al., 2025). Of all patients undergoing surgery, approximately 5% develop an SSI, making SSIs the second most prevalent infection acquired in healthcare settings (Ousey et al., 2023). In a recent study of 5,788 patients, approximately 22% developed an SSI; of these, <14% of patients received a swab, which showed the presence of multidrug resistance in approximately 70% of cases (Aboderin et al., 2024).

It is estimated that, if AMR is present, hospital treatment can amount to an additional $29,000 (USD) per patient (Gargate et al., 2025). By 2030, approximately 20% of all people in England aged ≥75 years will require some form of surgery, costing NHS at least £3.2 billion annually (Fowler et al., 2019). The cost of AMR to the NHS is high: compared to patients with infections that are not reported as resistant, patients with a resistant infection spend >9 additional days in hospital, with the additional hospital costs amounting to approximately £3,441 per patient (Taie et al., 2025). These data demonstrate that, with the global increase in AMR, an ageing population and associated rise in complications and comorbidities, SSIs pose a significant challenge (Blackburn et al., 2025b).

However, recent data indicate the importance of timely intervention via evidence-based management approaches: in a recent, year-long study of 2,368 women who underwent a c-section via the NHS, cost savings of £2,34784 to the NHS were recorded upon implementation of evidence-based SSI management approaches (Magro and Ashfield, 2025).

Therefore, it is crucial that, just as patients with or at risk of non-healing wounds, patients with surgical wounds receive evidence-based treatments and dressings that follow the principles of AMS (Rippon et al., 2021, Rippon et al., 2023). To prevent SSIs, a comprehensive strategy is required, using tools that reduce bioburden, including hygiene, appropriate dressings and good nutrition (Blackburn et al., 2025b).

Evidence-based tools

It is crucial to employ evidence-based tools and dressings that can help reduce the risk of AMR (Rippon et al., 2025). Awareness of the latest local and regional data as well as appropriate evidence-based interventions are the core pillars of AMS strategies (Desai et al., 2025).

Silver dressings and topical antimicrobial agents

Recent data indicate that systemic antibiotic treatment does not impact the composition of microbes in nonhealing wounds (Dinić et al., 2024). A study by Dinić et al (2024) demonstrated that AMR to topical antibiotic treatment was present in 83% of all samples (Dinić et al., 2024). Although antiseptic agents (e.g. iodine, PHMB, biguanide and silver) may help reduce the risk of AMR to antibiotics, microbes may still develop a certain amount of resistance to them; furthermore, there may be some level of toxicity associated with the use of these agents, impacting the skin and impairing healing progression (Rippon et al., 2025).

HCPs should implement evidence-based approaches for managing SSIs.

Action Statement

To achieve AMS goals, choose products based on research and evidence and follow local guidelines for treatment selection.

Action Statement

The use of antimicrobial agents may contribute towards an increase of AMR. Consider antimicrobial dressings with a physical mode of action, which can provide a viable alternative to treat a variety of wounds.

Action Statement

Box 7. Tips for patients to reduce the incidence of antimicrobial resistance when undergoing treatment for an infection.

- Do not overuse or underuse the prescribed antimicrobial treatment
- Do not self-prescribe
- Complete the course of the prescribed antimicrobial treatment as advised
- Inform your HCP if you have not been able to adhere to the recommended treatment dose or duration for any reason
- Do not store any leftover antimicrobial medication after completing the treatment course; return all unused or missed medication to your local pharmacy for safe disposal
- If you experience any side effects of the given antimicrobial medication, inform your HCP
- Access patient educational resources.

Dressings with a physical mode of action

With the risks associated with commonly used topical treatments and dressings containing antimicrobial agents, it is important to consider recent advances in wound dressings with a physical mode of action. These dressings are usually classed as non-medicated dressings and work by interacting with the microbes, removing them from the wound into the dressing by either chemical interaction or sequestration and, ultimately, locking them into the dressing. Once the dressing is removed, the captured microbes are removed from the wound, thus reducing bioburden.

Dressings coated with dialkylcarbomoyl chloride (DACC) can provide an alternative to dressings containing antimicrobial agents (Magro and Ashfield, 2025). The wound contact layer in DACC-coated dressings consists of a hydrophobic surface, which traps bacteria and is inactive towards the wound itself. The DACC layer can help remove bacteria that have been identified by the WHO as a priority AMS target (e.g. *Staphylococcus aureus* and *Pseudomonas aeruginosa*) and have a hydrophobic surface (Jeyaraman et al., 2025).

The bioburden of a wound can be reduced by using DACC-coated dressings, reducing the need to use antimicrobial treatments, in line with AMS objectives (Totty et al., 2017, Ousey et al., 2023). Furthermore, as the DACC-coating removes the microbes from the wound environment without breaking bacterial cells, the resultant lack of localised endotoxin release may further improve the wound environment (Jeyaraman et al., 2025).
Recent data indicate that DACC-coated dressings can be used for managing acute, surgical and non-healing wounds, providing an AMS-compliant alternative to traditional dressings or beads containing antimicrobial agents (Totty et al., 2017, Rippon et al., 2021, Rippon et al., 2023).

Therefore, DACC-coated or honey-based dressings may be preferred over dressings containing antimicrobial agents. Other dressings (e.g. superabsorbent or polysorbent dressings) may also entrap bacteria and slough and effect continuous wound cleaning.

Practical tips for patients

Recent studies indicate that appropriate and timely patient and HCP guidance can help achieve the goals of AMS (Balea et al., 2024). With the widespread use of digital and social media, patients are more cognisant of their disease(s) and treatment(s) (Dang et al., 2020). Therefore, clear communication with patients and carers can help them understand their role in a partnership toward achieving AMS objectives.

The MDT approach to AMS

Multidisciplinary team (MDT) communication and collaboration are vital, including both in-person and through appropriate documentation of patient records (Ousey, 2020, Blackburn et al., 2025a, Blackburn et al., 2025b). It is important that the teams implementing AMS are proficient in both clinical AMS principles and non-clinical skills, including the science of behaviour change (Weier et al., 2021).

The wound care sector in the UK has already adapted a highly successful MDT approach [Figure 7], making it a healthcare field highly amenable to the practice changes required for achieving AMS. Each wound care MDT member, including all healthcare workers and prescribing or non-prescribing personnel, should be aware of the following:

- Local AMR issues in the community/region
- Local antibiotic guidelines
- Principles of AMS and how to implement them for a patient with a wound, especially for those with non-healing wounds (Ousey, 2020, Blackburn et al., 2025a, Blackburn et al., 2025b).

The NICE guidance emphasises the importance of shared decision making when selecting an antimicrobial dressing (NICE, 2025b). However, the impact of dressing selection should always be considered when undertaking shared decision making. As per NICE

Organisations must employ a well-rounded approach including both clinical and change management principles when aiming to achieve AMS targets in wound care (Garraghan, 2022, Van Dort et al., 2024).

Action Statement

Figure 7. *Members of a wound care MDT responsible for practicing AMS principles.*

Scan the QR code above to access the full NICE guidance on' Topical antimicrobial dressings for locally infected leg ulcers: late-stage assessment'.

recommendations, if there is a need to use an antimicrobial dressing for treating a locally infected leg ulcer, it is important to ensure the dressing is both clinically appropriate and addresses the needs of the patient (NICE, 2025b). It is also important that healthcare professionals consider AMS strategies in this decision making process.

Nurses as crucial stakeholders

From identifying and treating wounds to supporting patients and carers with personalised treatment plans and appropriate education, nurses perform a crucial, and arguably the central, role in wound care MDTs (Blackburn et al., 2025a).

However, organisational, educational and resource-related barriers have been identified as major challenges for nurses aiming to achieve AMS objectives: in a systematic review of the role of nurses in AMS, Blackburn et al (2025b) found that understanding the impact and dynamics of nurse-led practices for achieving AMS in an MDT can help create training programmes tailored to wound care settings.

MDT recommendations

'Huddles' have been used successfully in the acute care sector to improve processes and safety and could be used within other settings. This involves short meetings (2-3 minutes) with the purpose of team communication and empowering all members to have their voice heard. Wherever possible, as the healthcare landscape evolves, there must be clear communication between health and social care sectors.

Recent data also indicate that a vast majority of HCPs approve targeted AMS educational workshops as tools in improving AMS awareness (Lanckohr and Bracht, 2022; Chetty et al., 2024).

These communication tools can be employed to approve AMS awareness across the UK.

Conclusion

The alarming rise in both AMR and the number of people living with wounds is a potential global catastrophe and makes AMS in wound care an urgent priority for all stakeholders. This document is a call to action for all HCPs involved in wound care, highlighting that the time for action cannot be delayed.

This publication highlights the importance of delivering HCP and patient education in applying AMS principles in wound care. Recommendations are provided to specialists and generalists for achieving AMS objectives when managing care of people living with wounds. The structured wound management approach outlined in this publication aims to facilitate appropriate and timely intervention via evidence-based tools that can help reduce bioburden in wounds while also reducing the probability of an increase in AMR.

The geographic and socio-economic challenges in managing AMR spread across the UK require significant and urgent focus from both the NHS and UK government. There is a need to undertake UK-wide epidemiological studies to understand the prevalence and incidence of AMR and deploy appropriate measures. Wound care-specific considerations are needed in the NHS plan for managing AMR and relevant assessment metrics need to be developed for HCPs involved in wound care.

The recent advances in dressings with a physical mode of action, and digital and artificial intelligence technologies, can help achieve AMS goals and assist in evaluating the impact of current strategies in managing the rising challenges of AMR across the UK.

Appendix 1: Infection-related terminologies (IWII, 2025)

Terminologies	Definitions and clarification
Colonisation	Refers to the presence of microorganisms that are undergoing limited proliferation. In colonisation, no significant host reaction is evoked and no delay in wound healing is clinically observed (IWII, 2025). However, colonisation increases the likelihood of infection if the colonising microbes become pathogenic, such as the accidental pathogen *S. epidermidis* (Blackburn et al., 2025b). Furthermore, colonisation provides microbes an opportunity to evolve into biofilms (Alves et al., 2021).
Biofilm	'Aggregate microorganisms that have unique characteristics and enhanced tolerance to treatment and host defences. Wound biofilms are associated with impaired wound healing and signs and symptoms of chronic inflammation' (IWII, 2025).
Bioburden	The process of wound healing involves a complex interplay of different cell types (including those of microbes), cytokines and inflammatory mediators, with some natural microbial presence due to the nature of injury (i.e. a skin break and its direct exposure to the environment); the type and extent of microbes in a wound may disturb natural healing progression, especially in the presence of comorbidities and complexities that increase the risk of non-healing (Eriksson et al., 2022, Schwarzer et al., 2024). The term 'bioburden' describes the combined load of all microbes present in the tissue even when an overt infection is absent. A high bioburden is associated with higher likelihood of wound chronicity (Norman et al., 2021).
Aseptic technique	'A practice framework to prevent microorganism cross-infection when performing a wound dressing procedure. The two accepted standards of aseptic technique are: sterile/surgical aseptic technique and clean/standard aseptic technique' (IWII, 2025). In wound management, aseptic technique is recommended as a standard infection reduction approach (Purssell et al., 2024).
Clean technique	Clean techniques are used when the 'risk of infection is minimised but use of non-sterile materials is considered permissible' (Purssell et al., 2024). The aim of clean techniques is to reduce the burden of microbes, whereas aseptic techniques aim to eliminate all microbes to ensure a reduction in the probability of infection (Purssell et al., 2024).
Antimicrobials	A substance that kills or inhibits the growth of microorganisms including bacteria, viruses, fungi and parasites (IWII, 2025).
Antibiotics	'A natural or synthetic medicine administered systemically or topically that has the capacity to destroy or inhibit bacterial growth'; antibiotics target specific sites within bacterial cells while exerting minimal or manageable influence on human cells, thus they have a low toxicity (IWII, 2025).
Antiseptics	'A topical agent with broad-spectrum activity that inhibits the multiplication of, or sometimes kills, microorganisms. Depending upon its concentration, an antiseptic may have a toxic effect on human cells' (Nair et al, 2023). Antiseptic-associated AMR is uncommon (Nair et al, 2023).
Topical antibiotics	Used for treatment of superficial wounds (such as those seen in dermatology departments) and to deliver the active ingredient to the site of infection; however, these antibiotics may affect wound healing and their unrestricted application may lead to AMR development (Bandyopadhyay, 2021).
Systemic antibiotics	Used for a wound infection that has spread to other parts of body, these antibiotics are administered orally or intravenously to ensure deep reach; however, they can lead to adverse events, affect the non-pathogenic bacteria throughout the body (e.g. those in the gut) and may increase AMR development if used without restrictions (Mohsen et al., 2020). Typically, acute wound infections require systemic antibiotic treatment while chronic infections, often present with a biofilm, are treated with topical antimicrobials (Schwarzer et al., 2024).

Appendix 1: Infection-related terminologies (IWII, 2025) *(Continued)*

Terminologies	Definitions and clarification
Inflammation	Identified by symptoms of swelling, heat, redness and pain, inflammation is the body's response to injury, which helps remove debris from the injury site; however, in nonhealing wounds, this phase is impaired, leading to prolonged symptoms and lack of healing progression (Wounds UK, 2019).
Infection	Infection is the invasion of the body by microorganisms such as bacteria, viruses, fungi, and other parasites (Gov.UK, 2025b).
The symptoms of inflammation and infection are very similar, which can potentially lead to an overdiagnosis of infection and overuse of antimicrobial treatments (Wounds UK, 2019).	
Exudate type	There are different types of wound exudate, with each indicating the status of the wound: • Serous exudate (thin liquid, mostly clear): indicates normal healing • Serosanguinous exudate (thin liquid, with pale red): indicates normal healing • Sanguinous exudate (thicker, fresh/bright red blood): indicates bleeding • Thick exudate, related to liquification of devitalised tissue, such as necrosis and slough; may be malodorous but not necessarily infected. The thickness and 'stickiness' of this type of exudate arises from the softening of necrotic tissue and slough as the body attempts to debride the wound naturally and separate the necrotic tissue from the wound in order to promote healing (National Library of Medicine, 2023) • Purulent exudate with or without malodour (opaque and thick; may be yellow, green, grey or brown): indicates infection (Power et al., 2017, Chambers and Bradley, 2018).
Bacteria-binding surfaces or materials	A type of wound dressing surface that inactivates or removes bacteria from the wound environment, without disrupting the bacterial cells which release endotoxins in the wound environment and compounds inflammation (Husmark et al., 2022). Examples of such surfaces include the hydrophobic surface of DACC-coated dressings.

Appendix 2: A checklist of measures for achieving AMS in wound care (Wounds UK, 2020)

Remember that AMS is everybody's responsibility throughout the patient journey

Patient and wound	Environment	HCPs and carers	Protocol
☐ Avoid any break in the skin and preserve overall skin integrity (i.e. keep skin clean, dry and well- hydrated) according to local policy and international guidance ☐ Implement wound bed preparation to reduce wound or skin microbial load: - Debride the wound of necrotic tissue, debris, foreign bodies, wound dressing remnants and slough. It is essential that you have undergone appropriate training and education to establish competency in the chosen debridement method - Cleanse the wound at each dressing change - Use aseptic technique for acute wounds and a clean technique for chronic wounds ☐ Optimise management of comorbidities (e.g. diabetes, tissue perfusion/oxygenation) ☐ Optimise nutritional status and hydration ☐ If the patient is at considerable risk, decontamination measures should be considered (e.g. cleaning and waste disposal), and, in some cases, isolation may be considered ☐ Patient capacity for self-care should be established; in the home setting, education about hygiene may be needed (e.g. how best to apply creams without increasing infection risk, suitable bathing products, how best to dry their skin with a clean towel) ☐ Consider antimicrobial treatment in some instances, such as suspected diabetic foot infections and suspected surgical site infections.	☐ Clean/disinfect surfaces before use ☐ Reduce clutter (e.g. ensuring appropriate storage spaces for equipment and dressings) ☐ Use appropriate waste disposal facilities for unused antimicrobial therapy and dressings and materials that may harbour antimicrobial resistant bacteria ☐ Provide adequate lighting ☐ Consider the impact of any pets in the home environment (i.e. keeping them away from the wound and ensuring general hygiene is maintained).	☐ Ensure hand hygiene ☐ Adhere to uniform policy, and consider that this may not provide full and up-to-date information; for example, the following should be avoided: - False nails/gel nails (dirt behind long nails is an infection risk; these nails increase the risk of accidental trauma to the patient's skin during procedures and may cause damage to gloves) - Jewellery (apart from a wedding band and stud earrings) - False eyelashes - Wearing hair down (touching or below the collar) - Watches, including fitness watches or bands ☐ Training for new staff: ensure that all staff are up-to-date with local protocols ☐ Staff with skin conditions: assess on an individual basis if they should be working or require extra PPE ☐ Staff illness: staff should be encouraged to stay at home if there is an infection risk.	☐ Prevent cross-infection by implementing universal precautions and aseptic or clean technique, as appropriate ☐ Work to reduce or manage exposure of dressings/ bandages to urine, faeces or other contaminants ☐ Avoid 'double dipping' in larger pots of creams and ointments ☐ Improve documentation of infection ☐ Perform routine review of antibiotics and antimicrobials ☐ Store equipment and supplies appropriately ☐ Regularly review local policies and procedures.

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