Local infection management in pressure ulcers

This meeting report summarises recommendations and a clinical pathway from United Kingdom (UK) experts for resolving infection in category 4 pressure ulcers (PUs), focussing on the use of STIMULAN® (an antibiotic carrier) in cases of osteomyelitis and associated surrounding soft-tissue infection. Given the complexity of these conditions and the patient groups involved, prescribing and non-prescribing healthcare professionals (HCPs) require clear guidance on when and how to use this therapy in their local setting.

Advisory board members

- **Jacqui Fletcher (Chair),** Independent Nurse Consultant
- **Abigail Booth,** Clinical Services Manager, Tissue Viability, Wound Medicine Centre and Continence Service; Lead Tissue Viability Nurse Specialist and NMP Prescribing lead, HCRG Care Group Kent
- **Luxmi Dhoonmoon,** Nurse Consultant, Tissue Viability, London North West University Healthcare NHS Trust
- **Anita Kilroy-Findley,** Clinical Lead, Tissue Viability, Leicestershire Partnership NHS Trust
- **Katie Leek,** Lead Nurse, Tissue Viability and Continence, University Hospitals of North Midlands NHS Trust
- **Nuria Martin,** Harm Free Care Matron and Tissue Viability Lead, West Hertfordshire Teaching Hospitals NHS Trust
- **Julie Mullings,** Lead Nurse, Community Services: Tissue Viability, Infection Prevention & Leg Ulcer, Manchester University NHS Foundation Trust
- **Heather Ogle,** Lead Nurse, Tissue Viability, Western Health & Social Care Trust
- **Kelly Phillips,** Skin Integrity Nurse Consultant, Doncaster and Bassetlaw Teaching Hospitals NHS Foundation Trust
- **Nicki Mayes,** Clinical Nurse Specialist, Wound Healing, University Hospitals Coventry and Warwickshire NHS Trust

WOUNDS | UK

Local infection management in pressure ulcers

The incidence of pressure ulcers (PUs) is increasing worldwide, driven by an ageing population and the rising prevalence of chronic, multi-system disorders, such as diabetes and cardiovascular disease (Hajhosseini et al, 2020). In ageing societies, such as the UK and the United States of America (USA), PUs continue to place a substantial burden on patients, carers, HCPs and healthcare systems, in large part due to the human and care costs associated with non-healing category 3 and 4 PUs (Black, 2025; Fletcher et al, 2025a; Lan et al, 2025).

PUs, particularly those classified as category 3 or 4, can be distressing for patients (category 3 PUs have full-thickness tissue loss, frequently over an area of bony prominence, *without* exposed bone, fascia or muscles; PUs are category 4 if fascia or muscles are exposed or if bone is visible or directly palpable). They can delay rehabilitation and necessary surgery, while significantly reducing patients' quality of life (Black, 2025). In addition to pain, malodour and social isolation, patients may become disengaged from their treatment. In patients with sacral PUs, wound contamination is a major issue, which may be further exacerbated by antibiotic-related adverse events, such as diarrhoea (Black, 2025). This can lead to further complications (e.g. soft-tissue infection and osteomyelitis). However, there has historically been a lack of evidence and guidance on managing these issues (Fletcher et al, 2025a).

In 2025, a multidisciplinary group of UK experts recommended timely, proactive intervention with evidence-informed therapies to resolve infection in PUs (Fletcher et al, 2025a). Building on these recommendations, an advisory board meeting of UK wound care experts was held in May 2026 with the following objectives:

- To highlight local antibiotic therapy as a standalone or adjunctive intervention for patients with PUs
- To develop a clinical pathway to support appropriate patient selection and promote consistent practice across UK care settings.

The advisory board included acute and community care HCPs specialising in tissue viability and complex wound care across different specialities. This diverse group represents a wide range of experiences across various UK clinical settings.

Local antibiotic therapy

Systemic antibiotic treatment remains the standard of care for managing spreading wound infections (Fletcher et al, 2025b). However, there is growing evidence to support the role of adjunctive local therapies, such as STIMULAN® with antibiotic(s), in delivering therapeutic concentrations of active agents to treat local infections, including osteomyelitis and the surrounding soft tissue infection (Chadwick et al, 2022). STIMULAN consists of absorbable calcium sulfate beads, which form a carrier for antibiotic therapy (once packed in the wound bed, the beads do not need to be removed and are expected to be absorbed into the wound); this means the antibiotic type and concentration can be tailored to the individual patient and delivered locally, directly at the site of infection. STIMULAN is an absorbable calcium matrix specifically designed to support the proactive management of dead space and, when mixed with antibiotics, is intended to assist in the resolution of infection in bone and surrounding soft tissue.

This localised treatment may support antimicrobial stewardship (AMS) goals by reducing reliance on systemic antibiotics and reserving them for spreading or systemic infection (Fletcher et al, 2025b). Use of STIMULAN with antibiotic(s) has been shown to reduce 1-year recurrence in patients with recurrent category 4 PUs (Khansa et al, 2018) and has been found to be more effective than debridement alone in managing non-healing, localised osteomyelitis (Jagadeesh et al, 2022).

STIMULAN with antibiotic(s) is already used in a range of UK clinical settings to treat infections in patients with lower limb wounds. Improved outcomes have been reported in clinical studies involving patients with diabetic foot infection, demonstrating its effectiveness in resolving infection in complex, non-healing wounds (Chadwick et al, 2022; Morley et al, 2022; Vas and Bates, 2024). A toolkit, including a clinical pathway and a standard operating procedure for the safe use of STIMULAN with antibiotic(s), has also been developed for patients with osteomyelitis in the diabetic foot (Chadwick et al, 2022).

The advisory board discussed development of a similar pathway for treatment of osteomyelitis and the soft tissue surrounding osteomyelitis in PUs.

The meeting and report were supported by an educational grant from Biocomposites.

Barriers to managing infection in PUs

The advisory board discussed potential barriers to providing consistent, evidence-based care in practice. Common barriers were identified as:

- **Data and reporting:** Widespread inconsistency, with category 4 PUs under-recognised because HCPs may lack confidence in identifying the involvement of underlying structures, such as fascia, muscles or bone. In some instances, HCPs may not recognise that, in some anatomical locations (e.g. over the sacral bone or malleoli), the depth to bone is minimal. Therefore, even when bone is not clearly visible, wound depth may still indicate involvement of deeper structures
- **Diagnostics:** Limited access to imaging and bone biopsies to confirm osteomyelitis, which can be exacerbated by frail patients being too physically vulnerable to transport to hospital
- **Knowledge gaps:** HCPs may lack awareness regarding PU categorisation and the risks associated with infections (e.g. failing to recognise the proximity of bone to the skin)
- **Care coordination:** A lack of standardised management pathways and inadequate communication and collaboration between primary, community and specialist care teams.

Clinical pathway

The Best Practice Statement 'Osteomyelitis in pressure ulcers' (Fletcher et al, 2025a) outlines a step-by-step approach to identifying osteomyelitis in PUs (see QR code). The advisory board recommended using the approach outlined in this Best Practice Statement to identify and categorise patients with PUs.

The clinical pathway outlined in **Figure 1** provides step-by-step guidance for selecting appropriate patients with category 3 or 4 PUs and safe use of STIMULAN with antibiotic(s), while aligning with local PU protocols.

1. Assessing patient suitability

There is a need to shift the current mindset of managing infections in PUs to treatment. The choice of intervention should be based on reducing patient harm and length of hospital stay, and improving quality of life and the care and cost burden on HCPs and healthcare systems.

Figure 1 outlines the factors for assessing whether a patient with a severe PU may benefit from STIMULAN with antibiotic(s). To assess these factors, HCPs should perform holistic and individualised patient and wound assessment, including:

- Identification of any allergies, if present (e.g. to antibiotics or other products)
- Consideration of patient consent and treatment engagement. It should be noted that an inability to provide informed consent is not a barrier to treatment as per the Mental Capacity Act and Best Interest guideline. However, it is essential that the patient is able to engage with the treatment
- Baseline wound and patient assessment as per local guideline, including assessment of pressure redistribution equipment, repositioning plans and offloading strategies. Establish nutritional status; if needed, the patient should be referred to the local dietician services
- Assessment of continence status and risk of urinary/faecal contamination (a key factor influencing infection risk) if they have a sacral PU. A referral to the Bladder and Bowel Service should be considered to optimise continence needs and reduce risk of infection.

2. Accessing STIMULAN

STIMULAN is available as a pack containing calcium sulfate powder, sterile liquid, a spatula, a mixing bowl, a paste applicator and a mould mat **[Figure 2]**.

It is approved for mixing with vancomycin, gentamicin or tobramycin as single antibiotics, and with the antibiotic combinations vancomycin–gentamicin and vancomycin–tobramycin, to create a thick paste, which is pressed into a mould mat to form beads. Both STIMULAN and antibiotic(s) are needed to create antibiotic-impregnated STIMULAN beads; the antibiotics require prescription and STIMULAN can be ordered via the National Health Service Supply Chain.

For patients with category 4 PUs, STIMULAN with antibiotic(s) can be prescribed by a HCP within a multidisciplinary team (MDT) or acute care setting. In some cases, this treatment can be added to a patient's care plan upon their transfer to community from acute care; the treatment can then be continued by non-prescribing HCPs within community care. It is important that non-prescribing HCPs fully understand the prescribing policy, contraindications to STIMULAN with antibiotic(s) and escalation process as per local guidelines. HCPs should also be aware of their local prescribing HCPs, especially in community settings. If MDT consultation is unavailable, effective communication and collaboration between primary and community care HCPs is crucial in developing a case for the prescription of STIMULAN with antibiotic(s).

In some regions, STIMULAN may not be

Scan the QR code above to access the Best Practice Statment, 'Osteomyelitis in pressure ulcers'

1. Assessing treatment suitability

Patient assessment
- Can the patient consent* and engage with the treatment?
- Have you ruled out allergy to antibiotics or other products used in the treatment?
- Has the patient been holistically assessed and optimised†?
- Is the wound deeper than the dermis?

PU assessment
- Is a category 3 or 4 PU present?
- If it is a category 4 PU, is the patient suitable for interventions (e.g. class A or a suitable class B as per Cierny-Mader; see Fletcher et al, 2025a)?

Patient† suitable for STIMULAN with antibiotic(s)
- Confirmed presence of infection (bone and surrounding soft-tissue‡) in a category 4 PU
- Category 4 PU where the patient has already received 6 weeks of oral antibiotics with no improvement noted
- Category 3 PU with a history of osteomyelitis (to optimise prevention of category 4 PU recurrence)
- Category 3 PU as an alternative to surgery
- First-line in a category 4 PU where other interventions are expected to fail, resulting in high downstream patient burden or care costs
- Patients with category 3 or 4 PUs who may otherwise experience harm or deterioration of quality of life
- In frail patients with a category 4 PU, to improve quality-of-life outcomes or prevent hospital admission
- Patients who require resolution of osteomyelitis with associated adjacent soft-tissue infection, pre-surgery optimisation or rehabilitation and/or before chemotherapy

Patient not suitable

STIMULAN is contraindicated in the filling of defects intrinsic to the bony structure, in bone metastasis and in patients with:
- Severe vascular or neurological disease
- Uncontrolled diabetes
- Severe degenerative bone disease
- Hypercalcaemia
- Renal disease
- Pregnancy.

Caution should also be taken with patients who may not be able to engage with treatment correctly.

Treatment should be in line with local antimicrobial stewardship policies.

2. Prescribing and ordering

STIMULAN pack and antibiotic(s)
- STIMULAN pack (5 cc, 10 cc or 20 cc paste volume)§
- One or more of the following antibiotics, depending on wound swab results:
  - 1000 mg/1 g vancomycin powder; 240 mg (6 ml) gentamicin liquid; 240 mg (6 ml) tobramycin liquid

Please note that these are the recommended amounts for 10 cc STIMULAN and should be calculated accordingly for other pack sizes

3. Applying

Wound bed and STIMULAN preparation
- Perform wound debridement and clean the wound bed and surrounding skin
- Prepare the STIMULAN beads with antibiotic(s), apply barrier film to the periwound area, and then apply the beads
- Apply the silicone wound contact layer to secure the beads
- Use a secondary dressing to prevent contamination and absorb exudate

Scan the QR code below to see STIMULAN preparation:

4. Monitoring

Progress assessment
- Follow local PU pathway and document all progress
- Do not remove STIMULAN beads unless any signs of contamination/deterioration are noted
- STIMULAN may take up to 60 days to be fully absorbed; the presence of residual beads within the wound bed during this period should be considered an expected finding
- Continue to re-assess and apply more beads if necessary

*An inability to provide informed consent is not a barrier to treatment as per the Mental Capacity Act and Best Interest guideline.

†Optimise the patient's general health and comorbidities and follow all processes appropriately (e.g. investigate how the pressure ulcer occurred; optimise the patient's overall health and any factors that are modifiable; implement the aSSKINg bundle; refer to safeguarding if necessary); ensure images are recorded to document progress.

‡Soft-tissue can be defined as 'skin layers between the dermis and the bone'.

§Refer to Instructions for Use to calculate the volume of beads required to fit the wound size.

Figure 1. Step-by-step guidance for safe use of STIMULAN with antibiotic(s) in patients with PUs

Abbreviations. *aSSKINg, an evidence-based care bundle to prevent and manage PUs (see Fletcher et al, 2025a); IFU, Instructions for Use; PU, pressure ulcer.*





Figure 2. STIMULAN pack (left) and STIMULAN beads *in situ* at first dressing change (right).

available on local formulary. HCPs routinely working with patients with PUs should present a business case for use of STIMULAN on their local formulary. The business case should focus on the need for early intervention with an evidence-informed therapy to reduce patient harm, wound deterioration, osteomyelitis recurrence and overall treatment costs:

- In a community setting, the local tissue viability nurse or microbiologist, an MDT member (e.g. a vascular surgeon) or early prescribing/medication optimising committees should be taken onboard to support with timely prescription and availability
- In acute settings, access to a prescriber or microbiologist may be easier, due to proximity of prescribing pharmacists and/or HCPs.

Box 1 lists potential prescribers across UK care settings.

3. Transporting, preparing and applying

Some HCPs may not be permitted to transport medications in their personal vehicle. In this case, local policies must be followed (for example, a special permission granting exception must be arranged in advance). It is important to ensure transportation as per recommended environmental conditions. Where possible, it is preferable to get the medication delivered to the patient directly.

To prepare STIMULAN beads impregnated with antibiotic(s), the following materials should be available:

- A level, clean surface for preparation
- Scissors and a bottle opener (for safely opening STIMULAN and the antibiotic bottle)
- Probe (for probe-to-bone confirmation) and measuring tape (for wound size assessment)
- Procedure tray
- STIMULAN
- Prescribed antibiotic(s)
- Timer (to follow bead solidification in the mould)
- Needles and syringes (for preparing STIMULAN paste and antibiotic solutions)
- Galley pot (for collecting solidified, antibiotic-impregnated STIMULAN beads)
- Dressing pack: A barrier film (to prevent maceration), silicone wound contact layer (primary dressing), film/tape to seal the edges and secondary dressing (to manage wound exudate and prevent contamination)
- Wound debridement implements
- Forceps (to pack the wound bed with prepared beads)
- Sterile gloves, if not available in the dressing pack
- Spare dressing pack (to ensure availability of clean dressings)
- Where applicable, a copy of the patient's care plan outlining follow-up.

HCPs should also ensure to bring prescription and drug preparation information and patient documentation materials. A patient/carer information leaflet may also be useful to clearly explain:

- What to expect from the treatment
- Who to contact and what to do in case of emergency or urine/faecal contamination.

If required, wound debridement should be performed as per local PU guidelines and before the application of STIMULAN with antibiotic(s). It is important that the wound bed contains <50% slough, to ensure direct contact between antibiotic molecules and infected tissue or bone (Chadwick et al, 2022).

After wound bed preparation, antibiotic(s)-impregnated STIMULAN beads should be prepared as demonstrated in the following video, accessible via a QR code.

Box 1. List of potential prescribers

- Non-Medical Prescribing tissue viability nurses/wound care specialists
- MDT members (e.g. vascular surgeons, orthopaedic surgeons, plastic surgeons, infectious disease specialists and microbiologists)
- General practitioners (GPs)
- Prescribing pharmacists and HCPs in hospitals.

Scan the QR code to see STIMULAN preparation

The advisory board recommended the following steps for placement of the prepared beads within the infected bone and surrounding wound bed:

- **Manage periwound:** Use a barrier or thin hydrocolloid film to protect the surrounding skin from maceration, as STIMULAN beads do not absorb exudate
- **Apply STIMULAN beads:** Place a sufficient quantity of beads in the wound cavity to ensure they remain in place. Do not over-fill the cavity
- **As a primary dressing**, use a silicone wound contact layer sealed around the edges of the dressing with adhesive film/tape to keep the beads *in situ*
- **Secure the site:** Apply a secondary dressing in accordance with local guidelines to secure the silicone wound contact layer and prevent potential contamination. In some wounds, a secondary dressing may be required if a non-adhesive dressing cannot achieve appropriate sealing of the wound contact layer (e.g. in wounds with larger cavities). A secure seal is important for achieving optimal outcomes, including infection management and effective use of resources. Therefore, for a wound with a large cavity, if required, an adhesive tape or film could be used
- **Dispose of waste:** Dispose of all clinical waste in accordance with local safety guidelines.

4. Monitoring

HCPs should refer to local PU guidelines for patient follow-up and frequency of dressing changes. Wound progression and resolution of infection should be monitored in line with local protocols. However, the following recommendations should also be considered when monitoring patients:

- Do not remove the beads unless contaminated with urine and/or faeces, or if wound deterioration has occurred
- The primary dressing (wound contact layer) should not be removed during follow-up unless it becomes contaminated with urine or faeces, or gets dislodged. If both the primary dressing and the beads become contaminated, the beads should be removed and a new preparation reapplied. The beads should also be removed if there are any signs of wound deterioration
- As the STIMULAN beads dissolve, an exudate-like material may appear in the wound bed. The amount of this material should decrease over time, while the barrier film helps protect the periwound area from maceration. The STIMULAN beads may require approximately 30–60 days for the beads to completely dissolve within the wound bed
- In patients with active infection, monitoring should follow local infection management guidelines. To support the safe use of STIMULAN with antibiotic(s), any adverse events should be documented
- The wound should be reassessed routinely in accordance with the recommendations outlined in the Best Practice publication 'Osteomyelitis in pressure ulcers' (Fletcher et al, 2025a). Ongoing treatment may be required until the infection has resolved.

Conclusion

Approximately £3.8 million is spent each day in England on the management of patients with PUs (Black, 2025), with sacral PUs representing a substantial, and under-reported, share of this burden (Fletcher et al, 2025a). There is a clear need to move beyond the current approach to infection management in PUs to reduce patient harm and the burden on HCPs and the National Healthcare Service. Through the clinical pathway outlined in this article, local antibiotic administration with STIMULAN may help support this shift. The advisory board also recommended the development of robust clinical case studies and case series to demonstrate real-world outcomes and encourage shared learning across UK care settings. ●

References

Black J (2025) The other costs of pressure ulcers. *Wounds Int* 16(1): 5

Chadwick P, Ahmad N, Dunn G et al (2022) Local antibiotic delivery: early intervention in infection management strategy. *Diabet Foot J* 25(2): 44–52

Fletcher J, Atkin A, Bowen G et al (2025a) *Osteomyelitis in pressure ulcers.* Wounds UK, London. Available to download from: www.wounds-uk.com

Fletcher J, Ashfield 5) Global, Regional, and National Burden of Pressure Ulcers From 1990 to 2021 and Projections Over the Next Decade: Results From the 2021 GBD Study. *Wound Repair Regen* 33(4): e70064

Hajhosseini B, Longaker MT, Gurtner GC (2020) Pressure Injury. *Ann Surg* 271(4): 671–9

Jagadeesh N, Abdul A, Shivalingappa VM, Kumar H (2022) Prospective comparative analysis of efficacy of local debridement with or without vancomycin impregnated calcium sulphate in chronic osteomyelitis. *J Orthop* 32: 133–8

Khansa I, Barker JC, Ghatak PD et al (2018) Use of antibiotic impregnated resorbable beads reduces pressure ulcer recurrence: A retrospective analysis. *Wound Repair Regen* 26(2): 221–7

Lan X, Tang Y, Huang Z et al (2025) Global, Regional, and National Burden of Pressure Ulcers From 1990 to 2021 and Projections Over the Next Decade: Results From the 2021 GBD Study. *Wound Repair Regen* 33(4): e70064

Morley R, Rothwell M, Stephenson J et al (2022) Complex foot infection treated with surgical debridement and antibiotic loaded calcium sulfate – a retrospective cohort study of 137 Cases. *J Foot Ankle Surg* 61(2): 239–47

Vas P, Bates M (2024) Local application of antibiotic-loaded calcium sulphate (STIMULAN®) in diabetic foot infections: Clinical evaluation process and preliminary experience. *Wounds UK* 20(4): 52–6