Technoleg Iechyd Cymru
Health Technology Wales

Topic Exploration Report [1]

Topic explorations are designed to provide a high-level briefing on new topics submitted for consideration by Health Technology Wales. The main objectives of this report are to:

- Determine the quantity of evidence available for a technology of interest.
- Identify any gaps in the evidence.
- Inform decisions on topics that warrant fuller assessment by Health Technology Wales (HTW).

Topic exploration report number	TER538
Topic	Micropore particle technology for the treatment of non-healing wounds (Amicapsil)
Summary of findings	Micropore particle technology (MPPT) involves a wound dressing with tiny pores that create powerful suction forces that draw fluid from the wound to the surface, drawing out toxins and enzymes produced by microbes, and allowing immune cells to access the biofilm. This aims to restore normal function of the skin's microbiome and to allow the immune system to control infection and support wound healing. HTW researchers searched for evidence on the clinical and cost effectiveness of MPPT for the treatment of non-healing wounds. One longitudinal comparative study, one non-interventional surveillance study, one case series and one survey conducted as part of a retrospective service evaluation were identified. MPPT appears to be effective at helping to reduce infection and promoting healing in acute and chronic non-healing wounds based on the evidence available. MPPT may be more effective than treatments that include antimicrobials; however, this is only explored in one concurrent study and in one study comparing to an external control. The technology may be cost saving, but there is very limited evidence for this. There are some gaps in the evidence for MPPT, such as a lack of concurrently comparative evidence, economic modelling based on quality of life data, and longer terms outcomes. Consequently, there are key uncertainties about the effectiveness of this technology, including how it compares to standard care.

[1] Cyfieithu dogfennau HTW wedi'u cyhoeddi o'r Saesneg i'r Gymraeg
Translation of published technical HTW documents from English into Welsh

Introduction and aims

Amicapsil, formerly known as Acapsil, is a wound dressing in highly porous powder form made of pyrogenic silica and serrathiopeptidase. Amicapsil is approved to treat both acute and chronic wounds of all types, including pressure ulcers and burns. It can be used by clinicians, and also by patients themselves as part of a telemedicine approach. Wound management is particularly important in people with spinal cord injuries because this leads to reduced immune responses and increased likelihood that chronic wounds will develop from injuries.

Standard care for wounds is generally cleaning and dressing the wound, and may require the use of antimicrobials, though evidence is highly uncertain on the clinical and cost effectiveness of antimicrobial dressings (Gray et al. 2018). Standard care varies dependent on wound type and has been found to vary greatly across settings (Gray et al. 2018). The US Food and Drugs Administration considers there to be a lack of effective treatments for non-healing chronic wounds and this represents an area of unmet medical need (Verma et al. 2022).

Using micropore particle technology (MPPT), Amicapsil works to restore normal function of the skin's microbiome, which allows the immune system to control infection and support wound healing. MPPT works by capillary-evaporation. The tiny pores in the wound dressing create powerful suction forces that draw fluid from the wound to the surface where it evaporates, drawing out toxins and enzymes produced by microbes in the wound as well. The pores also allow immune cells to access the biofilm at the wound site. Amicapsil can, therefore, control infections without the use of antimicrobials, potentially helping improve antimicrobial stewardship, and may allow the wound to heal more effectively.

Health Technology Wales researchers searched for evidence on the clinical and cost effectiveness of MPPT for the treatment of non-healing wounds.

Evidence overview

Guidance

No guidance on the use of MPPT for wound healing was identified. However, NICE has published guidance on the prevention and management of pressure ulcers and an evidence summary on advanced wound dressings for chronic wounds. Clinical guideline 179 (NICE 2014) recommends considering the use of dressings for adults with pressure ulcers that promote a warm, moist wound healing environment, but not to use gauze dressings or to routinely use topical antiseptics or antimicrobials. The same recommendations are made for treating children with pressure ulcers, as well as recommending not to use iodine dressings. The guideline states topical antimicrobial dressings can be considered to treat a pressure ulcer where clinically indicated in neonates, infants, children and young people, for example, where there is spreading cellulitis. Evidence summary ESMPB2 (NICE 2016) found that evidence for advanced wound dressings and antimicrobial dressings for chronic wounds was generally of low quality and estimates of the effects were uncertain. They judged the evidence was sub-optimal for informing clinical practice. No studies on MPPT were included in this summary.

Primary evidence

We identified three studies on the use of MPPT for wound healing, all of which assessed Amicapsil. These included one longitudinal comparative study, one non-interventional surveillance study, and one case series. The Topic Proposer also provided a survey published as part of a retrospective service evaluation that was published during the preparation of the TER.

Evidence overview

A longitudinal, comparative study was carried out in Ukraine involving 266 adult patients with wounds, venous leg ulcers or diabetic foot ulcers, comparing MPPT to treatments containing antimicrobials (MPPT group n = 88, Gentaxane group n = 90, iodine/dimethyl sulfoxide (DMSO) group n = 88) (Bilyayeva et al. 2017). The number of days taken to reach the clean wound stage was statistically significantly shorter in those treated with MPPT (3.0 ± 0.9 days) than treatment with Gentaxane (7.0 ± 1.2 days, $p < 0.001$) or iodine/DMSO (8.0 ± 1.1 days, $p < 0.001$). MPPT treatment also led to statistically significantly shorter times to granulation (4.5 ± 0.8 vs. 9.2 ± 1.4 and 10.3 ± 1.5 days, $p < 0.001$) and epithelialisation of the wounds (7.8 ± 1.1 vs. 14.1 ± 1.9 and 16.4 ± 2.7 days, $p < 0.001$). Wound surface area was significantly smaller for those treated with MPPT at days 7 and 10 after treatment application. The total number of hospitalisation days was statistically significantly shorter after MPPT treatment, at 14.6 ± 5.6 days compared with 21.0 ± 10.7 and 24.0 ± 8.0 days respectively for Gentaxane and iodine/DMSO. These results suggest MPPT leads to faster wound healing than the two treatments involving antimicrobials. There were no serious adverse events with MPPT, however, three patients with wounds exposing nerve bundles experienced increased pain and had to stop treatment with MPPT.

A UK-based observational, non-interventional surveillance study examined the effectiveness of MPPT treatment of pressure ulcers and wounds in people with spinal cord injuries (Sams-Dodd et al. 2024). Results were compared to an external control (Guest et al. 2018), in which participants were treated with standard care. However, the sample in this external control was dissimilar, including a low percentage of spinal cord injury patients, making the validity of comparisons uncertain. Forty-four wounds from 25 patients were included in Sams-Dodd et al.'s study, with varying grades of wound severity. The mean number of days to closure for acute grade 1 to 2 wounds was 21 ± 0 days and 188 ± 102 days for chronic grade 4 wounds. When comparing acute wounds to the external control, MPPT led to closure of 100% of wounds grades 1 to 4, whilst standard care only led to 100% closure of grade 1 wounds. Wounds grade 2 to 4 ranged from 0 to 57% closure by one-year follow-up. Wound closure also took longer in the external control sample for all wound grades. Grade 3 acute wounds closed in an average of 1.8 months with MPPT, whilst standard care took 6.6 months without antimicrobials and 8.2 months with antimicrobials. MPPT also reduced soft tissue infection and aided tissue regeneration on wounds acting as draining fistulas. No adverse effects were observed following use of MPPT. The study also compared costs to standard care, using the external control. The authors suggest MPPT use could lead to cost savings in the first year of 51 to 94% compared to standard care, depending on the grade of the wound.

A recently published survey of spinal injury patients who had been treated with MPPT, which was carried out as part of a retrospective service evaluation, included some self-reported clinical outcomes (Smith and Ridler 2024). In a sample of 41 people, covering 49 wounds, the median duration of use of MPPT to achieve wound closure was three weeks and eight weeks for acute and chronic wounds, respectively. A wound was classed as chronic if it had been present for more than six weeks. Median times to wound closure were four weeks and 10 weeks for acute and chronic wounds, respectively. MPPT was also reported to help control soft tissue infection in draining fistulas. These results were self-reported and, though the survey states that patients' responses were verified, no detail is given on how this verification was done.

A case series of 10 patients with acute, sloughy, wet and infected dehisced surgical wounds or complicated pressure ulcers in the UK found that speed of healing seemed to be improved with MPPT treatment (Ryan 2017). All of the wounds proceeded towards closure and the treatment was well tolerated.

Areas of uncertainty

- There is a lack of evidence concurrently comparing MPPT to other care options, with only one study found that provided evidence on this. It is uncertain whether the comparators in the study identified are representative of standard care in NHS Wales.
- The external control used in the other comparative study is dissimilar to the intervention population, limiting the utility of comparisons.
- Based on the results of Bilyayeva et al. (2017), the Topic Proposer has stated that they believe future randomised controlled trials (RCTs) are not possible with this technology due to ICH E10 guidelines on choice of control groups in clinical trials (ICH 2000), citing that comparators should not be used that have already demonstrated inferiority to the treatment under investigation. This would require future investigations to be single-arm, potentially using an external control as in another study included in this TER. However, ICH E10 guidelines also state that externally controlled trials are unable to control bias and it is often possible to perform randomised, concurrently controlled trials with certain adjustments in these cases.
- No economic evidence using modelling or utility/quality of life data is available. The only economic evidence available is a cost comparison, but the populations compared are dissimilar. However, the comparator population is a less complex patient profile so cost savings could potentially be underestimated.
- There is no evidence on longer term outcomes, such as risk of amputation, risk of infection, and mortality.

Literature search results

Health technology assessments and guidance
NICE. (2014). Pressure ulcers: prevention and management. Clinical guideline CG179. National Institute for Health and Care Excellence. Available at: https://www.nice.org.uk/guidance/cg179 [Accessed 20 May 2024]. NICE. (2016). Chronic wounds: advanced wound dressings and antimicrobial dressings. Evidence summary ESMPB2. National Institute for Health and Care Excellence. Available at: https://www.nice.org.uk/advice/esmpb2/chapter/Key-points-from-the-evidence [Accessed 20 May 2024].
Evidence reviews and economic evaluations
No evidence identified.
Individual studies
Bilyayeva OO, Neshta VV, Golub AA, et al. (2017). Comparative clinical study of the wound healing effects of a novel micropore particle technology: effects on wounds, venous leg ulcers, and diabetic foot ulcers. Wounds. 29(8): 1-9. Ryan E. (2017). The use of a micropore particle technology in the treatment of acute wounds. Journal of Wound Care. 26(7): 404-13. doi: https://doi.org/10.12968/jowc.2017.26.7.404 Sams-Dodd J, Belci M, Bandi S, et al. (2024). Stable closure of acute and chronic wounds and pressure ulcers and control of draining fistulas from osteomyelitis in persons with spinal cord injuries: non-interventional study of MPPT passive immunotherapy delivered via telemedicine in community care. Frontiers in Medicine. 10: 1279100. doi: https://doi.org/10.3389/fmed.2023.1279100
Background information and external control
Gray TA, Rhodes S, Atkinson RA, et al. (2018). Opportunities for better value wound care: a multiservice, cross-sectional survey of complex wounds and their care in a UK community population. BMJ Open. 8(3): e019440. doi: https://doi.org/10.1136/bmjopen-2017-019440 Guest JF, Fuller GW, Vowden P, et al. (2018). Cohort study evaluating pressure ulcer management in clinical practice in the UK following initial presentation in the community: costs and outcomes. BMJ Open. 8(7): e021769. doi: https://doi.org/10.1136/bmjopen-2018-021769 ICH. (2000). Choice of control group and related issues in clinical trials E10. ICH Harmonised Tripartite Guideline. International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use. Available at: https://database.ich.org/sites/default/files/E10_Guideline.pdf [Accessed 20 May 2024]. Verma KD, Lewis F, Mejia M, et al. (2022). Food and Drug Administration perspective: Advancing product development for non-healing chronic wounds. Wound Repair and Regeneration. 30(3): 299-302. doi: https://doi.org/10.1111/wrr.13008
Provided by Topic Proposer
Smith D, Ridler M. (2024). Patient-reported outcome survey of user-experiences in the spinal cord injured-community with MPPT for treating wounds and pressure injuries and for controlling soft tissue infection caused by osteomyelitis. Frontiers in Rehabilitation Sciences. 5: 1386518. doi: https://doi.org/10.3389/fresc.2024.1386518

Date of search	27 March 2024

Concepts used	Micropore particle technology, MPPT, Amicapsil, Acapsil, wounds, wound healing, wound infection

Proposed research question and evidence selection criteria (if selected)

Proposed Research question	**What is the clinical and cost effectiveness of micropore particle technology for the treatment of non-healing wounds?**

	Inclusion criteria	Exclusion criteria
Population	People with non-healing wounds (including but not limited to pressure ulcers, diabetic foot ulcers, venous leg ulcers, dehisced surgical wounds)	
Intervention	Topical application of micropore particle technology (MPPT)	
Comparison/ Comparators	Standard care, which in general is cleaning and dressing the wound, with or without the use of antimicrobials. However, standard care is dependent on wound type.	
Outcome measures	Wound reduction (in size and time taken to reduce) Wound recurrence or exacerbation Need for further treatment Length of hospital stay Number of appointments needed to attend (GP/home visits/outpatient) Compliance Risk of amputation Risk of infection Mortality Safety Health related QoL Resource use Economic outcomes	

Proposed speciality	**Injuries, accidents and wounds**