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ARE INCISIONS THE FORGOTTEN WOUND?

RETHINK INCISION CARE TO IMPROVE PATIENT OUTCOMES

This report summarises the findings of several studies into the efficacy and implementation of undisturbed wound healing (UWH) in a series of surgical and post-surgical settings. Particular focus is given to surgical oncology and the care of incision wounds during and after orthopaedic surgery. UWH is a principle that reduces patient mortality, improves recovery time, increases patients' quality of life and reduces costs.

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Introduction

It is generally accepted that a moist environment provides the optimal setting for wound healing, both in acute and chronic wounds. In recent years, a new concept has emerged in the field of surgical wound care: 'undisturbed wound healing'. This concept advocates allowing the healing process to progress uninterrupted, not disturbing the wound unless absolutely necessary (Brindle et al, 2019; Davies et al, 2019). It is based on maintaining a constant temperature, optimal moist environment and keeping the wound free of external agents, in order to facilitate the normal wound healing process.

When is the best time to start surgical wound care?

The simple answer is: in the operating theatre, a sterile environment where the wound is fresh and clean.

There is consensus in the literature that dressings applied in the operating theatre should remain on the wound for at least 48 hours after surgery, and it is strongly recommended to leave in place for up to 4 days, unless bleeding or wound exudate necessitates an early change. In these first 4 days, the wound has the highest risk of surgical wound infection (especially during the first 48 hours; Stryja et al, 2020). With this evidence in mind, it therefore makes no sense to change the dressing frequently – something often done out of habit or routine – unless deemed absolutely necessary.

Why is simple gauze not enough?

To facilitate UWH, there is a need for advanced dressings. This means dressings with a gentle adhesive that avoid blisters and peri-wound injuries, dressings with good exudate management and that allow the patient to shower and experience a free range of motion (Stryja et al, 2020).

What are the cost benefits of UWH?

Although advanced surgical dressings have a higher initial price than conventional ones, the lower number of dressing changes, reduced time spent by healthcare providers and reduction of complications make these advanced dressings an important tool, demonstrably saving overall healthcare costs. Furthemore, evidence clearly recommends their use as best practice (Stryja et al, 2020; Clin Guidel, 2020; Parvizi and Gehrke, 2018).

Finally, fewer dressing changes - or even potentially none - will enable the wound to heal, reduce dressing-related costs and can also dramatically reduce the amount of dressing-related medical waste - for example, comparing the usual 5–7 changes of a conventional dressing (including the consumables required to change those sterile or aseptically) with a dressing with the capacity to remain undisturbed for a much longer period of time in line with best practice.

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A paradigm shift in wound care

The concept of UWH is a paradigm shift in surgical wound care. But is it possible to adopt even more measures to prevent surgical wound complications? This report demonstrates our clinical experience in surgical wound care and the key points to better managing surgical wounds.

Oncological wound care

The field of surgical oncology has undergone significant advances in recent decades. Minimally invasive approaches have enabled reduced morbidity and faster patient recovery. Alongside this, advances in systemic therapies such as chemotherapy and immunotherapy have contributed to increased overall survival rates of many cancers.

Wound healing in cancer patients can be influenced by various factors associated with the disease itself, the treatments, and the overall health status of the individual (Deptuła, 2019). It is also well established that complications in the peri-operative period can impact cancer survival rates (Cui, 2023; Bohle et al, 2010; Li et al, 2020).

The outcomes to be evaluated are certainly different depending on the type of disease or surgery. In colorectal cancer patients, the priority is to minimise SSI, while in breast cancer patients, it is to reduce dehiscence and improve the scar. For sarcoma patients, it is crucial to ensure post-operative mobility to guarantee motor recovery. In all cases, ensuring comfort and reducing possible negative impacts on quality of life are key considerations.

Although there is no perfect algorithm for general or oncological surgery, there are already some proposals (SSERA Group, 2023) and evidence on how we should use advanced wound care in higher-risk patients, such as those with diabetes, obesity, clean or contaminated surgeries, urgent or very prolonged surgeries, immunocompromised patients, and/or those post-chemo and radiotherapy (Stryja et al, 2020).

What are the current challenges faced by cancer patients?

Delayed initiation or modification of cancer treatment: peri-operative complications may lead to delays in the initiation of cancer treatment, such as chemotherapy or radiation therapy. Timely administration of these treatments is often crucial for optimal outcomes (Cillis et al, 2014).

Impact on immune function: surgical stress and complications can suppress the immune system, making the body more vulnerable to the spread of cancer cells and the development of metastases (Shakhar and Ben-Eliyahu, 2003).

Increased risk of recurrence: peri-operative complications may contribute to a pro-inflammatory state, which can promote the growth and spread of residual cancer cells, increasing the risk of local or distant recurrence (Karakiewicz et al, 2007).

Negative impact on overall health and physiological reserve: complications can lead to a decline in overall health and physiology, making it more challenging for the body to withstand the stress of cancer and its treatments (Englesbe et al, 2016).

Impaired wound healing: complications related to wound healing can result in delayed recovery, increased risk of infection, and potential compromises in the integrity of surgical sites (Cohn, 1997).

Psychological impact: peri-operative complications may have psychological implications, leading to increased stress and anxiety, which can indirectly affect cancer outcomes through hormonal and immunological pathways (Nausheen et al, 2019).

Considering this, it is urgent to incorporate advanced wound care into the clinical management of surgical oncology patients. The underlying concepts of UWH should guide decision-making regarding the type of dressing used during the post-operative period.

Use in the COVID pandemic

We started using advanced wound care in 2020, during the COVID pandemic, in selected patients. These included those with large incisions (>15cm), anatomically challenging areas such as the knee [Figure 1], shoulder [Figure 2], axilla [Figure 3] and early discharges (less than 48h). The rationale was to provide these patients with an absorbent dressing, allowing early mobilisation without compromising adhesion, while ensuring the dressing remained in place for one week. This approach saved patients from unnecessary hospital or primary care visits, during the pandemic.

The results were encouraging: less SSI (although these were clean surgeries), no dehiscence or MARSI, and with the dressing remaining in place for one week [see Figures], along with overall patient satisfaction emphasising the comfort of the dressing (and giving patients the option to shower), led us to progressively expand its use.

Currently, the criteria for the use of advanced wound dressings have been expanded to include patients with a history of medical adhesive-related skin injury (MARSI) or intolerance to traditional dressings, as well as paediatric surgery patients (to maximise comfort and assist atraumatic removal) and patients receiving neoadjuvant chemo or radiotherapy (e.g. breast [Figure 4] and sarcoma).

In the continuum of advanced wound dressings, we find negative pressure wound therapy (NPWT), which is used as to prevent complications such as infection, haematoma, seroma, and dehiscence (WUWHS, 2016) in colorectal cancer (CCR) patients undergoing laparotomy (Sahebally et al, 2018; Curran et al, 2019) and emergency/re-interventions (Nakatsutsumi et al, 2022), as well as abdominal wall reconstructions and closure post-evisceration (Willms et al, 2022). In oncoplastic breast surgery, advanced dressings are frequently used to prevent ischemia and dehiscence at suture margins, with the aim of optimising healing and the appearance of scars (Peiszko et al, 2023).

The use of advanced dressings to facilitate UWH was shown to:

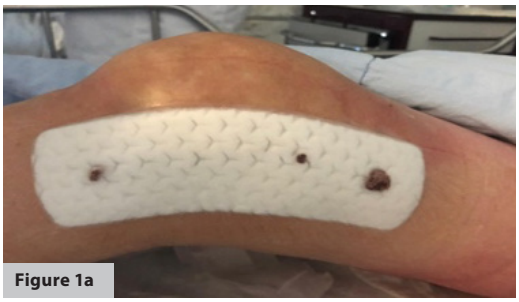
- Prevent wound contamination
- Maintain a moist wound environment
- Minimise risk of skin damage (e.g. blistering)
- Keep patient mobile
- Stay in place until sutures or staples were removed

Benefits for patients and clinicians

Although evidence is spread across different pathologies, specialties, and institutions – and not yet categorically validated through meta-analyses – the body of evidence is exponentially growing as professionals and patients experience its advantages. Drawing parallels with minimally invasive approaches such as laparoscopy and robotics, sometimes the primary outcomes may not be significantly different, but the reduction in morbidity and optimisation of patient comfort are sufficient reasons for this approach to gradually replace the traditional one as the preferred choice for both patients and professionals.

Figure 1. 85-year-old patient with high-grade pleomorphic sarcoma of the left knee and history of dementia

a. Day 1 post-op, dressing in situ;
b. Day 6 post-op, dressing in situ;
c. Dressing removal, atraumatic for sensitive skin, no pain;
d. Wound at Day 6 post-op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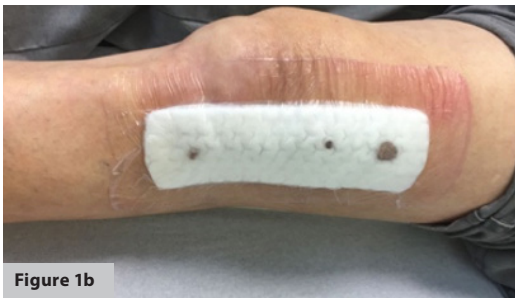
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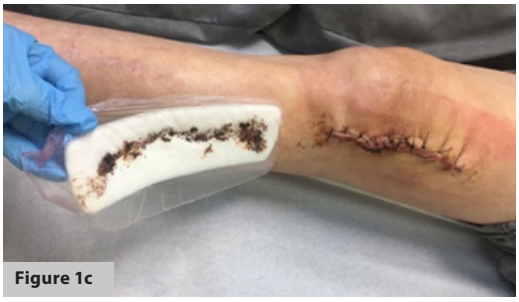
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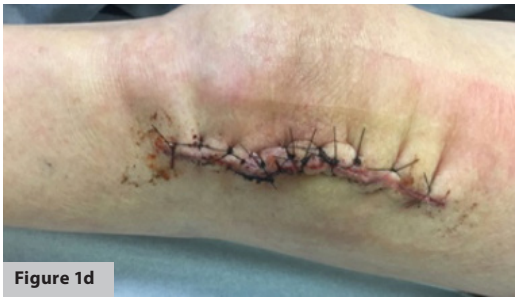
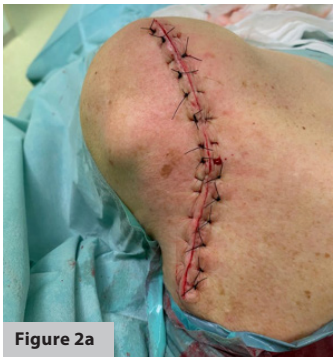


Figure 1d

Figure 2. 77-year-old patient with leiomyossarcoma of the right shoulder

a. Surgical wound in OR;
b. Advanced dressing in OR;
c. Day 6 post-op, dressing in situ;
d. Wound at Day 6 post-op;
e. Removed dressing;
f. Healed wound at day 30 post-op.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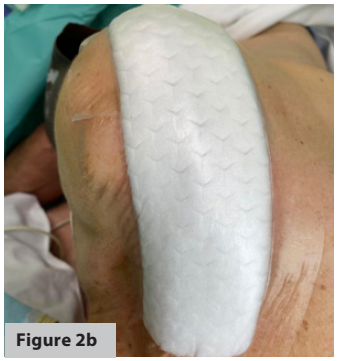
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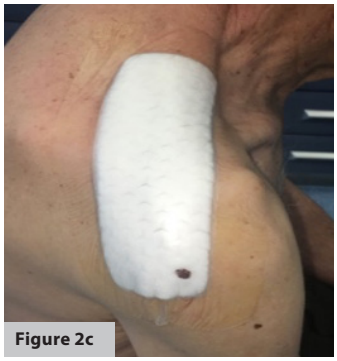
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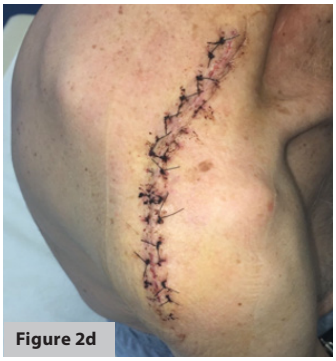
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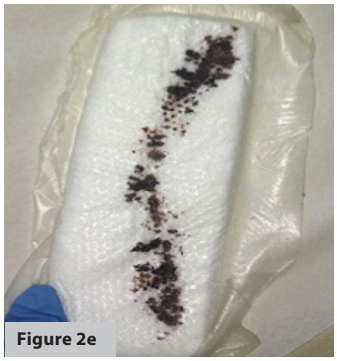
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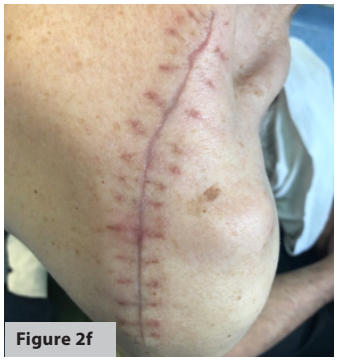
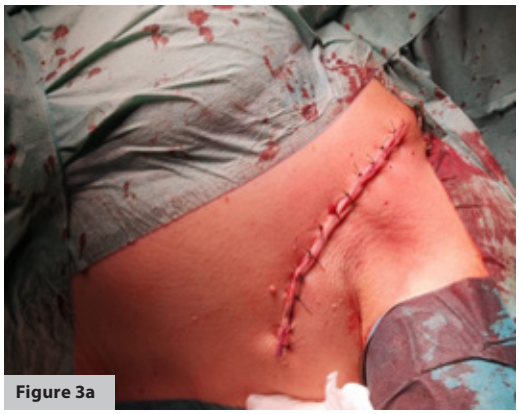


Figure 2f

Figure 3. Female 56-year-old patient with ulcerating basal cell carcinoma of the left axilla

a. Surgical wound in OR;
b. Advanced dressing in OR;
c. Day 6 post-op, dressing in situ, despite some minor rolling;
d. Wound at Day 6 post-op;
e. Healed wound at Day 30 post-op; this patient was very satisfied she could shower and dressing remained in place despite sweating.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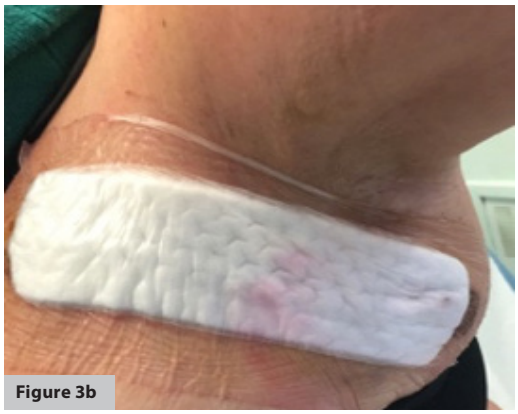
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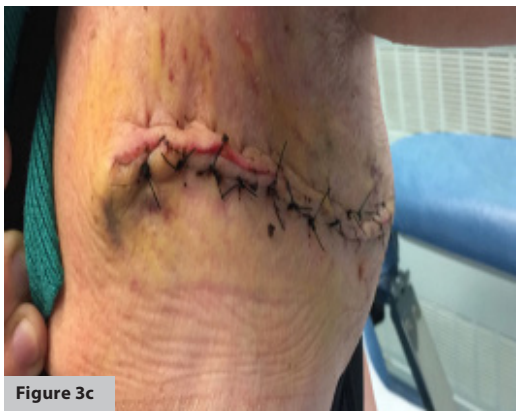
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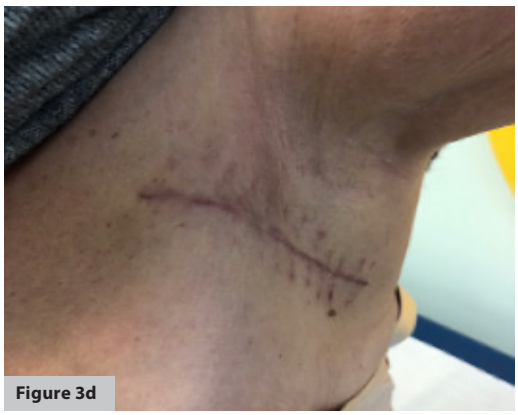
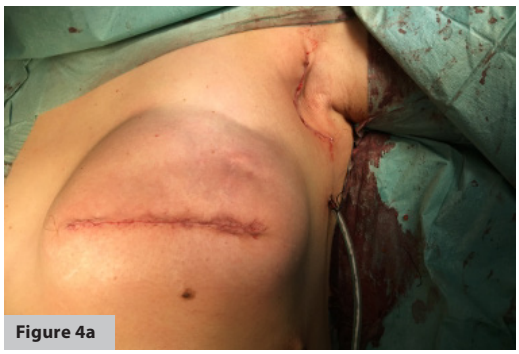


Figure 3d

Figure 4. Female 42-year-old patient with left breast carcinoma (post-neoadjuvant chemotherapy)

a. Surgical wound in OR;
b. Advanced dressing in OR;
c. Day 7 post-op, dressing in situ;
d. Healed wound at Day 30 post-op, optimal scarring.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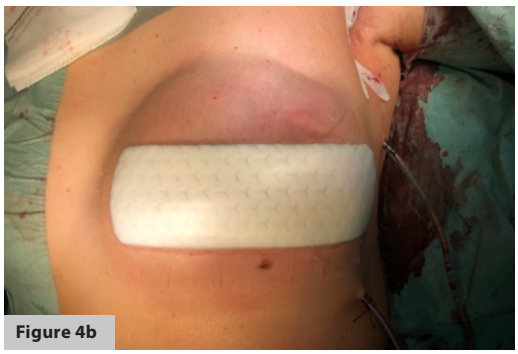
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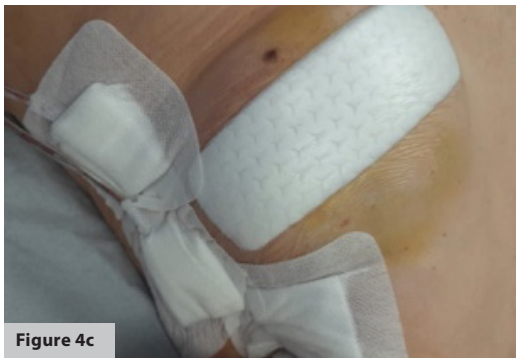
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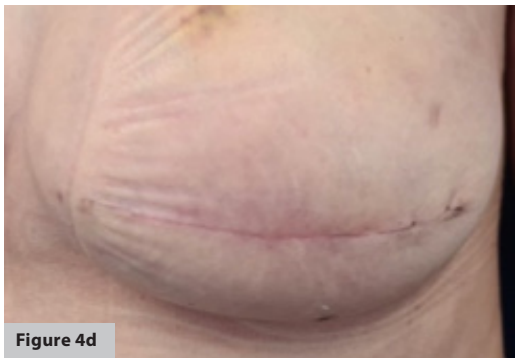


Figure 4d

Benefits for patients and clinicians (Continued)

Incisional wound care in trauma and orthopaedic surgery

Surgical wound care should begin at the time and place where the wound is generated: in the operating room. Sterile conditions and environment make this the ideal time to cover and protect the wound. We know that the greatest risk of contaminating and infecting the wound is within the first 4 days, and wound complications do not appear, or are rare to appear, before 7 days after surgery (Stryja et al, 2020; NICE, 2020) . The question is: should the dressing be changed routinely every 24-48 hours? The answer is no. In our daily practice, we use advanced dressings that can manage bleeding for up to 7 days. Therefore, our aim is to keep this dressing in place for a week if possible, unless it becomes saturated or other clinical requirements for premature change. If we have to change the dressing in the first 4 days after surgery, we do it in sterile conditions because of the high risk of wound infection, but if we have to do it after 4 days we do it in an aseptic way. Saline solutions or cleansing solutions are enough to clean the wound, the use of antiseptics not being necessary (Stryja et al, 2020). Figures 5 and 6 show how we manage the non-complicated surgical wound.

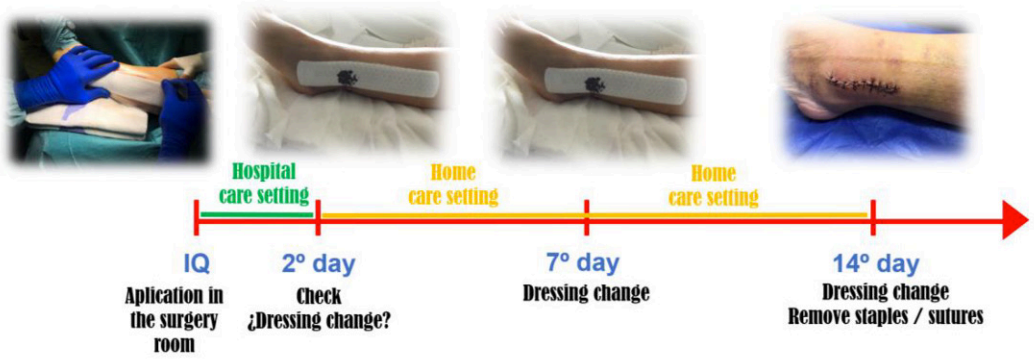


Figure 5. Timings in the care of a non-complicated surgical wound; note that with 2 or 3 advanced surgical dressings we can manage the entire healing process.

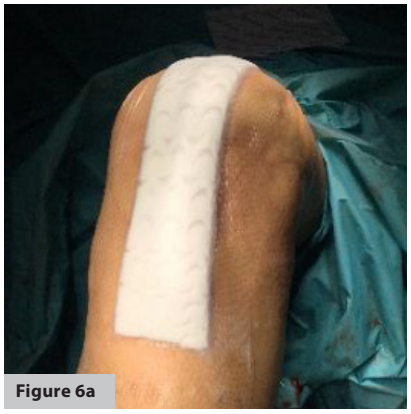
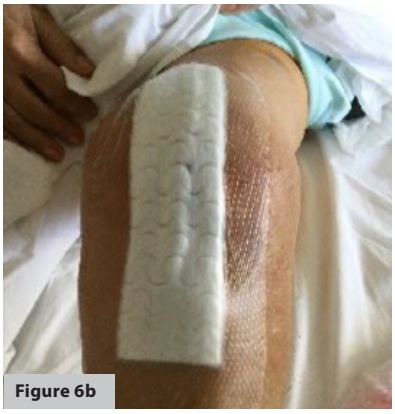


Figure 6a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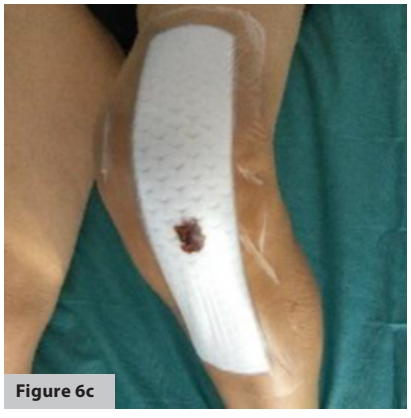
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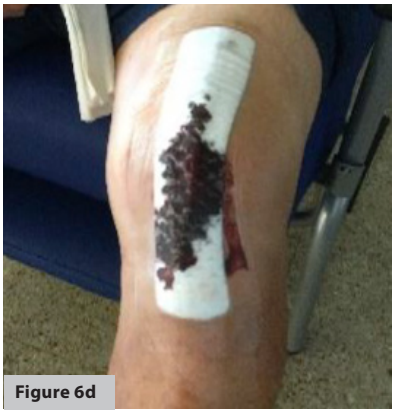


Figure 6d

Figure 6. Guide for a visual evaluation of the dressing

a. Dressing in place in the operating room;
b. Dressing clean 24 hours after surgery;
c. Dressing check 48 hours after surgery that does not require change;
d. Saturated dressing 48 hours after surgery that needs changing; when the bleeding reaches 2 or 3 adhesive edges, the dressing should be changed

What are the benefits of NPWT?

There is an increasing body of evidence that the use of incisional NPWT reduces SSI rate, especially in high-risk patients (Groenen et al, 2023; 2019; Webster et al, 2019; SSERA Group, 2023). Use of NPWT also appears to decrease the dehiscence rate (WUWHS, 2018) and improve the appearance and quality of scars (Pieszko et al, 2023; Tanaydin et al, 2018).

SSI and other complications such as wound dehiscence, haematoma, seroma and skin necrosis occur frequently and it is important to minimize risk (WUWHS, 2018). NPWT on primary closed incisional wounds has demonstrated a reduction in complication rates. NPWT can have many benefits to healing: increased perfusion, improved lymphatic flow, reduction of subcutaneous haematomas and seromas and mechanical stabilisation of the skin edges and decreasing lateral tension across the incision line (Cooper et al, 2018; Xie et al, 2022). Clinical trials and metanalyses supports the use of NWPT in:

1. High-energy proximal tibia, ankle and calcaneus fractures surgery
2. Periprosthetic fracture surgery
3. High-risk patients and in revision procedures in total hip and knee arthroplasty (Ailaney et al, 2021: Keeney et al, 2019; Cooper et al, 2018; Standard et al, 2012; Groenen et al, 2023; Willy et al, 2017.

Identifying high-risk patients

Independent risk factos for surgical site infections can be identified in the literature and there are up to 20 validated surgical site risk assessment tools for specific procedures or specialties, but none of these are developed for transversal and general use (Peart, 2019; Stryja et al, 2020). Currently, the most developed tool – regardless of discipline or procedure type – is the Simplified Surgical Site Event Risk Assessment (SSERA) model (SSERA Group, 2023). This tool takes into account factors such as body mass index, diabetes, and ASA score, as well as factors such as procedure duration, wound classification and surgical urgency. The tool stratifies risk level into high, elevated, moderate and low, and can help make decisions with regard to implementing costly risk mitigation interventions such as closed incision negative pressure devices. For the moment, SSERA is a useful but still non-validated tool, but does not substitute clinical judgment.

Risk assessment is essential for us when deciding whether to use advanced surgical dressings or NPWT device. In cases with high or elevated risk SSRE score, our preference is to treat the wound in the surgery room with NPWT. The device remains in situ for 2 weeks after surgery.

Where else is NPWT useful?

Other situations where we highly recommend the use of NPWT is in high-tension wound closures or revision procedures with previous history of dehiscence.

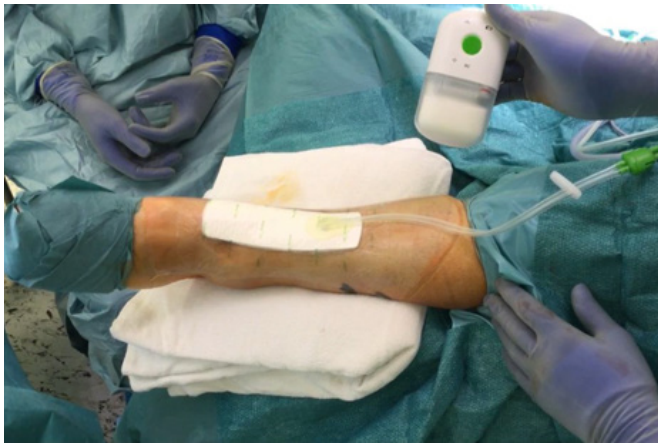
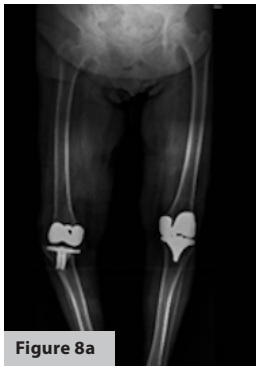


Figure 7. Application of NPWT device in the surgery room

What are the benefits of NPWT? (Continued)

Figure 8. Female 90-year-old patient with diabetes mellitus, chronic renal failure level III and lower limb venous insufficiency; total knee arthroplasty revision surgery for septic loosening (SSERA model: high-risk patient).

a. Radiographs showing right TKA loosening;
b. After removal of hardware and debridement;
c. Hardware removed;
d. Spacer with antibiotics replace temporarily the TKA;
e. Negative pressure incisional device placed during surgery; 7 hours after surgery, note that dressing and canister are full of blood but the device still works;
f. New canister in the device but original dressing still remains on the wound;
g. 5 days after surgery: removal of dressing, surgical wound in perfect condition. Application of a new dressing with the same device;
h. 12 days after surgery, end of NPWT treatment; at this point we covered the wound with an advanced surgical dressing;
i. Staples removed 20 days after surgery.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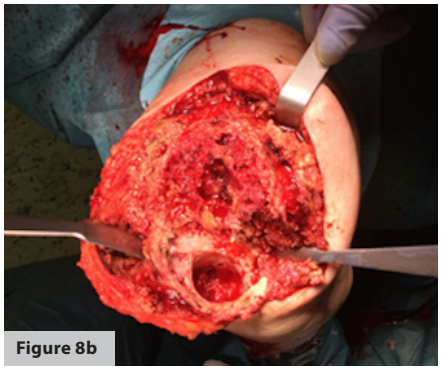
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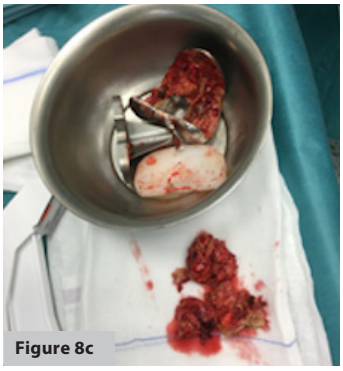
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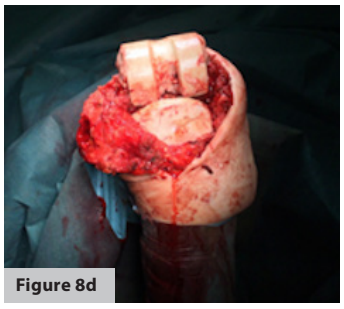
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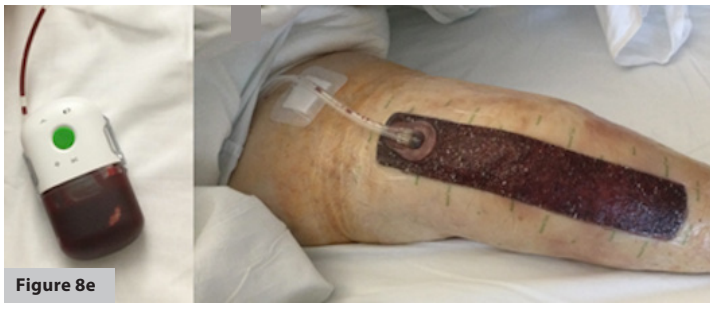
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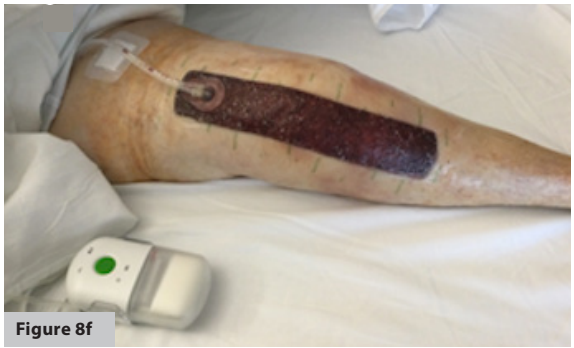


Figure 8f


Figure 8g

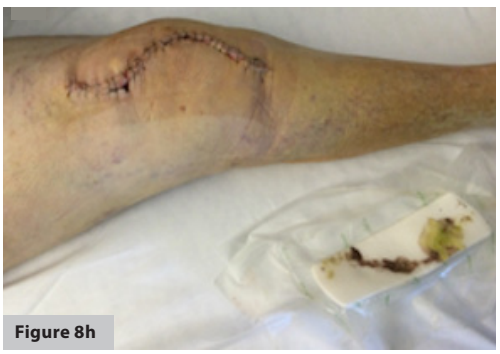


Figure 8h

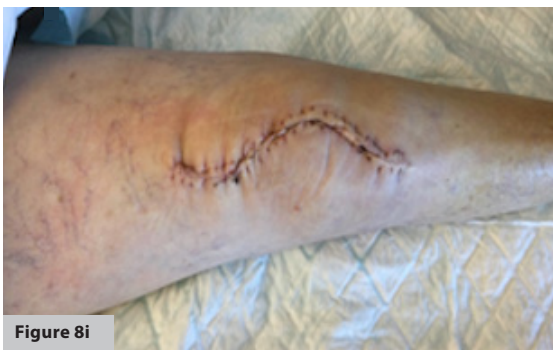


Figure 8i

Figure 9. Male 50-year-old patient; ankle fracture surgery. The surgery time was more than 3 hours. The picture shows ankle inflammation and high-tension wound closure.

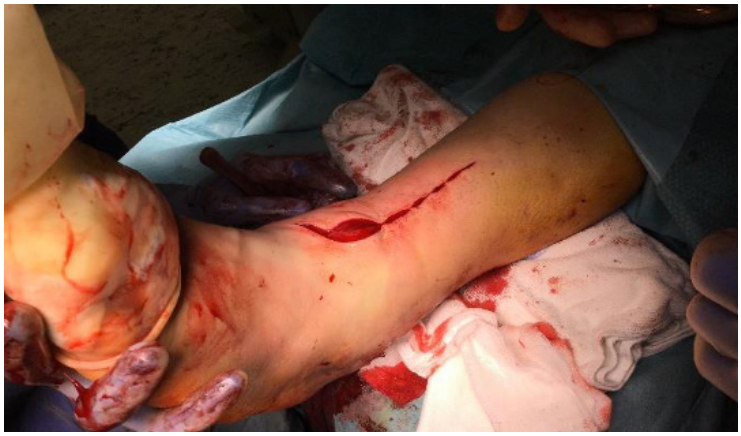
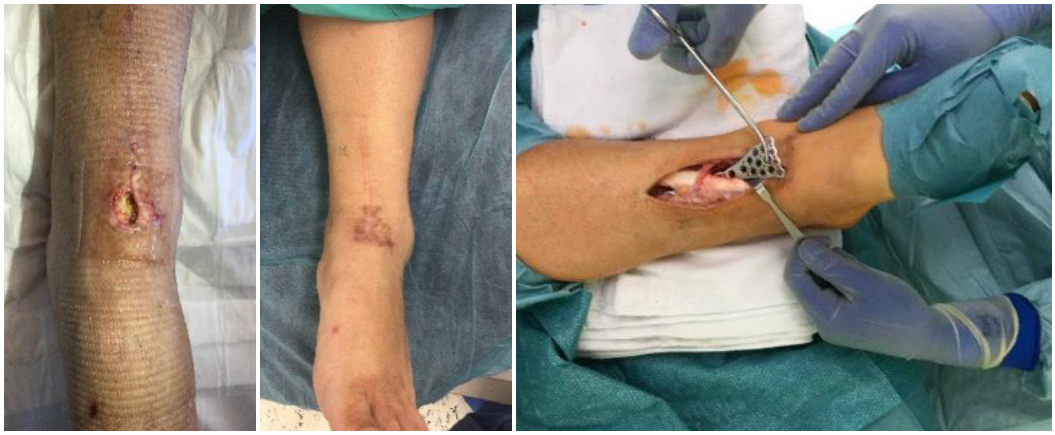


Figure 10. Male 53-year-old patient with history of ankle fracture, previous surgery resulting in wound dehiscence. In the revision surgery for hardware removal, this patient was considered at high-risk of developing wound complications. In these situations, we would highly recommend the use of NPWT.



Summary: The benefits of UWH and NPWT

To conclude, selecting dressings based on the concept of UWH is revolutionising wound care and challenging the traditional 'routine' approach to post-operative wound care. Dressings should be changed based on clinical need, not routine. Using advanced dressings helps to ensure the wound is kept moist, contamination-free and patient mobility maintained. The research shows:

- Cost savings in materials and clinical time
- Faster healing times
- Fewer post-operative complications
- Increased survival rates
- Improved quality of life for patients.

There is an urgent need incorporate the concepts of UWH in current post-operative wound care. The use of advanced dressings as default - and ciNPT where assessment indicates patient need due to risk profile - has been proven to improve patient outcomes and transform outdated clinical habits and routines that have now been shown to be detrimental to the healing process.

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