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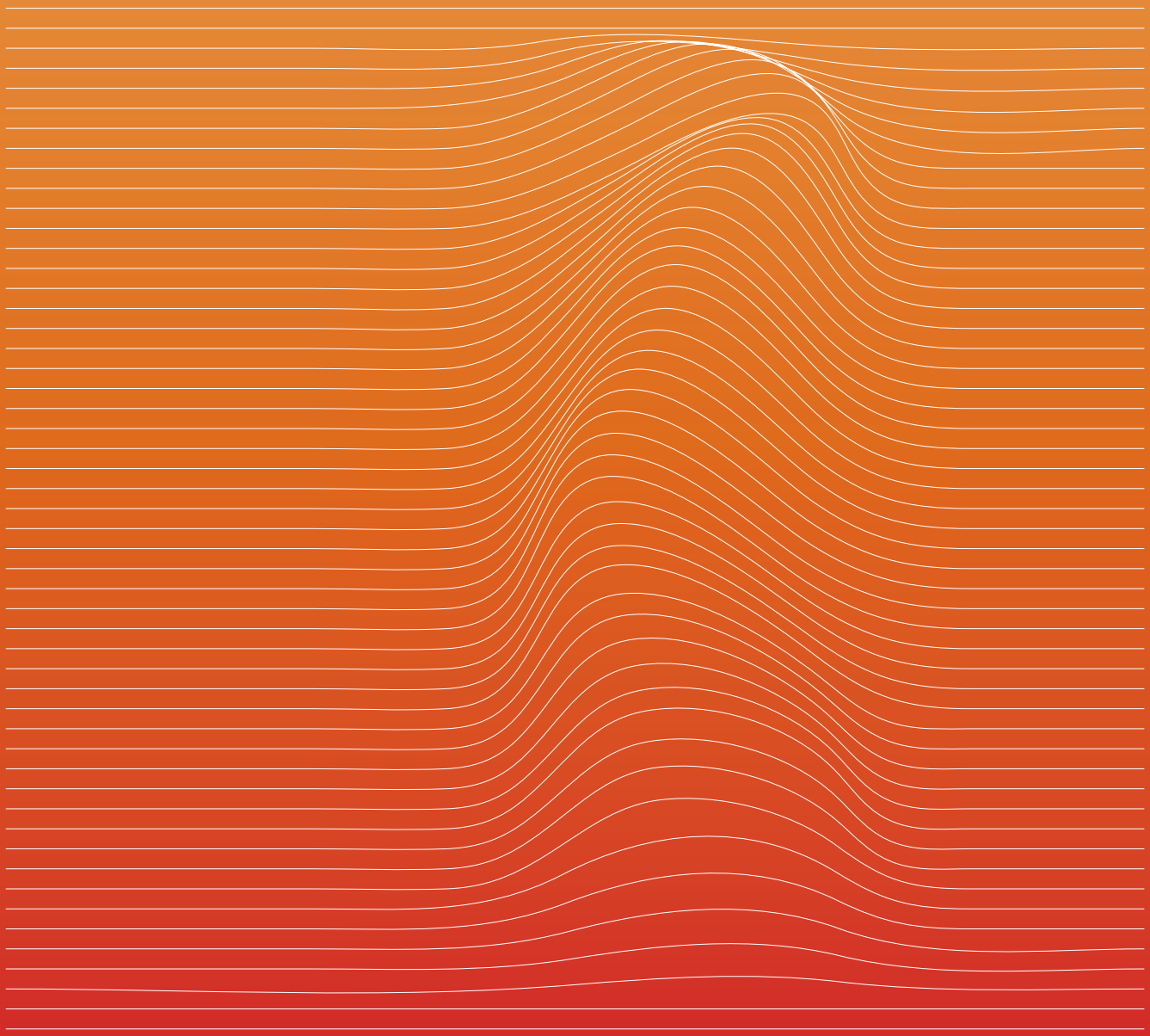

SURGICAL WOUND DEHISCENCE (SWD): INTERNATIONAL CONSENSUS STATEMENT ON ASSESSMENT, DIAGNOSIS AND MANAGEMENT

WOUNDS | INTERNATIONAL

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Foreword

The global volume of surgery is considerable and growing. It was estimated that 312.9 million surgical procedures were performed in 2012, which represented a 33.6% increase over 8 years (Weiser et al, 2015). Despite advances in surgical technique, intra-operative practice and the increasing availability of advanced wound dressings, surgical wound complications continue to pose significant challenges for patients, healthcare professionals and healthcare providers worldwide (Sandy-Hodgetts et al, 2022a; 2023). Surgical wound complications also represent one of the leading causes of morbidity following surgery (Sandy-Hodgetts et al, 2022b). Moreover, the burden of dehisced surgical wounds in the community setting is substantial and growing due to an ageing population, increasingly complex surgical procedures, early discharge from hospital post-surgery and a lack of follow-up surveillance (Hughes et al, 2021). Understanding the management of surgical wound dehiscence (SWD) in community settings is crucial; a UK study reported that more than half (57.1%) of wounds due to SWD healing by secondary intention were being cared for in a community, rather than in a primary or secondary setting (Chetter et al, 2017).

In December 2023, a group of experts convened for an online meeting to develop this consensus document, focusing on the assessment, diagnosis and management of SWD.

This consensus document aims to:

- Identify gaps within current assessment, diagnosis and treatment, and provide guidance on how to identify patients at risk
- Raise awareness and provide education on the prevention and management of SWD using guidelines and tools in practice
- Highlight how negative pressure wound therapy (NPWT) can help reduce the burden of SWD in the outpatient/community setting.

The overall aim is to explore the current landscape of surgery and post-surgical wound complications worldwide, the role and profile of NPWT for the treatment of SWD, and the importance of optimising patients throughout all stages of the surgical journey with a focus on the community and primary care setting.

Kylie Sandy-Hodgetts, Chair

What is surgical wound dehiscence?

A considerable body of evidence and research has been conducted on the prevention and treatment of surgical site infection (SSI). However, it is widely acknowledged that more research and understanding is needed regarding other types of surgical wound complications, such as dehiscence, where infection is absent from the complication (Sandy-Hodgetts et al, 2020). Although there may be links between SWD and SSI, there are marked differences between them – not all dehisced wounds become infected or require treatment for infection, and not all infected or inflamed wounds dehisce (Sandy-Hodgetts et al, 2013; World Union of Wound Healing Societies [WUWHS], 2018). It is important to note that chronic wounds always have a bacterial burden, which does not necessarily require action in order for the wound to heal (Nair et al, 2023). All dehisced wounds are colonised with a certain level of bacteria, with or without a host reaction. Upon multiplication of the bacteria, a host reaction is initiated; therefore, early detection of high bacterial burden in surgical wounds is critical to prevent SSIs or SWD (Sandy-Hodgetts et al, 2021).

Limited data exist to accurately capture the prevalence, incidence rates and true cost burden of SWD (Sandy-Hodgetts et al, 2016; Sandy-Hodgetts, 2017; Gillespie et al, 2023). Current estimates for rates of SWD differ across the globe, with variations existing within different healthcare settings, including hospitals and surgical specialties. Moreover, it has been suggested that the occurrence of SSI and SWD is most likely underreported (WUWHS, 2018; Sandy-Hodgetts et al, 2018). Compounding this issue is the consensus among experts that SWD data is often grouped together with SSI data, making it difficult to determine what portion of the data is reporting SWD and SSI. Furthermore, reported healthcare costs associated with SWD are frequently associated with SSI rather than dehiscence deriving from non-microbial causes (Sandy-Hodgetts et al, 2016).

Global prevalence of SWD across all economies

There is a paucity in the burden of SWD in low- and middle-income countries (LMICs) to high-income countries (HICs). Research from the Lancet Commission on Global Surgery estimates that over half of the 4.2 million post-operative deaths each year occur in LMICs (Nepogodiev et al, 2019). Given the considerable research foundation for SSI, it may be useful to consider figures related to SSI as a basis for estimating rates of SWD. Research has reported that patients in LMICs are disproportionately affected by higher incidence rates of SSI compared with patients in HICs (GlobalSurg Collaborative, 2018; Monahan et al, 2020). SSIs represent a significant financial burden in both LMICs and HICs, with patients likely facing high out-of-pocket expenditure for the management of their surgical wound complications (Monahan et al, 2020). In LMICs, SSI is the most frequent healthcare-acquired infection, and SSI rates range from 8 to 30% of procedures (Horan et al, 2008; Allegranzi et al, 2011; Biccard et al, 2018; Sobhy et al, 2019). It is possible that differences in rates of surgical wound complications between LMICs and HICs arise due to differences in protocols, limited supply of and/or access to resources, fewer skilled wound professionals and reduced access to formal health services between geographical locations and healthcare systems (World Health Organization [WHO], 2006; 2010; Builders and Builders, 2016).

Clarification of definitions and terminology

The expert panel agreed with the WUWHS (2018) definition of SWD [Box 1]; however, it was widely acknowledged that a succinct definition would be more relevant for clinical practice. Not all surgical wound complications are related to infection. Infection may not accompany wound dehiscence and, in dehisced wounds that are infected, the cause is not limited to the host immune response to contamination (also known as infection; Morgan-Jones et al, 2023). As a result, a revised definition for SWD was developed by the expert panel during the meeting [Box 2].

Current assessment, diagnosis and treatment methodology

According to the Centers for Disease Control and Prevention (2024), diagnosis of SSI is confirmed once an assessment against the complication criteria is met, and this is undertaken by the attending physician. In some countries, a diagnosis of SWD can only be made by the attending physician and not by nurses. This suggests that the primary diagnosis of SWD in clinical practice is reliant on physicians' level of expertise and knowledge for an accurate and timely diagnosis. Nursing interventions have a critical role particularly for the early assessment and identification of SWD, as well as alerting the attending physician to early signs of SWD.

Box 1. Definition of SWD (WUWHS, 2018)

Surgical wound dehiscence (SWD) is the separation of the margins of a closed surgical incision that has been made in the skin, with or without exposure or protrusion of underlying tissue, organs or implants. Separation may occur at single or multiple regions, or involve the full-length of the incision, and may affect some or all tissue layers. A dehisced incision may, or may not, display clinical signs and symptoms of infection.

Box 2. The expert panel's preferred definition of SWD

Surgical wound dehiscence (SWD) is the separation of the margins of a closed surgical incision that has been made in the skin. A dehisced incision may, or may not, display clinical signs and symptoms of infection – SWD can occur mechanically without infection.

The expert panel suggests that SWD most commonly occurs after discharge and is treated by community nurses in the home or by a GP unless a hospital readmission is required. Although SWD can occur at any time following surgery, it generally occurs 4–14 days after surgery (WUWHS, 2018). Community nursing plays a crucial role in the post-operative management of incisional wounds, with over 40% of clinician caseload in Australia managing this type of wound (Sandy-Hodgetts et al, 2016; Carville et al, 2022).

Guest et al (2018) show that 57.1% of dehisced surgical wounds in the UK are being treated in the community, where the care of these wounds constitutes a significant proportion of healthcare professionals' workloads, although it's widely acknowledged that the actual number could be higher due to underreporting (WUWHS, 2018; Sandy-Hodgetts et al, 2018). An increased drive towards early discharge from hospital and reduced length of stay may mean that SWD is typically managed in the community alongside other patient comorbidities that often take precedence (Hughes et al, 2021). Therefore, post-discharge surveillance has an important role in the early detection of an incisional complication after surgery.

There was a consensus from the expert panel that healthcare professionals have little to no concept of the rates of SSI or SWD in the community. Surveillance programmes for tracking SSI are used as a reporting mechanism to determine hospital key performance indicators, and a recent survey highlighted a distinct absence in the use of surveillance across the globe (Sandy-Hodgetts et al, 2022a).

The number of procedures performed in same-day surgery is increasing, and it is uncommon for patients to see the surgical team again post-discharge (Pang et al, 2021). Moreover, despite the advances in robotic and laparoscopic surgery, port site wound dehiscence and consequent port site hernia are on the rise and must not be overlooked (Richards, 2023).

In practice, treatment of SWD often depends on the extent of dehiscence. For deep surgical wounds, sharp or surgical debridement is typically recommended as the most appropriate treatment methods (WUWHS, 2018). It should be noted that this recommendation depends on the presence of necrotic tissue within the dehisced wound. In cases of superficial SWD, active intervention with NPWT may be warranted to facilitate rapid healing and mitigate the risk of further complications. Additionally, intra-operatively, the use of antiseptics may be considered to decrease the risk of SWD associated with localised infection.

Often, dehisced wounds are diverted from the normal healing trajectory and can take several weeks to heal, with some forms of dehiscence, such as perineal wound dehiscence, taking up to 16 weeks to resolve (Okeahialam et al, 2020). While dehiscence in the subcutaneous tissue can be controlled without NPWT, NPWT may be suitable if the wound is deeper in order to achieve wound closure. There is a consensus that a deficit in the evidence base exists on which dressing type to use and how long to leave dressings on for. Research suggests that dressing choice and protocols can vary due to different healthcare professionals' preferences, healthcare systems and surgery types, and that individuals' needs can also play

a role in dressing selection (Morgan-Jones et al, 2019; Sandy-Hodgetts et al, 2021). Therefore, the selection of the most appropriate dressing for an individual patient's post-surgical wound should be considered as carefully as possible through a full holistic assessment of the patient's needs (Sandy-Hodgetts et al, 2022b).

Diagnosing surgical wound infection

It was widely agreed by the panel that, based on anecdotal and observational accounts, discrepancies exist between evidence-based recommendations and what is occurring in practice. Often, patients who are not readmitted for surgical care attend their GP or pharmacy for treatment, at times without specialist treatment, resulting in a gap in the continuity of care. Little to no access to wound specialists at this critical time point may lead to further complications for the patient and ultimately a hospital readmission. Furthermore, the panel suggest that community nurses and GPs often see minor dehiscence in around 25–30% of cases and, therefore, consider it to be a 'normal' event or do not consider it to require different treatment from 'the usual'. Therefore, the panel agreed that there may be a culture of thinking post-surgery dehiscence is normal among clinicians. In the first few days following surgery, signs of inflammation — e.g. warmth, erythema, oedema, discolouration and pain – are normal and do not necessarily indicate an issue with wound healing. However, surgical wounds may show signs of inflammation beyond this time and extend beyond a normal healing trajectory. Consistent monitoring is therefore essential to detect any clinical signs of infection in a timely manner.

There are several published guidelines for the management of wound infection (Australian Wound Management Association, 2022; International Wound Infection Institute, 2022; National Institute for Health and Care Excellence, 2019), and healthcare professionals should refer to their local clinical guidelines regarding wound infection. More widely used definitions and classifications for surgical wound infections include the Southampton Wound Score (Bailey et al, 1992) and the ASEPSIS classification (Wilson et al, 1986) which are frequently used by healthcare professionals and researchers.

Identification of wound infection is often the result of both clinical judgement and microbiological testing (Haalboom et al, 2019). Wound swabs may not reveal the true microbiology of biofilms within the wound, which is usually the source of infection, so more research is needed on whether wound swabs are sufficient to diagnose infection (Nair et al, 2023). Moreover, the process of obtaining and accessing appropriate departments for wound swabbing may pose additional challenges for community healthcare teams.

Identifying infection in different skin tones

Evidence shows that discrepancies in wound care exist in many areas due to variations in skin tone (Oozageer Gunowa et al, 2017). There are certain challenges in diagnosing infection in individuals with dark skin tones due to the lack of colour change (Dhoonmoon et al, 2023); see Figures 1, 2 and 3. Additionally, any initial 'redness' seen on light skin may not be present in dark skin and thus be missed in the initial assessment (Wounds UK, 2021). In dark skin tones, changes in colour can run the spectrum of pink, red and purple, and in some cases, it may be limited to a subtle darkening of the existing skin tone (Dhoonmoon et al 2023). Therefore, healthcare professionals should look out for any changes in colour and not just 'redness', when assessing dark skin tones. Other cardinal signs of inflammation, including swelling, warmth and pain, should also be monitored and considered when diagnosing infection (Wang et al, 2020).

The current landscape and what needs to change

With the current shift to early discharge for the patient from the acute care setting to home care or rehabilitation centres, the imposition of clinical care is increasing in the nursing field. A paradigm shift is needed in the way clinicians view dehiscence, with a focus on prevention, early detection and active management to avoid costly hospital readmissions and reduced patient wellbeing.

Since SWD is not restricted to inpatient hospital care, it results in a high cost and resource burden in outpatient and community settings (WUWHS, 2018). There was a consensus from the expert panel that theatre budgets are sometimes used on postoperative dressings; however, as theatre staff may not directly see the benefits, it is often up to community nursing teams to advocate for using a portion of the budget towards more advanced dressings. Often, this requires substantial time

Figure 1: SWD following lymphoma excision in a patient with diabetes (photograph courtesy of Ethel Andrews)

Figure 2: SWD following an appendectomy (photograph courtesy of Ethel Andrews)

Figure 3: SWD following an above-the-knee amputation (photograph courtesy of Ethel Andrews)

Figure 1

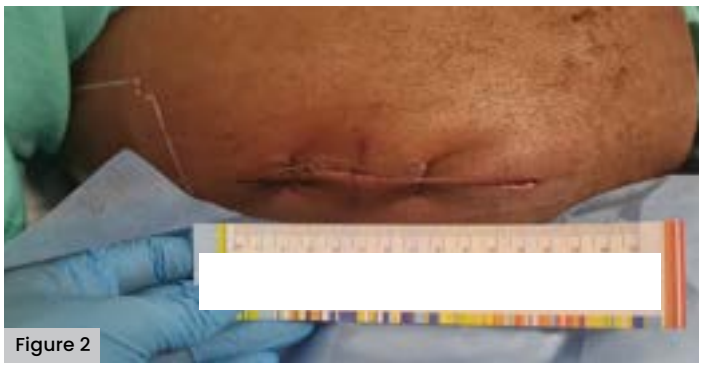


Figure 2

Figure 3

and effort to demonstrate through clinical audits, business cases and shared learning between healthcare professionals.

Education

To enable improved patient outcomes after surgery, education on identifying SWD is needed for healthcare professionals and carers. Ideally, training should be provided for new or junior members of staff through to management. In the pre-operative stage, awareness and education can help healthcare professionals identify which patients may be at increased risk of wound dehiscence. Implementing an active treatment pathway for SWD rather than adopting a passive management approach may contribute to achieving improved and expedited healing outcomes.

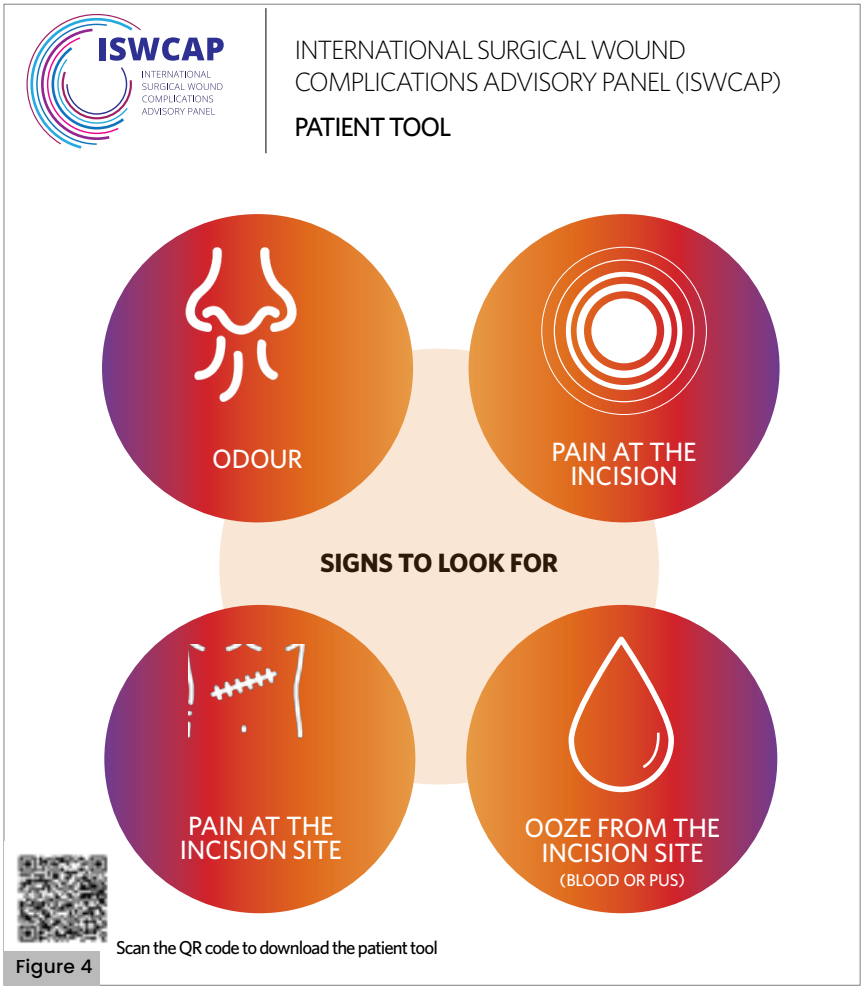
According to Blakey et al (2017), patients can be fearful of being readmitted to hospital, particularly adults aged 65 years and over, who mostly perceive readmission as negative and challenging (Blakey et al, 2017). However, healthcare professionals are ideally placed to challenge these perceptions and empower patients. By making the patient aware of their risk pre-surgery, both the healthcare professional and patient are better equipped to mitigate the risk where possible. Healthcare professionals are able to provide education and increase health literacy regarding incision care by using lay terms to describe symptoms that may indicate a complication [Box 3].

Other tools that healthcare professionals are able to use include visual aids to facilitate learning,

Box 3. Symptoms of an incisional infection

- Skin around the wound is 'red' or darker than the rest of the skin, sore/painful, feels warm/hot, is swollen and/or presents with cellulitis
- Wound has fluid (often green or yellow pus)
- Dehiscence – edges in one or more parts of the wound are open
- Patient feels generally unwell or has a raised temperature.

Figure 4: ISWCAP visual detection tool



especially where patients are able to take home pamphlets or information sheets, or digitally enabled information that is appropriate for the patient (Figure 4).

Telemedicine

The use of telemedicine in healthcare is increasing; for example, during the COVID-19 pandemic, there was a rapid adoption of telemedicine among wound care centres (Özker et al, 2021). Moreover, research has shown that telemedicine is a feasible method for the remote diagnosis of SSI (Sandberg et al, 2019; Lathan et al, 2022). The use of digital surveillance may improve post-discharge surveillance and prevent the loss of patients to post-surgical follow-up (Sandy-Hodgetts et al, 2022b; Rochon et al, 2023). Telemedicine may also be useful in rural areas, where patients may have to travel long distances to access healthcare (Sandy-Hodgetts et al, 2022b). In the management of dehisced wounds, smartphone technology may help reduce admissions to the acute care setting, where wound infections or breakdowns are managed in the home care setting (Sandy-Hodgetts et al, 2022c). Digital technologies may be useful for early detection and intervention of non-healing surgical wounds in the community, as well as help prevent acute readmissions due to wound complications. For example, healthcare professionals could consider utilising patient-to-provider smartphone technology to support with remote assessment and enhance communication upon transfer of the patient into the community setting.

Overcoming cultural barriers in healthcare services

It is widely recognised that improving organisational culture is related to positive patient outcomes

(Braithwaite et al, 2017). However, implementing change in practice is challenging as procurement staff, who tend to lack a clinical background, may prioritise budgets over clinical needs, which can lead to decisions that may not align with the best interests of patient care in the long-term.

Therefore, when conveying the need for a product or service to procurement, it is essential that clinicians present a compelling argument that highlights the clinical, operational and financial benefits of the offering. Additionally, clinicians should effectively communicate that although there may be initial cost increases associated with an active product, the product can help reduce the length of the care pathway and result in long-term cost savings. Focus should also extend beyond immediate economic considerations, such as dressing costs, to consider the psychosocial impact of SWD on patients' health, wellbeing, physical and social functioning and overall quality of life. The effects of dehisced wounds on patients' lives are often overlooked and need to be considered to promote patient-centred and holistic care among patients with SWD.

As primary users of products, clinicians are best placed to judge whether they are fit for purpose (Chapman and Hudson, 2021). Clinicians should also inform procurement of the challenges faced when using specific products or certain protocols in practice, and how these problems can be addressed with the help of procurement. There may also be an opportunity for clinicians to work in collaboration with wound care product providers and industry partners to help with funding certain dressings or products.

Cost/resource barrier

It is becoming increasingly apparent that a considerable proportion of wounds with healing problems are surgical wounds and that these wounds are costly to manage (WUWHS, 2018). A study of the annual costs to the UK's National Health Service (NHS) of caring for surgical wounds in a primary care setting reported that surgical wounds were the costliest and accounted for about 18.9%–21.8% of total expenditure on wound care (Guest et al, 2017).

Not only do dehisced wounds pose a financial impact on the acute setting, but they also place a substantial economic burden on district and community nursing settings (Sandy-Hodgetts et al, 2017). A study in Australia found the cost of treating 70 patients with SWD in a community nursing service was in excess of $56,000 Australian dollars (£28,705), which did not include organisational overheads or travel costs for nurse visits (Sandy-Hodgetts et al, 2016). Additionally, the management of infections accounted for 67% of the overall cost. Therefore, proposed measures, such as education and telemedicine, have the potential to reduce the overall cost of treatment.

SWD awareness and prevention

It has been reported that a wide range of technical, mechanical, patient-related and healing issues — individually or in combination — may contribute to SWD (Sandy-Hodgetts et al, 2013; 2018; WUWHS, 2018; Gomes et al, 2020):

- **Technical factors** — e.g. choice of sutures/clips/staples/glue, closing technique
- **Mechanical stress** — e.g. abrupt or vigorous movement, fall, trauma, vomit and coughing
- **Disrupted healing due to local and systemic factors** — e.g. obesity and diabetes
- **Non-infectious causes** — e.g. heamatoma or seroma.

When to suspect SWD: signs and symptoms

Assessment of a patient at risk of SWD needs to include medical and surgical history, nature of the surgical procedure, health, lifestyle, current medication, pain levels and psychological status (WUWHS, 2018). It is widely accepted that the most important sign of a SWD is the separation of wound edges. However, disrupted healing in surgical wounds often presents with several visual signs, including (Sandy-Hodgetts et al, 2017):

- Opposed sutured margins open or separated at any point along the incision site
- Broken sutures (non-healing opposed margins)
- Swelling, oedema, seroma, redness, bleeding and/or presence of exudate at the incision site
- Pain experienced by the patient at the incision site.

Current understanding of patients at risk of surgical wound dehiscence

Currently, risk prediction for SWD is an emerging field. Clinical risk prediction is dependent upon the use of population-specific datasets and jurisprudence in the use of independent risk factors based on logistical and sequential analysis of the dataset (Sandy-Hodgetts et al, 2023). There is no place for guesswork when attempting to predict patients who may be at risk of SWD. Determining the risk of SWD development must encompass the patient's full surgical journey, spanning from the pre-operative, intra-operative and post-operative phases, and extending to discharge from acute care to home (Sandy-Hodgetts et al, 2020). Early prediction and identification of patients who may be at risk of SWD following surgery is critical, as this can help inform the development of a tailored prevention plan to manage known risk factors and improve post-operative outcomes for patients (Sandy-Hodgetts et al, 2023).

Validated tools for risk assessment are essential for healthcare professionals to raise awareness and identify patients at risk. These tools must consider each patient's unique circumstances and characteristics (Sandy-Hodgetts et al, 2023), as well as communicate risk stratification to community teams to facilitate early identification, prevention or treatment of SWD in the community setting.

See Table 1 for major risk factors for SWD, which include obesity (body mass index [] ≥35kg/m^2), age >65 years, emergency surgery, extended duration of surgery, history of previous surgery in the same anatomic location, inadequate surgical closure, peri-operative hypothermia and local or systemic wound infection (Sandy-Hodgetts et al, 2013; WUWHS, 2018; Sandy-Hodgetts et al, 2019).

In addition to these factors, there are intra-operative risk factors specific to the type of procedure, such as abdominal, cardiothoracic, orthopedic or vascular surgery. These include emergency admission, classification of surgery (clean, clean-contaminated or dirty) and duration of the surgical procedure (Sandy-Hodgetts et al, 2017). Post-operative factors can also increase the risk of SWD, such as intra-abdominal pressure resulting from excessive coughing, recurrent vomiting and constipation.

Immunocompromised patients as a risk factor for SWD

There was a consensus from the expert panel that immunocompromised patients are a high-risk factor group for SWD (Rosen and Manna, 2023), a factor that is sometimes overlooked. It has been found that wound complications following surgery can have significant implications for patients who may be immunocompromised. The expert panel noted that in many surgical specialties, SWD, with or without SSI, seems to affect oncological outcomes both in terms of cancer recurrence and mortality rate (Murthy et al, 2007; Beecher et al, 2016).

Use of scoring/risk assessment tools

The expert panel suggests that specific scoring/risk assessment tools are not used routinely in clinical practice and that healthcare professionals tend to

Table 1. Main general risk factors for SWD (WUWHS, 2018)

Category of risk factor	Patient-related modifiable risk factors	Pre-operative risk factors	Intra-operative risk factors	Post-operative risk factors
Major	• BMI ≥35.0kg/m^2 • Diabetes mellitus • Current or recent smoking	• Emergency surgery • Age >65 years	• Extended duration of surgery • Inadequate surgical closure • Peri-operative hypothermia*	• Wound infection (SSI)
Moderate	• COPD‡ • Malnutrition: hypoalbuminemia (serum albumin <3.0g/dl) • Anaemia • BMI 30.0–35.0kg/m^2 • Alcohol abuse	• Male gender • ASA Physical Status ≥2 • Previous dehiscence/wound healing problems • Immunosuppression • Long-term steroid use • Malignant disease • Chemotherapy • Radiotherapy • Uraemia • Peripheral vascular disease • Suboptimal timing or omission of prophylactic antibiotics*	• Blood transfusion • High wound tension closure • Tissue trauma/large area of dissection and/ or undermining	• Failure to wean from ventilator • One or more complication other than dehiscence • Premature suture removal
Minor	• BMI 25.0–29.9kg/m^2 • Congestive cardiac failure • Cardiovascular disease	• Extended pre-operative hospitalisation or residency in a nursing home*	• Failure to obliterate dead space	• Trauma across incision
Rare		• Alpha-1 antitrypsin deficiency • Ehler-Danlos syndrome • Behçet's disease • Bleeding disorders*		

‡ May be a risk factor in different types of surgery for different reasons, e.g. because of coughing in abdominal surgery and sternotomy and because of the adverse effects of chronic disease on wound healing in all types of surgery *These are risk factors for SSI or other surgical wound complications, e.g. haematoma and seroma, that may be associated with SWD. Other factors listed in the table have been reported to be associated with SWD specifically
ASA: American Society of Anesthesiologists; BMI: body mass index; COPD: chronic obstructive pulmonary disease; SSI: surgical site infection

use mental checklists when thinking about what problems they need to address before the patient undergoes surgery. It was also discussed how risk assessment tools aren't very helpful if patients fail to disclose all the relevant information — e.g. treatment options they may be taking that they haven't mentioned to their healthcare professional. It is paramount that there are structured assessments in place to help guide and standardise practice with the aim of optimising outcomes for patients (Sandy-Hodgetts et al, 2022b). However, it has been reported that there is a lack of well-developed tools specifically for SWD in most surgical populations (Sandy-Hodgetts et al, 2023).

The WUWHS SWD Sandy Grading System

The WUWHS Sandy Grading System is a clinical grading system that was developed to aid in the diagnosis, classification and reporting of surgical wound dehiscence (Table 2; Figure 5; WUWHS, 2018). It is primarily designed for healthcare professionals who are managing the wound dehiscence. The system allows for a comprehensive description of the severity of the breakdown and informs the care plan pathway for the patient, especially if transitioning to home care.

Integrating the grading system into existing wound assessment tools can help healthcare professionals understand where the grading system fits into practice and how it can be used most effectively. Previous research has shown that the SWD Tissue, Infection/Inflammation, Moisture, Edge (T.I.M.E.) clinical decision support tool — a decision-making tool that integrates the WUWHS Sandy Grading System into the T.I.M.E. pneumonic — supported healthcare professionals to appropriately manage wounds (Phelps et al, 2021). During the study,

Table 2. WUWHS SWD Sandy Grading System (WUWHS, 2018)

WUWHS SWD Grade*		Descriptors
Increasing severity ↓ Single/multiple regions† or full-length separation of the margins of a closed surgical incision; occurring up to 30 days after the procedure‡	**1** Figure 2b-a	**Epidermis only, no visible subcutaneous tissue** ■ No clinical signs or symptoms of infection
	1a Figure 2b-b	As Grade 1 plus clinical signs and symptoms of infection
	2 Figure 2b-c	**Subcutaneous layer exposed, fascia not visible** ■ No clinical signs or symptoms of infection
	2a Figure 2b-d	As Grade 2 plus clinical signs and symptoms of infection
	3 Figure 2b-e	**Subcutaneous layers and fascia exposed** ■ No clinical signs and symptoms of infection
	3a Figure 2b-f	As Grade 3 plus clinical signs and symptoms of infection
	4^ Figure 2b-g	**Any area of fascial dehiscence with organ space, vicera, implant or bone exposed** ■ No clinical signs or symptoms of infection
	4a^ Figure 2b-h	As Grade 4 plus clinical signs and symptoms of infection= (e.g. organ/space SSI)

**Grading should take place after full assessment including probing or exploration of the affected area as appropriate by a clinician with suitable competency*
†Where this is >1 region of separation of the wound margins, SWD should be graded according to the deepest point of separation
‡Where day 1 = the day of the procedure
^Grade 4/4a dehiscence of an abdominal incision may be called 'burst abdomen'

healthcare professionals felt the tool was easy and quick to use, helped guide appropriate treatment and reduced the need to seek assistance from specialists. Healthcare professionals also reported that it would help instil confidence and lead to better patient outcomes. These findings have relevance to clinical practice as many nurses already use T.I.M.E., so incorporating the framework into the grading tool can help nurses understand where the grading tool fits into practice.

Surgical wound dehiscence is recognised in the ICD coding system and is separate to surgical site infection [Box 4]. While SWD has its own code for clinical coding, each of the grades is not descriptors within the ICD code itself. This can be a problem in clinical practice; therefore, to support the widespread use of the tool in practice, guidance would be needed to advise healthcare professionals as to what needs to be recorded for reporting and surveillance purposes. The expert panel raised the view that it would be useful to have the WUWHS SWD Sandy Grading System displayed in a pictorial way to help patients and healthcare professionals understand the seriousness of their condition [see Figure 6].

The importance of early intervention with a focus on the community setting and patient involvement

Early intervention is crucial to prevent the escalation of SWD to more serious consequences, like SSI. This is especially important as SWD is more likely to occur in the community, with most patients experiencing dehiscence following discharge from hospital (Sandy-Hodgetts et al, 2016; Hughes et al, 2021). Healthcare professionals need to focus on transitioning patients from being passive recipients of care to active participants wherever possible. This can be supported with self-care, which is increasingly recognised as an important part of the patient experience to help patients feel more informed and involved in their own care (WUWHS, 2020). Any guidance provided to patients on self-care should be tailored according to their willingness and capacity for involvement in their care — e.g. instructions on how to care for their wound, which may include how to photograph their wound and monitor their healing.

Before patients leave the hospital, they should be provided with aftercare advice, including what signs and symptoms of SWD and infection to look out for and, if necessary, a sufficient supply of dressings for patients to manage themselves until their first nurse or GP appointment in the community. Effective management of wounds in the community also relies on interdisciplinary work.

Box 4. ICD 11 coding box

Coding for SSI and SWD

ICD 11 codes for SSI and SWD are different

SSI: NE81.22 surgical site infection of operation wound

- Superficial surgical site infection NE81.20
- Deep surgical site infection NE81.21
- Organ space surgical site infection NE8.22.

SWD: NE81.1 disruption of surgical wound

- Disruption of caesarean section wound (JB44.0)
- Disruption of perineal obstetric wound (JB44.1).

Figure 5:
a) **WUWHS SWD Grade 1:** small area of dermal separation

b) **WUWHS SWD Grade 1a:** post-mastectomy — small areas of dermal separation with inflammation and infection

c) **WUWHS SWD Grade 2:** obese patient with exposed subcutaneous tissue and tunnel into pannus following surgery for seatbelt trauma

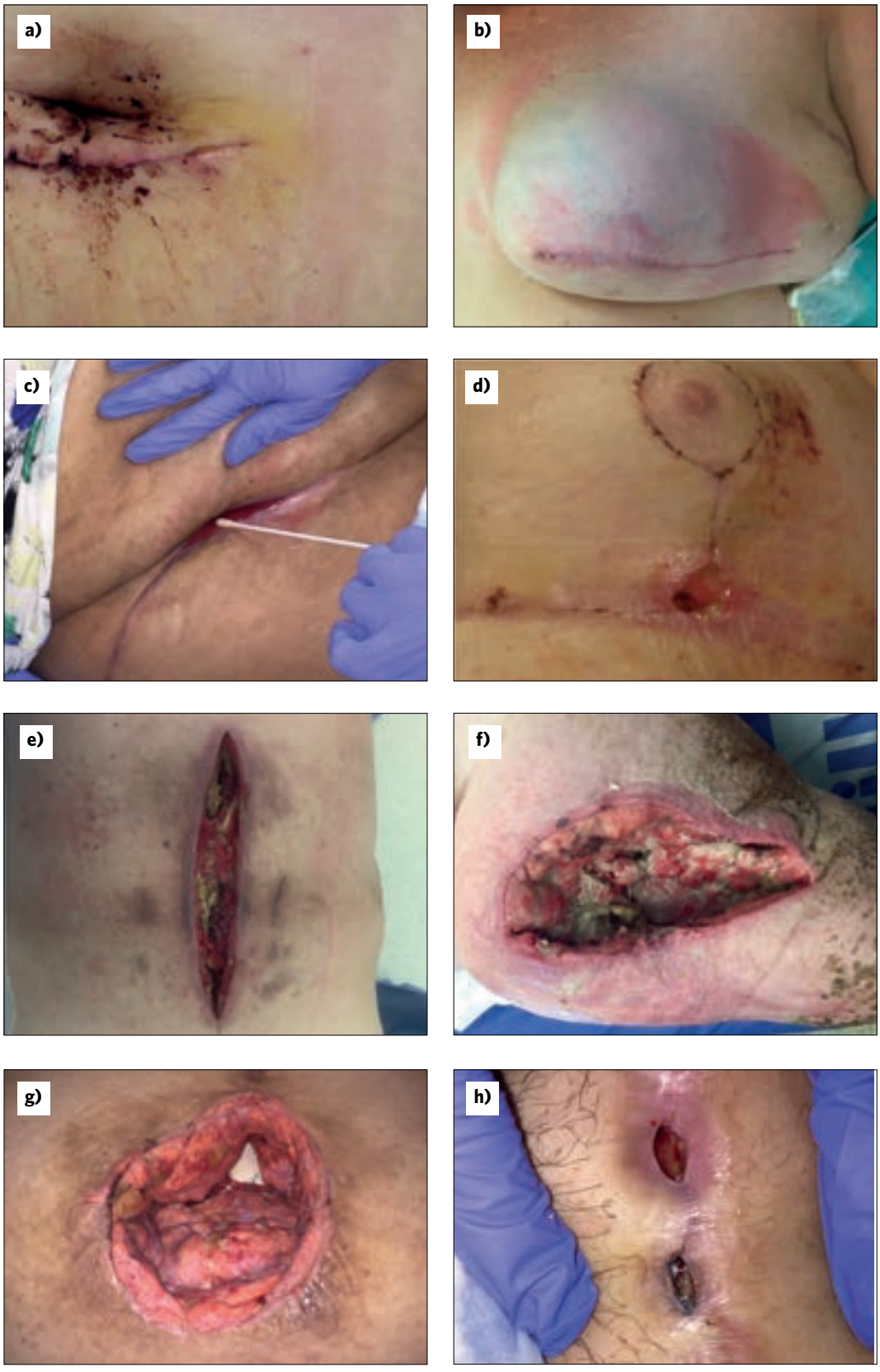
d) **WUWHS SWD Grade 2a:** post-mammoplasty — dermal separation with exposure of subcutaneous tissue with inflammation and purulent exudate

e) **WUWHS SWD Grade 3:** post-spinal surgery — full-length dehiscence with fascial exposure without signs of infection

f) **WUWHS SWD Grade 3a:** leg incision — dehiscence exposing muscle and fascia with pus and cellulitis

g) **WUWHS SWD Grade 4:** post-laparotomy — dehiscence with abdominal organ exposure and no signs of infection

h) **WUWHS SWD Grade 4a:** post-laparotomy — separation of suture line with exposed hardware with inflammation and signs of infection



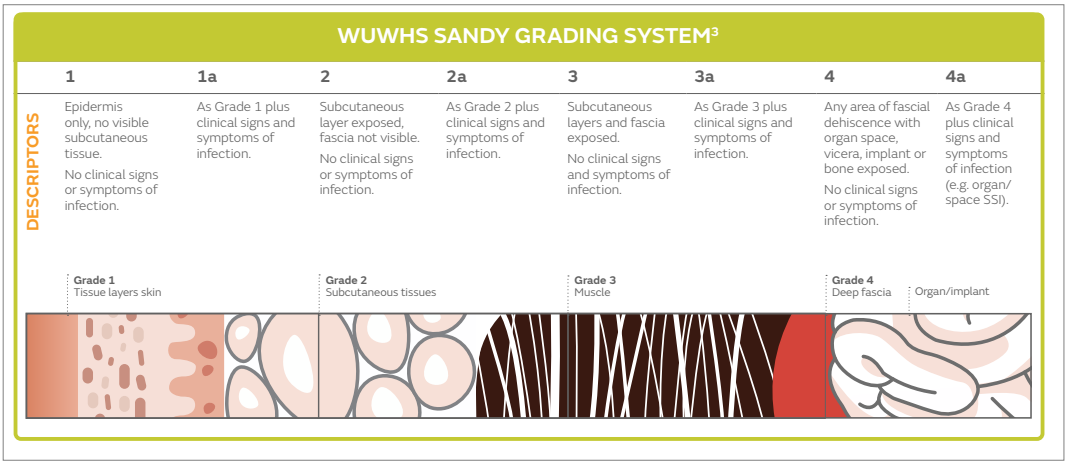


Figure 6: Proposed visual description of WUWHS SWD Grade according to the tissue layers involved in the dehiscence (WUWHS, 2018)

Research has proposed five generalisable principles to achieve timely wound healing (Ward et al, 2019):

1. **Wound assessment and exclusion of disease processes** — healthcare professionals need to determine cause of the wound, address risk factors that may delay wound healing, establish clear treatment goals and follow a structured and consistent pathway of care
2. **Wound cleansing** — healthcare professionals should aim to reduce bacterial load and remove contamination
3. **Timely dressing change** — healthcare professionals should determine optimum frequency of dressing change and conduct regular reviews
4. **Appropriate dressing choice** — healthcare professionals should consider characteristics of an ideal wound dressing and the importance of involving patients in decisions around dressing choice
5. **Considered and prudent use of antibiotics** — healthcare professionals need to use antibiotics carefully by only prescribing them when there is clear evidence of infection following appropriate clinical and microbiological review. If antibiotics are prescribed, they should be used for the shortest possible period of time and need to be targeted to the likely causative organism.

Ideal dressing properties for managing post-surgical incision wounds (Sandy-Hodgetts and Morgan-Jones, 2022) include:

- Flexible — Does not impede the patient's movement), providing elasticity to avoid pulling the skin or blistering (e.g. particularly over knee joints)
- Promote patient comfort
- Well-fixed to the skin on application, even if the wound has been disinfected shortly befor
- Absorbent — able to handle exudate
- Skin protective (e.g. reduce the risk of blistering, irritation and/or medical adhesive-related skin injuries [MARSI])
- Waterproof (for wounds free of clinical infection) — providing a good seal/barrier function and enabling the patient to shower
- Eliminate dead space where necessary
- Affordable
- Sustainable.

Management in practice: focus on the use of a NPWT pathway

It has been reported that a wide range of technical, mechanical, patient-related and healing issues — individually or in co-management of SWD require a comprehensive approach that begins with clearly identifying the goals of treatment — e.g. surgical debridement/closure versus healing by secondary intention. These goals should be discussed with the patient and documented clearly. Throughout SWD treatment, effective wound bed preparation is crucial, and healthcare professionals should use assessment techniques such as T.I.M.E. to help promote wound healing. Healthcare professionals also need to take the time to manage patients' expectations and communicate openly about what patients can expect in terms of healing and pain management. Moreover, a multidisciplinary approach is vital, involving surgeons, infection control specialists, community nurses, nutritional experts and other allied healthcare professionals.

Use of negative pressure wound therapy (NPWT)

Indications for NPWT are broad and can be considered for surgical site infection (Norman et al, 2022). NPWT is also used on wounds healing by secondary intention, including chronic and/or infected wounds (Dumville et al, 2015). Ultimately, treatment of SWD should be individually tailored to the patient according to their risk factors, characteristics, surgery type and wound type.

A view was raised by the expert panel that some healthcare professionals use NPWT at the first sight of dehiscence and that using NPWT within the first two weeks following surgery may help accelerate healing times. In some countries, such as New Zealand, nurses treating patients in rural areas may not have access to NPWT. Moreover, rural and remote communities often struggle to access resources and experience increased travel times (Vaughan and Edwards, 2020).

There are also reimbursement considerations, especially across many countries in Europe as well as LMICs. Reimbursement for NPWT also remains a challenge in some healthcare settings and regions, which can delay its use.

Pathway for NPWT for the treatment of SWD

There is currently no standardised pathway to support healthcare professionals with the management of dehisced wounds in clinical practice. As a result, the expert panel proposed a pathway to aid management of the SWD using NPWT (Figure 7).

Mechanism of action of NPWT

NPWT works by providing and distributing controlled negative pressure (suction) over an open wound or surgical incision to help draw the skin edges together (Putnis et al, 2014). NPWT has shown benefits in providing a physical barrier to external contamination, facilitating moist wound healing and stimulating angiogenesis (Lalezari et al, 2017). NPWT has also shown advantages in reducing excess wound exudate, tissue oedema, wound volume, and dressing change frequency and increasing granulation tissue formation, blood perfusion, wound edge contraction, and wound bed stimulation (Kamolz et al, 2004; Molnar et al, 2005; Stannard et al, 2006; Dunn et al, 2011; Malmsjö et al, 2012; Young et al, 2013; Chan et al, 2014; Malmsjö et al, 2014; Hudson et al, 2015; Seidel et al, 2020; Figure 8). These benefits have a direct impact on patients, such as improved quality of life and healthcare services, including reduced backlogs and wait times (Dowsett, 2012; Hudson et al, 2015; Seidel et al, 2020).

Undisturbed wound healing

Undisturbed wound healing (UWH) is a concept of relevance to clean surgical wounds, as leaving dressings *in situ* for as long as possible offers an undisturbed environment to facilitate healing (Brindle and Farmer, 2019). Benefits of UWH include optimised healing, reduced risk of contamination and potential infection, and savings in cost and clinician time (Brindle and Farmer, 2019). There is evidence that selecting a dressing with an extended wear time can have favourable healing outcomes and prevent potential contamination of the incision site (Rousseau et al, 2022). Dressing selection is an important component of improving outcomes for incision care (WUWHS, 2016) and it needs to be carried out according to local protocol, with consideration given to wound status, surgery type and individual circumstances (Sandy-Hodgetts and Morgan-Jones, 2022). Rather than changing dressings in a ritualistic or habitual way, clinicians need to exercise their judgement and only change dressings when clinically

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Management in practice: focus on the use of a NPWT pathway

(Continued)

Figure 7: Pathway for using NPWT in the management of SWD (adapted from WUWHS, 2018)

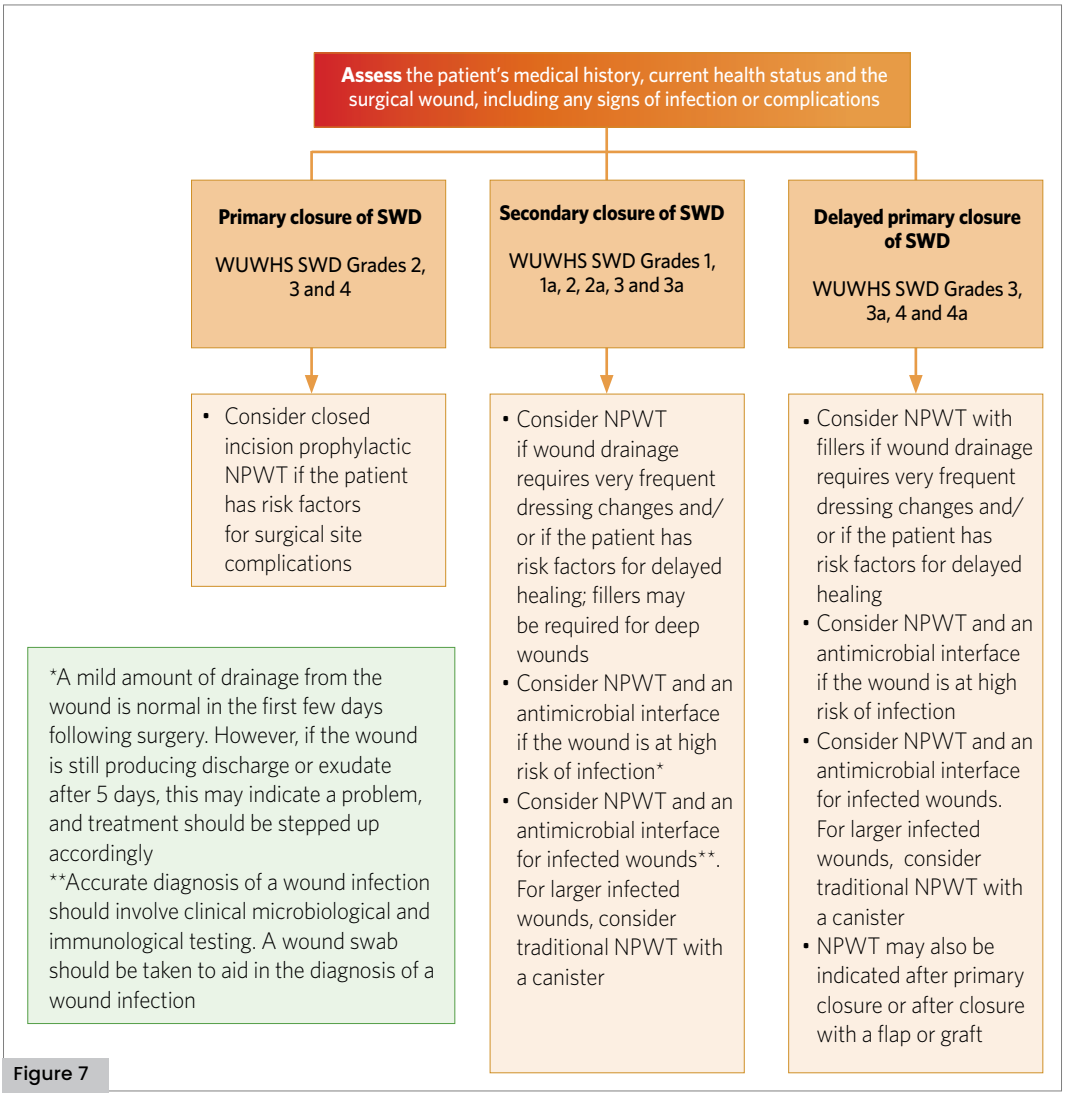

Figure 7

Figure 8: Mode of action of NPWT in open wounds (WUWHS, 2018)

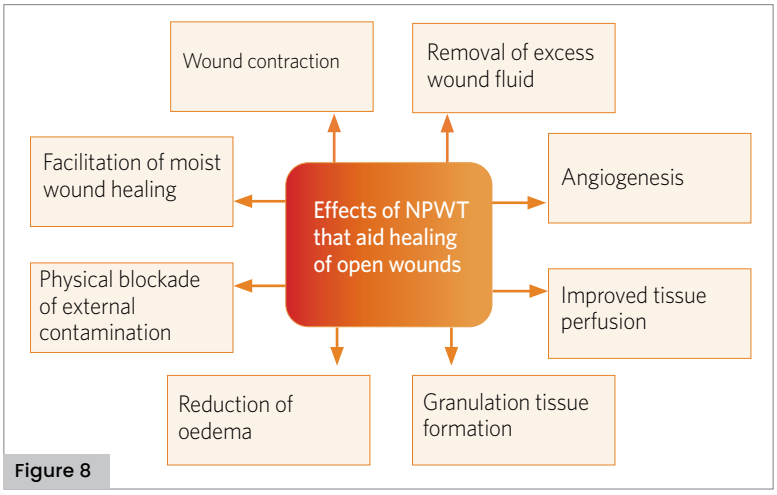

Figure 8

Box 5. Indicators that a dressing change may be needed (Sandy-Hodgetts and Morgan-Jones, 2022)

- Strikethrough
- Saturation of wound dressing
- Excessive bleeding
- Suspected local infection (e.g. local wound pain, 'redness' and swelling)
- Potential dehiscence or wound edge deterioration
- Loss of adherence of the dressing (i.e. dressing is peeling off).

necessary, in line with manufacturer's instructions, to promote UWH (Sandy-Hodgetts et al, 2020; Morgan-Jones et al, 2019). To help with decision-making, key indicators that a dressing change may be needed are listed in Box 5.

Shared care practices

In the management of chronic wounds, the adoption of shared care practices has benefits for both patients and healthcare professionals (Kapp and Santamaria, 2017).

Healthcare professionals should aim to provide the patient with as much information and knowledge about their condition as possible. Transparent communication is key to effectively managing patients' expectations (WUWHS, 2020). Alongside verbal education, patients should be provided with a package of information so they know how to care for their wound, how to use the device/dressings, what the appropriate levels of activity post-surgery are, pain management and who to contact with problems (Hiskett, 2020). Healthcare professionals also need to take the time to warn individuals of what might happen and what to expect, and it can be helpful to discuss with individuals how the product/device/dressing works and the issues they are designed to address. Furthermore, having open and honest conversations around dressing changes can be useful in addressing the individual's fear and anxiety (WUWHS, 2020).

Research has shown that educating patients on discharge from hospital, including involving them in shared decision-making processes and conversations around pain management, improves patients' ability to manage their surgical wounds at home (Tobiano et al, 2023). Shared care practices can help encourage patients to take an active role in the day-to-day management of their wounds, which includes practical tasks like monitoring, reporting and changing wound dressings (Ryan and Post, 2022).

When considering shared care options with patients, it is vital that healthcare professionals assess suitability, capacity and willingness of the patient to be involved in shared care. It is important to also consider the support the patient has available (e.g. carers and/or family members), as research has shown that patients with wounds report a higher degree of confidence in shared care practices when they have the support of a family member or friend to help (Wilde, 2020). See Box 6 for practical tips on how to successfully adopt shared care in practice.

A tool has been developed for healthcare professionals to use with patients and informal carers to discuss shared wound care (Figure 9; Moore et al, 2021). The tool should be considered at the start of the shared care journey to help identify patients and informal carers who may be

Box 6. Implementation of shared care

- **Assess:** Evaluate the patient's needs, suitability, capacity, willingness and capability to engage with shared care, as well as the support they have available (e.g. carers or family members). Consider the patient's skill level, mobility, dexterity and mental/physical capacity alongside an assessment of medical history, physical function, nutrition status, medication and cognitive/psychological function
- **Dress:** Select a dressing with the patient that can help facilitate shared care practices, and make sure the patient is aware of the risks and benefits associated with the chosen dressing. Note, single-use NPWT (sNPWT) can be more user-friendly for shared care
- **Educate:** Provide information to the patient on how to use the device/dressings, care for their wound, what signs to look out for, what to do if a problem arises and who to contact
- **Manage**: Identify an appropriate treatment and ensure consideration of necessary actions if care escalates. To improve monitoring practices, healthcare professionals could consider telemedicine and exchanging photographs of the wound for prompt reporting of issues
- **Reassess:** Carry out regular check-ins to assess the wound's healing process and address any concerns of the patient. Seek feedback from the patient (e.g. pain levels, comfort and challenges) and adjust the treatment plan if necessary. Keep in mind that the patient's capacity or willingness to engage in shared care can change over time – it can deteriorate, or it may improve.

Management in practice: focus on the use of a NPWT pathway

(Continued)

Figure 9: Shared wound care discussion guide

References 1. Moore Z, Kapp S, Loney A et al (2021) A tool to promote patient and informal carer involvement for shared wound care. *Wounds International* 12(3): 1-7. **2.** Moore Z, Dowsett C, Smith G et al (2019) TIME CDST: an updated tool to address the current challenges in wound care. *J Wound Care.* 28(3): 154-161. **3.** World Union of Wound Healing Societies (WUWHS; 2020) Strategies to reduce practice variation in wound assessment and management: The TIME Clinical Decision Support Tool. *Wounds International*

Figure 8

Updates and developments in the SWD landscape

To help optimise patient outcomes before, during and after surgery, healthcare professionals need to embrace protocols that are able to interlink between perioperative and postoperative care, such as enhanced recovery after surgery (ERAS). Adoption of standardised systems and guidelines needs to be accompanied by multidisciplinary collaboration and healthcare professionals working together with shared goals and objectives. Dehisced wounds are a significant problem for both patients and the healthcare professionals who treat them, and their management is a team event. Local champions who contribute to improving outcomes for patients with surgical wounds require the establishment of a healthy culture, consisting of small, incremental improvements that can lead to large, transformational change. Identification of the gaps in practice followed by education and implementation, led by champions of change, will lead to improved patient outcomes.

Enhanced Recovery After Surgery

ERAS is an approach that was founded in the 1990s and aims to optimise patients before, during and after surgery. ERAS refers to the implementation of patient-centred and evidence-based multimodal perioperative care pathways to reduce the physiological and psychological trauma of surgery on patients. These have been developed for a range of surgical specialties, including elective and non-elective surgery, and are designed to help patients achieve early recovery following surgery (Ljungqvist et al, 2021). Key elements of the ERAS protocols include pre-operative counselling, nutritional optimisation, standardised analgesic and anaesthetic regimens and early mobilisation (Wilmore and Kehlet, 2001; Kehlet and Wilmore, 2002; Kehlet and Dahl, 2003; Wainwright et al, 2020). ERAS protocols provide an approach to support coordinated care alongside standardised care pathways, and they require interdisciplinary collaboration among the surgery, anaesthesia, nursing, physiotherapy and nutrition teams. From a patient perspective, ERAS enables patients to achieve rapid recovery, which can improve their quality of life and allow them to return to work as soon as possible (Li et al, 2023).

Prehabilitation

There is a growing interest in prehabilitation programmes, which can be used to complement ERAS protocols (Bongers et al, 2021). Prehabilitation interventions, including exercise, nutrition and various psychosocial components, are applied pre-operatively with the aim to enhance functional capacity before surgery (Gillis et al, 2022). Prehabilitation programmes consist of a trimodal approach (considering patients' physical, emotional and nutritional needs) with a focus on optimising pre-operative patient-related factors, to help raise patients' functional capacity prior to surgery and help them withstand the stress associated with surgery (Carli et al, 2017).

The importance of SWD surveillance

Evidence exists to suggest that surveillance and data collection is essential to drive good clinical practice (Wilson, 2013; Sandy-Hodgetts et al, 2020). However, incidence rates of SWD, especially in the community setting, go largely unreported (WUWHS, 2018). Earlier discharge from hospital may mean that these wounds fail to be captured in hospital-based surveillance data, and complications that develop after the surveillance period can be 'lost' to follow-up (Sandy-Hodgetts et al, 2022a). Early identification of a surgical wound complication is key to early intervention and reducing the likelihood of a wound complication progressing to a more serious issue (Sandy-Hodgetts et al, 2020). Therefore, implementation of post-surgical surveillance programmes for SWD should be viewed as a priority to help uncover the true impact of SWD on the patient, clinician and wider healthcare system. Connected, integrated care and improved interdisciplinary communication between the surgical and community teams is critical so that surveillance is as effective and accurate as it can be. There is potential to use technology to support surveillance and patient involvement — e.g. for transferring photos of the wound and record-keeping. Moreover, there is evidence that using digital images in surveillance has a place in the real world (Rochon et al, 2023), and may help ensure that wounds are reviewed at the right time in the right place to improve patient experiences and outcomes.

Care bundles

Care bundles are a cluster of task-based activities usually engaged in the intraoperative or perioperative environment designed to reduce adverse outcomes following surgery. Adoption and implementation of a bundle approach in surgery has received varying success (Leaper et al, 2015; Tanner et al, 2015).

Evidence-based measures implemented in care bundles can have an important role to play in the prevention and management of SWD. Previous research has demonstrated the positive outcomes following the adoption of surgical care bundles in colorectal surgery, caesarean deliveries and gynaecological oncology surgeries (Petca et al, 2022). In the management of SWD, care bundles can be beneficial in improving the implementation of evidence-based practices and modalities, streamlining care, and enhancing communication within multidisciplinary teams.

The role of the caregiver

It has been reported that families and caregivers have a key role to play in caring for patients who have had surgery and improving the experience of wound care self-management (Kapp and Santamaria, 2020; Wilde, 2020). Goals of treatment and management of the surgical wound should be decided in collaboration with patients and their caregivers. Additionally, caregivers need to be provided with information and advice on proper wound/dressing care, how to recognise problems and who to contact. Furthermore, support from caregivers, including help with dressing applications, wound cleansing and identifying clinical signs of infection, can increase patients' confidence and capability to be involved in their own care (Kapp and Santamaria, 2017; Wilde, 2020).

Cultural practices, including community and traditional medicine

In South Africa, traditional healers are in abundance in urban and rural areas (Mokgobi, 2013). Although the ways in which community healers work may be disparate from western medicine, the panel suggests that many patients are seen by community healers before and after western-trained healthcare professionals. It has been reported in Uganda that patients may prefer traditional healers as an initial point of contact due to their increased accessibility, who, in low-resource areas, tend to be present in higher numbers than western-trained healthcare professionals (WHO, 2013; Sundararajan et al, 2020).

Therapeutic relationships that acknowledge an individual patient's cultural beliefs and ensure that care is tailored appropriately to the individual is paramount. In some cultures, there may be a mistrust of 'mainstream' medicine, so it is vital to work with the patient at a level that feels comfortable for them (Sandy-Hodgetts et al, 2022d). In some cases, it may be necessary to work alongside 'traditional' healers, as they can offer appropriate psychological, cultural and spiritual care that is important to the patient and respectful of cultural sensitivities (Campbell and Amin, 2014; Sandy-Hodgetts et al, 2022d).

Quality improvement and driving change

Changing the way in which care is delivered will help improve patients' quality of life. A change in mindset is essential, including a proactive approach that emphasises preventative measures and early intervention rather than treating problems as they arise or considering perceived 'expensive' treatments as a last resort. Strong leadership and organisational support are key driving forces for change towards evidence-based decision-making (Shafaghat et al, 2021). Healthcare professionals need to be clear about what needs improving (e.g. definitions, grading system and tools for practice) and what success looks like (e.g. improved patient outcomes and healing rates), as well as how improvement will be monitored.

There is an opportunity to work in collaboration with companies that manufacture wound care products, industry partners, media partners and other key stakeholders to drive change and bring about improvement. Industry experts and local representatives can support healthcare professionals by providing education and training programmes. Services need to be patient- and community-focused, not just nurse- or surgeon-led. By empowering patients and giving them ownership and responsibility for their own care and skin integrity, healthcare professionals can improve outcomes for patients and encourage continuous improvement through health literacy and patient education. Everyone who sees the patient throughout their surgical journey has a responsibility to identify any gaps in their knowledge and promote evidence-based practice.

Key consensus statements

1. In the current landscape of SWD, there are discrepancies in surveillance reporting and resource allocation across healthcare settings, which warrants a paradigm shift towards proactive prevention, early detection and community-based management to alleviate the burden of SWD and improve patient outcomes
2. Understanding the multifactorial nature of SWD is key for the effective prevention of SWD, and a comprehensive approach should be taken to mitigate the risk of SWD occurrence
3. Early identification of SWD risk factors is paramount – validated risk tools and standardised assessment frameworks can help facilitate proactive intervention
4. Integration of NPWT into treatment pathways may offer benefits in promoting wound healing and reducing complications
5. Optimising patient outcomes in the management of SWD requires the implementation of protocols such as ERAS, involving caregivers and acknowledging cultural differences
6. Quality improvement efforts are essential to drive positive change and ensure patient-centred care delivery across different healthcare settings.

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