Surgical Wound Dehiscence - Identification and Management

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Consider........

• What does SWD mean to you?
  – Wound disruption
  – Wound separation
  – Wound opening
  – Wound rupture
  – Wound breakdown

• Wound failure
  • Surgical site failure
  • Post-operative wound dehiscence
  • Burst abdomen
  • Fascial dehiscence
What does SWD mean to you?

• Reserved exclusively for the serious event of evisceration of abdominal contents that may occur following failure of a large abdominal surgical incision.

• To others, meaning covers a spectrum of problems ranging from:
  
  ➢ superficial separation of part of an incision
  ➢ complete separation of the full depth of the incision with exposure of body organs or surgical implants
• Surgical wound dehiscence (SWD) is the separation of the margins of a closed surgical incision that has been made in 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.
What causes SWD?

- Technical issues with the closure of the incision – e.g. unravelling of suture knots

- Mechanical stress – e.g. coughing can cause breakage of the sutures or rupture of the healing incision after suture or clip removal/reabsorption

- Disrupted healing – e.g. due to comorbidities or treatments that hamper healing, or as a result of a surgical site infection (SSI)
Causes of SWD

• Major risk factors for SWD are:
  - Obesity (body mass index (BMI) ≥35kg/m²)
  - Diabetes mellitus
  - Current or recent smoking
  - Emergency surgery
  - Age >65 years
  - Extended duration of surgery
  - Inadequate surgical closure
  - Peri-operative hypothermia and wound infection
Risk factors for SWD

How do we assess SWD?

- Prior to assessment of SWD, the events, leading to the dehiscence, e.g. coughing, vomiting, trauma, suture/clip removal, purulent drainage, should be ascertained.

- SWD occurring very soon after surgery and of very recent occurrence may be suitable for re-suturing.

- The entire length of an incision with SWD should be fully assessed: the factors that led to the SWD may also be affecting other regions of the incision that remain closed.
How do we classify SWD?

Classification allows for a systematic and reproducible method for identifying, measuring and recording an event (i.e. pressure injury, skin tear)

Distinct absence of grading system for SWD describing wound characteristics to inform evidence based practice clinical management of SWD. The Sandy SWD Grading System came about from the doctoral research of Kylie Sandy-Hodgetts in 2017.

This grading system was adapted by the WUWHS SWD Consensus Document: prevention and outcomes.


www.woundsinternational.com
Holistic Assessment

- Medical and surgical history
- Nature of the surgical procedure (e.g. elective/emergency, closing method, type of surgery)
- Current health
- Lifestyle

- Current medication
- Pain
- Psychosocial status e.g. care setting, occupation, concordance, QoL
Incision/wound assessment

• Prior to assessment of SWD, the events, leading to the dehiscence, e.g. coughing, vomiting, trauma, suture/clip removal, purulent drainage, should be ascertained.

• SWD occurring very soon after surgery and of very recent occurrence may be suitable for re-suturing.

• The entire length of an incision with SWD should be fully assessed: the factors that led to the SWD may also be affecting other regions of the incision that remain closed
Remember

- If more than one area of dehiscence is present, each area should be assessed individually.
- A short area of dehiscence is not necessarily only superficial and may extend deeply.
- Probing should be undertaken very gently and carefully to avoid inadvertently exacerbating the dehiscence or causing other damage.
- All general and wound assessments, further tests, interventions and referrals should be documented.
Table XI: Proposed WUWHS SWDI Grading System (Adapted from Sandy SWD Grading System**)

<table>
<thead>
<tr>
<th>WUWHS SWDI Grade*</th>
<th>Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dermal layer only involved; no visible subcutaneous fat&lt;br&gt;No clinical signs and symptoms of infection</td>
</tr>
<tr>
<td>1a</td>
<td>Figure 9a, page 19&lt;br&gt;As Grade 1 plus clinical signs and symptoms of infection (e.g. superficial incisional SSI)</td>
</tr>
<tr>
<td>2</td>
<td>Subcutaneous layer exposed; fascia not visible&lt;br&gt;No clinical signs and symptoms of infection</td>
</tr>
<tr>
<td>2a</td>
<td>Figure 9b, page 19&lt;br&gt;As Grade 2 plus clinical signs and symptoms of infection (e.g. superficial incisional SSI)</td>
</tr>
<tr>
<td>3</td>
<td>Subcutaneous layers and fascia exposed&lt;br&gt;No clinical signs and symptoms of infection</td>
</tr>
<tr>
<td>3a</td>
<td>Figure 9c, page 19&lt;br&gt;As Grade 3 plus clinical signs and symptoms of infection (e.g. deep incisional SSI)</td>
</tr>
<tr>
<td>4</td>
<td>Any area of fascial dehiscence with organ space, viscerum, implant or bone exposed&lt;br&gt;No clinical signs and symptoms of infection</td>
</tr>
<tr>
<td>4a</td>
<td>Figure 9d, page 19&lt;br&gt;As Grade 4 plus clinical signs and symptoms of infection (e.g. organ/space SSI)</td>
</tr>
</tbody>
</table>

*Wounding should be taken before full assessment including probing or evaluation of the affected area as appropriate by a clinician with suitable competency.
*Where this is a region of separation of the wound margins, SWDI should be graded according to the deepest point of separation.
*Where day 1 = the day of the procedure.
*See Appendix 1, page 38, for the COC definitions of the different types of SSI.
*Grade 4a dehiscence of an abdominal incision may be called "deep incisional".
Figure 8 | Proposed WUWH5 SWD Grade according to the tissue layers involved in the dehiscence.
## Proposed WUWHS SWD Grading System

<table>
<thead>
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<th>WUWHS SWD Grade*</th>
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</table>
| 1                | Dermal layer only involved; no visible subcutaneous fat  
• No clinical signs and symptoms of infection |
| 1a               | As Grade 1 plus clinical signs and symptoms of infection (e.g. superficial incisional SSI) |
| 2                | Subcutaneous layer exposed; fascia not visible  
• No clinical signs and symptoms of infection |
| 2a               | As Grade 2 plus clinical signs and symptoms infection (e.g. superficial incisional SSI) |
| 3                | Subcutaneous layers and fascia exposed  
• No clinical signs and symptoms of infection |
| 3a               | As Grade 3 plus clinical signs and symptoms infection (e.g. deep incisional SSI) |
| 4^               | Any area of fascial dehiscence with organ space, viscera, implant or bone exposed  
• No clinical signs and symptoms infection |
| 4a^              | As Grade 4 plus clinical signs and symptoms 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’
WUWHS SWD Classification

- WUWHS SWD Grade 1 - Small area of dermal separation
WUWHS SWD Classification

- WUWHS SWD Grade 1a
- Post-mastectomy: small areas of dermal separation with inflammation and infection
• WUWHS SWD Grade 2 - Obese patient with exposed subcutaneous tissue and tunnel into pannus following surgery for seatbelt trauma
• WUWHS SWD Grade 2a - Post-mammoplasty: dermal separation with exposure of subcutaneous tissue with inflammation and purulent exudate
• WUWHS SWD Grade 3 - Post-spinal surgery: full length dehiscence with fascial exposure without signs of infection
• WUWHS SWD Grade 3a
  - Leg incision: dehiscence exposing muscle and fascia with pus and cellulitis
WUWHS SWD Classification

- WUWHS SWD Grade 4 - Post-laparotomy: dehiscence with abdominal organ exposure and no signs of infection
• WUWHS SWD Grade 4a
  - Separation of suture line with exposed hardware with inflammation and signs of infection
Is this SWD?

- Multiple small areas of superficial SWD with signs of infection following mastectomy
• SWD after reduction mammoplasty
• SWD with abscess formation and draining pus following total knee arthroplasty
• Abdominal wound dehiscence post-laparotomy
• Using TIME to assess SWD
### Incisional Healing and TIME Framework

<table>
<thead>
<tr>
<th>Incisional parameter</th>
<th>Relationship to TIME framework</th>
</tr>
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<tbody>
<tr>
<td>Incision colour</td>
<td>Tissue</td>
</tr>
<tr>
<td>Healing ridge</td>
<td></td>
</tr>
<tr>
<td>Peri-incisional area</td>
<td>Infection/inflammation</td>
</tr>
<tr>
<td>Exudate</td>
<td>Moisture</td>
</tr>
<tr>
<td>Wound margins</td>
<td>Edge</td>
</tr>
<tr>
<td>Relationship to TIME framework</td>
<td>Signs of healing progression</td>
</tr>
<tr>
<td>--------------------------------</td>
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</tr>
<tr>
<td><strong>Tissue – incision colour</strong></td>
<td>• Days 1–4: red</td>
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<tr>
<td></td>
<td>• Days 5–14: bright pink</td>
</tr>
<tr>
<td></td>
<td>• Day 15–1 year: pale pink, progressing to white or silver or darker than usual skin colour</td>
</tr>
<tr>
<td><strong>Tissue – healing ridge</strong></td>
<td>• Days 5–9: a healing ridge of thickened tissue indicating newly formed collagen can be felt about 1cm either side of the incision along its length, and persists into the remodelling phase</td>
</tr>
<tr>
<td><strong>Infection/inflammation – peri-incisional area</strong></td>
<td>• Signs of inflammation: mild oedema, erythema, warmth or skin discolouration that resolves by day 5</td>
</tr>
<tr>
<td></td>
<td>• Pain</td>
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<tr>
<td><strong>Moisture – exudate</strong></td>
<td>• Days 1–4: decreasing volume from moderate to minimal and changing from sanguineous to serosanguineous to serous</td>
</tr>
<tr>
<td></td>
<td>• Resolves by day 5</td>
</tr>
<tr>
<td><strong>Edge – wound margins</strong></td>
<td>• Epithelial closure should be seen by day 4 along the entire incision</td>
</tr>
<tr>
<td></td>
<td>• Edges are approximated</td>
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</table>
## Signs that incisional healing may be impaired

### Relationship to TIME framework

<table>
<thead>
<tr>
<th></th>
<th>Signs of healing impairment</th>
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</table>
| **Tissue – incision colour** | • Days 1–4: may be red; tension in the incision line  
• Days 5–9: edges may be well-approximated and the tension remains  
• Day 10–14: if SWD does not occur, colour may remain red or progress to pink and may be followed ultimately by hypertrophic scarring |        |
| **Tissue – healing ridge**  | • Lack of healing ridge                                                                                                                                                                                                  |
| **Infection/inflammation – peri-incisional area**  | • Signs of inflammation may be absent in the first few days after surgery  
• Signs of inflammation and pain may be present for extended periods |        |
| **Moisture – exudate** | • Exudate persists beyond day 1–4  
• Exudate may be serosanguineous, serous or purulent (e.g. cloudy, green, yellow or brown) |        |
| **Edge – wound margins**  | • Epithelial resurfacing may be only partially present or entirely absent  
• Area(s) of separation (SWD) may be present by day 14 |        |
## Assessment of SWD

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Assess</th>
<th>Specifics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tissue</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Location and extent of dehiscence</td>
<td>• Location of the incision</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Proportion of the incision affected</td>
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<tr>
<td></td>
<td></td>
<td>• Number of areas of dehiscence</td>
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<tr>
<td></td>
<td></td>
<td>• Presence of sutures/clips and condition (intact/broken)</td>
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<tr>
<td></td>
<td></td>
<td>• Depth of dehiscence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Partial or full-thickness dehiscence and tissue layers affected</td>
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<tr>
<td></td>
<td></td>
<td>(WUUHS SWD Grade)</td>
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<tr>
<td></td>
<td></td>
<td>• Extension to or exposure of organs/bone/implant</td>
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<tr>
<td></td>
<td></td>
<td>• Presence of undermining/tunnelling</td>
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<tr>
<td></td>
<td></td>
<td>• For abdominal SWD, presence of evisceration</td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Tissue viability</td>
<td>• Condition of exposed tissues</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wound bed tissue types and proportions – e.g. of necrotic/devitalised</td>
</tr>
<tr>
<td></td>
<td></td>
<td>tissue, slough and granulation tissue</td>
</tr>
<tr>
<td></td>
<td>• Dimensions</td>
<td>• Dimensions of the dehisced area(s): maximum length, width, depth</td>
</tr>
<tr>
<td>Infection (or inflammation)</td>
<td>• For local indicators of infection or</td>
<td>• Clinical signs and symptoms of acute or chronic infection</td>
</tr>
<tr>
<td></td>
<td>inflammation</td>
<td>• N.B. In patients who are immunosuppressed, signs and symptoms may be</td>
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<tr>
<td></td>
<td></td>
<td>less obvious</td>
</tr>
<tr>
<td>Parameter</td>
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<td>Specifics</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| **Moisture**| • Exudate/drainage colour, consistency, type and odour                 | • Location of the incision  
• Proportion of the incision affected  
• Number of areas of dehiscence  
• Presence of sutures/clips and condition (intact/broken) |
|             | • Exudate/drainage level                                              | • Purulent (cream, yellow or green) or haemopurulent (red, brown) may indicate infection  
• Yellow or brown exudate may indicate a urinary or enteric fistula  
• Malodour may indicate infection or fistula |
| **Edge**    | • Edges of dehisced area                                               | • In long-standing areas of dehiscence, the edges may become undermined |
|             | • Colour and condition of the surrounding skin                        | • Signs of dermatological conditions that may affect healing – e.g. radiation dermatitis  
• Signs of spreading infection – e.g. spreading erythema, warmth and oedema  
• Periwound maceration may indicate high exudate/drainage levels and/or inadequate absorbency of the dressing |
Case study 1

- **60-year-old woman**
- **2cm section of incision dehisced following laparotomy 10 days previously**
- Local wound infection resolved with a topical antimicrobial dressing
WUWHS SWD Grade 1a
## Case study 2

- **58-year-old man**
- Full separation of opposed margins including full thickness of skin following spinal surgery 3 weeks previously
- Wound was clean and not infected

### WUWHS SWD Grade

<table>
<thead>
<tr>
<th>Grade</th>
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<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dermal layer only involved; no visible subcutaneous fat</td>
<td>9a, page 19</td>
</tr>
<tr>
<td>1a</td>
<td>As Grade 1 plus clinical signs and symptoms of infection (e.g. superficial incisional SSIs)</td>
<td>9b, page 19</td>
</tr>
<tr>
<td>2</td>
<td>Subcutaneous layer exposed; fascia not visible</td>
<td>9c, page 19</td>
</tr>
<tr>
<td>2a</td>
<td>As Grade 2 plus clinical signs and symptoms of infection (e.g. superficial incisional SSIs)</td>
<td>9d, page 19</td>
</tr>
<tr>
<td>3</td>
<td>Subcutaneous layers and fascia exposed</td>
<td>9e, page 19</td>
</tr>
<tr>
<td>3a</td>
<td>As Grade 3 plus clinical signs and symptoms of infection (e.g. deep incisional SSIs)</td>
<td>9f, page 19</td>
</tr>
<tr>
<td>4</td>
<td>Any area of fascial dehiscence with organ space, viscer, implant or bone exposed</td>
<td>9g, page 19</td>
</tr>
<tr>
<td>4a</td>
<td>As Grade 4 plus clinical signs and symptoms infection (e.g. organ/space SSIs)</td>
<td>9h, page 19</td>
</tr>
</tbody>
</table>

### Photo courtesy of Risal Djohan
WUWHS SWD Grade 3
Case study 3

• Mechanical dehiscence of sternal incision following CABG 6 days previously
• Minimal serous exudate, no signs of local or systemic infection
WUWHS SWD Grade 4
### Table 9: Assessment of SWD using the TIME framework (adapted from [10])

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Assess</th>
<th>Specifics</th>
</tr>
</thead>
</table>
| **Tissue**                       | Location and extent of dehiscence                                      | Location of the incision  
Proportion of the incision affected  
Number of areas of dehiscence  
Presence of sutures/ips and condition (intact/broken)  
Depth of dehiscence  
Partial or full-thickness dehiscence and tissue layers affected (see Figure 8, page 16); WUWHS SWD Grade (see Table 10, page 18)  
Exudate drainage level  
Saturated dressing  
Presence of undermining/tunneling  
For abdominal SWD, presence of oesophageal perforation  
Tissue viability  
Condition of exposed tissues  
Wound bed tissue types and proportions - e.g. necrotic/devitalised tissue, slough and granulation tissue  
Dimensions  
Dimensions of the dehisced area(s); maximum length, width, depth |
| **Infection (or inflammation)**  | For local indicators of infection or inflammation                      | Clinical signs and symptoms  
See Box 5 and Box 6, page 13, and Box 8, page 17, for signs and symptoms of acute and chronic infection  
N.B. In patients who are immunosuppressed, signs and symptoms may be less obvious |
| **Moisture**                     | Exudate/drainage colour, consistency, type and odour                  | Purulent (cream, yellow or green) or haemopurulent (red, brown) may indicate infection  
Yellow or brown exudate may indicate a urinary or enteric fistula  
Malodour may indicate infection or fistula  
Exudate/drainage level  
Indications of the level of exudate production can be gained from the condition of the current dressing (i.e. a dry dressing indicates low exudate levels; a saturated or leaking dressing indicates higher levels) and the appearance of the wound bed |
| **Edge**                         | Edges of dehisced area                                                | In long-standing areas of dehiscence, the edges may become undermined  
Colour and condition of the surrounding skin  
Signs of dermatological conditions that may affect healing - e.g. radiation dermatitis  
Signs of spreading infection - e.g. spreading erythema, warmth and oedema  
Periwound maceration may indicate high exudate/drainage levels and/or inadequate absorbency of the dressing |
Local management

- Dependent on a range of factors including the:
  - Severity of the dehiscence – e.g. WUWHS SWD Grade and exposure of viscera, bone or implants
  - Presence of infection
  - Timing of the dehiscence in relation to the surgery that produced the incision
  - Presence of co-morbidities that increase the risk of surgical site complications and/or impair healing.
NPWT

- NPWT should be used in the context of holistic management of the patient
- Used only as an adjunctive treatment in the management of wound infection
- Suitable for highly exuding, deep or complex dehisced wounds.
- NPWT fulfils the needs for moist wound healing, exudate/drainage management, elimination of dead space and protection from external contamination in the facilitation of healing by secondary or tertiary healing after SWD.
Effects of NPWT that aid healing of open wounds

- Wound contraction
- Facilitation of moist wound healing
- Physical blockade of external contamination
- Reduction of oedema
- Removal of excess wound fluid
- Angiogenesis
- Improved tissue perfusion
- Granulation tissue formation
• Correct assessment and categorisation will lead to correct management

• Thank you for listening
• WUWHS. World Union of Wound Healing Societies (WUWHS) consensus document. Surgical Wound Dehiscence: Improving prevention and outcomes. Wounds Int. 2018