

The Scottish Ropper Ladder for infected wounds: a 5-year journey from concept to national tool

KEY WORDS

- ▶▶ Antimicrobials
- ▶▶ Guidance
- ▶▶ Infection
- ▶▶ Pathway
- ▶▶ Wounds

The ability to take a concept and turn it into a useable model for clinical practice is often a challenge. The Scottish Ropper Ladder is an example of how that has worked in practice. From an idea developed due to cost-pressures and the need to guide practice for clinicians in NHS Lothian, the tool has been adapted and adopted nationally across Scotland. At all stages it has been tested in practice, refined and supported with education. The Ladder aims to support identification and management of infected wounds alongside a suite of work around chronic wounds and antimicrobial wound dressings (AWDs).

Plato said: *“Necessity is the mother of invention.”* In healthcare it is no different; as clinicians come across challenges they look for creative ways to solve the problems. During 2009–2010, several studies and articles started to raise questions around the use of antimicrobials, antiseptics and, specifically, silver dressings in the management of wounds. The VULCAN study (Michaels et al, 2009) had identified how the incorrect and long-term use of silver did not affect healing rates in non-infected venous leg ulcers. While many debated the details and validity of the use of silver dressings for these wounds (White and Kingsley, 2010; Leaper and Harding, 2010), it was clear that correct diagnosis and treatment of critical colonisation and local infection needed to be improved (Cutting et al, 2005; Vowden and Cooper, 2006; Cooper, 2006; Cutting, 2008).

Discussions around the use of antiseptics to reduce overuse of antibiotics were published (Cutting, 2008; Leaper and Harding, 2010) and the lack of high-quality trials for silver dressings was highlighted in the Drugs and Therapeutic Bulletin (Iheanacho, 2010) before hitting the national headlines (Daily Mail, 2010). This led to many health authorities across the UK reviewing their local practice and formularies related to silver and other antimicrobial wound dressings (AWDs). Best Practice Statements were developed to provide staff with guidance on appropriate usage

and several experts recommended the 2-week rule for use of antimicrobials (Wounds UK 2010; Newton, 2010; Wounds UK, 2011).

During 2012, questions started to be raised at an executive level in NHS Lothian about the costs of silver dressings, appropriate use and whether there was evidence for them to be used in practice. The question was put to Healthcare Improvement Scotland (HIS): *“Are silver dressings effective and cost-effective for the healing of infected wounds and prevention of wound infection relative to other types of wound dressings?”* HIS commissioned a scoping report to provide an overview of the evidence base, including gaps and uncertainties, to inform decisions on the feasibility of producing an evidence review on the topic (HIS, 2013). Scoping reports are peer reviewed but do not make recommendations to NHS Scotland.

This report was aimed at informing decision-making around investment and disinvestment and to assist the development of wound management protocols. Following the review, an advisory statement was issued which identified insufficient advice to support or refute the use of silver dressings. It suggested that silver dressings should be used within the context of local research and audit to examine their effectiveness (HIS, 2013). Against this backdrop, the concept of the Ropper Ladder originated.

RUTH ROPPER
Lead Nurse Tissue Viability,
NHS Lothian, Scotland

CONCEPT DEVELOPMENT

(2011-2012)

The Tissue Viability Nurse Specialists (TVNS) had noted the debates and discussions around silver and wanted to try and pre-empt any directives that might remove a valuable antimicrobial from their 'toolkit' and potentially lead to an increase in wound infections and use of antibiotics.

Following the HIS advice statement, senior management decided to remove silver dressings from formulary and discussions took place about how this might impact practice. The original concept was triggered by a discussion group on the use of silver dressings and started out as a flowchart or pathway to guide staff.

After discussions between the TVNS and Lothian Joint Formulary (LJF) pharmacist, it was decided that this should be expanded to include all topical antimicrobials. The author identified that if a simple decision tool could be developed, clinicians could be guided on how to identify if a wound was infected. The tool could then guide them to make informed choices on when to 'Start' and when to 'Stop' AWDs to improve patient outcomes. It would need to be simple to understand and use in practice and be based on current best evidence. The pathway during development had a similar appearance to a ladder and, combining the name of the author and the Health Board, a title was agreed — The Ropper Lothian Ladder.

The tool was based on the European Wound Management Association (EWMA) position documents on Identifying criteria for wound infection (EWMA, 2005) and Management of wound infection (EWMA, 2006) and the Best Practice Statement on the Use of Topical Antiseptic/Antimicrobial Agents in Wound Management (Wounds UK, 2010). At the time 'critical colonisation' was widely used to describe wounds that were not actively infected but had a high bacterial load which was slowing wound healing, so it was included in the original descriptions (Cooper, 2005; Cutting et al, 2005; Vowden and Cooper, 2006). Criteria

common to all wound types were perceived as important diagnostic criteria and were used in the original development of the Ropper Lothian Ladder (EWMA, 2005; EWMA, 2006).

The ladder shows four stages, progressing from 'Stage 1', where healing was progressing normally, through to 'Stage 4', where spreading infection was a major concern. Each stage in the ladder guided the staff to treatment options linked to local formulary guidance. When antimicrobials were used, the 2-week time frame was recommended for review of treatment. To ensure the tool linked with all existing guidelines, consultation also included infection control and microbiology clinicians.

PILOT OF THE ROPPER LOTHIAN LADDER (2012)

Once the ladder was at final draft stage, it was piloted in a number of acute and community areas amongst adults and children, to ensure it was usable in all clinical settings.

Each area was asked to pilot a simple questionnaire on five patients with a wound and return the results within 4 weeks. Questions were asked around ease of use; whether guidance was clear for treating infected wounds and around stopping AWDs. There was also an opportunity for open comments.

A total of 21 pilot questionnaires were returned, which equated to 85 wounds in total being assessed with the tool. Most staff had completed one form for their five patients; however, one area completed a form for each patient.

- ▶ 100% of staff found the ladder easy to use
- ▶ 90% found treatment guidelines clear
- ▶ 75% found guidance clear on when to stop AWDs
- ▶ 53% of wounds seen were identified as showing increasing signs of infection (Stage 2, 3 or 4).

There were a variety of comments from staff:

- ▶ How to make the guidelines clearer — these were considered for the final version

▶ Related to specific areas of practice and groups such as vascular, diabetic or immunocompromised patients where prophylaxis is a critical issue — it was felt that the statement about staff using the tool alongside clinical judgement would cover these situations and enable staff to go outside the guideline

- ▶ Challenges of chronic wounds that became repeatedly infected — this was outside the remit of the tool but addressed in general education sessions
- ▶ Practice that was outside the scope of the guidelines was not taken forward.

After the pilot results were analysed, a final version of the ladder, the Original Ropper Lothian Ladder (*Figure 1*), was agreed and approved within NHS Lothian in March 2012.

ROLLING OUT THE NEW GUIDANCE (2013)

NHS Lothian covers a population of approximately 850,000 and is the UK's second largest Health Authority. It includes 21 hospitals, including 4 major teaching hospitals, 126 GP practices (including Practice and Treatment room nurses, and linked Community Nursing bases) and approximately 130 Care Homes over an area of 700 square miles. To ensure the message could get out to all areas, a range of different methods were required. These included:

- ▶ Roadshows for GPs, practice/treatment room and community nurses
- ▶ District nurse team sessions
- ▶ Acute study days
- ▶ Link nurse sessions/study days
- ▶ Team briefs
- ▶ Intranet tissue viability (TV) pages
- ▶ TV resource folders
- ▶ Tissue viability education sessions were updated, and all wound management training included using the Ropper Ladder to aid staff in the identification of infected wounds.

Following feedback from the training sessions and initial use of the Ropper Ladder, a separate step-by-step guidance to direct staff to the current formulary AWDs was

developed. Alongside this, guidance was given on how and what to choose if non-formulary choices had to be considered.

WIDER SPREAD AND NEW INITIATIVES (2014–2015)

Locally, in conjunction with Microbiology, an online education course was developed for NHS Lothian staff called ‘Identifying and Treating Infected Wounds.’ This covered the topic of infected wounds including signs and symptoms, the stages of the Ladder, how to swab wounds and common bacteria. It also identified AWDs; how they work, when to

use and when not to use. Staff knowledge is tested using photos to stage against the Ladder.

In Scotland, the National Association of Tissue Viability Nurse Specialists (NATVNS) is an organisation which includes all TVNS across Scotland. It links to National and Scottish Government initiatives and meets quarterly to take work forwards and provide a resource for staff to share practice and evidence with their peers. The Ropper Lothian Ladder was shared through this route and NHS Fife and Forth Valley requested to use the Ladder to link to their local processes and formularies. A generic version was created and some areas adapted it with acknowledgements to the original.

Nationally, in August 2013 it was agreed that HIS should conduct a Health Technology Assessment with a group of experts to look at the evidence in more detail around ‘AWDs for chronic wounds.’ This piece of work would take a couple of years to complete.

Across the UK, Europe and internationally, publications started to question the terminology of ‘critical colonisation’ as well as issues around the challenges of non-healing wounds and misconceptions about antimicrobials in general (Wounds UK, 2013; Gottrup et al, 2013; International Wound Infection Institute, 2016).

The Ropper Lothian Ladder continued to be used while these debates and reviews were underway with the plan to review once the findings were available.

THE HIS REPORT (2015)

HIS started the process of looking at the evidence by defining the protocol of what would be covered in the report. The final questions agreed after consultations were:

- ▶▶ What is the clinical and cost-effectiveness of different AWDs and their safety, compared with other dressings and techniques for treating localised infection in chronic wounds in adults?
- ▶▶ What are the patient and organisational issues associated with the use of different AWDs in adult patients with chronic wounds?

Twelve members of the HIS project team were involved in the literature searches and 23 clinical experts from across Scotland and the UK reviewed the evidence and provided feedback. The review

Figure 1. The Original Ropper Lothian Ladder



Table 1. Five elements of HIS Review

No	Element	Process/Groups involved
1	Clinical effectiveness	Published evidence
2	Cost-effectiveness	Published reviews Health economists
3	Patient issues	Synthesis of existing qualitative research. Primary qualitative research with focus groups and phone interviews
4	Organisational issues	National Procurement NHS Boards Information Service Division (ISD) Scotland
5	Recommendations	Consensus of clinical experts Modified Delphi approach with 70% agreement over three rounds

Table 2. Recommendations from HIS report (2015)

1	The routine use of AWDs to heal chronic wounds is not recommended.
2	In the absence of sufficient clinical evidence to guide decision-making, NHS Scotland should adopt a consistent approach to guide the use of AWDs in treating localised wound infection in chronic wounds. A national management algorithm should be agreed. See our consensus statements for more information.
3	When selecting a dressing for people with chronic wounds, alongside holistic clinical assessment, consider the factors of importance to the patient such as odour, pain/ discomfort, leakage and mobility as well as healing.
4	Having first taken into account patient and wound-specific factors, the costs of dressings relative to their benefits should guide their use. See our consensus statements for more information.
5	There is a need for good quality randomised controlled trials (RCTs) on the use of AWDs to treat localised infection in chronic wounds. The subsequent impact of reduced infection on patient outcomes (for example healing, improvement in signs and symptoms) also needs to be explored. There is also a need for good quality economic evaluations.
6	A national patient leaflet should be developed, which can be used as an aid to support shared decision-making between patients with chronic wounds and healthcare professionals.
7	There is a need for accessible and evidence-based education and training on the appropriate use of AWDs in chronic wounds.
8	The Therapeutics Branch in the Pharmacy and Medicines Division at Scottish Government would be well placed to take forward the implementation of the recommendations in this HTA.

involved five key elements (*Table 1*) and where evidence was not available, consensus was looked for among experts and clinicians using a three-stage Delphi process.

The report was published in December 2015 as Health Technology Assessment, Antimicrobial Wound Dressings (AWDs) for Chronic Wounds (HIS, 2015a), along with a shortened version in plain English on understanding the report (HIS, 2015b). Within the report, the Ropper Lothian

Ladder was mentioned by 48 of 199 respondents (24%) as being used in current practice in their area. The report provided eight recommendations (*Table 2*) and eight consensus statements (*Table 3*) to guide the use of AWDs for chronic wounds in NHS Scotland.

DEVELOPMENT OF SCOTTISH TOOLS (2016-2017)

The eighth recommendation from the HIS report was that ‘the Therapeutics Branch in the Pharmacy and Medicines Division at Scottish Government would be well placed to take forward the implementation of the recommendations in this HTA’ (HIS, 2015a; 2015b).

The Effective Prescribing and Therapeutics Branch, at Scottish Government, supported the formation of a multidisciplinary short life working group (SLWG) and in late 2016 the author was invited to join the group with representatives from across Scotland to take the work forward. This multi-professional group included TVNs, Podiatrists, Pharmacists, Leg Ulcer experts, other wound specialists, Prescribing Advisors from across Scottish Health Boards, plus representatives from academia to ensure it linked with nurse training.

The group identified a need for a nationally agreed management algorithm to guide staff in the management of chronic wounds as well as the use of AWDs. It was decided to create an algorithm and link it to an updated version of the Ropper Lothian Ladder which could be agreed for all areas. Patient information leaflets were also developed to support them in understanding the management of their chronic wounds, with or without infection.

As the new tool would be used across Scotland it was decided to rename it the ‘Scottish Ropper Ladder for Infected Wounds’. It went through several consultations before finally being agreed by the SLWG. In line with current consensus ‘critical colonisation’ was removed and the four stages reflect the International Wound Institute: Wound Infection Continuum wording (International Wound Infection Institute, 2016). After debate around how to highlight sepsis as an increasing concern, this was also included. The tool was reviewed by staff in both acute and primary care settings and is therefore believed

Table 3. Consensus statement from HIS Report (2015)

For chronic wounds, the evidence is insufficient to draw conclusions on the use of AWDs to treat localised wound infection. There is a need for a more consistent approach to the use of AWDs across NHS Scotland. Expert consensus was reached on the following statements.

1	<p>a. When treating a patient with a chronic wound, symptoms of localised infection must be present before use of an AWD is commenced.</p> <p>b. However, in certain patients with underlying health conditions, some of the signs and symptoms of localised infection might be masked.</p>
2	<p>Clinical experts agreed that the most commonly observed signs and symptoms of localised infection, which might prompt use of AWDs, include:</p> <ul style="list-style-type: none"> ▶▶ Pain/increased pain ▶▶ Erythema/redness ▶▶ Heat ▶▶ Wound deteriorating/getting bigger ▶▶ Exudate: thick, haemopurulent or purulent and/or high volumes ▶▶ Inflammation/swelling/oedema ▶▶ Delayed or stalled healing ▶▶ Malodour. <p>Some of the above signs and symptoms can be caused by patient factors other than localised wound infection. Therefore, a holistic assessment of the patient is required to rule out causes other than localised infection.</p>
3	<p>After 2 weeks of using an AWD, if the symptoms of localised infection have ceased entirely, stop using the AWD and dress the wound in line with formulary recommendation.</p>
4	<p>After 2 weeks of using an AWD, if the symptoms of localised infection have improved, but not ceased entirely, consider continued use of the AWD, but review at weekly intervals.</p>
5	<p>If, after 2 weeks of using an AWD, the symptoms of localised infection have not changed or have become worse, follow the guidance given in stage 3 of 'The Ropper Lothian Ladder' in line with your local policies and procedures.</p>
6	<p>A national patient leaflet should be developed, which can be used as an aid to support shared decision-making between patients with chronic wounds and healthcare professionals.</p>
7	<p>There is a need for accessible and evidence-based education and training on the appropriate use of AWDs in chronic wounds.</p>
8	<p>The Therapeutics Branch in the Pharmacy and Medicines Division at Scottish Government would be well placed to take forward the implementation of the recommendations in this HTA.</p>

to be suitable for adults with wounds in all areas. The SLWG developed the resources using best practice and expert consensus as well as consultation with patients and public. The final documents included:

- ▶▶ Algorithm for Assessment and Management of Chronic wounds
- ▶▶ Scottish Ropper Ladder for Infected Wounds (Figure 2)
- ▶▶ Patient information leaflet 'Understanding your Chronic Wound'

▶▶ Information for Health Boards to guide AWD use.

The final documents were approved by Therapeutics Branch and then disseminated to Health Boards in January 2018 as well as being made accessible via the HIS website (HIS, 2018).

RECOMMENDATIONS

HIS guidance was given that stated: *'These resources are provided for Boards to review, as necessary, to fit with their local guidance, e.g. sepsis screening tool, local formularies for dressings and antibiotics. These resources aim to standardise a clinician's approach to wound care, reduce variance in practice, and reduce any inappropriate use of antimicrobial dressings.'*

The challenge is now for each area to disseminate and integrate the new tools into local training and clinical practice. Locally, in NHS Lothian, staff need to be supported to update local TV resource packs and training around the Scottish Ropper Ladder for Infected Wounds as well as the new resources supporting chronic wound management.

CONCLUSIONS

Guidelines can be useful tools to aid staff in their decision making, but they are only effective when used in clinical practice on a daily basis and supported by education and training. The Ropper Lothian Ladder aimed to aid staff in identifying when a wound was critically colonised or infected and then to give guidance on what treatment plan to follow. This proved successful in NHS Lothian and the updated Scottish Ropper Ladder should assist staff across the whole of Scotland to identify infected wounds more clearly, as well as help them to review and/or stop treatment. In the NHS, we have to ensure our practice is patient-centred and clinically cost-effective. As more concerns are raised about antimicrobial stewardship and inappropriate use of antibiotics (Lipsy et al, 2016), the use of tools such as this should support healthcare staff in making informed clinical decisions. **WUK**

REFERENCES

Cooper RA (2005) Understanding wound infection. In: *European Wound Management Association (EWMA) Position Document: Identifying Criteria for Wound Infection*. MEPLtd, London

Cutting KF (2008) Critical colonisation. In: *Association for the Advancement of Wound Care (AAWC) (2008) Advancing your practice: Understanding Wound Infection and the Role of Biofilms*. Malvern PA

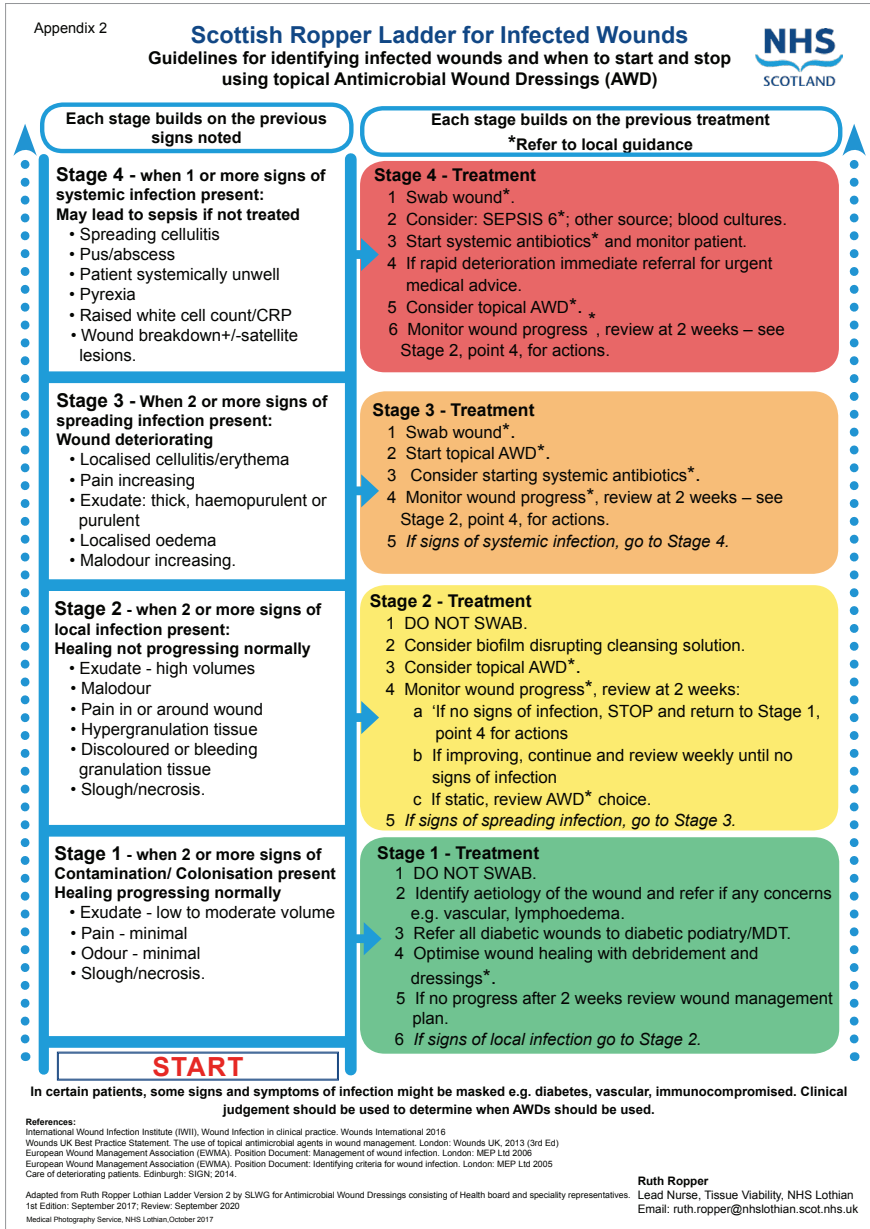


Figure 2. Scottish Ropper Ladder for Infected Wounds

Cutting KF, White RJ, Mahoney P, Harding KG (2005) Clinical identification of wound infection: a Delphi approach. In: *European Wound Management Association (EWMA) (2005) Position Document: Identifying Criteria for Wound Infection*. MEP Ltd, London

Daily Mail (2010) *NHS Wastes £25M on Silver Dressings that Don't Beat Bugs*. Available online: www.dailymail.co.uk/health/article-1266093/NHS-wastes-£25M-on-silver-dressings-that-don-t-beat-bugs/html (accessed 14 August 2018)

European Wound Management Association (EWMA) (2005) *Position Document: Identifying Criteria for Wound Infection*. MEP Ltd, London

European Wound Management Association (EWMA) (2006) *Position Document: Management of Wound Infection*. MEP Ltd, London

Gottrup F, Apelqvist J, Bjanshot T et al (2013) EWMA document: Antimicrobials and non-healing wounds. Evidence, controversies and suggestions. *J Wound Care* 22 (5 suppl):S1–89

Healthcare Improvement Scotland (2013a) *Technologies Scoping Report 12. Are Silver Dressings Clinically Effective and Cost Effective for the Healing of Infected Wounds and the Prevention of Wound Infection Relative to other types of dressings?* Available at: http://www.healthcareimprovementscotland.org/our_work/technologies_and_medicines/earlier_scoping_reports/technologies_scoping_report_12.aspx (accessed 14 August 2018)

Health Improvement Scotland (2013b) *Advice Statement 001/13*. Available at: http://www.healthcareimprovementscotland.org/our_work/technologies_and_medicines/earlier_advice_statements/advice_statement_001-13.aspx (accessed 14 August 2018)

Healthcare Improvement Scotland (2015a) *Antimicrobial Wound Dressings for Chronic Wounds. HTA Report 13*. Available at: http://www.healthcareimprovementscotland.org/our_work/technologies_and_medicines/shtg_hta/hta13_antimicrobial_dressings.aspx (accessed 14 August 2018)

Healthcare Improvement Scotland (2015b) *Antimicrobial Wound Dressings HTA Understanding our Report and Advice*. Available online: http://www.healthcareimprovementscotland.org/our_work/technologies_and_medicines/shtg_hta/hta13_antimicrobial_dressings.aspx (accessed 14 August 2018)

Healthcare Improvement Scotland (2018) *Resources to Guide the Management of Suspected Infection in Chronic Wounds*. Available online: http://www.healthcareimprovementscotland.org/our_work/patient_safety/tissue_viability/infection_in_chronic_wounds.aspx (accessed 14 August 2018)

Iheanacho I (2010) Silver dressings – do they work? *Drug Ther Bull* 48(4): 38–4

International Wound Infection Institute (IWII) (2016) *Wound Infection in Clinical Practice. Wounds International*. Available at: <http://www.woundsinternational.com/consensus-documents/view/iwii-wound-infection-in-clinical-practice> (accessed 14 August 2018)

Leaper D, Harding K (2010) Antimicrobials and antiseptics. *Journal of Wound Technology* 7:34–5

Lipsy BA, Dryden M, Gottrup F et al (2016) Antimicrobial stewardship in wound care a Position Paper from the British Society for Antimicrobial Chemotherapy and European Wound Management Association. *J Antimicrob Chemother* 71(11):3026–35

Michaels JA, Campbell B, King B et al (2009) Randomized controlled trial and cost-effectiveness analysis of silver-donating antimicrobial dressings for venous leg ulcers (VULCAN trial). *Br J Surg* 96(10): 1147–56

Newton H (2010) Reducing MRSA bacteraemias associated with wounds. *Wounds UK* 6(1):56–65

Vowden P, Cooper RA (2006) An integrated approach to managing wound infection. In: *European Wound Management Association (EWMA) Position Document: Management of Wound Infection*. MEP, London

White R, Kingsley A (2010) Silver dressings the light of relevant clinical research: what can be concluded? *Wounds UK* 6(2): 157–8

Wounds UK (2010) *Best Practice Statement: The Use of Topical Antiseptics/Antimicrobial Agents in Wound Management*. Available at: <https://www.wounds-uk.com/resources/details/best-practice-statement-the-use-of-topical-antisepticantimicrobial-agents-in-wound-management> (accessed 14 August 2018)

Wounds UK (2011) *Best Practice Statement: The Use of Topical Antiseptics/Antimicrobial Agents in Wound Management*. Available at: <https://www.wounds-uk.com/resources/details/best-practice-statement-the-use-of-topical-antisepticantimicrobial-agents-in-wound-management-2nd-edition> (accessed 14 August 2018)

Wounds UK (2013) *Best Practice Statement: The Use of Topical Antiseptics/Antimicrobial Agents in Wound Management*. Available at: <https://www.wounds-uk.com/resources/details/best-practice-statement-use-topical-antimicrobial-agents-wound-management> (accessed 14 August 2018)