The Leeds Wound Infection Framework: Development and implementation of a new pathway to improve care

KEY WORDS
- Antimicrobial stewardship
- Framework
- Infection
- Pathway

Standardised practice is vital to reduce variations in care, improve service delivery and encourage staff confidence (Fletcher et al, 2018). In infection management, this is particularly relevant, as the growing threat of antimicrobial resistance (AMR) needs to be met by all clinicians with a unified approach informed by the principles of antimicrobial stewardship (AMS). The Leeds Wound Infection Framework was developed by Leeds Community Healthcare Trust to standardise practice relating to the early recognition and management of wound infection within the Trust. This article highlights the issues that led to the development of the framework, how it was implemented in practice and the benefits seen by the Trust.

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Infection management is a key issue in wound care. Infection is a significant cause of delayed or failed healing in chronic wounds: Guest et al (2020) found that an estimated 59% of chronic wounds healed if there was no evidence of infection compared with 45% if there was a definite or suspected infection, with non-healing wounds contributing to the cumulative burden of wounds.

Infection management has become an increasingly urgent issue, with the growing threat of antimicrobial resistance (AMR), which is when micro-organisms evolve over time and no longer respond to any antimicrobial therapy (Fletcher et al, 2020). The United Nations and other international agencies estimate that, if no action is taken, antimicrobial drug-resistant diseases could cause 10 million deaths each year by 2050, costing £66 trillion (Interagency Coordinating Group on Antimicrobial Resistance, 2019).

The solution to reducing and preventing further AMR is a multi-modal approach known as antimicrobial stewardship (AMS). This includes infection prevention and the promotion of judicious use of antimicrobials to preserve their future effectiveness (NICE, 2014; NICE and PHE, 2019), while also improving the safety and quality of patient care. A change in practice is required, focusing on management of infection risk, prevention and early intervention. In wound care, early identification of infection and infection risk is an integral part of AMS and the overall reduction of antimicrobial use (Sandy-Hodgetts et al, 2020).

Standardised frameworks and pathways can help to facilitate this approach and improve patient care (*Figure 1*); early intervention and standardised care can also improve cost-efficiency and result in cost savings in practice (Fletcher et al, 2018). As with any change in practice, a new framework needs time to become well established, with clear, measurable outcomes to demonstrate its impact.

DEVELOPMENT OF A NEW FRAMEWORK

Leeds Community Healthcare Trust developed the Leeds Wound Infection Framework to standardise

Figure 1. Why have a framework?

practice across the Trust. For context, there are 897,000 patients registered to GP practices in the area, of which 174,176 were aged 60+ in April 2020. Leeds Community Healthcare Trust operate the community services within Leeds, including the Tissue Viability Service.

Results from the first set of audit results of the wound assessment CQUIN 2017/2018 showed that wound infection was not being consistently documented in the Trust. In addition, this coincided with a patient safety incident, one aspect of which related to a delay in recognising wound infection. This determined that a framework specific to the recognition and treatment of wound infection was needed.

THE LEEDS WOUND INFECTION FRAMEWORK

The new Leeds Wound Infection Framework aimed to:

- Improve patient safety
- Standardise first-line antimicrobial dressing use
- Gain insight into prescribing data trends
- Evaluate silver spend in the Trust.

The framework was based on the International Wound Infection Institute (IWII) 2016 Guidelines, using the guideline definitions and the wound infection continuum *(Figure 2)* to identify infection and facilitate early intervention (IWII, 2016). The signs and symptoms associated with the wound

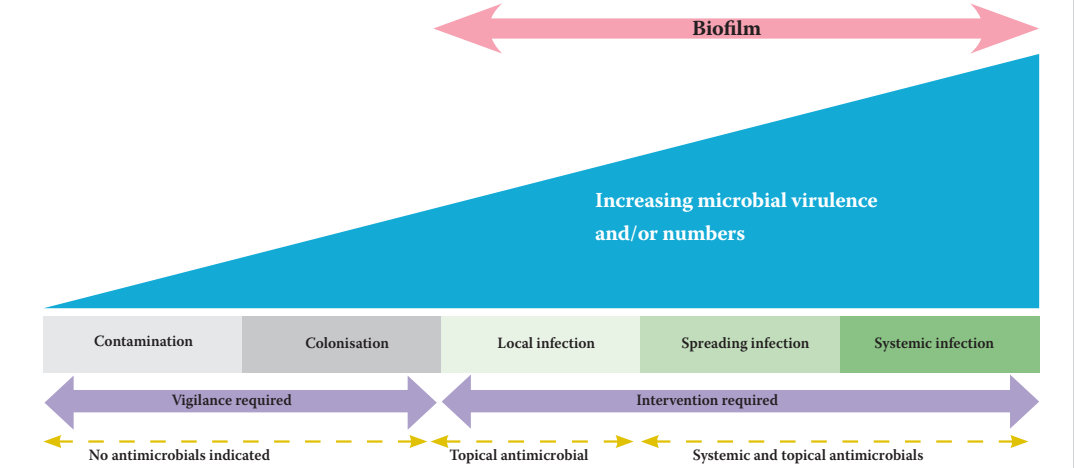

Figure 2. International Wound Infection Institute (2016) wound infection continuum

Table 1: Signs and symptoms associated with stages of the wound infection continuum (IWII, 2016)

Contamination	Colonisation	Local infection		Spreading infection	Systemic infection
All wounds may acquire micro-organisms. If suitable nutritive and physical conditions are not available for each microbial species, or they are not able to successfully evade host defences, they will not multiply or persist; their presence is therefore only transient and wound healing is not delayed	Microbial species successfully grow and divide, but do not cause damage to the host or initiate wound infection	Covert (subtle) signs of local infection: • Hypergranulation (excessive 'vascular' tissue) • Bleeding, friable granulation • Epithelial bridging and pocketing in granulation tissue • Wound breakdown and enlargement • Delayed wound healing beyond expectations • New or increasing pain • Increasing malodour	Overt (classic) signs of local infection: • Erythema • Local warmth • Swelling • Purulent discharge • Delayed wound healing beyond expectations • New or increasing pain • Increasing malodour	• Extending in duration ± erythema • Lymphangitis • Crepitus • Wound breakdown/ dehiscence with or without satellite lesions • Malaise/ lethargy or non-specific general deterioration • Loss of appetite • Inflammation, swelling of lymph glands	• Severe sepsis • Septic shock • Organ failure • Death

infection continuum were also used to inform care at each stage *(Table 1)*.

The framework focuses on wound assessment, identification of signs and symptoms of local infection and vigilance for signs and symptoms of spreading and systemic infection, and sepsis. The treatment focus is then on cleansing of the wound, appropriate dressing use and appropriate escalation if systemic infection is suspected. See *Figure 3* for the full pathway.

FOCUS ON WOUND CLEANSING

Wound cleansing is a key step in infection prevention (IWII, 2016; 2022). Anecdotally within the Trust, it was found that despite the science supporting wound cleansing, wounds were not always being thoroughly cleansed, and sometimes not cleansed at all.

The framework states that all wounds should be thoroughly cleansed using tap water or saline. There was discussion within the team as to whether a wound cleansing solution or surfactant should be used, or advocating use of a debridement or cloth.

The team decided to promote wound cleansing with tap water or saline in this initial rollout of the framework. The rationale was also that, if too many changes were made, it would be more difficult to establish which of these changes were making a difference. The framework was therefore kept as simple as possible, with scope to make additions or adjustments later on, depending on the results from the implementation of the framework, and the emerging evidence on biofilm in wound infection.

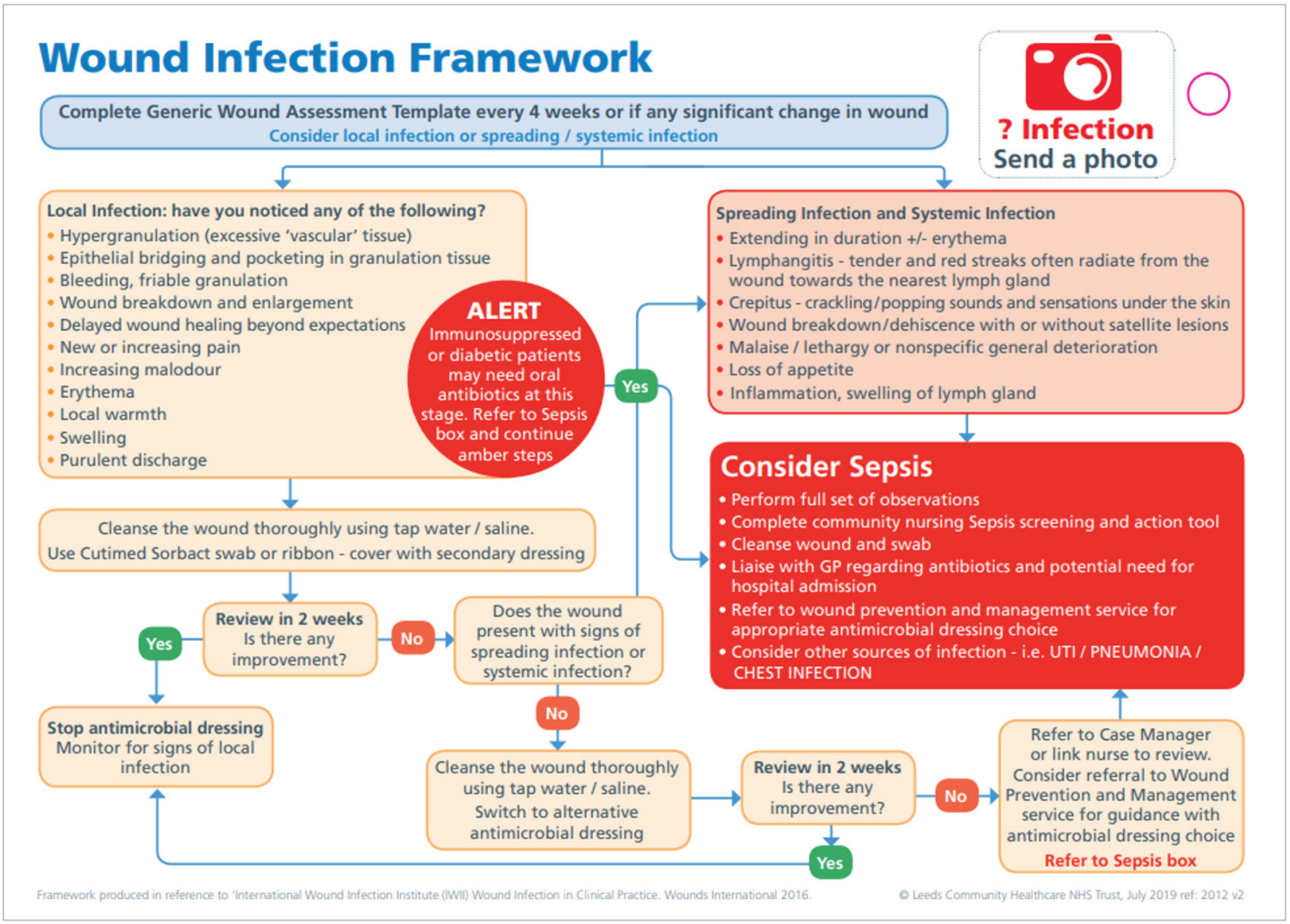

Figure 3. The Leeds Wound Infection Framework

FOCUS ON DRESSING SELECTION

It was necessary to have one antimicrobial dressing included in the framework. After much deliberation and debate, the product selected was Cutimed® Sorbact® (essity). Cutimed Sorbact was selected specifically as it is a product that can be used across the age ranges. The infection framework would need apply to all patients within Leeds Community Healthcare Trust. This would include children and potentially breast-feeding mothers. The first-line product needed to be safe for all patients. Dressings, such as Cutimed Sorbact with a physical mode of action, are effective in wound bioburden management as there is no risk of bacteria developing resistance (Frykberg and Banks, 2015; Ousey and Chadwick, 2019).

Another project that complimented this work was the move from obtaining all wound care products via FP10, to wound care being procured via NHS supply chain. This project enabled community and primary care nurses to have instant access to an antimicrobial, in this case, Cutimed Sorbact. This change helped facilitate the rollout of the framework as clinicians had instant access to the recommended dressing. This also prevented delays for patients who we recognised as having signs of local infection.

IMPLEMENTATION OF THE FRAMEWORK

It is important to note that successful implementation of the framework, and the ensuing benefits seen in practice, was not just due to products but team effort and collective change. It should also be emphasised that the framework was not intended to replace clinician judgement, with staff still encouraged to use their own judgement and 'think outside the box' where necessary.

The Trust team and Essity developed a training programme for community staff and primary care staff, to ensure that clinicians had a thorough understanding of the infection framework. This programme provided a thorough understanding of wound infection, and how the framework would aid in the identification and management of local and systemic wound infection. The training programme was initiated in the second half of 2018 and throughout 2019. Education and training was provided to the 13 neighbourhood teams, GP practices that wanted the training, podiatry, recovery hubs and children's services.

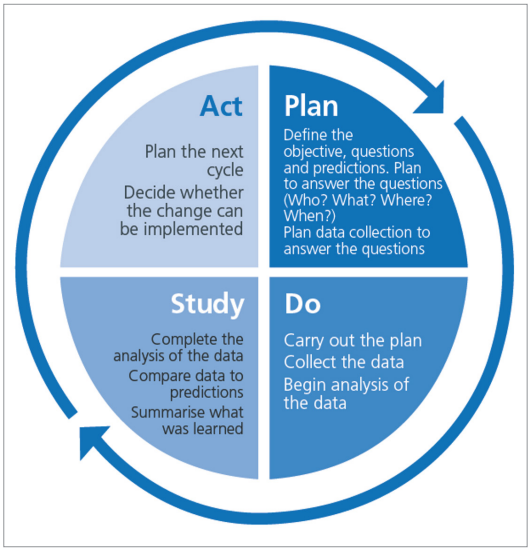

Figure 4. Planning and implementation of the pathway

See *Figure 4* for information on how the framework was planned and implemented in practice, and then how the resulting outcomes were measured.

CONCURRENT CHANGES

In addition to implementation of the framework, concurrent changes were made to practice, which proved to be 'absolutely essential' in practice.

Camera phones were issued to unregistered staff, enabling them to discuss concerns about potential local infection, and enabling decision-making at an early stage. Being able to take a photograph gave staff more confidence, as they were able to show this to a more senior clinician, to help to make a decision about whether an antimicrobial was necessary at this point.

As previously mentioned , there was a move to direct purchase, including first-line antimicrobial dressings. This enabled efficiency and continuity of care, as the appropriate treatment pathway could be triggered immediately on identification as per the framework.

Regular training sessions were implemented, with initial monthly face-to-face training sessions followed by online training. Easy access to training meant that staff could increase their knowledge and awareness, and the regularity of the sessions kept training at the forefront. This meant that the framework was kept in mind and not forgotten, with

staff always alert and able to identify the early signs of infection confidently.

IMPROVEMENTS IN PRACTICE

As well as standardising care and thus reducing variation, implementation of the pathway resulted in measurable improvements in cost-efficiency. Some of the key improvements when comparing 2019 to 2018 were:

- Silver spend reduced by £124,894.54 which equates to a 47.68% reduction
- Antimicrobial spend reduced by £61,058.09 which equates to a 14.34% reduction
- 650 fewer wound swabs, equating to a reduction in spend of £11,719.50.

Antibiotic prescribing trends were of particular interest. The purpose of monitoring antibiotic prescribing was to ensure that there was no increase in antibiotic prescribing. The team did not want a conservative wound infection framework, which resulted in an increase in the use of antibiotics, particularly in the context of AMS.

Antibiotic prescribing for wound infection can be difficult to measure due to huge variations in read code use by prescribers. In view of this, it was decided to use two separate measures of antibiotic prescribing:

- Number of items of Flucloxacillin
- Number of antibiotic prescriptions issued to the S1 read code for wound infection.

Subsequent data showed that there was a slight decrease in antibiotic prescribing, although this was not sustained month-on-month. There are too many variables when considering flucloxacillin prescribing to claim that the decrease was due to the rollout of the wound infection framework, but it was reassuring to the team that, despite a conservative framework, there was no increase in antibiotic prescribing [see *Figure 5 and 6* for more information].

BREAKDOWN OF ANTIMICROBIAL SPEND

As a baseline, *Table 2* shows the 2018 antimicrobial spend, and percentages spend. For every £1 spent on an antimicrobial in 2018,

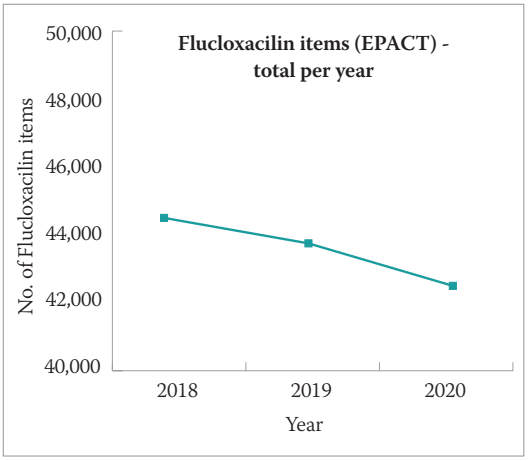

Figure 5. Flucloxacillin prescribing

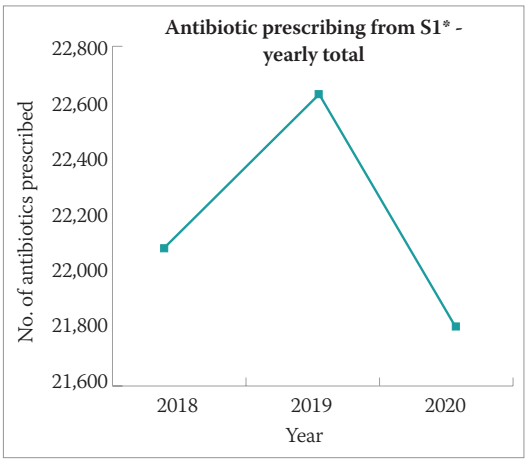

Figure 6. Antibiotic prescribing

£0.62 was on a silver-based dressing. Overall antimicrobial dressing spend for 2018 was £425,698.71, all of which came via FP10.

In 2019, implementation of selected formulary items went on NHSSC. Therefore, 2019 data contain both FP10 and NHSSC data. As Table 3 shows, in 2019, for every £1 spent on antimicrobials, £0.38 was on silver-based dressings, thus showing a significant reduction from 2018. The two main conclusions to be made from the data when comparing 2019 to 2018 are:

- Silver spend reduced by £124,894.54, which equates to a 47.68% reduction
- Antimicrobial spend reduced by £61,058.09, which equates to a 14.34% reduction.

NEXT STEPS

Improvements have been made through implementation of the framework, standardisation

Table 2. Antimicrobial spend in 2018		
2018	**Total**	**Percentage spend**
Total	**£425,698.72**	**100**
Silver	£261,965.96	**62**
DACC	£70,471.15	**17**
PHMB	£43,200.40	**10**
Iodine	£31,780.35	**7**
Honey	£15,784.66	**4**
N/A	£2,496.19	**1**

Table 3. Antimicrobial spend in 2019		
2018	**Total**	**Percentage spend**
Total	**£364,640.62**	**100**
Silver	£137,071.42	**38**
DACC	£142,294.23	**39**
PHMB	£43,250.81	**12**
Iodine	£25,354.42	**7**
Honey	£13,552.71	**4**
N/A	£3,147.03	**1**

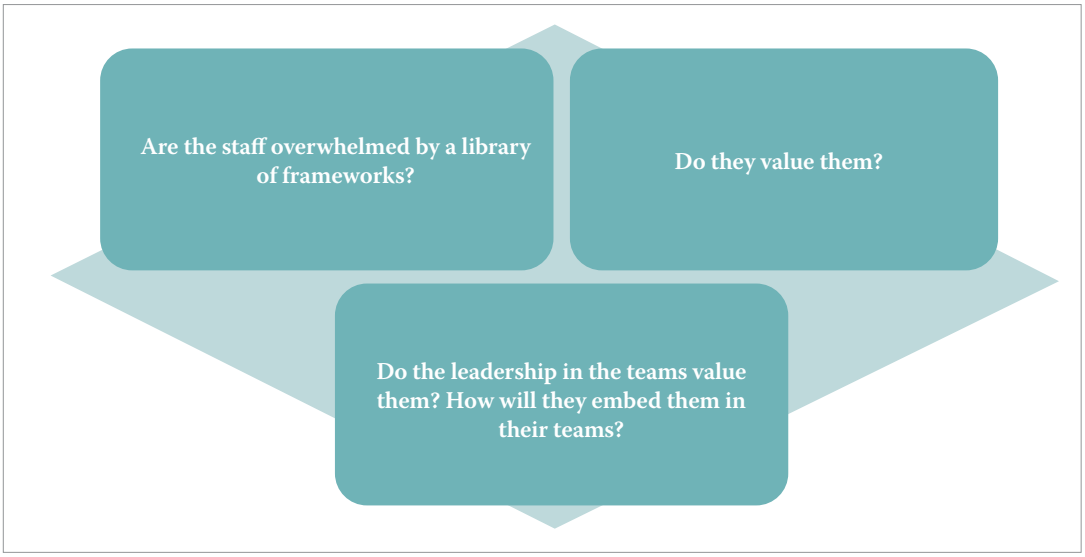

Figure 7. Questions to ask in practice

of practice and staff training. Now that the framework has been embedded into practice, adjustments or additions can be made if necessary. These will encompass:

- The recommendations within the updated IWII (2022) consensus document
- Continued anecdotal reports of wounds not being cleansed thoroughly
- Adding a surfactant for cleansing infected wounds
- Potentially adding a debridement pad/cloth and, if so, which one?
- Restarting regular training.

It is also important to continually address the role of standardised frameworks and pathways in practice [see *Figure 7*], to ensure that they are benefiting staff, healthcare systems and patients. It would be imprudent to assume that continued development of frameworks for clinicians will always be of benefit. At what point do generalist clinical teams reach saturation point if presented with frameworks, or pathways for every clinical situation they may encounter? These are important questions to ask if

DECLARATION OF INTEREST
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we are going to continue to use clinical frameworks/pathways to try have an impact on global concerns such as AMR, as well as improved outcomes in our local areas. WUK

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