

Applied Wound Management as an audit tool to inform practice

Wound care practice can be difficult to monitor due to the complex nature of wounds, the patients, the variety of dressings, and the number of staff involved. Applied Wound Management (AWM) and the three wound healing continuums provide a simple audit tool to collect data on a daily basis, which can be analysed over time allowing performance to be monitored and compared with data from other time periods or with other clinical settings. This paper demonstrates that keeping records of patient numbers, presenting conditions and healing rates can be invaluable when discussing staff training, staffing levels and the work involved in caseloads.

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KEY WORDS

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Audit
Prevalence rates
Workload

The use of audit in clinical practice has become an essential part of the NHS in recent years (Jamvedt al, 2007). Most, if not all clinical settings will use clinical audits to measure performance of certain aspects of practice to prove that it meets standards set at either local or national level (McIsaac, 2007), and to ensure that care is clinically and cost-effective.

In wound care, one of the earliest clinical audits to be carried out was the pressure ulcer prevalence audit (Clark and Watts, 1991). Data from audits like this helped to highlight areas where pressure ulcers were particularly problematic and, in turn, identify areas where clinical resources could be

redirected (Clark and Watts, 1991). Prevalence only gives an indication of the scale of the problem – there was no information about how the pressure ulcers occurred, or where they developed. Thus, this early prevalence data led to the monitoring of pressure ulcer incidence, which provided more data as to the actual numbers of patients developing pressure ulcers in a specific clinical area. This was both

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more informative about performance and clinically relevant, as it allowed staff to focus on risk assessment and other prevention strategies.

Audits are now accepted practice as they provide an essential baseline of information from which services can be strengthened, resources allocated effectively and improvements in performance (or otherwise) demonstrated. However, performing

audit, in itself, is not a solution to healthcare quality issues. How the information is used to improve care or support effective practice is the real value of audit (McIsaac, 2007). With the continued emphasis on evidence-based practice (EBP), audit is a vital tool to ensure the assimilation of EBP into clinical areas (McIsaac, 2007).

A highly successful example of the impact of audit upon clinical practice has been demonstrated through the analysis of postoperative wound infection rates. A number of audits have been published and, indeed, are ongoing, the findings of which have led to a tangible reduction in the incidence of postoperative wound infection (Taylor et al, 2004; Reilly et al, 2001). Central to the success of surgical infection audits, was the regular feedback to the surgeons and staff involved in the care of the patients, with issues such as handwashing, preoperative skin preparation and wound dressings all being reviewed and improved (Reilly et al, 2001).

An audit carried out on the population of Hull and East Riding of Yorkshire estimated the cost of wound care to be approximately £15–18 million per annum (Drew et al, 2007). The audit examined the records of 1,644 patients with 2,300 wounds. The majority of the patients were being treated in the community (74%), 21% in hospital and 5% in residential or

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hospice care (Drew et al, 2007). Of the total hospital patient population, more than one in four patients had a wound. This type of audit information provides invaluable information for health boards with respect to planning the effective allocation of resources.

In addition, there is a growing need to reduce healthcare-acquired infection rates. These can be addressed by using audit data such as this to identify areas at high risk of infection, allowing for effective preventive and intervention strategies to be implemented.

Clinical wound audits are also valuable for demonstrating cost-effectiveness when implementing changes in therapy. Lambourne et al (1996) carried out an audit studying patients with leg ulceration, and found that compression therapy applied in community clinics had economic benefits and, more importantly, lead to improved healing rates.

There is little doubt as to the value of auditing practice, with a view to ensuring that it is both clinically- and cost-effective, and resource efficient.

Applied Wound Management (AWM)

AWM allows the categorisation of most wounds healing by secondary intention and, if applied in a clinical setting, can facilitate clinical audit, producing data which could define the true extent of wounds healing by secondary intention in the UK.

AWM utilises three different continuums, each relating to a key wound parameter:

- ▶ Wound Healing Continuum (WHC): is represented by the tissues in the wound and is a colour-based continuum
- ▶ Wound Infection Continuum (WIC): is subdivided into named stages representing varying host responses to bioburden, each identified by clinical clues
- ▶ Wound Exudate Continuum (WEC): is represented by volume and consistency parameters, and each can be graded according to a 'matrix' continuum.

This practical application to everyday wound care enables practitioners to approach wound assessment logically and systematically by monitoring and recording wound tissue types, exudate levels and viscosity, and the presence or absence of infection. Each of the continuums are based on simple measurements which can be carried out by all members of staff, and are not designed for use only by specialists. Increased workloads across the NHS mean extra efforts need to be made to ensure decision-making remains systematic, clear and coherent. The AWM system aids this type of decision-making, reducing the risk of poor practice and litigation, through accurate assessment.

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Audit

This paper reports the results of a routine audit carried out over a three-month period by staff in the tissue viability department of Grampian Health Board, Aberdeen using AWM to collect data about their patient group, such as the number of patients with wound infection and types of dressing used. The tissue viability department covers two main hospital sites, as well as hospices and special cover for care homes when required. The population of Grampian is over 500,000, however, this is spread over a large geographical area.

Methods

During the three-month period AWM data was collected on all patients' wounds at each review. Digital images were also taken so that details could be compared over time. The AWM database in Aberdeen allows patient data to be uploaded into a computer database. At each patient review, details of the

wound are updated according to the three continuums and the wounds are measured. All data held is anonymous and can only be accessed by the nurse involved in the care of that particular patient.

The database is able to produce reports based on the assessment data. These provide information on the types and size of wounds, exudate levels, tissue types, healing rates and therapies used to treat the wounds.

Data was analysed on all new patients referred to the service from January 2009 until March 2009.

Results

In a patient group of 199, there were 287 wounds which were reviewed 687 times. The average number of wounds was 1.4 per patient and these wounds were reviewed on average 2.4 times. Wound types were analysed, with the majority being traumatic (39%) or pressure ulcers (35.5%). These two groups accounted for almost 74% of all wound types seen. *Table 1* lists the types of wounds the patients presented with.

Applied Wound Management

Wound Healing Continuum data

The Wound Healing Continuum is a simple method by which wound tissue types can be recorded as colours (Gray et al, 2006). Ideally, wounds will pass through the continuum moving from black to pink.

Wound tissue types, as defined by colour, are outlined in *Table 2*. Of interest is the high percentage of wounds that had necrotic and/or sloughy tissue present (59%; black, black/yellow, yellow, yellow/red). This shows the severity of the wounds that are being seen by the tissue viability department, and also indicates that less troublesome and healing wounds may not be being referred to the service.

From the department's perspective, there are less referrals for the treatment of wounds that are progressing towards healing, such as red granulating and pink wounds. This could indicate that the nursing staff are competent in treating patients with healing wounds.

Wound Exudate Continuum

Wound exudate levels and viscosity were recorded according to the Wound Exudate Continuum. However, viscosity is not being presented in this paper. Of interest was the high number of patients with wounds which were assessed as having low exudate levels (60%, n=171), indicating that these wounds required dehydration. Overall, there were 74 wounds that had either moderate or high levels of exudate (Table 3). The recording of exudate levels is notoriously difficult and is often viewed as subjective, because there is no clinically accepted standard of measurement. Of greater importance is the type of exudate, purulence and odour.

Wound Infection Continuum

The Wound Infection Continuum allows the clinician to analyse the clinical presentation of the wound and by comparing with the descriptions on the continuum, to assess for the presence or absence of infection.

Wounds can be documented as colonised, critically colonised, locally infected or with spreading infection (Gray et al, 2006). Wounds which are colonised will not exhibit outward signs of clinical infection and the bacterial burden will not result in clinical signs and symptoms of infection.

The term critical colonisation describes a state where the wound bioburden is such that wound healing is affected (Gray et al, 2006). This stage is normally witnessed as the slowing or cessation of wound healing, and may also be recognised by a change in colour of the wound bed.

The majority of wounds reviewed (56%) were assessed as having local or spreading infection. This, again, is an indication that the wounds referred to the tissue viability team required specialist input.

Most common primary wound treatments

The most common primary wound care treatments included:

- ▶▶ Antimicrobial agents (48%)
- ▶▶ Alginates and hydrofiber products (13%)

Table 1

Types of wounds

Type of wound	Number of wounds	Percentage
Traumatic wounds	112	39
Pressure ulcers	102	35.5
Surgical wounds	38	13.2
Leg ulcers	31	11
Burns	2	0.7
Diabetic foot ulcers	2	0.72

Table 2

Wound tissue types according to the Wound Healing Continuum

Colour of wound	Number of wounds	Percentage
Black	27	9.4
Black/yellow	12	4
Yellow	59	20.5
Yellow/red	75	26
Red	83	29
Red/pink	11	4
Pink	6	2
Unknown	14	5

Table 3

Volume of wound exudate

Level of exudate	Number of wounds	Percentage
No exudate	42	14.5
Low volume	171	60
Medium volume	42	14.5
High volume	32	11

- ▶▶ Negative pressure wound therapy (NPWT) (3%).

A correlation can be seen between the high number of patients presenting

with wounds which were assessed as being critically colonised, locally infected or with spreading infection, and the number of antimicrobials being used.

Table 4

Wound Infection Continuum data collected

Microbiological state of the wound	Number of patients	Percentage
Contaminated/no sign of infection	20	15
Colonised	17	5
Critically colonised	32	24
Locally infected	40	30
Spreading infection	25	26

Table 5

Average reduction in wound size in patients with open abdominal wounds

Number of wounds	34
Total volume of wounds at first review	6791cm ²
Total volume of wounds at final review	917cm ²
Range of wound volume	1.5cm ² –3024cm ²
Average wound volume at first review	200cm ²
Average wound volume at final review	27cm ²

Most common secondary dressings

Most common secondary wound dressings used included:

- ▶▶ Foam dressings, 19%
- ▶▶ Low adherent dressings, 14%
- ▶▶ Low/non-adherent foams, 10%.

The fact that 24% of patients had low-adherent products applied to their wounds indicates that nurses see pain reduction on dressing removal as an important feature. Wounds may be painful for a number of reasons, for example, the actual disease process, such as in vascular lesions or malignancy, or they may be painful at specific times, such as during dressing changes (Hollinworth, 2005). Many patients will have a degree of background pain relating to their wound and this may increase in severity when

wound care procedures are carried out. This must be considered when choosing dressings, as it may directly impact on the patient's quality of life (Young and Roden, 2008). The growth in the use of low adherent products is therefore welcome from both a clinical and quality of life perspective.

Open abdominal wounds

Of particular importance to the tissue viability team has been the increase in the number of patients presenting with post-surgical open abdominal wounds. These wounds can be distressing for the patient due to their size and visibility. Abdominal compartment syndrome is the pathophysiological consequence of raised intra-abdominal pressure, which may result from a number of clinical conditions, such as intestinal obstruction, peritonitis secondary to infection, abdominal trauma and intra-abdominal oedema. (De Backer; 1999). If abdominal wounds are closed by primary suturing when the abdominal

cavity is under pressure due to oedema, there is a risk that the perfusion to the intra-abdominal organs can be affected, which, if left untreated, may lead to ischaemia (De Backer; 1999).

During the audit period, a total of 34 patients with an open abdomen were referred to the service. Wound measurements were carried out on this group of patients at their first review and the total volume was estimated to be 6,791 cm². Wounds were measured from their widest points and volume was estimated on the deepest part of the wound. While this may not be accurate with respect to comparisons with other studies, if the same points are measured by the same clinician, there is at least some correlation by which to judge improvement or deterioration in the wound.

There is much controversy about the accurate measurement of wounds, particularly in relation to deep wounds, where volume of tissue loss is greater (Fette, 2006). Studies by Thomas and Wysocki (1990) on pressure and leg ulcers demonstrated good correlation between wound tracing, the Kundin gauge and computerised photographic analysis. It could be argued therefore that more accurate measurements could have been made using technology, however, as this was not available, wounds were measured at their widest points and depths.

The total volume of all wounds reduced from 6,791 cm² to 917 cm² over the audit period of three months, a large reduction of 86% (Table 5). This may in part be related to the use of negative

Table 6

Reduction in wound size for wounds treated with NPWT and those treated with traditional dressings

Therapy type	Volume pre-treatment	Volume post-treatment	Percentage reduction in volume
Negative pressure wound therapy	6417cm ²	681.75cm ²	84
Traditional therapies	367cm ²	233cm ²	36.5

pressure wound therapy (NPWT) (Table 6). NPWT uses suction through a wound contact layer to encourage local tissue perfusion, drainage of exudate and reduction of local oedema (Molnar, 2004). The impact on quality of life for patients when using NPWT on large open wounds is visible as they are able to mobilise more easily. Patients may also be discharged with the NPWT system. The dressings do not become wet and heavy with exudate, odour can be reduced and the therapy may help to reduce embarrassment and discomfort (Jones, 2008).

One patient had a wound volume in excess of 3,000cm². For this size of wound, combined with the large volume of exudate involved, NPWT was the treatment of choice.

Table 7 shows the number of patients treated with NPWT, or topical negative pressure (TNP), and those with traditional dressings, while Figures 1 and 2 show the percentage reduction in wound volume.

These figures demonstrate that NPWT offers greater benefits for patients with larger wounds and is more clinically/cost-effective.

Discussion

Overall, the results of the audit reflect the department's workload and give a clear indication of the patient groups who are most likely to be reviewed. It should also be noted that these patients were new patients who were referred during this time period, other patients seen before this date were not included.

The majority of the wounds referred to the service had necrosis and/or sloughy tissue present, which indicates that these wounds are more likely to require specialist intervention such as sharp debridement or other aggressive debridement therapy. Of 287 wounds, 120 had two or more tissue types present, which may have implications for healing and dressing selection.

The high prevalence of traumatic wounds (39%) may be related to the age of the patients, the time of year — many elderly patients are admitted at this time of year because of falls and incidents

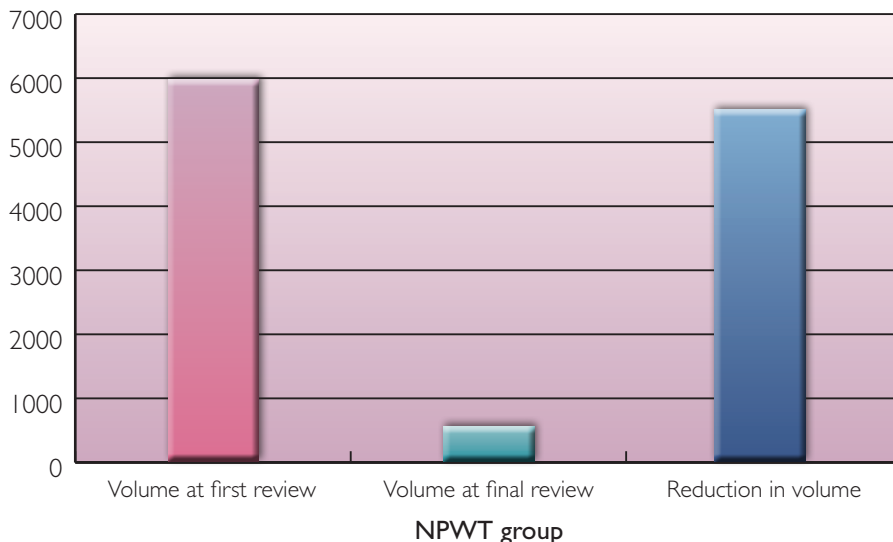


Figure 1. Reduction in volume from first to final review for patients treated with TNP.

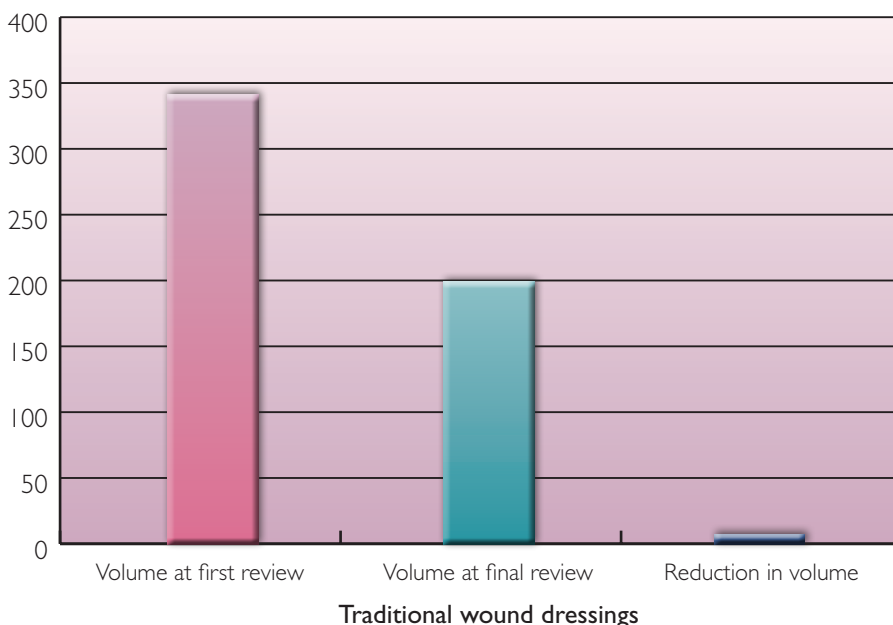


Figure 2. Reduction in volume from first to final review for patients treated with traditional dressings.

relating to loss of mobility (Close et al, 1999). Due to poor health, many of the traumatic wounds in the elderly can become chronic and, in the case of pretibial lacerations, there is a risk that leg ulceration may result if treatment does not include compression and vascular assessment (Beldon 2008 a, b).

The high prevalence of pressure ulcers in the patient group may also relate to the age of the patients and the inclusion of data from the local acute medical services for the elderly unit. This shows that a large proportion of the workload of tissue viability services is in the treatment and management of

Table 7
Number of patients treated with NPWT and traditional dressings

Dressing used	Number of patients
Gauze-based TNP	11
Silvercel™ (Systagenix)	11
Flamazine® (Smith & Nephew)	6
Aquacel® (ConvaTec)	4
Iodosorb® (Smith & Nephew)	2

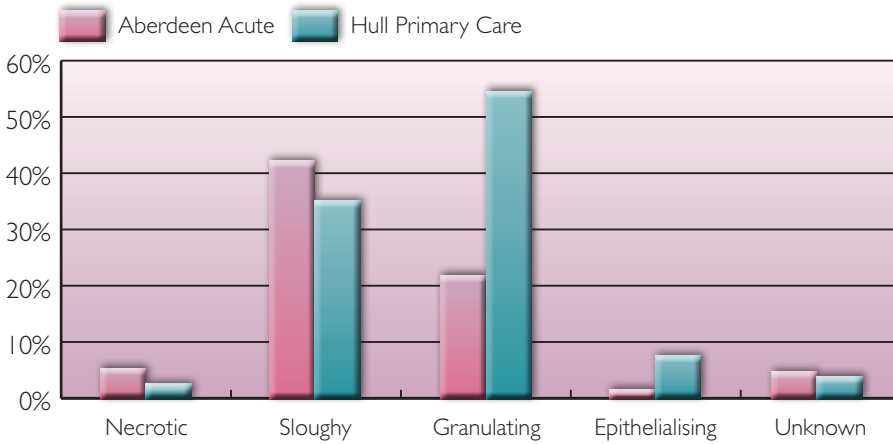


Figure 3. Difference in patient wound tissue types in Hull PCT compared with those in Aberdeen.

pressure ulceration. The data on pressure ulcer prevalence can help to identify areas which require increased input with respect to clinical education, resources and pressure-reducing equipment (Clark and Watts 1991).

Barrett (2008) used AWM data to examine trends in patients with wounds in a primary care trust (PCT) in Hull. Figure 3 shows the differences in wound

tissue types in Hull compared with those in the Aberdeen group.

While in essence these groups are demographically different, it is helpful to compare the trends for referral. The majority of cases in Aberdeen have sloughy wounds, while in Hull PCT there were more patients with granulating wounds. Aberdeen also had more patients with wounds containing

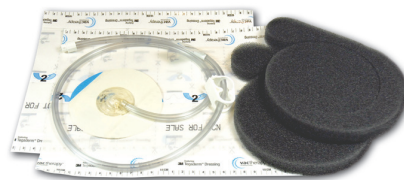
necrotic tissue. This potentially shows that patients in the acute sector have wounds which are in a more severe state, i.e. with sloughy tissue present, and that there may be more wounds which are moving towards healing in the community.

The majority of patients in Aberdeen and Hull (Barrett, 2008) had wounds which were low or moderately exuding. This should be reflected in the dressing changes made during the period of care, i.e. less frequent dressing changes as wounds are not viewed as highly exuding.

The wound infection data from Aberdeen shows a higher degree of wounds which were assessed as infected; 56% local or with spreading infection, compared with just 7% of wounds in the PCT group. Although the assessment criteria are similar; there will be differences in the observers making the assessment, but allowing for this, there is still a large variation in the numbers of patients with infected wounds.



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Key points

- ▶ Audit is a key component of health care and provides valuable information on performance, therapies and management systems.
- ▶ The impact of acute and chronic wounds on the health service is significant.
- ▶ Regular wound care audit can provide data which can be used to inform resource allocation, therapy choices and patient management.
- ▶ Applied Wound Management (AWM) is one method of collecting patient wound assessment and demographic data on a regular basis.

This could be explained by the acute nature of the patients with wounds being treated in the secondary care setting, compared with those in the community setting. However, this is not always the case.

In the Aberdeen site, of the 56% of patients who had critical colonisation or infection, 48% were being treated with antimicrobial products, including Kerlix AMD™ (Covidien) gauze-based negative pressure therapy. This indicates that in the majority of cases, the patients who required antimicrobial treatments were receiving them. The remaining 8% of patients with infection may have been on oral antibiotics and thus did not need antimicrobials.

Results in the Hull PCT indicated that although only 23% of patients required an antimicrobial agent, 33% of patients were treated with them (Barrett, 2008). Barrett therefore undertook a programme of education to reduce the level of antimicrobial use.

Conclusions

Audit has become a core part

of assessing clinical standards and performance (McIsaac, 2007). In wound care there are many variables to consider when treating patients. This can make a prescriptive system difficult to employ, as every patient and wound is different. The implementation of wound formularies, guidelines and wound assessment systems is key to giving staff options and guidance. Education is central to improving wound care, and without support for staff, guidelines and assessment forms may not have the intended outcomes.

The audit in Aberdeen has helped to highlight the workload for staff, both in tissue viability and in the wards where the patients are being cared for. Issues such as high wound infection rates indicate that more should be done to reduce infection rates where possible.

It is essential to have information about the care we provide. Without baseline information we cannot identify areas of strength or weakness. Building audit tools into our daily practice can help to provide this data without having to undertake large, time-consuming projects on an annual basis.

AWM provides not only good baseline information, but also allows for continuous monitoring of progress for individual patients and the trust as a whole. **WUK**

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