Value-based procurement in wound care

KEY WORDS

- Health economics
- Health outcomes
- Ulcers
- Value-based procurement
- Wounds
- Wound dressings

Background: Health systems globally are facing unprecedented challenges in attempting to balance sharply rising demand against constraints on the availability of financial and other resources. These challenges have led to pressures to constrain expenditure growth through cost containment. But cost containment alone cannot be a sustainable solution if focus on short-term costs ignores the effect on long-term outcomes. **Aim**: The aim is to raise awareness of the concept of value-based healthcare (VBH) and to illustrate its application to the procurement of wound care products. VBH is about achieving the best possible health outcomes with available resources: either by producing better outcomes with the same resources or by producing the same outcomes with less. Minimising short-term costs is not consistent with the principles of VBH if it leads to higher costs on the long run or if the potential to improve patient outcomes is lost. **Method**: The impact of different dressing characteristics on the costs of nurse time, dressing spend, and the total annual costs of treating a cohort of patients is estimated. **Conclusions**: Dressing characteristics other than price are an important factor in determining the total cost of healing a wound. For example: fluid handling capacity impacts wear time that in turn impact the frequency of dressing change. Reducing dressing change frequency adds value by releasing nurse time for other uses and reducing annual dressing spend. Similar considerations apply to other dressing characteristics. The lowest cost dressing is not necessarily the one which adds most value.

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Health systems globally are facing unprecedented challenges in attempting to balance sharply rising demand against constraints on the availability of financial and other resources. In the 18 years from 2000/01 to 2018/19 NHS expenditure increased by £98.7 billion, from £54.2 billion to £152.9 billion, an increase of 182% (97% in real terms; NHS Funding and Expenditure, 2019). In the same period expenditure increased from 4.9% to 7.19% of GDP. The increase in demand is significantly more than can be explained by the increase in the UK population of around 13% between 2000 and 2018 (Office for National Statistics, 2021). Demographic change, new technologies and an increase in patient expectations have all contributed to the rise in demand. An additional £36 billion of funding for health and social care was announced in 2021 to tackle recent challenges.

These trends have led to pressures to constrain expenditure growth through cost containment. Cost containment may be a short-term solution to localised budget problems, but it cannot be a long-term solution for the healthcare system as a whole because focussing solely on short-term costs ignores the impact on long-term outcomes. More recently, interest has shifted to the concept of value-based healthcare (VBH), first proposed in the mid-1990's by Michael Porter and Elizabeth Teisberg in the context of the US healthcare system (Porter and Tiesberg, 2006; Tiesberg et al, 2020).

The aim of VBH is to focus decision-making on achieving the best possible health outcomes with available resources, either by producing better outcomes with the same resources or by producing the same outcomes at lower cost. Value is generated when the use of resources in a particular way leads to health gains that exceed the gains forgone because resources are displaced from other potential uses. The UK National Institute for Health and Care Excellence (NICE) uses formal methods of cost-effectiveness

to assess the value of new medical technologies, methods grounded in the principle that if a new and more costly product is to be funded, other services will need to be curtailed or eliminated to release the necessary resources (NICE, 2013). Similarly, a decision not to fund a particular product or service, which is cost-effective, implies that potential health gains are lost.

Value-based pricing

The appraisal process adopted by NICE is designed to assess whether a product or service represents a cost-effective use of NHS resources at the prices offered by a manufacturer. A value-based price is the price at which the product or service is just cost-effective (offers a net health gain) relative to the next best alternative use of resources. The cheapest product is not necessarily cost-effective if a more expensive alternative offers a net health gain, despite the higher price.

In practice, although NICE does not negotiate prices with manufacturers, it is common for manufacturers to offer a discount in the form of a Patient Access Scheme (PAS) in circumstances where the product is unlikely to be cost-effective at the list price.

Value-based procurement

Agencies, such as NICE, have developed sophisticated evaluation processes for new and potentially expensive pharma and medical devices, but the same scrutiny is rarely applied to existing products. NHS procurement has tended to concentrate on the achievement of short-term financial goals by focussing on minimising product price. This is not consistent with the principles of VBH if purchasing the cheapest product leads to higher costs in the long-term or health gains are lost.

Research by North-West Procurement Development and the University of Liverpool highlighted some of the issues (Mangan and Ludbrook, 2018).

- NHS procurement is predominantly focused on product price, and current processes do not give sufficient attention to other costs incurred throughout the treatment pathway, or to the impact of decisions on patient outcomes
- Current procurement cycles focussed on short-term cost reduction may miss opportunities for long-term gains.

A comprehensive approach to value-based procurement would involve engagement with stakeholders and suppliers to map and quantify the value chain. The starting point is to understand the context in which a product is to be used:

- What is the current treatment pathway and what are the expected outcomes and costs associated with current practice?
- How does the product fit within the treatment pathway?
- What effect does the performance of the product have on patient and healthcare system outcomes?

Within this framework it is possible to compare the performance of different products in terms of their respective impact on patient outcomes and costs over the complete episode of care.

VALUE-BASED WOUND CARE

Technical properties of a dressing

An important goal of wound management is to heal a wound as quickly as possible and avoid the incidence of complications. In the 1960's two seminal studies demonstrated that a moist wound environment provides the optimal conditions for healing (Winter, 1962; Hinman and Maibach, 1963). Exudate is important to keep the wound moist, but excess exudate can lead to maceration of the surrounding skin and an enhanced risk of infection. The functions of a wound dressing include protecting the wound from environmental contamination while maintaining a moist environment and removing excess exudate. An important difference between a basic low-cost dressing, such as moistened gauze, and modern advanced dressings is their ability to manage exudate.

- The capacity of a dressing to absorb and retain moisture affects wear time (Payne et al, 2009). Dressings typically need to be changed when the dressing becomes saturated in order to avoid maceration of the surrounding skin. Longer wear times make it possible to reduce the frequency of dressing changes, which saves on nurse time and potentially also on the cost of dressings and other materials

Table 1. Costs of care in a community setting, per 100 patients treated

			Community-based treatment			
			Nurse time per dressing change (minutes)		Dressings per change	Frequency of dressing change (per week)
			Travel	Treatment		
Patients treated	100					
Weeks	52					
Nurse cost/hour	£44					
Dressing* cost	£5.31					
Standard care			15	15	2.0	2.5
Nurse cost/week	£5500					
Dressing* cost/week	£2655					
Total cost/week	£8155					
Annual dressing cost	£138,060					
Reduced frequency of dressing change (–20%)			15	15	2.0	2.0
Nurse cost/week	£4400	–£1100				
Dressing* cost/week	£2124	–£531				
Total cost/week	£6524	–£1631				
Annual dressing cost	£110,448	–£27,612				
Reduced number of dressings per change (–15%)			15	15	1.7	2.5
Nurse cost/week	£5500	–				
Dressing* cost/week	£2257	–£398				
Total cost/week	£7757	–£398				
Annual dressing cost	£117,364	–£20,696				

* Two dressings and a sterile dressing pack per dressing change (sterile dressing pack £0.57; Aquacel dressing £2.70; Biatain silicone £2.04). Prices are from the Drug Tariff (NHS Electronic Drug Tariff, 2022)

- Dressing changes can be painful for the patient and time-consuming for the nurse (Woo et al, 2008). Dressings that minimise pain and discomfort, and/or dressings that make it easier for patients or their carers to change dressings themselves improve outcomes for patients and may also reduce costs
- In a foam dressing, the top film forms an effective barrier against external contamination and allows the patient to shower or bathe, as well as helping to maintain normal functioning. Permeability of the film allows moisture to evaporate and enhances the total fluid handling capacity of the dressing
- A gap may be created between the wound and a dressing when the dressing does not fully conform to the wound bed (Keast et al, 2009). The result can be the pooling of exudate leading to leakage, maceration of the surrounding skin and a risk of infection. A dressing that conforms to the wound bed avoids the need for a separate filler or wound contact layer to close the gap. Fewer dressings reduce material costs directly.
- Some dressings are impregnated with an antibacterial to reduce the risk of infection. Wound infection is a potentially serious complication which impacts patient welfare and leads to delayed healing. (Badia et al, 2017)
- Sustainability is an important priority for the NHS (NHS England, 2020). The manufacture, distribution and disposal of wound dressings has an impact on the use of plastic and packaging materials and CO_2 emissions from transportation and distribution.

Assessing value

In the NHS most wound care is delivered by a nurse or healthcare assistant. In 2017/18, 53% of the cost of managing chronic and acute wounds was attributable to the cost of community nurses (29%), practice nurses (17%) and healthcare assistants (7%) (Guest et al, 2020). Wound care products accounted for 6% of the total cost. A survey carried out in five English NHS trusts

identified 4772 wound patients in a population of approximately 2 million (Ousey et al, 2013). Of 4660 wounds where treatment duration was recorded, 1371 (29%) were of more than six months' duration, and 830 (17.8%) had been treated for more than a year. Hence the main drivers of the cost of wound care are the length of time it takes to heal the wound and the intensity of nurse and other inputs required in the treatment process. The cost impact of product choice comes primarily through the impact of product performance on these variables.

In order to illustrate the value of differences in product performance, *Table 1* shows a hypothetical annual cost of treating 100 patients with standard dressings in a community setting. The example assumes two dressings and a sterile dressing pack per dressing change (sterile dressing pack £0.57; Aquacel dressing £2.70; Biatain silicone £2.04). Prices are from the Drug Tariff (NHS Electronic Drug Tariff, 2022) for a 10cmx10cm dressing or closest size. Nurse time is valued at the rate of £44 per hour for a Band 5 nurse (Jones and Burns, 2021). This example does not include the cost of materials other than dressings (such as antibiotics; diagnostic tests; bandages or analgesics). In this sense the estimates are conservative simply to illustrate a point.

The weekly cost of nurse time varies according to the requirements of the wound and the patient. Evidence suggests that in the NHS between 10 and 20 minutes is the norm to remove an old dressing, cleanse the wound and apply a new dressing (Vowden et al, 2009; Drew et al, 2007). Travel time depends a lot on local geography. A London-based audit recorded average travel time of 16.6 minutes per home visit, whereas in Bradford the average was 12.48 minutes (Vowden et al, 2009). Most dressing changes occur every 2 or 3 days with a mean of 2.5 changes per week for patients treated in the community and more frequent changes for hospital inpatients (mean 3.8 per week; Ousey et al, 2013; Dowsett et al, 2014).

There are more than a dozen distinct dressing categories. Some require a primary and secondary dressing, and combining dressings is common. A recent study in a sample of 49 patients with a variety of wound types collected information on the type of dressings used at each change (Wilson et al, 2019). In 72% of routine changes more than one dressing was used, 45% 2 dressings and 27% 3 or more dressings. The weighted average was 2.0 dressings per change.

A practical example

In this example, the cost of treating 100 patients with standard care is £8,155 per week, of which the cost of dressings is £2,655 (*Table 1*). The example demonstrates that selecting a dressing with superior performance can reduce treatment costs overall and the annual spend on dressings.

Fluid handling

Dressings differ in their ability to manage exudate. A clinical assessment of foam dressings, carried out by the NHS Clinical Evaluation Team (2018), identified, among other product features, pain on removal, ease of disposal, fluid management capacity (g/10cm^2), and moisture vapour transmission (g/10cm^2) as important distinguishing features. Of the 20 silicone foam dressings evaluated, fluid management capacity ranged from 6.77g/10cm^2 to 25.32g/10cm^2. Importantly, the lowest priced dressing was also the dressing with the lowest fluid handling capacity and lowest rate of moisture vapour transmission.

Fluid handling capacity is important for wear time. Dressings are typically changed when they become saturated, so better fluid handling extends the time when the dressing needs to be changed. Dressing change frequency is an important cost driver because it impacts the cost of nurse time and the volume of dressings that will be required per treatment episode.

In the NHS most dressing changes occur every 2 or 3 days with a mean of 2.5 changes per week for patients treated in the community and 3.8 per week for patients treated in hospital (Ousey et al, 2013; Dowsett et al, 2014). Switching from the dressing with the lowest fluid handling capacity to the one with the highest (25.32./10cm^2 versus 6.77g/cm^2) would make it possible to reduce the frequency of dressing change for at least some patients. For patients treated in the community, a reduction in the mean frequency of dressing change from 2.5 to 2.0 per week reduces treatment costs from £8155 to £6524 weekly, a reduction of

£1631 per 100 wounds treated (*Table 1*). Spending on dressings would be reduced by £531 per week and more than £27,000 annually. The reduction in nurse time amounts to 25 hours a week or 1300 hours annually. In a hospital setting where the frequency of dressing change is likely to be higher, potential savings would be greater.

Selecting a dressing with superior fluid handling provides an opportunity to improve efficiency and save money directly on the procurement budget. Switching from the currently least expensive silicone foam (£1.45) to the one with the highest fluid handling capacity (£2.30) would reduce the dressings spend by £132 per week (£6864 annually) if it made it possible to reduce dressing change frequency from 2.5 to 2 changes per week.

Conformability

Many hard-to-heal wounds are characterised by a shallow cavity which makes it difficult for some dressings to achieve close contact to the wound bed (Keast et al, 2009). This results in a gap or dead space between the wound bed and the dressing with a risk of pooling of exudate in the cavity and leakage from the dressing, delayed healing and a risk of infection. Application of a wound filler under the secondary dressing to eliminate the gap resolving this problem. A conformable dressing fits closely to the wound bed and eliminates the need for a separate dressing.

More than 70% of wounds are treated with two or more separate dressings, of which approximately 25% are fillers (Wilson et al, 2019). A foam dressing that is conformable to the wound bed would save money by eliminating the need for a separate dressing. Even a small reduction in the number of wounds requiring more than one dressing from 70% to 60% would reduce the average number of dressings per change from 2.0 to 1.7, reduce weekly treatment cost from £8155 to £7757 and reduce weekly dressing spend by £398 per 100 wounds (*Table 1*).

Reducing the risk of infection

Some dressings are impregnated with an antimicrobial agent such as silver with the aim of reducing the risk of infection in patients with burns or following open surgery.

The traditional approach to preventing and treating infection in burn wounds is to use silver sulfadiazine (SSD). SSD is relatively less expensive than a silver-impregnated dressing, but SSD needs to be changed daily, where a modern antimicrobial dressing can be left in place for between 3 and 7 days (Jemec et al, 2014). For 100 patients the weekly cost of nurse time alone of a daily dressing change at 15 minutes per change excluding travel time is £7700 (at £44 per hour), compared with the cost of twice-weekly changes (£2200), a difference of £5500 per week (*Table 2*).

Standard postoperative dressings provide a barrier against external contamination of a surgical wound. Antibacterial dressings are typically more expensive than a standard postoperative dressing but may offer greater protection against the risk of surgical site infection (SSI) (NICE, 2021). NICE guidance on preventing and treating surgical infections estimates that at least 5% of patients undergoing a surgical procedure will develop SSI. The use of an antibacterial dressing in place of a standard postoperative dressing could reduce the incidence of SSI, although the evidence is not unequivocal (Dumville et al, 2016). Consequences of SSI for patients include pain and discomfort, delayed discharge and the possibility of additional surgical intervention. In extreme cases infection may be fatal. For the healthcare sector the main resource impact is on theatre and bed availability arising

Table 2. Nurse time-cost of burn care with silver sulfadiazine (SSD) or a silver dressing per 100 patients

	SSD	Silver dressing
Patients	100	100
Time per change (min)	15	15
Nurse cost/hour	£44	£44
Changes/week	7	2
Nurse cost per week	**£7700**	**£2200** (—£5500)

Table 3. Value-based procurement in wound care: a framework for discussion

Product name	
Nearest comparator product or products	
Direct costs	
Is there any evidence that the product has a substantially different efficacy compared with the comparator?	
What is the difference in product acquisition cost per unit, including costs of delivery?	
Are there particular requirements associated with storage or disposal of the product?	
Are there any special training requirements to enable staff to use the product effectively?	
Are there important benefits to the staff using this product?	
Patient outcomes	
Does the product help to reduce wound pain or pain at dressing changes?	
Does the product help to support self-care and/or promote activities of normal living?	
Are there any other important benefits of this product for patients or their carers?	
Resource efficiency	
Do the properties of the product affect the time it takes to change a dressing, or the number of nurses/healthcare assistants required for a dressing change?	
Does the product offer an improvement in wear time which could be translated into a reduction in dressing change frequency?	
Could the dressing be a substitute for another product in order to reduce the number of separate dressings required at each change?	
Is there evidence that the dressing reduces the risk of wound-related complications such as infection?	
Organisational benefits	
How does the product contribute to sustainability? For example, through the processes of production, distribution, and disposal.	
Does use of the product reduce the amount of waste products which need to be managed?	
Does the company offer a risk-share agreement or any other support to the organisation designed to monitor and measure outcomes?	
Does the product contribute to the achievement of other organisational goals?	

from extended length of stay, readmission and/or reintervention. A survey published in April 2019 covering 95 NHS acute trusts found that SSI led to reoperation in 36.2% of cases. SSI led to sepsis in between 12.0% and 47.3% of cases, depending on the speciality (Getting it Right First Time, 2019).

Mean all-cause mortality rates associated with SSI ranged from 2.9% to 7.6%. The presence of SSI led to delayed discharge in 34.1% of cases, and the mean additional SSI-associated length of stay was 12.1 days. Almost half of admissions with reported SSI led to readmission, with a mean length of stay of 9.8 days (Getting it Right First Time, 2019). The mean additional cost attributable to SSI in the UK has been estimated at £7800 per episode (Manoukin et al, 2021).

DISCUSSION

In the face of an unprecedented growth in the demand for NHS spending on health, priorities have become dominated by the need to contain costs. NHS procurement is incentivised towards the attainment of short-term financial goals by focussing on product price. However, cost containment alone is not a long-term solution if it ignores the impact on patient outcomes, and purchasing the cheapest product may be counter-productive if it leads to higher spending on dressings in the long-run. The true opportunity cost of not selecting a product that costs more but offers savings across the complete treatment episode, is that fewer patients can be treated.

Value-based healthcare highlights the need to ensure that purchasing decisions contribute to improvements in efficiency: producing better outcomes with the same resources or producing the same outcomes with less. Value is assessed by measuring net health gain, judged by comparing the gain provided by one product against the potential gains lost because resources are diverted from alternative uses. Achieving wound healing is a complex process that involves much more than the choice of dressings, however the choice of dressings can have a significant impact on overall costs, including procurement costs. Unless there is clear evidence that one product has a negative effect on healing relative to others, an evaluation of different dressings should consider the context in which the dressing will be used and the impact of the technical properties of different dressings on outcomes for patients and the healthcare system.

The process of implementing a comprehensive system of VBP is complex and takes time and would need to be supported by appropriate incentives. However, a modest beginning could be made by including a couple of additional considerations into the tendering and purchasing process for wound dressings. For example, assuming there is no evidence that a particular dressing inhibits healing:

- Do the properties of the dressing affect the time it takes to change a dressing, or the number of nurses/assistants required?
- Does the dressing help to support self-care and/or promote activities of normal living?
- Does the dressing help to reduce wound pain or pain at dressing change?
- Does the dressing offer an improvement in wear time which could be translated into a reduction in dressing frequency?
- Could the dressing substitute for another type of dressing that would reduce the number of dressings required at each dressing change?
- Is there evidence that the dressing reduces the risk of wound-related complications such as infection?
- How does the dressing contribute to sustainability? For example, through the processes of production, distribution, and disposal; and/or does it reduce the total number of products which are required to heal a wound?
- Are there logistical benefits of this product in terms of ordering, storage and disposal?

Assessing wound care products in this way requires information that most purchasers do not have readily to hand. Manufacturers can support a move towards value-based purchasing by developing the required information and providing it to purchasers in a clear and systematic format. *Table 3* provides a framework for initiating discussion. WUK

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