The dehisced abdomen following invasive intervention

KEY WORDS
Surgical site infection
Dehisced abdomen
Stoma
Dressing regime

Open abdominal wounds with proximal active stomas present some of the most challenging and complex wounds, often exhibiting a deterioration in the integrity of the adjacent skin due to stoma leakage and associated repetitive laparotomy wound contamination. This can result in surgical site infection and tissue degeneration. In this article, the author aims to explore the challenges of managing patients with dehisced abdomens complicated by stoma leakage and adjacent skin fragility following radiotherapy.

The author evaluates the effectiveness of a combined hydrocolloid (Hydrofiber®, ConvaTec) and surgical dressing regimen as part of an ongoing review of care for eight patients with non-healing complex wounds, resulting in delayed discharge due to extended stoma education and management. The primary dressing used was the hydrocolloid Aquacel® Ag Hydrofiber (ConvaTec). Aquacel® Ag Surgical cover dressing (ConvaTec) was used as a secondary dressing.

Overall, all eight patients demonstrated a positive wound healing outcome after the new dressing regimen was introduced, with pain reduction and exudate management seen alongside reductions in wound care and stoma care interventions. This allowed a stoma education programme to be instituted by the specialist stoma nurse and meant that the patient was well prepared for discharge from hospital.

This innovative dressing regimen demonstrated a significant improvement in the wound healing process and promoting a positive patient experience and an improvement in quality of life. The regimen has been accepted as the first line treatment over conventional therapy by a further 10 patients not involved in the case study, as well as by urology consultants and ward nursing staff, promoting significant cost savings.

BACKGROUND

Patients with surgical incisions can experience a myriad of post-operative complications, the most common of which is surgical site infection, resulting in dehiscence (Ravenscroft et al, 2006), blistering and bleeding, and pain during movement, as well as at dressing change (Harle et al, 2005). Surgical site infection forms up to 20% of all healthcare-associated infections, with at least 5% of patients who undergo a surgical intervention going on to develop a significant infection with resulting delayed healing. The majority of infections result during surgery from contamination at the incision site with microorganisms from the patient's own body (National Institute of Health and Clinical Excellence [NICE], 2008).

Wound infection is the result of an imbalance in the complex interactions between the invading bacteria, the wound and the patient's immunity (Timmons, 2009). A surgical site infection may range from limited wound discharge, affecting the superficial layers of the skin, epidermis, dermis and subcutaneous fat, to life-threatening post-operative complications, which involve deeper structures, such as muscle, organs and bone (Lemmer et al, 2003). *Figures 1* and *2* show abdominal dehiscence following surgical intervention.

Wound dehiscence can have a significant effect on patients' and carers' quality of life. Infected wounds are associated with considerable morbidity and increased length of hospital stay as well as representing a financial burden to

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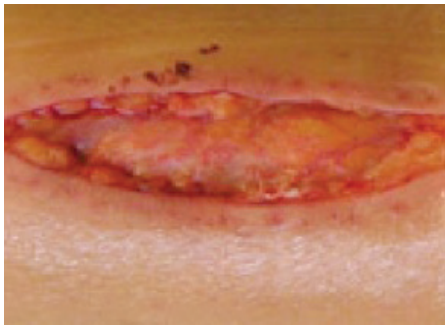

Figure 1: Non-infected abdominal dehiscence, two weeks following surgery.

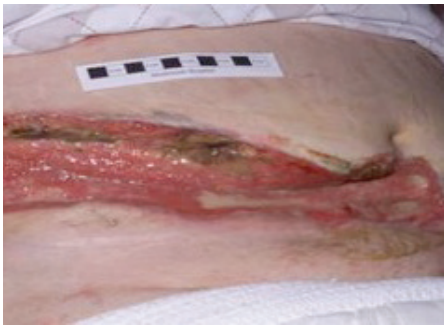

Figure 2: Infected abdominal dehiscence four weeks following surgery.

healthcare providers across primary and secondary care (Wilson, 2003).

In an attempt to manage post-operative wound dehiscence, both clinicians and dressing manufacturers are constantly trying to develop new interventions and products that will not only manage the infective tissue, but also provide an environment for healing. It is, therefore, essential that evidence-based assessment and treatment plans are implemented if clinicians are to guarantee that the patient receives a high standard of quality-based care and experiences an effective wound care journey, which may involve implementing advanced wound care technologies.

NEW DRESSING REGIMEN

Stoma-related complications can develop immediately following surgery or several months or years later, with up to 47% of stoma patients experiencing at least one complication (Lyon and Smith, 2001). It is suggested that up to 73% of stoma complications will be related to a skin complaint, such as excoriation, weeping and bleeding. This results in stoma leakage and increased adjacent skin infection and leads to a vicious cycle of non-adherence of the product to the patient's skin, which reduces compliance with wound management and increases complications (Vujnovich, 2004).

Clinicians often find difficulties in resolving these issues since there are often no surgical/advanced product solutions that provide a barrier between the stoma and skin. This would allow stoma function and management, and wound healing, to take place simultaneously. New and innovative dressing solutions, therefore, require investigation, implementation and evaluation if these challenges are to be resolved.

Within the author's large Foundation Trust, this group of patients would often be managed with the use of topical negative therapy (TNP), which involves using a gauze system to contain and manage the dehisced abdomen, separating it from the complications of exudate and faecal leakage from the stoma. Although effective in patients with a wide healthy tissue margin between the laparotomy site and stoma, it was found that in those patients with an excoriated, narrow border of tissue, adhesion of the TNP therapy device was reduced and leakage continued to make segregation difficult.

Within this evaluation it became evident that the current regimen of care was, at times, not effective in managing the segregation between wound and stoma. It was also deemed costly, with TNP dressing changes occurring almost daily and patients becoming less mobile and more de-motivated due to leakage.

The decision to implement Aquacel Ag Surgical cover dressing *(Figure 3)*, was taken due to evidence of the product's ability to prevent infection to the wound bed and provide a barrier to the leakage from the stoma. This should mean fewer dressing changes, a reduction in the demand placed on clinical resources, and product costs and less disruption to the patient's normal stoma activities.

METHODS

Eight patients were evaluated over a seven-week period at weekly visits by the author, who was the lead nurse in the case

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Figure 3: A Hydrofiber-hydrocolloid primary or secondary dressing.

KEY POINTS

- Complex and difficult-to-manage dehisced abdominal cavities and newly formed stomas require an innovative approach
- The dressing featured is a highly absorbent wound care product with an active barrier to segregate stoma and wound bed, aiding active wound healing, pain reduction and adjacent skin protection
- It provided a positive wound care experience and quality of life in regards to wound and stoma management reducing hospital stay, healthcare resource costs and improving patient compliance with independent stoma care regimen.

study, alongside information provided by ward-based clinicians managing both the stoma care and abdominal wound regimen. The outcomes assessed were healing, pain, exudate management and cost evaluation.

All patients had undergone complex urological surgical procedures resulting in either the formation of urinary ileum conduit and/or colostomy stoma formation in close proximity to the laparotomy closure suture line. Urinary ileum conduit is the surgical anastomosis of the ureter to one end of a detached segment of ileum, the other end being used to form a stoma on the abdominal wall (Karp, 2004).

Six out of the eight patients had undergone radiotherapy treatment, which resulted in the added complication of a fragile and painful abdominal surface area.

A plethora of dressing regimens had been implemented pre-evaluation, consisting of barrier sprays, a basic adherent postoperative film dressing and soft silicone adhesive foam, with six of the patients having TNP gauze systems applied. All failed to act as a satisfactory clinical barrier to the stoma sites and were unable to manage and 'lock away' the resulting heavy exudate levels from the dehiscing laparotomy surgical site. This had a significant impact upon the physical and psychological elements of the patients' wound care experience.

All eight patients were referred to the author via the consultant urologist/gastroenterologist/physician for wound care advice, alternative methods for

Table 1
Patient background

Patient A	*Patient B*
63-year-old female	*78-year-old female*
Diagnosed with cervical cancer *Vesicovaginal and rectovaginal fistula* *Treatment with chemotherapy and radiotherapy* *Surgical formation of colostomy* *Complications of urinary incontinence and internal adhesions* *Surgical formation of ileal conduit* *Depression and low mood*	*Diagnosed with bladder cancer* *Surgical intervention of radical cystectomy* *Surgical intervention of pelvic node extraction* *Surgical formation of ileal conduit*
Laparotomy dehiscence complicated by two stoma leakage delaying both wound healing and patient independent management of stomas *Adherence to traditional regimen poor, with inability to segregate laparotomy and stomas. Pain due to radiotherapy and inflamed periwound skin*	*Laparotomy dehiscence complicated by one stoma leakage and Methicillin-resistant* Staphylococcus aureus *(MRSA) infection delaying both wound healing and patient's independent management of stoma* *Poor adherence to traditional regimen with inability to segregate laparotomy and stomas*

managing the dehisced wound bed with minimal disruption to the active stoma sites and ongoing patient education for independent management of stoma care. The Aquacel surgical cover dressing has been advocated for post-surgical wounds, such as cardiac and orthopaedic surgery due to its flexibility on the skin, allowing patients a full range of free movement, comfort and absorbency (Burgess, 1993; Robinson, 2000). This product was chosen due to the author's previous experience of packing wounds with Aquacel Hydrofiber Dressing and covering with a hydrocolloid called Duoderm® (ConvaTec), termed 'the Jubilee method'. It was agreed that this product may well meet the key needs of patients where conventional advanced wound care formulary products had been unsuccessful in managing heavy fluid exudate levels, stoma leakage, flexibility and comfort on movement of the patient.

All patients were informed about the product before the evaluation began and consent was obtained. All but one patient declined to be photographed for this study.

Two of the eight patients will be discussed within this evaluation to highlight the patient and clinician treatment experience, alongside any clinical and cost benefits of this change in practice. The patient's medical histories are outlined in *Table 1*.

CASE STUDIES

Due to the proximity of the stomas to the dehisced laparotomy sites in both patients, nursing staff found it challenging to adhere stoma collection bags to the friable, macerated skin that bridged the two sites. The abdominal dressing/adhesion film often overlapped the stoma bag edges which, when wet, affected the adhesion of the bags, increasing the risk of leakage.

The leakage of urine and faeces (patient A) and urine (patient B), resulted in abdominal wound contamination, causing further maceration and tissue destruction. Both patients were having their abdominal wounds cleansed and redressed up to four times per day (formulary dressings) or once per day (TNP), which had a direct effect on their ability to carry out independent activities, such as mobilisation, socialising with visitors and reducing the input from the specialist nurse education programme, which was aimed at promoting the self-management of the patient's stomas. At week six, before the use of Aquacel, patient A commented: 'I cannot stand the fluid leaking all the time. I have to stay and lay on the bed most of the day because as soon as I stand up it runs everywhere. The smell is terrible.'

Both patients felt that their abdominal wound had become a priority in their wound care treatment, which made learning to manage the stoma themselves very difficult. However, self-management was going to be vital when they were eventually discharged from hospital. At four weeks, and prior to the use of Aquacel, patient B commented: 'The doctors and nurses try their best but no one seems to be able to stop my wound dressing getting wet when I move about. It's making my skin very sore, I can't really do much on the ward because of it, to be honest. I know I cannot go home until I can put my bags on properly but I worry too much about my wound to think about the bags.'

Wound evaluation

Both patients were admitted to the surgical urology department of South Tees NHS Hospitals Foundation Trust, a large teaching hospital, for the surgical management of their urological problems. Patient A had already undergone surgical intervention, as well as chemotherapy and radiotherapy and had experienced subsequent complications. Patient B was admitted for malignancy management.

As is current practice within the organisation, the patients were duly referred by the surgical team to the lead nurse for wound care, whose role is to collaborate with the clinical team to provide evidence-based wound management.

The wound care assessment, evaluation and intervention employed nationally uses the patient-centred care plans, incorporating the nationally recognised Wound Healing Continuum (WHC) (Gray et al, 2004), alongside McCaffrey's (1983) numerical pain scoring tool. To ensure that the assessments were

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consistent, and to limit variation in wound measurement data, the same clinician — lead nurse for wound care — undertook all aspects of the patients' wound care management, evaluation and documentation throughout the study.

Initial assessment

On initial assessment, both of the patients' wound beds exhibited moderate slough with large central necrotic regions. There was associated severe maceration around the wound margin radiating across the skin divide and verging on the stoma borders.

Both patients' wounds were significant in size and depth with no visible areas of underlying healthy granular tissue and both emitted a strong malodour. Microbiology results indicated that patient B's wound bed was locally infected with the presence of *Staphylococcus aureus*, a common pathogen found in the infected chronic wound (White, 2002).

The wounds of both patient A and B produced exudate of a high viscosity and volume and the periwound skin appeared fragile, macerated and inflamed. Both patients experienced pain and discomfort at dressing change and on a continuous basis, with average pain scores of 3/10 (patient A) and 8/10 (patient B). This was exacerbated by the frequent dressing changes, which took place on average four times per day, despite the patients restricting their mobility and living activities to a minimum, and undertaking an intensive analgesia regimen. This meant that both patients had been on oral opioid morphine medication. Both patients commented that they felt this management of the wound placed extra strain on the doctors, nurses and their families, each day.

Patient A commented: 'I didn't want to bother the nurses when my dressings got wet as they had usually only been away for 20 minutes or so. I left it as long as I could before bothering them. They have enough to do for other patients.'

Following clinical assessment of both dehisced abdominal wounds and the

Table 2
Patient A's results using the test dressing

Date	*Length*	*Width*	*Depth*	*Clnical status*
Week one	*17cm*	*3.4cm*	*3cm*	*Necrotic, sloughy, local infection, high exuding, macerated, inflamed and fragile with strong malodour. Pain score at dressing change 3/10* *Surgical debridement undertaken*
Week two	*18.3cm*	*3.8cm*	*4cm*	*Sloughy, granular base, critically colonised, medium exuding, fragile, no malodour. Pain score at dressing change 1/10*
Week three	*17cm*	*3.3cm*	*3.4cm*	*Granular base, critically colonised, medium exuding, fragile, no malodour. Pain at dressing change 0/10*
Week four	*13.5cm*	*3cm*	*2.5cm*	*Granular base, critically colonised, low exuding, fragile, no malodour. Pain score at dressing change 0/10*
Week five	*8cm*	*2cm*	*1.8cm*	*Granular, epithelial periwound skin, critically colonised, low exuding, no malodour. Pain score at dressing change 0/10*
Week six	*5cm*	*1.5cm*	*1.2cm*	*Granular, epithelial periwound skin, low exuding, no malodour. Pain score at dressing change 0/10*

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failure of previous dressing regimens in respect to the management of the heavily exuding matter and resulting periwound skin maceration, it was evident that a new dressing regimen was needed if wound healing was to be promoted.

Both of the abdominal wounds were surgically debrided at the bedside, which involves removing necrotic and sloughy tissue from the wound bed in order to expose healthy granulating tissue to speeds up the wound healing process (Timmons, 2003).

Aquacel surgical dressing

The test dressing promotes three key facets with which to aid the wound healing process. Firstly, it locks in fluid, trapping bacteria (Walker et al, 2003) and protects the periwound skin by aiding the reduction of maceration (Coutts and Sibbald, 2005). Secondly, it contours to the wound, minimising 'dead space' where bacteria can multiply — its design also maintains intimate contact with the incision site even during skin movement (Jones et al, 2005). Thirdly, the product responds to levels of fluid by forming a cohesive gel, maintaining a moist wound bed. Practitioners can also opt for a antimicrobial silver dressing version called Aquacel Ag Hydrofiber dressing (Jones et al, 2004). The overall product has been shown to promote a 'skin-friendly' environment with its polyurethane film providing a viral/bacterial barrier, flexible conformable material and a waterproof film.

Applications

Using an aseptic technique both abdominal wound beds were packed with Aquacel Ag Hydrofiber Dressing

Table 3
Patient B's results using the test dressing

Date	*Length*	*Width*	*Depth*	*Clinical status*
Week one	*17cm*	*3cm*	*5cm*	*Necrotic, sloughy, local infection (MRSA), high exuding, macerated, blistered, inflamed fragile, strong malodour. Pain at dressing 8/10* *Surgical debridement undertaken*
Week two	*16.5cm*	*4.2cm*	*6cm*	*Sloughy, local infection (MRSA), high exuding, inflamed, fragile, minimal malodour. Pain score at dressing change 5/10*
Week three	*13cm*	*3.8cm*	*5.8cm*	*Sloughy, granular, medium exudate, fragile periwound skin, no malodour. Pain* *Score on dressing change 0/10*
Week four	*11cm*	*3.3cm*	*5.2cm*	*Granular, critically colonised, low exuding, no malodor, healthy periwound skin. Pain score on change 0/10*
Week five	*7.1cm*	*2.8cm*	*4.5cm*	*Granular, epithelial periwound skin, critically colonised, low exuding, no malodour. Pain score on dressing change 0/10*
Week six	*6cm*	*1.5cm*	*3.2cm*	*Granular, epithelial periwound skin, critically colonised, low exuding, no malodour. Pain score on dressing change 0/10*
Week seven	*5.2cm*	*1.3cm*	*2.8cm*	*Granular, epithelial periwound skin, critically colonised, low exuding, no malodour. Pain score on dressing change 0/10*

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and the test dressing was applied over the whole wound to form a seal *(Figure 4)*. This was performed twice a week over a seven-week period and a full wound assessment and evaluation of wound status was performed using the WHC (Gray et al, 2004).

The application of both products proved to be quick and simple. Both were easily removed from their packaging, placed on the wound bed and lightly pressed into position. A simple basic dressing pack, Softdrape – Primary care pack (Richardson Healthcare) was used to aid the sterile application process. The test dressing was positioned to ensure that all macerated skin from the stoma sites were not in contact with the adhesive edging and did not overlap the stoma bag borders. A barrier spray was used for maceration management once the secondary product was in place.

Both patients noticed an immediate improvement in skin comfort, flexibility on movement and confidence, that the product would not be contaminated by leaking fluid. Patient A commented: 'It doesn't leak so I feel more safe with this one.' Patient (B) commented: 'I like the way it moves with my tummy. It feels secure and doesn't leak like the other dressings.'

RESULTS

At each weekly assessment and twice-weekly dressing change within the urology ward, both of the wound beds demonstrated a significant reduction in both circumference and depth. The slough and associated heavy malodour had resolved by week two and by week three there was reduction in associated exudate production from a heavy status down to a medium status, which resulted in a healthy granulating wound bed being made visible.

The excoriated and macerated skin borders demonstrated a noticeable degree of epithelialisation at week two requiring no further barrier therapy. A routine microbiology swab at week two (patient A) and week three (patient B) demonstrated clean wounds with no evidence of increased bacterial bioburden and by week two the patients' pain scores had reduced significantly to an average of 2/10 at dressing change.

Psychological effects

By week two both patients showed a significant improvement in mood, appetite and mobility and were taking an active interest in visits from the nursing and surgical team, as well as from family and friends. They also took more of an interest in the specialist nurse education programme that supports independent stoma care activities, such as learning how to apply and remove the stoma device.

After starting the new regimen, patient A accepted medical assistance to help with her chronic anxiety state. Her decreased motivation and low mood was related to both her diagnosis and the wound dehisence. Within two weeks of the new dressing regimen both patients were able to take weekend leave in preparation for hospital discharge with very little support needed from the community district nursing teams. Patient A commented: 'I can now wear my own clothes instead of hospital gowns and I can go on weekend leave at last.'

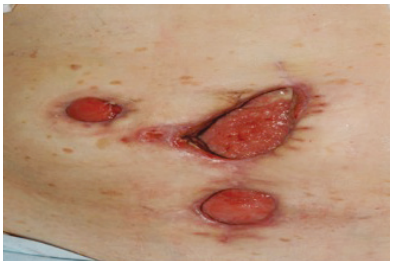
Weeks three and four highlighted a noticeable reduction in exudate production with both patients' wounds being changed every third day compared with changes of once and four times per day, respectively, during the previous dressing regimen, and the dressing changes every 48 hours at week one. By the fourth week the dressing regimen was reduced in both patients to once every four days. This promoted more independence in the patients, who were able to develop their own daily activities while on the ward and at leave at the weekend without the disruption of wet, heavy, soiled, odorous dressings.

Both patients' stoma care regimens lead to a significant increase in independence from the clinical staff, with both requiring no assistance by week three. A summary of both patients results are detailed in *Tables 2 and 3*.

Reduction in wound size

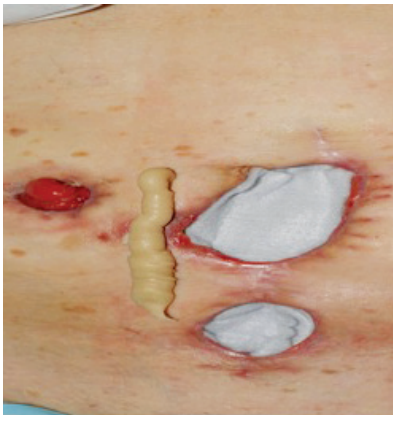
Throughout the dressing regimen there was a noticeable reduction in the size of both patients' wounds. Patient A demonstrated a 30% reduction in length, 44% in width and 39% in depth. Patient B demonstrated a 30.5% reduction in length, 43% in width and 51% in depth. These reductions had not been achieved

Figure 4. Aquacel surgical management regimen of dehisced abdomen and associated stoma site complications (patient B)



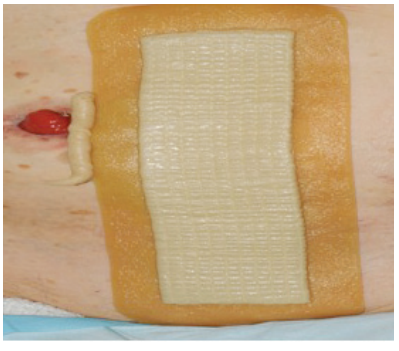
Step One

Cleanse the wound and stoma site following hospital policy. Ensure that surrounding periwound skin is dry with no wound or stoma exudate present



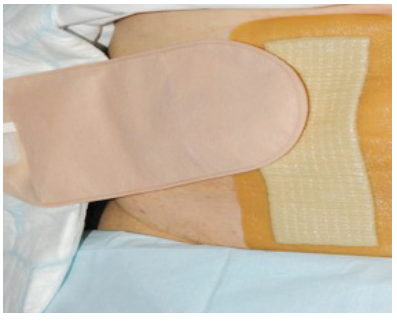
Step Two

If the wound is clean and free of infection, use Aquacel Ag Hydrofiber to pack the wound cavity, ensuring the wound bed is covered up to the periwound skin edges. Use Aquacel Ag dressing for wounds that are infected as per policy. Using stoma paste, line the bridge of tissue between the wound edge and stoma edge as the first sealant of the dressing regimen. Where possible, this should be closer to the wound edge and periwound skin rather than the stoma site edge



Step Three

Ensuring all of the periwound skin and surrounding tissue is free from exudate, gently stretch the abdomen so the skin around the wound is taught before applying the Aquacel Surgical dressing firmly. The edges near to the stoma paste should be gently pushed into and on to the paste leaving a visible border of paste in between the dressing and stoma site



Step Four

Ensure that periwound skin around the stoma site is free from exudate before applying stoma collection device as per policy, ensuring a firm adhesion to both the surrounding tissue and stoma paste. The stoma device may be removed as and when required leaving the Aquacel Surgical dressing in situ

with the previously used dressing therapies. Throughout the treatment process, after establishing the new regimen, the wounds produced negative microbiology results. This omitted the need for systemic antibiotic therapy and complex analgesic regimens, which are commonly implemented for complex difficult-to-heal, infected wounds.

Further assessment and evaluation was not required from the lead nurse for wound care due to the satisfactory healing status of both patients, with Patient A

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'The dressing regimen lead to improvements in exudate management, pain reduction, odour control and the maintenance of good skin integrity'

being discharged at six weeks and patient B being discharged at seven weeks. At the time of discharge, both patients were able to continue receiving appropriate support within a community setting.

Education tool

Patient B consented to having her stoma and dehisced abdomen photographed. These images were then used as a training prompt tool for ward nurses and to promote the consistency and standardisation of regimens for complex abdominal wounds with associated stoma complications. The tool featured the four photographs alongside simple application instructions and was placed with the stock of dressings and stoma paste.

COST IMPLICATIONS

Cost was considered for the first five patients within the study, comparing the price of the new dressing regimen with that of the traditional therapy spend to ensure that the introduction of such a regimen was not only clinically beneficial, but also demonstrated financial credibility.

During the new regimen, five patients were evaluated during a period of between 14–21 days, involving three dressing changes per week and amounting to an estimated total cost of £931.97 versus a TNP cost of twice weekly dressing changes at £2257.50. Although TNP is an effective therapy in this patient group, those patients with a macerated narrow periwound skin margin had poor adherence and the patients within this study often had their therapy changed daily, which would significantly increase the overall TNP spend. These costings do not include nursing resources, educational input and discharge delay, which would again involve a further significant increase.

DISCUSSION

The optimal goal of effective wound care is healing, alongside the promotion and maintenance of patient comfort, safety and quality of life.

Wound care clinicians must ensure that they are up to date with methods of management and care of the patient who presents with the dehisced abdomen following complex urological surgical interventions. This entails being aware of new products and advanced treatments, which may assist in optimal wound care treatment for this patient group.

Within today's healthcare climate, patients and their families expect to receive the highest standard of wound care from experienced, knowledgeable and caring clinicians. These practitioners should be familiar with advanced products that can streamline wound care and reduce the impact and demand on clinical resources.

The regimen helped both patients since they found the new dressing comfortable and did not experience pain during its application and removal. Another benefit was the lack of leakage and the fact that it did not disturb the stoma device. The patients were able to carry on with their daily activities, such as eating, mobilising and receiving visits. They appreciated the inconspicuous appearance of the product and its long wear time compared with previous dressings. The patients felt positive, confident and appeared happier with the reduction of their wounds.

CONCLUSION

The use of a product regimen that incorporates Aquacel Ag Surgical cover dressings in the management of complex, difficult-to-manage dehisced abdomens complicated by stoma formation has demonstrated a significant overall reduction in wound size, depth and promotion of a healthy periwound skin not previously achieved with various wound care regimens.

The dressing regimen used led to improvements in exudate management, pain reduction, odour control and maintenance of skin integrity, which are key elements within any wound healing process. There has also been an improvement of the physical, psychological and social aspects for both patients signifying a wound care treatment, which has resulted in a more positive experience for both the patient and family members. This was particularly valuable within the evaluation due to the complex and sensitive nature of the patient's medical status where the patient's quality of life, privacy, dignity, pain status and stoma care were more of a priority than the actual end point of wound closure. WUK