Closing the gap between the evidence and clinical practice — a consensus report on exudate management

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Chronic wound care is a topic of great importance for both healthcare systems and patients (Dowsett et al, 2015; Guest et al, 2015). A group of researchers undertook a modified Delphi process to build a consensus among 85 international wound care specialists on how to assess and treat chronic wounds, including how to translate evidence on exudate management into clinical practice. Consensus was reached on the importance of effective exudate management, how and when to assess exudate and the warning signs for when a patient should be referred to a wound care specialist.

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Conflict of Interests
Each of the authors have acted as consultants for Coloplast in the past, as well as other healthcare suppliers and companies.

Ethical Principles
The authors warrant that this manuscript is their original work, has not been published before and is not being considered for publication by another publisher.

Ethics Approval
This research did not require ethical approval. It did not include patients, or patient data. Only the opinions of health care providers were gathered, and that information was only gathered directly from the providers, who consented to the process and the information collected.

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Eighty-five wound care experts and specialists from 19 countries took part in a consensus process that spanned 4 months, ending in November 2019. The process included both traditional Delphi surveys, as well as, virtual and face-to-face facilitated dialogues (Keast et al, 2020). The result was a consensus on best practices in chronic wound care and how to translate those best practices into effective bedside care for patients. This second article, in a four-part series, focuses on effective exudate management with the ultimate goal of reducing healing time.

Exudate is defined as the fluid that leaks from a wound (Romanelli et al, 2010; Davies, 2012). Exudate is the result of the inflammatory process and is usually clear or amber-coloured fluid (Adderley, 2010), which contains proteins, enzymes (especially matrix metallopeptidases or MMPs), leucocytes (granulocytes, macrophages), sugar, tissue cells, bacteria, and fungi. In acute wounds, exudate stimulates the proliferation of fibroblasts, keratinocytes and epithelium, which is beneficial to wound healing (Cutting and White, 2002; Davies, 2012).

While exudate production is a normal feature of healing wounds (Romanelli et al, 2010), over or under production of exudate or exudate of the wrong composition can delay healing (Okan et al, 2007; Romanelli et al, 2010; Lloyd Jones, 2014; Moore and Strapp, 2015; World Union of Wound Healing Societies [WUWHS], 2019). The amount of exudate can depend on the wound's aetiology, healing phase, size and patient comorbidities (Cutting and White, 2002; Davies, 2012; WUWHS, 2019). In chronic wounds, exudate slows down or even blocks cell proliferation, interferes with growth factor availability and contains elevated levels of inflammatory mediators and activated MMPs8-10 (Romanelli et al, 2010).

The accumulation of exudate in the gap between the wound bed and the wound dressing is often referred to as exudate pooling. Exudate pooling is likely in wounds with irregular topographies, pockets, or cavities and this can impact negatively on wound healing by causing maceration and potential infection (Sibbald et al, 2000; Adderley, 2010; Benbow and Stevens, 2010). Exudate pooling can also occur when the exudate is not absorbed by the wound dressing or the volume of fluid exceeds the dressing's absorptive capacity (Romanelli et al, 2010; Moore et al, 2013; Wounds UK, 2013; Dowsett et al, 2019). Once depth, tunneling, or undermining is identified, the dressing selected must be able to reach the extent of the wound base, as well as fill the dead space (Whitney et al, 2006).

The aim of managing exudate is to achieve an optimally moist healing environment (Dowsett, 2008; Romanelli et al, 2010; Davies, 2012). A rigorous approach to exudate management

can reduce healing time and the subsequent economic burden of the wound and improve patient quality of life (WUWHS, 2007; Benbow and Stevens, 2010; Wounds UK, 2013).

Over production of exudate can lead to (Wounds UK, 2013; Dowsett et al, 2015; WUWHS, 2019):

- Dressing leakage (strikethrough)
- Frequent dressing changes (discomfort, pain, trauma, skin stripping)
- Maceration periwound skin damage (MASD / Moisture Associated Skin Damage)
- Infection or increased bioburden
- Odour
- Delayed healing
- Protein or fluid loss (electrolyte imbalance)
- Social, psychological and economic effects.

Patients experiencing excess wound exudate admit to isolating themselves and have been found to suffer from increased rates of depression and anxiety (WUWHS, 2007; Jones et al, 2008; Palfreyman, 2008; Romanelli et al, 2010; Davies, 2012; Wounds UK, 2013).

Methodology

Consensus building is based on the belief that when people think together, they can make better decisions (Bain and Hansen, 2020). This project utilised a Modified Delphi Process that combines the rigor and validation of the traditional scientific Delphi method with professionally facilitated virtual and face-to-face collaborative processes (Keast et al, 2020). Eighty-seven wound care specialists across 19 countries were sent a series of surveys on chronic wound care, including specific questions on best practices in exudate management, based on the literature review evidence. Eighty-four of the survey participants then met face-to-face for two days to review the survey results and finalise their consensus.

The consensus process was informed by a detailed systematic review of the literature. The review covered articles related specifically to exudate management which were published after 2000. Over 30 articles were reviewed. Key findings were presented and discussed at the face-to-face interactive dialogue session. The key findings from the literature included:

- The appearance of exudate is an indicator of the health of the wound. Colour, consistency, odour, amount of exudate should be assessed (WUWHS, 2007; Adderley, 2010; Romanelli et al, 2010; Davies, 2012; Moore and Strapp, 2015; WUWHS, 2019)
- Effective exudate management allows moist wound healing and prevents maceration of periwound skin (Chen et al, 2007; Okan et al, 2007; Gibson, 2009; Romanelli et al, 2010; Dowsett, 2011; Wounds UK, 2013; Dowsett et al, 2015; WUWHS, 2019)
- A gap or dead-space between the wound bed and the wound dressing should be avoided as it allows exudate pooling which allows maceration of the periwound skin and negatively influences would healing (Keast et al, 2014; Braunwarth et al, 2017; Dowsett et al, 2018; Dowsett et al, 2019; Keast et al, 2020)
- There is the potential for biofilm formation when exudate pools in the wound bed (Dowsett et al, 2019; Wounds UK, 2017; WUWHS, 2016; Swanson et al, 2015a; 2015b; Scali and Kunimoto, 2013);
- Appropriate dressing selection can help manage exudate and avoid exudate pooling (Wilson et al, 2019; Moore and Strapp, 2018; Cartier et al, 2014; Wounds UK, 2013; Dowsett, 2011; Adderley, 2010 ; Dowsett, 2008); and,
- Not only does excessive exudate negatively impact patient quality of life, but the patient's overall health and wellbeing can impact exudate characteristics (Wounds UK, 2018; Orsted et al, 2017; Wounds UK, 2013; Dowsett, 2011; Dowsett, 2008).

Participants

Participants were qualified wound care specialists; 45% of participants had more than 20 years experience and 86% had more than 10 years' experience. A total of 18% of participants reported that their practice is 100% wound care. Participants included: doctors (29%), nurse specialists (61%) and other healthcare professionals (10%).

Survey results

Eighty-seven wound care specialists were surveyed in September and October 2019. The first survey was answered by 71 participants (82% response rate) and the second survey received 61 responses (70% response rate). The surveys had an overall completion rate of 96%. Survey responses were anonymous.

A total of 82% of respondents agreed or strongly agreed that wound care treatment should be primarily focused on providing an optimal healing environment. Meanwhile, 93% of respondents agreed or strongly agreed that moisture balance is critical for providing an optimal wound healing environment *[Figure 1]*. Ninety per cent of respondents agreed that one of the most important factors in providing an optimal healing environment for wounds is managing the dead-space or gap between the

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Figure 1. Moisture balance in the wound is critical to optimal healing.

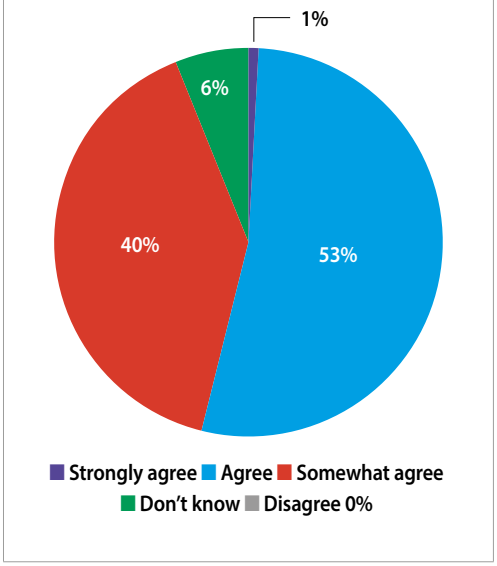


Figure 2. Effective management of wound exudate is one of the best ways to promote an optimal healing environment.

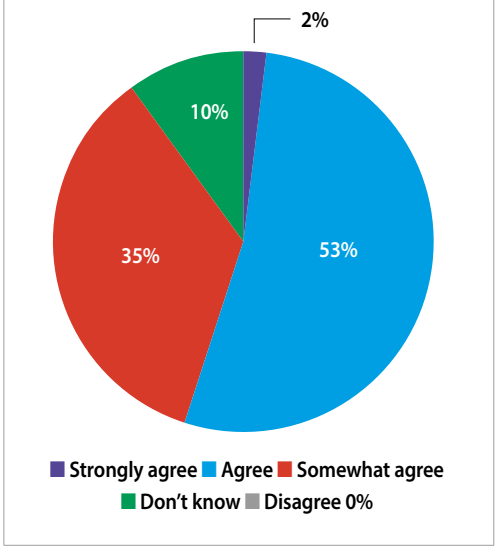
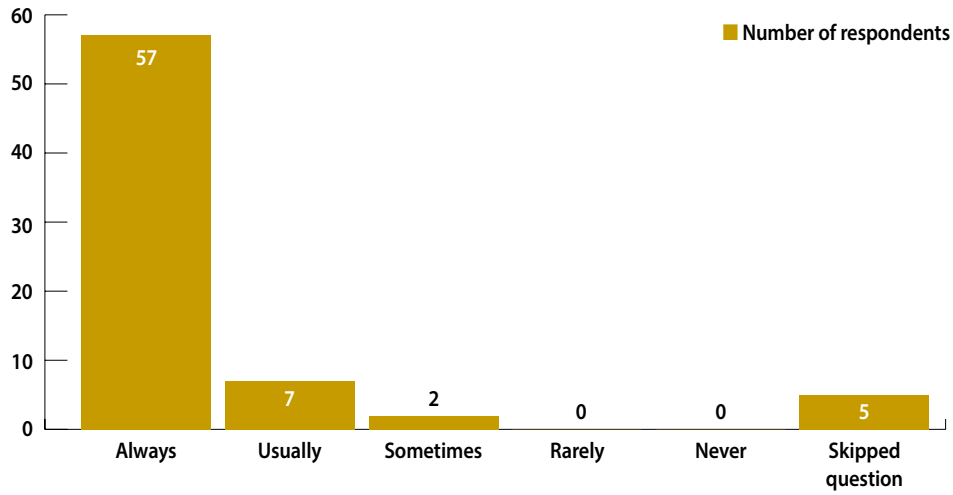


Figure 3. When examining a wound, how often do you consider exudate colour, odour, consistency and amount?



wound bed and the wound dressing. Eighty-eight per cent agreed or strongly agreed the effective management of exudate is one of the best ways to promote an optimal healing environment *[Figure 2]* and the most important reason respondents identified for managing the gap or dead-space was to remove pools of exudate from the wound bed. Similarly, 85% of respondents identified exudate management as the most important critical success factor in effective wound care.

Regarding wound care assessment, respondents identified assessing the wound bed and wound exudate as the two most important things that health care providers should consider. When examining a wound, 86% of respondents indicated that they always consider the exudate colour, odour, consistency and amount *[Figure 3]*. No respondents indicated that they rarely or never consider exudate when assessing a wound.

The top three factors respondents identified as most important when determining the best dressing choice for patients were: wound bed assessment, prevalence of bacteria in the wound and amount of wound exudate. Finally, respondents indicated that on average they spend 46% of each wound care patient visit on education and self-care advice, with the most common techniques utilised to ensure care plan compliance being individualised instruction (87%), caregiver or family training (73%) and demonstrating of wound care best practices (71%).

Consensus

Eighty-four of the wound care specialists

surveyed met in Denmark in November 2019 for a facilitated face-to-face dialogue. Consensus was reached on a number of recommendations regarding exudate management. Consensus was achieved when more than 80% of participants agreed and no participants disagreed with a recommendation (i.e. 100% of participants either agreeing with or agreed to support a recommendation).

Participants reached consensus on how to create and maintain an optimal moisture balance in chronic wounds, focusing their recommendations on how and when to assess wounds, how to determine the best dressing choice and optimal frequency of dressing changes.

Respondents agreed that chronic wounds should be assessed a minimum of once per week and optimally at each dressing change. When assessing a wound, healthcare providers should always:

- Consider the patient's health status and history;
- Measure the wound's progression (or lack thereof);
- Determine the wound characteristics (wound aetiology, wound depth and width, wound location, wound bed typography, etc.);
- Look for signs of infection;
- Assess periwound skin;
- Assess pain levels; and,
- Assess exudate (amount, colour, odour and consistency).

Changes in all of the above considerations should be assessed at each reassessment to identify improvements, lack of improvements or deterioration and the treatment plan should be adjusted accordingly.

Once agreement was reached that optimal moisture balance is critical to wound healing, participants discussed how to assess and treat the underlying cause of any moisture imbalance detected during a wound assessment or reassessment. Effective wound bed preparation, use of appropriate dressings, changes in dressing change frequency and education/self care instructions, on things like patient nutrition and compression therapy, were identified as effective practices.

Participants agreed that the best way to create an optimal moisture balance in chronic wounds is to effectively analyse the wound and wound exudate and to use that information to determine the best dressing choice and frequency of dressing changes. Participants agreed that the most appropriate dressing choice should always:

- Remove excess exudate from the wound bed,
- Protect the wound edge and periwound skin,
- Maintain a moist healing environment,
- provide confidence and security to the patient, and
- Is comfortable for the patient and easy for the patient to perform self-care (concordance with care regimen).

It was further agreed that the dressing choice to effectively manage exudate and promote moisture balance is a dressing that conforms to the wound bed.

Consensus was also reached on when a health care provider should consider referring the patient to a wound care professional. It was determined that, if during the wound assessment any of the following issues are identified, referral to or consultation with a wound care specialist is advised:

- Deterioration or lack of improvement in the wound – lack of improvement being defined as a decrease in the wound area of less than 20% within 4 weeks;
- Increased pain levels;
- Unexpected increases in the amount of exudate;
- Deterioration of wound edge (advancing, rolling, undermining, etc.) or periwound skin (advancing, maceration, etc.);
- Suspicion of infection or biofilms in the wound, or if the patient develops a fever;
- Comorbidity complications or overall decline in patient's health and wellbeing.

Participants recommended that treatment guidelines and training programmes be developed to help non-wound care specialists effectively treat chronic wounds.

Conclusions

While there is a great deal of evidence about the importance of exudate management in chronic wound care, the prevalence of non-healing wounds continues to be a global problem. This project brought together wound care specialists from across 19 countries to develop a consensus on how healthcare providers should assess and treat wounds to promote healing. The results provide data on the opinions and practices of over 80 wound care specialists and a consensus on how healthcare providers should translate the evidence on exudate management to the bedside.

The consensus process concluded that exudate management is necessary to provide an optimal healing environment. Exudate management should be a central consideration in every wound care patient's treatment plan and should be based on a comprehensive

patient and wound assessment. Treatment plans should treat the underlying wound aetiology and address patient concerns. Selecting the right dressing is the best way to manage exudate and prevent pooling in the wound bed and spreading to the periwound skin, as well as providing confidence to patients.

The choices that healthcare professionals make regarding wound treatment will significantly impact the patient experience, will influence the patients' quality of life, and will impact the healing time. Every healthcare provider's outcome goal should be fewer days with wounds and appropriate exudate management is one of the best ways to achieve that outcome. WINT

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