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In his Key Note address at 2005 WOCN annual conference, Tim Porter O’Grady emphatically announced our “arrival” into the 21st century, identifying the accomplishments and significance of our profession as healthcare experts. As Dr Porter O’Grady put it, healthcare as we used to know it no longer exists. In acute care particularly, the typical 7-day stay of the 1980s has been shortened to approximately 2 days or less. Although some still try to wedge a 21st century healthcare timeline into a 1980 schedule, attempts to accommodate such incompatibility lead to frustration, job dissatisfaction, and colleague distress, especially with the newer graduates who did not learn to provide care in a 7-day context. The challenge, as Dr Porter O’Grady presented it, was to let go of the beliefs and values that gave meaning to the workday 20 years ago but that now are unnecessary or symbolic.

Consider, for example, the bed bath. “A new generation of nurses who are ‘too posh to wash’ are threatening traditional nursing practices by refusing to perform basic tasks,” the leader of Britain's nurses’ union stated in May 2004, sparking a flurry of vocal activity from the BBC News and the Royal College of Nurses. Of note is that this statement was not based on substantive data but on the opinions of practicing nurses who may not see the whole picture but rather form an impression on an N of 1. The debate was further fueled by the motion put forward at the Royal College of Nurses annual meeting that given the shortage of registered nurses, tasks such as bed baths may be relegated to nonregistered auxiliary staff. The motion was defeated, but the debate continues.

Nurses in the United Kingdom are not alone in voicing the sentiments, substantiated or not, that today’s nurses are not interested in basic care. I recently overheard colleagues in North America noting that nursing students, “don’t even know how to give a bed bath anymore.” Although not necessarily intended to lean in that direction, the discussion had an air of self-satisfaction about it—the new nurses just didn’t know about nursing the way that the “old school” did. Can this be true? Are our universities really turning out inferior students? Is the bed bath the key marker of good nursing? What, one may ask, is good nursing? Hooper notes that the topic fuels the ongoing academic discussion of the definition of nursing—a science or an art or both? From a clinical practice viewpoint, nursing is competence, critical thinking, and skilled assessment. From a patient’s viewpoint, the most important attributes of nursing are connected to respect and dignity, confidence and trust in providers, and courtesy and availability of staff.

Because the average age of the nursing work force is 40 years and older, the majority graduated in the late 1970s or early 1980s at a time when nurses were still giving bed baths to acute care postsurgical patients and hospital stays were still several days. No one used computers or digital images for wound care, and there was time for ostomy or wound care teaching. Teaching nurses was didactic and memory-based rather than case-based or problem-based compared to today’s education of nurses by Web, in groups, and collaboratively along with a skill set not even conceived of 20 years ago. What remained constant and comfortably unchanging was the bed bath. And yet, much has changed.

Despite 21st-century nursing graduates bearing little resemblance to their predecessors, the qualities of respect and dignity espoused by Nightingale persist as fundamental to nursing care. The bed bath symbolizes such consistency, but even Nightingale changed a previous
nursing regimen, or lack thereof. Today, we expect rational and evidence-based care that is systematic, critical, collaborative, and patient-focused. Patient-focused care does not exclude the bed bath, so why do students not give baths? The short empirical answer is that patients in acute care do not require a bed bath—they are helped out of bed the day of surgery, assisted to the sink to wash, and encouraged to do so for themselves. During this assistance, the nurse is assessing the patient’s color, balance, pain level with activity, respirations, urine in the catheter or voided, and cognition. Encouraging and proactive, the nurse ensures that the patient is safe, exercised, and clean. Even during this initial foray out of bed, discharge is discussed, challenges considered, and home support considered.

Where does the bed bath fit into nursing? Certainly bathing itself is a powerful ritual associated with healthcare. Furthermore, a deeply religious connotation to cleansing and comforting asserts itself throughout cultures. Hector and Touhy provide an excellent overview of the meaning of bathing from cleanliness, self-control, and discipline to a therapeutic and healing art. Indeed, 19th-century nursing textbooks devoted several pages to sanitation and cleansing, at a time when many did not have running water or could not bathe regularly. “Don’t make your sick room into a sewer,” writes Nightingale in 1859. There is something immensely satisfying about bathing a patient thoroughly, rinsing and combing his or her hair, indeed making him or her feel better by virtue of a nurse’s touch. And yet, notably, a search of the literature on bed baths revealed few articles on the topic. Dunn and colleagues compared thermal bed bath and tub baths in patients with dementia and concluded that physiologic parameters indicated a high level of stress associated with tub baths. Several other studies were also found that address the issues of dementia and bathing, but none were found that evaluated the qualitative aspects of bathing from the nurses’ or the patients’ perspectives. Related to the bed bath was cost; the newer disposable bed bath in critically ill patients was at least as effective in cleansing as the traditional basin bath and more efficient in time spent, nurses’ satisfaction, and cost savings.

Is it time to let the bed bath fade away along with other remnants of the 7-day routine? Virtues as powerfully symbolic as Latin learning, religious instruction—even nursing caps and uniforms—are long gone. Necessity dictates that 21st-century nurses must let go of the symbolism of the bed bath but retain the conscientious critical care that finds meaning in bed baths and other intimate contact necessary and meaningful in nursing care.

**References**

Do Topical Analgesics Reduce Pain Associated With Wound Dressing Changes or Debridement of Chronic Wounds?

Elizabeth Evans  ■  Mikel Gray

QUESTIONS:
1. Does evidence exist to support the use of topical agents/analgesics for chronic wound pain associated with dressing changes or debridement?
2. Is Eutectic Mixture of Local Anesthetics (EMLA) cream safe to use in the treatment of wound pain associated with dressing changes or debridement?
3. Does sufficient evidence exist to conclude that other topical anesthetic agents are effective for managing chronic wound pain associated with dressing changes or debridement?

Although clinical experience strongly suggests that pain is commonly associated with chronic wounds, little systematic research exists defining its epidemiology, pathophysiology, assessment, or treatment. Nevertheless, existing research indicates that patients with chronic wounds: (1) are at high risk for both acute and chronic pain, (2) have pain that tends to be moderately severe to severe in intensity, and (3) report that uncontrolled pain is the most significant predictor of impaired quality of life.2-4

Although the precise etiology of chronic wound pain is not entirely understood, two pathophysiologic processes are believed to be principally responsible.1 Nociceptive pain is caused by release of inflammatory mediators that stimulate local afferent receptors leading to the perception of a sharp, stabbing, throbbing, or aching pain. Neuropathic pain is caused by damage to local nerve receptors. Typically described as burning or stinging, the location and intensity of neuropathic pain may not correlate with objective evidence of tissue damage. Many patients with chronic wounds report elements of both nociceptive and neuropathic pain, referred to as mixed pain.

Wound pain is initiated after the initial tissue damage by an inflammatory response, which sensitizes the skin’s pain receptors. This process serves to protect the injured site from further trauma, and the pain typically subsides with healing in an acute wound. However, in the chronic wound, the prolonged inflammatory response can lead to increased wound sensitivity (primary hyperalgesia) and increased periwound sensitivity (secondary hyperalgesia). When repeated noxious stimuli lead to chronic or recurring bouts of wound pain, the patient may sense any sensory stimuli as pain, a condition called allodynia.5 Wounds can also cause damage to the nerves, resulting in neuropathic pain. Even the lightest sensation, such as a soft touch next to the wound, can cause excruciating pain (allodynia). Damaged nerves can also fire ectopics, which may feel like shooting pain or electric shocks. Many other wound complications, such as infection or maceration, can further contribute to pain.5

Krasner3 has proposed a taxonomy for classifying wound pain based on the context of its occurrence. Chronic pain is defined as ongoing noncyclic discomfort that persists for a period of days or months. This is distinguished from cyclic acute pain, which is defined as a recurring exacerbation or occurrence of pain owing to repetitive procedures. The third type of pain, noncyclic acute pain, is defined as an acute exacerbation of discomfort associated with a non-repetitive procedure, leading to further tissue disruption or damage.

Dressing changes, a routine and unavoidable aspect of chronic wound care, produce acute cyclical wound pain.2-4 Based on a survey of 3,918 wound care clinician respondents, acute cyclical pain is most intense at the time of dressing removal, followed by wound cleansing, and more...
severe when dressings adhere to the wound. Conservative or surgical sharp debridement provokes acute noncyclical pain, leading many patients to ask clinicians to discontinue the procedure before its completion, unless additional analgesia or local anesthesia is administered. The purpose of the Evidence-Based Report Card is to review the published data on topical analgesia in wound care and to answer the Evidence-Based Report Card questions.

**Methods**

A systematic review of the MEDLINE, PubMed, and CINAHL electronic databases from January 1996 to November 2004 was completed using key words: “local anesthetics,” “EMLA cream,” “lidocaine,” “amitriptyline,” “pressure (decubitus) ulcer,” “leg ulcer,” and “chronic wound.” Evidence-based databases available through the OVID database search service (ACP Journal Club, Cochrane Database of Systemic Review, Cochrane Central Register of Controlled Trials, and Database of Abstracts of Reviews of Effects) were also searched.

**Question 1: Does Evidence Exist to Support the Use of Topical Agents/Analgesics for Chronic Wound Pain Associated With Dressing Changes or Debridement?**

The Cochrane Wounds Group of the Cochrane Database reviewed the topical agents or dressings for pain in venous leg ulcers, updated in 2003. Its meta-analysis included randomized controlled trials that evaluated local interventions to relieve leg ulcers of vascular or arterial origin. Diabetic legs ulcers were excluded in part of the studies because of the potential of decreased sensory perception resulting in a potential altered pain perception. Pain was defined as either persistent pain or cyclical pain at dressing changes or debridement. In all of the trials included in the systematic review, pain was measured using a visual analog scale (VAS). The VAS is a 10-cm horizontal line with “no pain” label at the beginning of the line and “pain as bad as it could be” label at the end of the line. Persons completing the instrument are asked to mark the spot that corresponds to their pain level, and the distance from 0 is measured in millimeters to generate a score.

Six published trials were identified that met the inclusion criteria, and all compared 1 local anesthetic (Eutectic Mixture of Local Anesthetics [EMLA] cream) (Astra Zeneca) to placebo or no anesthesia. EMLA is a mixture of 2 local anesthetics, lidocaine and prilocaine. The term “eutectic mixture” implies that the mixture of the 2 anesthetic agents achieves a lower melting point when compared to a preparation containing either agent alone. EMLA contains 25 mg of lidocaine and procaine per gram mixed with a thickener (Carbopol) and an emulsifier (Araldite); it does not contain any preservatives. The resulting oil-in-water emulsion is readily absorbed across intact skin and 1-2 hours of application under occlusion induces analgesia of approximately 3-4 hours after cream removal. Genital mucosa analgesia is achieved after only 5 minutes of EMLA application. EMLA use has been extensively studied for peripheral IV catheter insertion, lumbar puncture, parenteral injections, and circumcisions.

Six trials met the inclusion criteria for the Cochrane review. The protocols in the 6 trials were sufficiently similar to allow meta-analysis of pooled findings from 317 subjects. In all of the trials, a thick layer of EMLA was applied and covered with plastic wrap for occlusion. Up to 10 g of EMLA was the maximum amount of cream applied per treatment per study, but the trial completed by Hanson and coworkers restricted the amount of EMLA to 5 g. Each of the trials evaluated the analgesic efficacy of EMLA when applied 10, 20, 30, or 60 minutes before debridement, and it was used for as many as 15 treatments. Unfortunately, only 1 study stated that it allowed pretreatment oral analgesia, whereas the other 5 trials did not mention its use. Meta-analysis of pooled findings from these 6 studies found that 5% EMLA reduced the intensity of pain associated with debridement by an average of 20.6 mm on the VAS when compared to placebo cream. Based on the results of the systematic review and meta-analysis, the authors recommend that a minimum of 20 minutes of pretreatment with EMLA be used to maximize the analgesic effect. However, the EMLA application time should be increased to 60 minutes in patients who report significant pain with debridement despite pretreatment 20 minutes before the procedure or in those who require additional debridement.

Of particular importance, no adverse effects on ulcer size or healing rate were reported among subjects randomized to EMLA. Several research teams attempted to explain this finding. Lok and colleagues extrapolated that faster time to a clean ulcer owing to improved pain control may allow more effective debridement and subsequent healing. Vanscheit and coworkers hypothesized that debridement reduces infection risk and odor and promotes growth of granulation tissue. None of these trials, however, directly evaluated the effect of EMLA or debridement on leg ulcer healing rates, so no firm conclusions can be drawn.

**Question 2: Is EMLA Cream Safe to Use in the Treatment of Wound Pain Associated With Dressing Changes or Debridement?**

The Cochrane systematic review also identified adverse events associated with topical application of EMLA cream in chronic wounds. The most common local reaction was a transient burning sensation observed in 15%, whereas slight local redness and paleness was observed 2-3%. True allergic reactions to local anesthetics were rare and usually involved an ester agent (procaine, cocaine, tetracaine, or benzocaine). No cross-reactivity between the amide and ester agents was found. Patients with known allergies to the amide anesthetic agents (lidocaine, bupivacaine, meptivacaine, and prilocaine) were excluded from the trials.

In addition to these adverse reactions, a case study of an 84-year-old female who experienced tonic-clonic seizures
after the 17th application of 10 g EMLA for leg ulcer debridement was identified. This patient had multiple comorbidities and was on multiple medications when the EMLA cream was applied. No definite relationship between the seizures and application of EMLA were established in this case report.

Stymne and Lillieborg\(^\text{15}\) studied the safety of 24-hour continuous application of EMLA to leg ulcers. The lidocaine and prilocaine plasma levels are not central nervous system (CNS) toxic for single dose or repeated single doses (up to 15 EMLA treatments in a 1-month period) in previous studies. Ten hospitalized patients (ages 71-86) with painful leg ulcers measuring 50-100 cm\(^2\) were studied. A 10-mL syringe was filled with 5% EMLA to allow a standardized application of 1 g cream per 10 cm\(^2\) of ulcer area (1 mL = 1 g of EMLA), to a maximum dose of 10 g. The cream was removed from the wound after 24 hours. Blood samples were drawn before the application and at 14 scheduled times after this to assess lidocaine/prilocaine plasma levels. The Cmax values of lidocaine (185-277 ng/mL) and prilocaine (62-277 ng/mL) were well below the threshold levels that cause CNS toxicity (5000-6000 ng/mL for either drug). By 24 hours, the concentration was < 60 ng/mL of lidocaine, except in 1 patient, and was undetectable for prilocaine except in 2 patients. The maximum concentration was obtained 2-4 hours after EMLA application. Based on these findings, the researchers concluded that even after 24 hours of continuous exposure with up to 10 g of EMLA, it did not produce neurotoxicity.\(^\text{15}\)

Hafner and associates\(^\text{16}\) evaluated the effect of EMLA on local microcirculation by applying the cream to the fourth finger of the left hand of 12 healthy volunteers and comparing results to placebo cream applied on 2 separate dates approximately 7 days apart. A video capillaroscope filmed the area every 5 minutes for a 60-minute observation period. Also simultaneous continuous recordings using laser Doppler fleximetry were performed. EMLA cream increased skin perfusion, primarily in the nutritive vascular plexus. EMLA cream is postulated to suppress sodium channels, leading to relaxation of smooth muscles within local arterioles or opening of the precapillary sphincter, but vasodilation also may be attributable to suppression of local sympathetic tone. The localized nerve block leads to analgesia, hyperemia, and an increase in skin temperature. Therefore, no clinically relevant vasoconstrictive effects are expected from a 60-minute EMLA application\(^\text{16,17}\).

**Question 3: Does Sufficient Evidence Exist to Conclude That Other Topical Anesthetic Agents Are Effective for Managing Chronic Wound Pain Associated With Dressing Changes or Debridement?**

**Lidocaine (Lidoderm) Patch\(^\text{18,19}\)**

A systematic literature review using the parameters discussed revealed no published studies using the Lidoderm patch for wound pain. Dever and Galer\(^\text{18}\) followed 16 patients with refractory peripheral neuropathic pain who had inadequate pain relief or adverse side effects with typical analgesics/agents, such as antidepressants, anticonvulsants, antiarrhythmics, opioids, and nonsteroidal antiinflammatory drugs. To gain better control, Lidoderm patches were used as complementary therapy. Patients were instructed to apply up to 3 patches directly to the painful area (enough to cover the most painful region) to be worn for a maximum of 12 hours per day. The majority (81%) reported moderate to complete pain relief with the patch, and they also noted less brush-evoked mechanical allodynia. No systemic side effects or drug-drug interactions were noted, and only 1 patient had a skin irritation.

In the clinical setting, numerous other analgesics, including nonsteroidal antiinflammatory drugs, aspirin, capsaicin, and clonidine, have all been applied topically to reduce wound pain,\(^\text{7}\) but systematic literature review failed to identify any evidence concerning the safety or efficacy of these agents. Topical capsaicin has been recommended for the management of neuropathic pain in chronic wounds, but repeated use of 0.075% capsaicin degenerated epidermal nerve fibers, with a 74% reduction in nerve fibers as soon as 3 days after initiation of therapy.\(^\text{20}\) Discontinuing capsaicin allowed reinnervation of the epidermis over a 6-week period.

Two preclinical studies using animal models\(^\text{21,22}\) were identified that demonstrated a potential analgesic effect of topical amitriptyline and a synergistic effect when topical lidocaine and opioids were combined.

**Topical Opioids**

Topical opioids have also been used for chronic wound pain, especially in the palliative care setting. Potential advantages of topical as compared to systemic opioid analgesics include little or no systemic absorption with reduced risk of constipation, sedation, and nausea. A systematic literature review revealed no randomized or quasi-experimental clinical trials, but several cases series were identified. Twillman and coworkers\(^\text{23}\) reported on 9 case studies treated with morphine-infused IntraSite gel (MIG).\(^\text{23}\)

In this case series, diamorphine 10 mg was mixed into 10 mL of IntraSite gel and the resulting compound was packed into the cleansed wound, being sure to coat the entire exposed surface, which was then covered with a gauze dressing.\(^\text{24}\) This procedure was completed twice daily. The clinical investigators found that most patients were able to reduce their oral analgesia, and they noted that MIG did not alter pain sensation from other sites. Only 2 of the 9 patients in this series required titration to 15 mg in 10 mL of gel to gain adequate pain control, defined as a VAS score of 0 out of 10. The patients did relate pain with dressing change, but the intensity of this pain was not discussed. Although the MIG gel proved successful in various wound types, it did not provide adequate pain relief for patients with erythema, edema, and intact skin.

**Implications for Practice**

Wound care clinicians need to reevaluate their pain beliefs. It has long been believed that the more severe pressure ulcer
stage caused less pain because of sensory nerve ending destruction. Dallam and colleagues demonstrated in a 1995 study that patients with stage IV pressure ulcer had more pain than patients with pressure ulcers of lesser stages. Therefore, it is essential that WOC/ET nurses incorporate pain management into routine daily practice, including selective use of topical analgesics before wound dressing changes or debridement. The strongest evidence base is associated with EMLA cream. It should be applied directly to the wound and covered with plastic wrap for 20 minutes. You can only safely cover 100 cm² surface with a maximum amount of 10 g EMLA. If pain is not managed at 20 minutes pretreatment EMLA application time, then increase the time to 45-60 minutes using plastic wrap.

In addition to incorporation of topical and oral analgesia when completing painful procedures, the European Wound Management Association has recently released a document based on an extensive survey of wound care clinicians throughout Europe and North America that recommends minimizing wound pain by the use of nontraumatic dressings. Dressings identified as causing the least trauma were hydrofibers, hydrogels, alginites, and soft silicone.

KEY POINTS

- Adequate evidence exists to support the use of the topical analgesic EMLA for chronic wound pain associated with dressing changes or debridement. (Strength of Evidence: Level 1)
- EMLA cream has been associated with minor adverse side effects, including transient burning sensation, slight local redness, and pallor. A single case report of seizures in an elderly patient was reported, but no clear association with application of EMLA cream was established. (Strength of Evidence: Level 1)
- There is insufficient evidence to determine whether 5% lidocaine gel, Lidoderm patches, and lidocaine-soaked gauze are effective as topical analgesics. (Strength of Evidence: Level 5)
- There is insufficient evidence to determine whether topical opioids are effective for the management of chronic wound pain. (Strength of Evidence: Level 5)

References

Preparing a Grant Proposal—Part 5
Organization and Revision

Janice C. Colwell ■ Donna Zimmaro Bliss ■ Sandra Engberg ■ Katherine N. Moore

Translating a research idea into a well-written grant proposal takes planning and commitment. This Spotlight is the fifth in a series by the members of the Center for Clinical Investigation (CCI) of the Wound, Ostomy and Continence Nurses (WOCN) Society. The aim of this series is to facilitate high-quality grant writing and encourage submissions to WOCN’s grants program. This article provides guidance on the development of a grant proposal and the revisions necessary to result in a polished final product.

■ Organization

The savvy investigator organizes the grant preparation with the submission deadline and requirements in mind. The submission requirements are usually explicitly stated in the grant instructions; for example, whether a proposal needs to be received by the funding agency by a certain date, whether a postmarked date is sufficient, or which time zone is applied to deadlines for electronic submissions.

■ Timeline

Use of a timeline is an excellent organization technique that allows an estimate of the deadline for completing each section of the proposal. Timelines should include time for peer review and for revisions based on the review. For a grant of 10-15 pages, it is courteous to provide a colleague with 2 to 3 weeks for his or her review. Considering colleagues’ work demands, availability, and personal commitments will make the timeline more feasible, especially when letters of support and signatures are required. At minimum, the investigator’s immediate supervisor should write a letter indicating he or she is aware of the project and ensuring that the investigator will be given the time needed to conduct the research if it is to be implemented during his or her work time. These persons may want to read the completed proposal to frame their remarks knowledgeably.

Using a checklist to track completion of the various components of the proposal so that important sections of a grant are not missed is another helpful organizational aid. Figure 1 presents a checklist that is applicable to the grants program of WOCN. Items specific to an investigator’s research environment may be added. The importance of addressing all proposal components is reflected in the instructions for the WOCN grants program, which warn that incomplete applications will not be reviewed (WOCN.org, click on Center for Clinical Investigation). Once a grant is completed, additional time may be needed for an internal committee or office to process or approve it before it can be submitted. Employees of a university or healthcare system who are actively engaged in research may need to have their completed proposal reviewed by a committee of peers, such as a nursing research committee, or approved by their institution’s research administration office. Attention to these details should be done at the start of grant preparation and added to the timeline. Missing the review deadline of an internal committee may result in missing the grant submission date.

■ Reference Managers

Using computer software to store, organize, and format references (eg, Endnote or ProCite) saves considerable
time. Most of these software programs enable direct downloading of citation information from online literature databases, such as Medline or CINAHL. Book chapters and those not indexed on the electronic databases need to be entered manually. Although learning to use this software and its functions takes some initial time investment, these programs offer efficiency in the tedious task of citing and formatting references and are particularly helpful when revisions are required.

Once completed, the proposal is then ready for ethics review. To avoid delays in initiating the study, some centers will submit for ethics review before or at the time the proposal is submitted; other centers will only review a proposal after funding is received. In this case, submitting the application as soon as possible after being notified of receiving the award and before receipt of funds is recommended.

### Format and Writing Style

It is critical to read and follow the grant agency formatting instructions. Requirements about formatting promote fairness and “level the playing field,” i.e., each investigator has the same space within which to present his or her research idea and plan. In many grant programs, failure to follow the formatting instructions will disqualify a proposal. Formatting instructions may be as simple as stating a maximum word count or specific about font, line spacing, margins, page numbers, and reference style. For example, the WOCN Hollister Grant for Contiuence Nursing specifies a page limit of 10 double-spaced pages, 1” margins, and a 12-point font. Section headings are usually provided in the formatting instructions to help the author organize the application and indicate some of the criteria the review committee will consider. The WOCN grants program requires the following headings/sections: statement of research question, brief introduction, and materials and methods. Subheadings are added for clarity, such as statistical analysis plan under the materials and methods section.
Appendices and Letters of Support

An appendix, if allowed by the funding agency, can include supporting materials, such as letters of support. Because the appendix is viewed as an accessory to the main proposal, it should not contain vital information about the proposal, such as diagrams of the conceptual model or a table of the variable names and their measurement tools. Some agencies will outline what is permitted in an appendix. Letters should be considered strategically. Suggestions are to request a letter of support from one of the investigator’s colleagues who has expertise on the proposed topic or a person with decision-making authority who may use the findings of the study. Letters stating agreement to serve as a site for the study, provide access to the population to be studied (eg, an ostomy support group), or provide consultation (eg, for statistical analysis) show that the study is feasible and also valuable. Key data collection instruments that are not well known in the public domain should be provided in the appendix. If use of an instrument requires permission from the developer, then the letter of permission should accompany the tool. The appendix can also contain letters from an ethics committee or institutional review board approving the study, if an ethics review must be completed before the proposal submission.

Grammar and Presentation

The grant should be written clearly and directly, using active voice that is free of clinical or technical jargon. Typographic, spelling, or grammatical errors imply a lack of care and attention, which reflects poorly on the writer. Referring to variables by consistent names rather than using acronyms is recommended to avoid confusion, especially if several variables are being studied. Some grant agencies only allow use of standard international abbreviations. The space saved by using nonstandard abbreviation for some terms must be weighed against a potential lack of clarity. A general rule is to write without abbreviations at first and then, if necessary, use them sparingly.

The presentation must be understandable by a reviewer who may not be an expert in the field. Some review committees may include clinicians or healthcare consumers. Some agencies publish the names of the members of the grant review committee on their Web site. If the review committee is composed of professional members, it may be possible to review their work to determine their area of expertise. A well-written proposal will be appealing to any reviewer. Reference style must be consistent; a style that uses numbers to designate citations within the text saves space. Regardless of the style, compare all citations in the reference list with the text and vice-versa.

Revising and Peer Review

A quality grant proposal requires several revisions. In the first draft, all the ideas are presented without much concern about the format, page limit, or writing style. In the second or third revision, the ideas are organized into a more coherent document and follow the required formatting instructions. The final revision focuses on polishing the presentation and checking for accuracy and completeness. Taking short breaks from reading the proposal between revisions may facilitate more critical revision.

Review of a research proposal by colleagues is an invaluable support service that should start early when developing the research aims and design. Colleagues who are experts in the study topic should be asked to evaluate the merit and scientific quality; they can determine whether key references are included and interpreted appropriately. Another colleague or staff member who is qualified in editing can conduct a separate review for style, spelling, sentence structure, and formatting. If time allows, asking someone who has some familiarity with the topic to read the proposal for understanding and logic of presentation may be helpful. Participating in a mock review session, wherein several colleagues discuss their review of the proposal with each other and with the investigator is also beneficial.

Conclusion

Following the instructions for formatting and presenting a proposal and using a checklist for organizing progress can make writing a research proposal less intimidating. Asking knowledgeable colleagues to review drafts of the proposal will improve the quality of grant writing. The WOCN program is ideal for the novice researcher—it is intended to support new researchers with small studies. All WOCN members should feel comfortable accessing the Board of the CCI for advice on proposal development.

KEY POINTS

- ✔ Following instructions for grant writing and formatting provided by the funding agency is essential.
- ✔ An organized plan for completing and monitoring progress and timelines is critical to meet submission deadlines.
- ✔ Internal reviews by colleagues provide invaluable feedback for an effective grant application.
- ✔ WOCN CCI is an excellent starting place for novice grant writers.
Clinical practice guidelines have been proposed to significantly reduce the gap between available scientific evidence and clinical practice. Evidence-based guidelines are also being produced at an ever-increasing pace. However, guidelines do not implement themselves, and the research to support implementation does not provide straightforward answers. What works in one setting does not necessarily work in another. In short, guideline implementation and change of practice is complex and messy. The purpose of this article is to discuss the implementation of clinical practice guidelines using the Promoting Action on Research Implementation in Health Services framework. More specifically, 3 key components are highlighted: (1) the evidence base for guideline recommendations, (2) the clinical context where guidelines are to be implemented, and (3) the nature of facilitation needed to ensure a successful change process. An overview of the literature in the field is provided, and the authors’ experiences are shared, and a few recommendations are tentatively provided.

Evidence-based nursing is an increasingly advocated approach to providing the patient with optimal care and thereby improving outcomes. The basic objective of evidence-based healthcare is to eliminate ineffective practices and implement more effective procedures. In reality, this process is not straightforward. Many studies point to an underuse of appropriate research-based knowledge in clinical practice. A promising means to address this dilemma is the development and implementation of clinical practice guidelines (CPGs). Guidelines, increasingly used as a tool to disseminate evidence-based knowledge, have been proposed to significantly reduce the gap between scientific evidence and clinical practice. However, as with evidence-based practice in general, guidelines do not implement themselves. Compared with many other routine care processes, the implementation of guidelines highlights the issue of getting research-based knowledge into clinical use, which adds to the complexity of change.

The purpose of this article is to discuss the implementation of CPGs, a form of direct research utilization, using the Promoting Action on Research Implementation in Health Services (PARIHS) framework to guide the discussion. In 1998, Kitson and coworkers criticized current, often linear, models for research uptake. This research group argued that a multidimensional nonlinear approach would be more appropriate because of the complex nature of implementing research into clinical practice. They subsequently developed and proposed the PARIHS model, which emphasizes the strength of and interplay among 3 major components: (1) the nature of the evidence being used, (2) the quality of the context in terms of coping with change, and (3) the type of facilitation needed to ensure a successful change process (Figure 1). Details, but not the basic tenets, of the model were refined in 2002. There has been a growing interest in this model, as evidenced by its use as a theoretical framework in several studies.

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Corresponding author: Lars Wallin, PhD, RN, KUSP, Faculty of Nursing, University of Alberta, 5th Floor, Clinical Sciences Building, Edmonton, Alberta, T6G 2G3 Canada (e-mail: lars.wallin@ualberta.ca).
Despite the use of more active implementation strategies, it is becoming abundantly clear that implementing guidelines is not a straightforward undertaking. Authors of systematic reviews in this field have concluded that there is an imperfect evidence base to support strategies to implement CPGs. Although the bulk of these studies are conducted within the medical field, the findings also have relevance for nursing. The most recent systematic review, reporting on 235 studies, details the implementation effect of guidelines. The findings from the majority of the studies (87%) reveal modest to moderate improvements in patient care as a result of implementing guidelines. Commonly evaluated interventions to support implementation were in the form of reminders, dissemination of educational materials, educational outreach, and audit and feedback. There was considerable variation in the observed effects both within and across interventions. The median absolute improvement in performance across interventions was 14%. Active and multifaceted implementation strategies are often proposed, but the authors found no relationship between the number of component interventions and the effects. Several authors assert that the mere distribution of guidelines cannot be expected to result in clinical practice changes. Grimshaw and colleague’s 2004 review suggests that printed materials (guidelines and educational materials) alone can result in a moderate change of practitioner behavior and improve patient outcomes.

The current status of knowledge on implementation can be summarized by the claim that various strategies are likely to be efficient under different circumstances in different settings. Challenges to CPG implementation primarily are related to guideline content and the environment where the guidelines are to be used. The literature in the field also points to the fact that implementation strategies not yet are evidence based. Rather, the strategic implementation of a specific guideline is often perceived as a black-box phenomenon, with change processes more based on personal beliefs—and viewed as more art than science—when the contrary is urgently needed.

**Why Guidelines?**

CPGs were originally defined as systematically developed statements to assist practitioner decisions regarding appropriate healthcare for specific clinical circumstances. More recent definitions have included the guidance of patient decisions. The essence of guidelines is to facilitate implementation of evidence-based practice rather than providing care based on unsupported approaches.

Studies in the United States and the Netherlands suggest that approximately 30-40% of patients do not receive care according to current scientific evidence and that 20-25% of care provided is not needed or potentially harmful. According to the principles of evidence-based practice, the approach required by healthcare practitioners to handle a lack of appropriate knowledge for taking care of an individual patient or patient group is to: (1) convert information needs into answerable questions, (2) retrieve the best evidence to answer the questions, (3) critically appraise that evidence, (4) implement the results of this appraisal in clinical practice, and (5) evaluate care performance. However, even for a forward-thinking specialist nurse, it is challenging to follow the production of new knowledge in his or her field, given the large amount of research published in numerous journals. Furthermore, searching and appraising relevant articles to obtain pertinent information requires skill and dedicated time, yet the latter is becoming an increasingly scarce resource. When striving for evidence-based practice, CPGs may offer a better alternative for busy practitioners wanting guidance in clinical decision making. Instead of practitioners spending time and resources on extracting evidence for practice, most CPGs offer a quick and effective method for increasing the use of research in practice.
Availability of Guidelines

Recently there has been extensive and rapid development of CPGs. Between 1996 and 1999, 1446 guidelines were submitted to the Canadian Medical Association (CMA) database.\(^2\) Nursing-related guidelines are also available in increasing numbers and are disseminated through means such as the Internet, professional practice groups, and journals. Currently, several organizations, such as the National Guideline Clearinghouse (www.guidelines.gov), the Guidelines International Network (www.g-i-n.net), the Registered Nurses Association of Ontario (RNAO) (www.rnao.org/bestpractices/index.asp), and CMA (http://mdm.ca/cpgsnew/cpgs/index.asp) provide Internet-based access to a variety of guidelines. In the United States, the National Guideline Clearinghouse has 3 guidelines developed by WOC nurses: management of wounds in patients with lower-extremity arterial disease, management of wounds in patients with lower-extremity neuropathic disease, and prevention and management of pressure ulcers (http://www.guidelines.gov/browse/DisplayOrganization.aspx?org_id=173). In Canada, the RNAO supplies 4 guidelines relevant to the focus of the WOCN: assessment and management of venous leg ulcers, assessment and management of stage I to IV pressure ulcers, promoting continence using prompted voiding and risk assessment, and prevention of pressure ulcers.

Guideline development is a resource-demanding task requiring skills, time, and extensive finances. Therefore, the authors strongly advise selecting a CPG that is already published instead of developing one at the local or regional level. Guideline quality will continuously improve as standards for guideline development are more clearly defined.\(^2\) To ensure that guidelines relevant for clinical use are developed according to quality standards, assessment tools such as Appraisal of Guidelines Research and Evaluation (AGREE) (www.agreecollaboration.org), are available. It is advisable to do such an assessment before deciding to use a CPG to ensure that the guideline has the potential to bring about desired effect in clinical nursing practice.

Evidence From Nursing Research

The type of evidence on which the guidelines are based likely affects their uptake. The lack of valuable and reliable nursing research is still evident in several areas. The most obvious is the lack of intervention studies in various nursing specialties, for example, in urinary incontinence. The prominent use of descriptive studies within nursing generates evidence that is rated low on the continuum of evidence strength.\(^3\) Some have claimed that the evidence developed by experimental research (primarily randomized controlled trials), systematic reviews, and meta-analysis may be unsuitable\(^2\) or unavailable\(^3\) for specific areas of nursing practice. This may be true to some extent. However, there is still a deficit of high-level evidence in many areas of nursing, even in areas where experimental research could be undertaken. This is clearly illustrated in the RNAO guideline Promoting Continence Using Prompted Voiding (www.rnao.org/bestpractices/index.asp). Of the 19 recommendations listed in the guideline, all but 2 are rated at level C (the lowest grade—evidence based on expert opinion). Based on the findings of a recent study,\(^1\) the authors of the current article hypothesize that this low rating of evidence affects practitioners’ inclinations to adopt recommendations outlined in the guideline. Higher motivation to make use of research findings in practice will be more likely if the CPG is based on valid and robust evidence.

Using Many Knowledge Sources

The use of guidelines in clinical practice implies, to a greater or lesser extent, the standardization of care. The positive side of standardization is the reduced variation in care practices; the potential negative effects may be a reduction in patients’ influence of care or providers who experience diminishing professional freedom. This tension has been extensively debated, and the phrase “cookbook medicine/nursing” has been condescendingly used regarding evidence-based practice. Such attitudes constitute obvious barriers to guideline implementation. By adopting a broad perspective on the types of knowledge appropriate to support clinical decisions, this obstacle can be minimized. As suggested by Rycroft-Malone and colleagues,\(^2\)
clinical experience, patient perceptions, and information generated in the local context (eg, audit outcomes) are critical knowledge sources when making decisions about individual patient care and most often possible to combine with the use of research-based knowledge. Overall, the quality of clinical decisions is enhanced when grounded in research and adapted to the local context.

Overall, the quality of clinical decisions is enhanced when grounded in research.

**Context**

Perhaps the most influencing factor affecting CPG implementation is the context in which nursing practice occurs. Context is not easily defined and is often compared or equated to climate, culture, practice, or work environment. According to the PARIHS model, context refers to: “the environment or setting in which the proposed change is to be implemented” and comprises culture, leadership, and evaluation. Nurses work in dynamic contexts that are undergoing constant restructuring and change, and this is likely to continue in the future. Close consideration of context and its effect is critically important to ease the complexity of CPG implementation.

**Creating a Supportive Culture**

Successful implementation of CPGs is more likely to occur when a clear understanding of the culture exists. Organizational culture is created by staff, units, and the organization, collectively resulting in a “character” and a “feel” that separate environments beyond physical structure. Resnick et al reported implementation barriers as: “education of staff, carryover of training related to guideline implementation, getting staff ‘buy-in,’ dealing with turnover and float pool staff, accountability of all staff, the workload and assessment and documentation issues, and the ongoing maintenance of the program once it was initiated.” A culture that supports evidence-based practice can overcome these barriers and create an environment that enables and empowers nurses to access, appraise, and adapt CPGs to their local context. Evidence-based practice is further supported by organizations valuing the practice and autonomy of nursing. Finally, an openness to change is essential for embracing the new knowledge and accomplishing the changes that are occurring when guidelines are implemented.

**Transformational Leadership**

Leadership is a key element to creating a context that is amenable to CPG implementation. Leadership is having vision and the tools to carry out that vision, particularly in the ever-changing healthcare environment. Effective leadership affects nurses’ job satisfaction and retention. Credibility, trustworthiness, and good communication skills are traits of good leaders. Leadership type and style foster an environment that lends itself to evidence-based practice by encouraging use of research in daily practice. Effective leaders at all levels of the organization who are committed to the use of CPGs can enlist the support of others and create opportunities for nurses to experience the usefulness of CPGs. This cultivates a context that is ready for CPG implementation.

**Ongoing Evaluation**

The final subelement of context in the PARIHS is evaluation. Evaluation of CPG implementation should occur on many levels, including nurses’ experience with the guideline, their compliance with its recommendations, patients’ experiences with the care suggested by the guideline, and patient outcomes. Using repeated measurement of specific indicators, Duncan and Pozehl found improved patient outcomes with the establishment of feedback mechanisms on practitioners’ adherence to CPG recommendations. Improvement in patient outcomes may provide the hard evidence for the effectiveness of a guideline and reassure practitioners to continue to use it. This generates a good loop, and patients receive consistent care. Evaluation and feedback to practitioners is likely to reinforce further use of guideline recommendations. If nurses experience difficulty in using a guideline or do not find it relevant for their work environment, the guideline may have to be better adapted to current context.

If nurses experience difficulty in using a guideline or do not find it relevant for their work environment, the guideline may have to be better adapted to current context.
Facilitation

Effective facilitation is the third element that coexists in a dynamic relationship with evidence and context to allow successful uptake of evidence into practice. Facilitation emerged from the field of counseling and since then has been used in various disciplines and fields, including evidence-based practice. Basically, facilitation refers to an approach whereby one person conducts specific tasks and activities to help or make things easier for others. A primary objective for facilitation is to challenge existing practices and support new ways of doing things. From a guideline implementation perspective, facilitation can take numerous forms, from: “providing help and support to achieve a specific goal to enabling individuals and teams to analyze, reflect and change their own attitudes, behaviors and ways of working.”

Aiding Facilitation

Facilitation does not occur unaided; rather specific knowledge is required to make it happen. The role of the facilitators is critical to the process and requires a combination of personal attributes, knowledge, and various skills depending on how the role is operationalized and the purpose it means to serve. As Harvey and coworkers suggest, if facilitation is needed to accomplish specific tasks or goals, the facilitator can achieve this by providing practical help and support. However, if facilitation is aimed at change in practice through development and empowerment of individuals and teams, as in the case of CPG implementation, then the emphasis is expanded to enabling. According to the authors’ experiences on facilitation, combining basic help to perform tasks and more sophisticated enabling of staff members most often works effectively in facilitating guideline implementation.

The Nature of Facilitation

Harvey et al conducted a concept analysis of facilitation. As part of this analysis, various skills and attributes that are considered important to be an effective facilitator were summarized. Some of these include interpersonal and communication skills, knowledge, the ability to create a conducive environment, vision, patience, and motivation. Furthermore, this research group suggested that the mix of skills and attributes may vary depending on the context, purpose, and type of facilitation. The skills and attributes must be related to both the facilitation process and the content of the practice area to be truly effective in the facilitator function. A concrete program for facilitating the implementation of guidelines was published by the Royal College of Nursing Institute in the United Kingdom. It depicts facilitation of an interdisciplinary team through various stages of the implementation process of a specific guideline at their workplace. Several theoretical approaches to support such a team are conceivable, such as educational, epidemiologic, organizational, behavioral, social influence strategies, or a mix of such strategies. In a recent article, Wallin and colleagues reported on an evaluation study of facilitation with a change team where critical thinking, sharing ideas, and focusing on change were central ingredients of the process. Concrete elements in the process were identification and appraisal of evidence, unit context mapping according to the Strengths-Weaknesses-Opportunities-Threats analysis, unit adaptation of a generic guideline, and preparation of introductory/educational meetings with the main staff group.

Use of Intermediaries in Facilitation

Although not a well-researched area, the use of intermediaries in facilitating research utilization and evidence-based practice is, indeed, supported by the literature. Intermediaries such as clinical nurse specialists (CNS) and clinical nurse educators (CNE) most often have the knowledge, skills, and attributes necessary to support the implementation of guidelines. They have the expertise, communication skills, knowledge of the local context and practice, research knowledge, and credibility. However, despite these attributes, their scope of practice may be so broad that the facilitative aspect is minimized in the face of other priorities. To enhance the potential for successful change of practice, the role of these practitioners must be reexamined.

Summary

Unfortunately there is no magic bullet to accomplish effective implementation of guidelines. Naïvely viewed, it is a simple task—a well-developed guideline is adopted on a unit or practice area and providers just use it in their day-to-day work. Experience and the literature tell us it does not work that easily in reality. Whether these difficulties are consequences of human nature and obstacles that simply exist in complex organizations or rather an issue of underdeveloped knowledge on how to accomplish change is not clear. The authors prefer to think it is the latter. Although it is consoling to know that guidelines themselves appear to result in some change of practice, the mere presence of CPGs does not fully lead to effective implementation. Implementation of guidelines is a complex and demanding task; it often requires a change in practitioners’ attitudes, skills, and behaviors. Change requires commitment, and the process of change, whether it is a small adjustment or more revolutionary, should not be underestimated.
In conclusion, the following suggestions may make both the nature and the use of CPGs more straightforward. First, intervention studies are needed that evaluate the effectiveness of various nursing approaches. This type of research is critical in generating a knowledge base on which to develop guidelines. Second, organizations must support the culture, leadership, opportunities, and openness needed for the successful implementation and evaluation of CPGs. If it is not possible to change the culture, it is vital to have an understanding of the prevailing culture to establish an appropriate implementation strategy. Third, facilitators, such as CNSs and CNEs, who possess the knowledge and skills, are well positioned to facilitate the effective implementation and evaluation of CPGs and must be present in various healthcare settings and have their work directed to these kinds of tasks. Finally, the PARIHS framework provides a guiding tool in planning to implement a guideline. The model is not prescriptive, but it does provide an overview of ingredients that need to be considered in an implementation project. With more reflective planning, a better understanding of the nature of evidence to be implemented, the context where change is to occur, and the facilitation required, the risk of failure and disappointment will diminish and the potential for success increase.

**ACKNOWLEDGMENTS**

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**KEY POINTS**

- More intervention studies are needed that evaluate the effectiveness of various nursing approaches.
- Organizations must improve their support of the culture, leadership, opportunities, and openness needed for successful implementation of guidelines.
- Clinical nurse specialists and clinical nurse educators are thus well positioned to facilitate the effective implementation of guidelines.
- The PARIHS framework provides an overview of ingredients that should be considered in a guideline implementation project.

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**Commentary by Jo Rycroft-Malone**

One of the greatest challenges for healthcare providers at the beginning of the 21st century is how to ensure that patient care is effective and efficient at a time when resources are constrained, population and workforce demographics are changing, and users have ever-increasing expectations of positive healthcare outcomes. In parallel, the evidence base for practice has grown massively in recent years, with approximately 10,000 new randomized controlled trials included in MEDLINE every year and 350,000 trials identified by the Cochrane Collaboration. Despite this, and as Wallin and colleagues indicate, studies have also shown that patients continue to receive treatments that are unnecessary or are potentially harmful. Against this context there has been a drive to constantly improve the quality and availability of evidence to support the implementation, cessation, or continuation of practices introduced to improve health. Clinical guidelines are viewed as an important clinical tool in the quest to promote evidence-based practice.

As Wallin and colleagues describe, the development of clinical guidelines both nationally and locally has increased dramatically recently. Considerable investment has been made by national, professional, and regional bodies in the development of guidelines in the hope that they will go some way to improving patient outcomes. Politically, however, less attention has been paid to guideline implementation. Sheldon et al in a study evaluating the use of national clinical guidelines in the United Kingdom’s National Health Service found that the uptake of such guidance was highly variable. The commentator speculates and suggests that similar evaluations in other developed countries would reveal comparable findings. So why do we have all this evidence-based information, yet its uptake remains patchy?

Until recently, the common wisdom was that if you produce evidence-based products, such as clinical guidelines, and disseminate these to the relevant people, they would automatically be used in practice and decision making. Arguably, it is naïve to suggest that because guidelines exist, their implementation automatically follows. However, traditional and early models of research utilization did have unacknowledged assumptions of linearity...
and rationality. More recently, there has been a slow shift to recognize that the process of implementing evidence in practice is more complex and is similar to a “contact sport” necessitating the challenge, negotiation, and overcoming of various boundaries, objects, and players.\(^4\)\(^5\)\(^6\) Getting evidence into practice requires attention to the nature of evidence, contextual factors, people, and processes. The PARIHS framework that Wallin and colleagues use to good effect in their article was developed to counterbalance linear approaches to evidence implementation by acknowledging the interplay and interdependency of many factors. It is proposed within the framework that successful implementation depends on the nature of the evidence being used, the quality of context, and the type of facilitation required to enable a successful change process.\(^4\)\(^6\)

In this article, Wallin et al raise some key points about evidence, context, and facilitation in relation to guideline implementation; these include that research evidence is valued differently by different people. This means that if you take an evidence synthesis, such as a clinical guideline, it cannot automatically be assumed that the recommendations will mean the same thing to individuals and groups. Therefore, guideline implementation strategies will need to incorporate sharing views about “the evidence,” possible negotiation, and local consensus building to make it relevant and applicable to the patient, the individual’s practice and decision making, and the practice context. Second, the practice context must be receptive to new ideas and practice recommendations. There is increasing awareness evident in the literature that there are several factors that may make a context more conducive to change, some of which are described by the authors here. The challenge remaining, however, is to create these types of organizations—a particularly big and onerous undertaking with the other political and practical constraints healthcare organizations and practitioners operate within.

Finally, Wallin and colleagues stress the importance of a flexible approach to facilitation. The role of a dedicated project lead is critical to the success of implementation in numerous different evidence-into-practice projects.\(^7\)\(^8\) Facilitators have the potential to work with individuals and teams to articulate issues to do with the guideline, how it applies to their practice, enable the development and implementation of strategies that acknowledge and incorporate these factors, and work on contextual issues. Importantly, as the authors stress, these people may already be part of the organization in clinical nurse specialist and clinical nurse educator roles for example.

As Wallin et al state, there is no magic bullet (or for that matter magic target) to achieve the successful implementation of guidelines into practice. Critically, this article highlights that guideline implementation is not easy. It requires good planning, skill, and experience; a good understanding of change management; and the support and engagement of people at many levels of the organization. The reality of the clinical context is messy and complex; therefore, any guideline implementation strategy must be able to deal with this complexity. The evidence base about implementation is still developing, and many ideas and strategies require further testing. The authors, however, have usefully framed some of the issues that require attention, and, as such this article will be a helpful starting point for those in the business of trying to make guideline implementation a reality.

**ACKNOWLEDGMENTS**

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**References**

Statement of the European Pressure Ulcer Advisory Panel—Pressure Ulcer Classification

Differentiation Between Pressure Ulcers and Moisture Lesions

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Commentary by Dorothy Doughty

A pressure ulcer is an area of localized damage to the skin and underlying tissue caused by pressure or shear and/or a combination of these.

The identification of pressure damage is an essential and integral part of clinical practice and pressure ulcer research. Pressure ulcer classification is a method of determining the severity of a pressure ulcer and is also used to distinguish pressure ulcers from other skin lesions. A classification system describes a series of numbered grades or stages, each determining a different degree of tissue damage.

The European Pressure Ulcer Advisory Panel (EPUAP) defined 4 different pressure ulcer grades (Table 1).1 Nonblanchable erythema is a sign that pressure and shear are causing tissue damage and that preventive measures should be taken without delay to prevent the development of pressure ulcer lesions (Grade 2, 3, or 4).

The diagnosis of the existence of a pressure ulcer is more difficult than one commonly assumes. There is often confusion between a pressure ulcer and a lesion that is caused by the presence of moisture, for example, because of incontinence of urine and/or feces. Differentiation between the two is clinically important, because prevention and treatment strategies differ largely and the consequences of the outcome for the patient are imminently important.

This statement on pressure ulcer classification is limited to the differentiation between pressure ulcers and moisture lesions. Obviously, there are numerous other lesions that might be misclassified as a pressure ulcer (eg, leg ulcer and diabetic foot). Experience has shown that because of their location, moisture lesions are the ones most often misclassified as pressure ulcers.2-3

Wound-related characteristics (causes, location, shape, depth, edges, and color), along with patient-related characteristics, are helpful to differentiate between a pressure ulcer and a moisture lesion (Table 2 and Figure 1).
### TABLE 1.

**European Pressure Ulcer Advisory Panel Classification**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Short Description</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nonblanchable erythema of intact skin</td>
<td>Nonblanchable erythema of intact skin. Discoloration of the skin, warmth, edema, induration, or hardness may also be used as indicators, particularly on individuals with darker skin.</td>
</tr>
<tr>
<td>2</td>
<td>Blister</td>
<td>Partial-thickness skin loss involving epidermis, dermis, or both. The ulcer is superficial and presents clinically as an abrasion or blister.</td>
</tr>
<tr>
<td>3</td>
<td>Superficial ulcer</td>
<td>Full-thickness skin loss involving damage to or necrosis of subcutaneous tissue that may extend down to, but not through, underlying fascia.</td>
</tr>
<tr>
<td>4</td>
<td>Deep ulcer</td>
<td>Extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structures with or without full-thickness skin loss.</td>
</tr>
</tbody>
</table>

### TABLE 2.

**Wound-Related Characteristics**

<table>
<thead>
<tr>
<th>Causes</th>
<th>Moisture Lesion</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure and/shear must be present.</td>
<td>Moisture must be present (eg, shining wet skin caused by urinary incontinence or diarrhea).</td>
<td>If moisture and pressure/shear are simultaneously present, the lesion could be a pressure ulcer as well as a moisture lesion (combined lesion).</td>
</tr>
<tr>
<td>Location</td>
<td>A moisture lesion may occur over a bony prominence. However, pressure and shear should be excluded as causes and moisture should be present.</td>
<td>It is possible to develop a pressure ulcer where soft tissue is compressed (eg, by a nutrition tube, nasal oxygen tube, or urinary catheter).</td>
</tr>
<tr>
<td>Shape</td>
<td>A combination of moisture and friction may cause moisture lesions in skin folds.</td>
<td>Wounds in skin folds of bariatric patients may be caused by a combination of friction, moisture, and pressure.</td>
</tr>
<tr>
<td>Shape</td>
<td>A lesion that is limited to the anal cleft only and has a linear shape is not a pressure ulcer and is likely to be a moisture lesion.</td>
<td>Bones may be more prominent where there is significant tissue loss (weight loss).</td>
</tr>
<tr>
<td>Shape</td>
<td>Perianal redness/skin irritation is most likely to be a moisture lesion resulting from feces.</td>
<td></td>
</tr>
<tr>
<td>Shape</td>
<td>If the lesion is limited to one spot, it is likely to be a pressure ulcer.</td>
<td></td>
</tr>
<tr>
<td>Shape</td>
<td>Diffuse different superficial spots are more likely to be moisture lesions.</td>
<td></td>
</tr>
<tr>
<td>Shape</td>
<td>In a kissing ulcer (copy lesion) at least one of the wounds is most likely caused by moisture (urine, feces, transpiration, or wound exudate).</td>
<td></td>
</tr>
<tr>
<td>Shape</td>
<td>Irregular wound shapes are often present in a combined lesion (pressure ulcer and moisture lesion).</td>
<td></td>
</tr>
<tr>
<td>Shape</td>
<td>Friction on the heels may also cause a circular lesion with full-thickness skin loss. The distinction between a friction lesion and a pressure ulcer should be made based on history and observation.</td>
<td></td>
</tr>
</tbody>
</table>

(Continues)
## TABLE 2.

### Wound-Related Characteristics (Continued)

<table>
<thead>
<tr>
<th>Pressure Ulcer</th>
<th>Moisture Lesion</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Depth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial-thickness skin loss is present when only the top layer of the skin is damaged (Grade 2). In full-thickness skin loss, all skin layers are damaged (Grade 3 or 4). If there is a full-thickness skin loss and the muscular layer is intact, the lesion is a Grade 3 pressure ulcer. If the muscular layer is not intact, the lesion should be diagnosed as a Grade 4 pressure ulcer.</td>
<td>Moisture lesions are superficial (partial-thickness skin loss). In case where the moisture lesion gets infected, the depth and extent of the lesion can be enlarged/deepened extensively.</td>
<td>An abrasion is caused by friction.</td>
</tr>
<tr>
<td><strong>Necrosis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A black necrotic scab on a bony prominence is a pressure ulcer Grade 3 or 4. If there is no or limited muscular mass underlying the necrosis, the lesion is a pressure ulcer Grade 4. Necrosis can also be considered present at the heel when the skin is intact and a black/blue shimmer is visible under the skin (the lesion will most likely evolve into a necrotic eschar)</td>
<td>There is no necrosis in a moisture lesion.</td>
<td>Necrosis starts without a sharp edge but evolves into sharp edges. Necrosis softens up and changes color (eg, blue, brown, yellow, or grey) but is never superficial.</td>
</tr>
<tr>
<td><strong>Edges</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If the edges are distinct, the lesion is most likely a pressure ulcer. Wounds with raised and thickened edges are old wounds.</td>
<td>Moisture lesions often have diffuse or irregular edges.</td>
<td>Jagged edges are seen in moisture lesions that have been exposed to friction.</td>
</tr>
<tr>
<td><strong>Color</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red skin: If redness is nonblanchable, this is most likely a pressure ulcer Grade 1. For people with darkly pigmented skin, persistent redness may manifest as blue or purple. <strong>Red in wound bed:</strong> If there is red tissue in the wound bed, the wound is either a Grade 2, a Grade 3 or a Grade 4 pressure ulcer with granulation tissue in wound bed. <strong>Yellow in wound bed:</strong> Softened necrosis is yellow and not superficial; it is either a Grade 3 or a Grade 4 pressure ulcer. Slough is a creamy, thin and superficial layer; it is a Grade 3 or a Grade 4 pressure ulcer. <strong>Black in wound bed:</strong> Black necrotic tissue in the wound bed indicates a pressure ulcer Grade 3 or 4.</td>
<td>Red skin: If the redness is not uniformly distributed, the lesion is likely to be a moisture lesion (exclude pressure and shear as causes). <strong>Pink or white surrounding skin:</strong> Maceration resulting from moisture.</td>
<td>Red skin: If the skin (or lesion) is red and dry or red with a white sheen, it could be a fungal infection or intertrigo. This is often observed in the anal cleft. <strong>Green in wound bed:</strong> Infection. Be aware that zinc oxide ointments may result in whitened skin. While eosin is not recommended, it is still used in some areas. It will turn the skin red/brown and obstruct the observation of the skin.</td>
</tr>
</tbody>
</table>

Moisture lesions are superficial (partial-thickness skin loss).

In case where the moisture lesion gets infected, the depth and extent of the lesion can be enlarged/deepened extensively.

An abrasion is caused by friction.

Necrosis starts without a sharp edge but evolves into sharp edges. Necrosis softens up and changes color (eg, blue, brown, yellow, or grey) but is never superficial.

Jagged edges are seen in moisture lesions that have been exposed to friction.

Red skin: If the redness is not uniformly distributed, the lesion is likely to be a moisture lesion (exclude pressure and shear as causes).

Pink or white surrounding skin: Maceration resulting from moisture.

Red skin: If the skin (or lesion) is red and dry or red with a white sheen, it could be a fungal infection or intertrigo. This is often observed in the anal cleft. Green in wound bed: Infection. Be aware that zinc oxide ointments may result in whitened skin. While eosin is not recommended, it is still used in some areas. It will turn the skin red/brown and obstruct the observation of the skin.
Try to find out the causes of the lesion:

**Check the (wound) history in the patient record.**
- If the lesion commenced as a large and deep lesion, it is unlikely that it is a moisture lesion.
- If the lesion developed after a long period of pressure and/or shear (eg, surgery, emergency department, radiology), even if the pressure and/or shear are not currently present, it is likely the lesion is a pressure ulcer.

**Which measures are taken/what care is provided?**
- Superficial linear lesions are often caused by removing sticking plaster and are neither pressure ulcers nor moisture lesions.
- If the pressure ulcer does not improve despite pressure relieving measures and suitable dressings for more than 7 to 10 days, and moisture is present, consider the possibility that the lesion is a moisture lesion.
- If the moisture lesion does not improve despite the use of skin barrier products and incontinence/moisture management for more than 2 days, and pressure and/or shear is present, consider the possibility that the lesion is a pressure ulcer. Exclude the possibility of contact sensitivity (eg, latex allergy). A dermatological consultation is recommended when in doubt about the diagnosis of contact allergy.

**What is the skin condition at the different pressure points?**
- If a pressure ulcer is present at another pressure point, it is likely this new lesion is also a pressure ulcer.

**Check whether the movements, transfers, and position (changes) of the patient may have caused the lesion.**
- If the affected area is a pressure point, a pressure ulcer is likely.
- If the affected area is not a pressure point, it is unlikely that the lesion is a pressure ulcer.
- If friction is exerted on a moisture lesion, this will result in superficial skin loss in which skin fragments are torn and jagged.
- Continuous friction causes abrasions.
- If shear deforms the superficial and deeper tissue layers, a pressure ulcer may be the result.
- If a lesion occurs on the heel, check if the lesion was caused by:
  a) pressure and/or shear very likely a pressure ulcer
  b) movement/transfer/shoes very likely a friction lesion/abrasion not pressure ulcer

**If a patient is incontinent, consider whether the lesion is a moisture lesion or not.**
- If skin barrier products are used in patients who are incontinent, then the chance that a new lesion is a moisture lesion is limited.
- If diapers or incontinence pads are often saturated, consider possibility of a moisture lesion.

**Exclude other possible causes.**
- Sometimes it can be difficult to differentiate between a moisture lesion and an infection, also characterized by irregular edges and satellite lesions (‘islands in front of the coastline’). In these cases, the clinical picture (fever, leukocytosis) should differentiate from moisture lesions.
- Other dermatological conditions should be considered when in doubt about the diagnosis of pressure ulcer or moisture lesion. A dermatological consultation is then recommended.

**Additional parameters**

**Texture of the skin**
Dead tissue feels dry/leathery and not pliable.

**Temperature of the skin**
Compare the temperature of the skin at the pressure point with the temperature of the surrounding skin. This may also be an indicator for detecting Grade 1 pressure ulcer in patients with a darkly pigmented skin.
- If the temperature is higher than that of the surrounding skin, hyperemia is present and the lesion is recent.
- If the temperature is lower than that of the surrounding skin, the blood flow is limited and the lesion is not recent.

**Pain**
Pain is described in 37% to 87% of the patients with pressure ulcers. Therefore, pain is not a discriminating characteristic for pressure ulcers.

Pain is caused:
- by irritation of the sensory nerve endings in and around the ulcer;
- when the wound is debrided;
- when aids are applied too tightly (eg, tubes, drains);
- when dressings rub against the surface of the wound;
- when dressings that stick to the wound surface are removed.

Patients with pressure ulcers experience both acute and chronic pain and describe the sensation as burning, stinging, sharp, stabbing, and tingling.
References


Commentary by Dorothy Doughty

Dr. DeFloor and the EPUAP have produced a thought-provoking statement on differentiation of pressure ulcers and moisture lesions, which coincides with similar issues raised during the recent consensus conference held by the National Pressure Ulcer Advisory Panel (NPUAP). The EPUAP and NPUAP staging systems for pressure ulcers are essentially equivalent; both use depth of breakdown as the basis for wound “stage,” and both include partial-thickness (Stage 2) lesions. Both of these systems were developed when our understanding of the pathology of pressure ulceration and other mechanical injuries was limited; it made sense at that time to classify wounds based on depth of tissue injury. As our knowledge base has grown, however, we have realized that our staging system is frequently problematic. One “problem” is that both partial-thickness and full-thickness lesions are labeled as pressure ulcers, although the current evidence suggests that pressure ulcers are full-thickness injuries and that partial-thickness lesions are generally a result of friction and maceration. These are not just semantic issues; as the EPUAP statement notes, accurate determination of causative factors is critical to the effective management of any patient with skin breakdown, because effective management begins with correction of the causative factors.

This document reflects the EPUAP’s recognition of and response to this problem; it effectively highlights the importance of differentiating between pressure ulcers and moisture-related lesions, and it provides helpful guidance to the clinician in conducting a thorough assessment and in accurately interpreting the assessment parameters. As noted, lesions caused by pressure or shear are typically full-thickness lesions with regular borders, whereas lesions caused by moisture or friction are typically partial-thickness lesions with irregular borders. This document, however, also acknowledges that these distinctions are not always as simple as they sound, because a lesion can be caused by a combination of factors.

The NPUAP has also begun to deal with the many complex issues related to pressure ulcer staging. The recent consensus conference posed numerous questions, including: “Are Stage 2 ulcers actually pressure ulcers (are they caused by pressure)?” and “Should lesions caused by factors other than pressure and shear be included in the pressure ulcer staging system?” This conference stimulated lively debate, and the WOCN’s contributions to this conference will be highlighted in an article in the January 2006 issue of the *Journal of Wound, Ostomy, and Continence Nursing.*

Instructions for Authors

The *Journal of Wound, Ostomy and Continence Nursing (JWOCN)* is a peer-reviewed journal. It disseminates research, evidence-based best practice (where research evidence does not exist), and general information to meet the ongoing educational and professional practice needs of the members of the Wound, Ostomy and Continence Nurses Society (WOCN) and other healthcare professionals around the world. Manuscripts that make a clear and original contribution to practice, theory, and scholarship within the broad mandate of WOCN practice are encouraged.

*JWOCN* welcomes submissions that adopt an interdisciplinary approach; reflect cultural issues; address pediatric issues in wound, ostomy, or urinary and fecal continence care; address international issues in WOC care; or that make use of more traditional care methods presented in the form of case studies.

Submissions should avoid sexist language and must be prepared according to the *American Medical Association Manual of Style* (9th ed). They should be approximately 15 to 20 pages, including references and abstract. All manuscripts are to be submitted electronically only.

To review complete submission guidelines and details for submitting a Research Report, Review, Case Study, or Letter to the Editor please visit the Web site www.WOCN.org or e-mail the managing editor at jwocn@look.ca.
The Use of Digital Images in Evaluating Homecare Nurses’ Knowledge of Wound Assessment

Kathleen M. Buckley ■ Binh Q. Tran ■ Linda Koch Adelson ■ Janice G. Agazio ■ Lauro Halstead

PURPOSE: The purpose of this study was to evaluate homecare nurses’ knowledge of wound assessment using digital images and case studies.

DESIGN: A descriptive design was used.

SUBJECTS AND SETTING: Subjects were a convenience sample of 33 registered nurses from a Washington, DC, metropolitan-based home health agency.

METHODS: Participants were asked to complete a demographic data sheet and a wound assessment checklist, while viewing projected digital images of 10 different wounds. A case study accompanied each image and provided wound assessment data that could not be visualized. Frequencies were calculated to determine the percentage of homecare nurses who were accurate in their assessment.

RESULTS: The most common error in staging was a lack of recognition of wounds that were not stageable. The majority of the homecare nurses were able to accurately identify wound bed and periwound characteristics; the greatest variability was found in the ratings for wound bed color.

CONCLUSIONS: Despite the difficulty of interpreting digital images of wounds, the study findings support the value of using them to evaluate nurses’ knowledge of the visual aspects of wound assessment as a basis for educational programs.

It has been estimated that approximately 5 million patients in the United States have chronic wounds, with 1.5 to 1.8 million new wound cases added each year.¹ Much of the current wound care has shifted to the expanding homecare market secondary to cost-containment measures and decreased length of hospitalization. In a study of 13 homecare agencies in Michigan, wounds were found in 36% of the patients, the majority of which were surgical, pressure ulcers, and vascular leg ulcers.² Even in the home setting wound care remains costly. Factors that may add to cost include variability of wound assessment, inconsistency in documentation, and low use of advanced wound products.³ These factors may lead to prolonged healing times, lower healing rates, an increased number of home health visits, and more frequent hospitalizations secondary to complications.

Homecare nurses must be able to accurately assess wounds, select appropriate dressings from numerous wound care products, and make decisions on the proper wound care protocol for various wound types.² To provide suitable educational programs and improve homecare nurses’ skills in assessing wounds and using advanced wound care products and treatments, periodic evaluations of their knowledge base is necessary. Although the best method for evaluating homecare nurses’ knowledge related to wound assessment and treatment has not been established, one important aspect of wound assessment is identifying the macroscopic (visible to the naked eye) characteristics of the wound.³ In addition to wound visualization, the nurse should have knowledge of patients’ medical diagnoses, medications, dietary habits, mobility, tobacco use, and

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The purpose of this study was to evaluate homecare nurses’ knowledge of wound assessment using digital images and case studies and to identify those areas in which their assessment had the greatest accuracy.

Literature Review

Research regarding nurses’ knowledge of wound assessment and management has been primarily limited to pressure ulcer prevention and evaluation.5-8 Pieper and Mott2 examined hospital nurses’ knowledge of pressure ulcer risk and prevention, pressure ulcer staging, and wound description. They developed and used a 47-item true-false Pressure Ulcer Knowledge Test to evaluate nurses’ knowledge, and found that nurses who had recently attended a lecture or read an article about pressure ulcers scored higher on the test. The nurses’ age, educational background, or years of nursing employment did not have a significant effect on their scores.

Beitz et al5 examined the knowledge of pressure ulcer care among professional and nonprofessional nursing staff in a community hospital using a 100-item true-false Pressure Ulcer Risks and Treatment Test. They found large knowledge gaps, particularly in thematic areas, including pressure ulcer etiology factors, support surfaces, classification systems, and treatments. The nurses scored better, however, in areas of wound assessment and surgical approaches to pressure ulcers and complications, which was consistent with their hospital experience. The community hospital nurses also completed a Learning Needs Assessment Inventory, which demonstrated a low correlation between their knowledge of wound care and perceived need for additional education.

Research studies of homecare nurses’ knowledge of wound assessment and management are more limited.2,6,11 In a recent survey of 124 homecare nurses’ attitudes and knowledge related to leg ulcer care in the Ottawa-Carleton region of Canada, 92.7% of the nurses agreed that they could benefit from ongoing education about leg ulcers.5 Another 24.6% of the nurses stated that they did not have adequate knowledge of wound care products to use them effectively. Although the nurses’ agreement that they could benefit from additional education on wound care is not a measure of the nurses’ knowledge base, it does suggest the need for ongoing education and evidence-based practice guidelines. On the basis of the survey’s findings, the researchers suggested that crucial changes in practice may be needed for the region, including the recommendation for screening for arterial disease in patients with leg ulcers using Doppler measurement of the ankle brachial pressure index (ABPI). This study shows how an assessment of homecare nurses’ knowledge can potentially lead to improvements in practice.

Although nurses’ knowledge of wound assessment and care was not directly measured through a questionnaire or examination, Pieper and others2 studied wound treatments as self-reported by homecare nurses from 13 agencies in Michigan. They found that tap water and normal saline were the most commonly used cleansing solutions for wounds, and dry and moist gauze were the most frequently used dressings. This practice contradicts the current recommendation against the use of gauze dressings. Ovington,12 a leading expert in wound care, proposes that gauze dressings prevent optimal healing and should be replaced by readily available various advanced wound products. These products generally require fewer dressing changes and may reduce healing time, prevent infection, and be more cost-effective.

Researchers who have examined nurses’ knowledge of wound care using photographs or digital images are even more scarce. One research study did use wound photographs to evaluate the use of a decision tree in the management of chronic wounds.11 The investigators conducted an experimental study in a sample of 94 homecare nurses. Both the experimental and control groups of nurses were given photographs of 3 chronic pressure ulcers at different stages, with a brief description of the patient’s state of health. The experimental group was also provided with a decision tree on chronic wounds, whereas the control group had to rely on their own knowledge. The researchers found that the experimental group was able to make better decisions about staging and product choice with the addition of the decision tree. Although this study did not evaluate the effect of the photograph on an accurate wound assessment, the nurse was required to use the photograph to first stage the wound before selecting a product.

Wound assessment is not an exact science and is primarily based on skillful observation.13 Because many wound assessment components are visual, it seems reasonable to use images to assess nurses’ evaluation of wounds. When a direct inspection is not available, viewing photographs or digital images of wounds is comparable to bedside examination and provides similar assessments and treatment plans.14,15 It would not be possible, however, to develop an effective management plan for a wound based on an image alone. A holistic nursing assessment, including
information on the patient’s concurrent health problems, general risk factors (such as overall health, mobility, nutritional, and continence status), specific causative factors of the wound, potential for self-care or caregiver support status, and patient and family education needs, contributes to an appropriate plan of care. One practical means of combining the visual and more subjective data to evaluate nurses’ knowledge of wound assessment and management is through a case study accompanied by a digital image.

This article presents the results of a study of homecare nurses’ assessment of wounds using digital images and case studies. This study addressed the following question: How accurate are homecare nurses in assessing wounds based on digital images and case studies?

Methods

A descriptive design was used to determine homecare nurses’ accuracy in wound assessment. After receiving administrative approval, the homecare nurses from a Washington, DC, metropolitan-based home health agency volunteered to attend 1 of 4 educational sessions on wound assessment held over a 1-month period. On arrival, each nurse was given a packet of materials, which contained a demographic form, 10 brief case studies of various wounds with accompanying black-and-white images, and a wound assessment checklist. In addition, color digital images of the wounds were displayed by means of a PowerPoint (Microsoft Corp., Redmond, Wash) presentation on a standard projection screen using a liquid crystal display (LCD) projector.

Although a black-and-white image was provided to guide the homecare nurses in making their notations on the correct wound assessment checklist for each case, the nurses were directed to focus their assessment on the projected color image. Measures were taken to minimize color distortion of the images. They included projection of the image from a standard distance of 12 feet, use of similar background lighting, and operation of the same projector with laptop computer for each session.

As each wound image was displayed, the case study was read aloud by the primary investigator, and the nurses were given approximately 5 minutes per case to assess the wound using the wound assessment checklist. This process allowed little time to review or change answers for previous cases as the session proceeded. The nurses were instructed not to discuss the wounds among themselves but to use their own judgment in the assessments. The nurses were also asked not to discuss the case studies with nurses who planned to attend a future session. The forms were collected when completed, and each session concluded with a brief educational review of all of the cases with a summary of the correct answers. Each session lasted approximately 60 minutes.

The study was approved by the home health agency and the Catholic University of America’s Institutional Review Board as exempt under 45 CFR 46.101(b)(2)(4). The nurses’ assessment data were collected as part of an educational program, and the form used did not require them to disclose their identities directly or indirectly through identifiers. The selected images of wounds were obtained from a previously archived database and did not contain the patient’s face or any other identifying characteristics (eg, tattoos or birthmarks).

Instrument

The wound assessment checklist and PowerPoint of the wound images were designed for the study (Figure 1). Nurses evaluated each wound according to the stage of the wound, color and type of tissue in the wound bed, color and characteristics of the periwound, and presence of tunneling and undermining. The parameters of wound assessment selected included those currently in use by the home health agency at which the study occurred but excluded linear measurements and those wound characteristics that could not be determined visually, such as odor, induration, warmth, and pain. The nurses were also supplied with a copy of the National Pressure Ulcer Advisory Panel (NPUAP) guidelines for the staging of pressure ulcers. The wound digital images used in the PowerPoint presentation were taken from existing archived data and selected as examples of wounds most commonly treated in home health agencies. Wound types included surgical wounds, pressure ulcers of various stages, venous stasis ulcers, diabetic foot ulcers, and arterial ulcers. Each image was accompanied by a case history, including the patient’s age, gender, ethnicity, medical diagnoses, brief history of the wound, medications, linear dimensions of the wound, description of wound exudate, and pertinent wound parameters that could not be determined visually.

To establish content validity and scoring criteria for the images, 4 WOC nurses initially rated the wounds for each case. Measures to minimize distortion in color or clarity through projection of the images were similar to those described that were used with the homecare nurses. The WOC nurses were also provided with the opportunity to explain their reasons for selecting various wound characteristics. Compilation was made of the ratings to determine percentage agreement in each category of assessment among the WOC nurses. Because the WOC nurses were not completely in agreement for discriminating among the items, the correct answer for each item was determined by a decision rule based on agreement of at least 75% of the WOC nurses.
nurses. Once the correct answer for each item was determined, frequencies were calculated to determine the percentage of homecare nurses who achieved accuracy in their assessment. The frequencies for each item were then averaged for all of the case studies to determine a mean percentage agreement for each response category.

### Results

#### Study Sample

The convenience sample of home health nurses (N = 33) consisted of women who primarily were in their 40s and 50s and college educated (Table 1). The nurses’ experience varied, with a mean 22.2 ± 9.9 years working as an RN with 10.6 ± 5.5 years in homecare. The largest group of nurses participating in this study performed 5-10 patient wound visits per week.

#### Color of Wound Bed and Periwound

Of all of the wound characteristics assessed, the greatest variability among the homecare nurses was found in the ratings for wound bed and periwound color. In only one case was there 100% agreement by the homecare nurses for wound bed colors. This agreement occurred in case 4, which presented an acute surgical wound completely red in color. The variability in the rating of wound colors had

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**TABLE 1.**

Demographic Characteristics of Homecare Nurses (N = 33)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, yr</strong></td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td>5 (15.2)</td>
</tr>
<tr>
<td>40-49</td>
<td>14 (42.4)</td>
</tr>
<tr>
<td>50-59</td>
<td>13 (39.4)</td>
</tr>
<tr>
<td>60-69</td>
<td>1 (3.0)</td>
</tr>
<tr>
<td><strong>Gender, n (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>33 (100)</td>
</tr>
<tr>
<td>Male</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Education (degree), n (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>6 (18.2)</td>
</tr>
<tr>
<td>Associate</td>
<td>6 (18.2)</td>
</tr>
<tr>
<td>Bachelor’s</td>
<td>14 (42.4)</td>
</tr>
<tr>
<td>Master’s</td>
<td>6 (18.2)</td>
</tr>
<tr>
<td>Doctoral</td>
<td>1 (3.0)</td>
</tr>
<tr>
<td><strong>Average number of wound visits per week</strong></td>
<td></td>
</tr>
<tr>
<td>&lt; 2</td>
<td>7 (21.2)</td>
</tr>
<tr>
<td>2-5</td>
<td>8 (24.2)</td>
</tr>
<tr>
<td>5-10</td>
<td>12 (36.4)</td>
</tr>
<tr>
<td>&gt;10</td>
<td>6 (18.2)</td>
</tr>
</tbody>
</table>
also been found among the WOC nurses when developing the scoring criteria for the images. For example, although all of the colors were identified by some of the WOC nurses in case 1 (Figure 2), the correct answers for wound bed colors were determined to be red and yellow (Table 2). In only 5 of the 10 cases did the homecare nurses reach an agreement higher than 75% (Table 3), the cutoff that had been used to determine the correct answer among the WOC nurses. As the number of colors increased in a case, the accuracy in color identification decreased (Table 3).

Some of the comments that were made by the WOC nurses during their assessment of the images provided insight into color decisions. In an image of a skin graft (case 1), a black color was evident around the wound margins (Figure 2). Two of the WOC nurses described it as dried blood and did not include it as a color of the periwound, whereas the other 2 WOC nurses assessed it as eschar and checked the color black. As one of the WOC nurses stated, “That’s the problem with a photograph. It doesn’t allow you to scratch and sniff.” In another image of a venous stasis ulcer (case 5), yellow was noted in the wound bed by all of the WOC nurses. However, in their comments, 2 of the experts described the area as slough and suggested a debriding agent, whereas 2 others stated that it was most likely tendon, which needed to be kept moist.

As one of the WOC nurses stated, “That’s the problem with a photograph. It doesn’t allow you to scratch and sniff.”

**Wound Pressure Ulcer Staging**

In determining the scoring criteria, there was complete agreement among the WOC nurses for staging of all the wounds, except for 1 of the pressure ulcers (case 2), which was rated by one of the experts as stage III rather than stage IV (Figure 3). This wound exhibited tunneling, as evidenced by a cotton-tip applicator inserted into the tunnel, which led to a question of muscle and bone involvement. The percentage agreement with the correct response among the homecare nurses for staging ranged from 39% to 100% for all 10 case studies, with a mean of 72.5% ± 23% agreement (Table 4). Case 2, which created some disagreement among the WOC nurses, also produced low agreement (39%) among the homecare nurses. Two other cases received low agreement percentages. Case 7 consisted of a pressure ulcer of the ischial tuberosity that was completely covered with necrotic tissue. Seventy percent of the homecare nurses attempted to stage this wound without being able to visualize its depth or involvement, whereas the WOC nurses agreed that accurate staging of the pressure ulcer was not possible until the wound had been debrided. Case 10 was a diabetic ulcer of the plantar surface of a foot, which 42% of the homecare nurses staged as a pressure ulcer, although it did not meet the recommendations for pressure ulcers according to NPUAP guidelines.

**TABLE 2.**

Percentage Agreement Among WOC and Homecare Nurses for Wound Bed Color in Case 1*

<table>
<thead>
<tr>
<th></th>
<th>Red</th>
<th>Pink</th>
<th>White</th>
<th>Yellow</th>
<th>Gray</th>
<th>Black</th>
</tr>
</thead>
<tbody>
<tr>
<td>WOC nurses</td>
<td>100%</td>
<td>50%</td>
<td>25%</td>
<td>100%</td>
<td>25%</td>
<td>50%</td>
</tr>
<tr>
<td>Homecare nurses</td>
<td>88%</td>
<td>55%</td>
<td>3%</td>
<td>82%</td>
<td>18%</td>
<td>39%</td>
</tr>
</tbody>
</table>

*Bold indicates ≥75% decision rule used to determine correct answers.

As one of the WOC nurses stated, “That’s the problem with a photograph. It doesn’t allow you to scratch and sniff.” Seventy percent of the homecare nurses attempted to stage this wound without being able to visualize its depth or involvement, whereas the WOC nurses agreed that accurate staging of the pressure ulcer was not possible until the wound had been debrided.
TABLE 3.
Comparison of Number of Wound Colors With Accuracy in Identification

<table>
<thead>
<tr>
<th>Case No.</th>
<th>No. of colors</th>
<th>Percentage Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>90.9</td>
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<tr>
<td>10</td>
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<td>90.9</td>
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<tr>
<td>5</td>
<td>1</td>
<td>87.9</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>75.8</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>57.6</td>
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<td>8</td>
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<td>30.3</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>24.2</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>18.2</td>
</tr>
</tbody>
</table>

Type of Tissue in Wound Bed
Ratings on tissue type continued to vary with each case among the homecare nurses. The mean number of correct responses selected by homecare nurses for all of the cases ranged between 65% and 92% for the various wound bed tissue types (Table 4). The lowest mean number of correct responses was in identification of epithelial tissue (64.7 ± 22%), and the highest mean was in recognition of eschar (92.3 ± 14%).

Periwound Characteristics
Although the homecare nurses generally did well in identifying periwound characteristics, with correct answers ranging between 68% and 88% for all cases (Table 4), there was some variation in agreement. These differences were expected because the WOC nurses had also varied in their responses. For example, in only 4 of the 10 case studies was there 100% agreement among the WOC nurses for the presence or absence of edema. One WOC nurse commented that the “shiny” look of the skin in a venous stasis ulcer suggested edema, but that it also could have resulted from excessive lighting caused by a camera flash. Other WOC nurses noted that distant photograph shots showing the complete extremity were more useful in determining the presence of edema, as well as the extent of the wound and the general condition of the skin (eg, xerosis and scaling).

Other WOC nurses noted that distant photograph shots showing the complete extremity were more useful in determining the presence of edema, as well as the extent of the wound and the general condition of the skin.

Tunneling and Undermining
Only case 2 was identified as having tunneling by all of the WOC nurses. It was a wound photographed with a cotton-tip applicator placed deep in the side of a wound with another placed parallel to it outside the wound (Figure 3). Although the tunnel itself could not be directly visualized in the image, it was clear to all of the WOC nurses that the placement of the cotton-tip applicators was indicative of tunneling. Only 70% of the homecare nurses, however, recognized it as a tunnel. Similarly, undermining could not be directly viewed in any of the images. Nevertheless, it was noted in 3 of the wounds (cases 2, 3, and 7) by the WOC nurses. One WOC nurse clarified her assessment of 1 wound (Figure 4) and stated, “See that purple color on the periwound and those rolled edges. If I could probe under that edge with a cotton-tip applicator, I am certain that I would find undermining in that area.”

Discussion
The color of the wound bed and periwound had the most variability of all the wound characteristics assessed by the WOC nurses. Assuming that the nurses were knowledgeable in identifying basic colors, the challenge of identifying colors in wound images is the same as experienced in visualizing wounds directly in the clinical environment. Generally, red is identified in clean granular wounds, whereas yellow and black are used to describe the presence of necrotic tissue. Bone, tendon, callous, and topical treatments, such as povidone-iodine, however, may also cause yellow in a wound. In a similar manner, eschar, suture,
<table>
<thead>
<tr>
<th>Case No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Mean ± SD</th>
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<tbody>
<tr>
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<td>Stage IV pressure ulcer</td>
<td>Surgical wound</td>
<td>Venous stasis ulcer</td>
<td>Arterial ulcer</td>
<td>Pressure ulcer covered with necrotic tissue</td>
<td>Stage II pressure ulcer</td>
<td>Pressure ulcer covered with eschar</td>
<td>Diabetic foot ulcer</td>
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<td>91</td>
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<td>58</td>
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<td>82</td>
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<td>55</td>
<td>82</td>
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<td>Maceration</td>
<td>91</td>
<td>46</td>
<td>46</td>
<td>97</td>
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<tr>
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<tr>
<td></td>
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<td>82</td>
<td>82</td>
<td>58</td>
<td>46</td>
<td>21</td>
<td>61</td>
<td>88</td>
<td>97 ± 24</td>
</tr>
<tr>
<td></td>
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<td>18</td>
<td>91</td>
<td>82</td>
<td>88</td>
<td>21</td>
<td>58</td>
<td>94</td>
<td>64</td>
<td>94</td>
<td>69.2 ± 29</td>
</tr>
<tr>
<td></td>
<td>Callous</td>
<td>91</td>
<td>67</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>97</td>
<td>100</td>
<td>100</td>
<td>55</td>
<td>88.3 ± 17</td>
</tr>
<tr>
<td></td>
<td>Tunneling</td>
<td>100</td>
<td>70</td>
<td>88</td>
<td>85</td>
<td>100</td>
<td>100</td>
<td>88</td>
<td>100</td>
<td>100</td>
<td>92.8 ± 10</td>
</tr>
<tr>
<td></td>
<td>Undermining</td>
<td>87</td>
<td>55</td>
<td>94</td>
<td>91</td>
<td>100</td>
<td>100</td>
<td>70</td>
<td>100</td>
<td>97</td>
<td>89.1 ± 15</td>
</tr>
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</table>
In contrast to color, the staging of wounds using digital images was much less variable, as evidenced by the high percentage of agreement among the WOC nurses. Although the staging of wounds was generally consistent among the WOC nurses, there was some variability among the homecare nurses. Some of the homecare nurses used the NPUAP pressure ulcer staging guidelines on wounds that were not pressure ulcers, and others staged a pressure ulcer that was completely obscured by necrotic tissue. Accurately staging pressure ulcers is important for treatment decisions, as well as for regulatory purposes and reimbursement.

Although the majority of the homecare nurses identified the wound bed and periwound characteristics in most cases, there were some errors in assessment. These errors may have resulted from deficient skills in assessment or to limitations of assessment based on digital images. For instance, a poor understanding of the terms used in the assessment scale, such as “maceration,” “epithelial,” or “granulation,” may have affected the homecare nurses’ choices. In contrast, variation in the angle and distance of the camera from the subject and the source of lighting may have led to different interpretations of some wound characteristics. Although angled lighting has been recommended for capturing features such as edema or distention, these characteristics are not as easily recognizable in a digital image. They may even be difficult to assess in a bedside examination, which is why palpation is recommended for determining their presence and extent.

The subjective human element also may have led to differences in assessment of wound color or characteristics. Past experiences often guide a multidimensional assessment for experts in which they rely on the interaction of multiple cues. Interpretation of cues may be primarily based on experience rather than the analysis of lighting or color. For instance, in the current study, all of the WOC nurses reported that they saw edema in the venous stasis ulcer, whereas only 27% of the homecare nurses agreed with this finding. Was the experts’ assessment based on what they expected to see, and were they looking more carefully for an expected characteristic based on their previous experience? Because a digital image of a wound is only a 2-dimensional representation of a 3-dimensional object, it is understandable how tunneling and under-
mining may be difficult to identify. Some of the home-care nurses, however, were unable to identify tunneling even in an image where a cotton-tip applicator was placed within and outside the tunnel of the wound. Although this finding initially seemed surprising, it highlighted the importance of not taking for granted that nurses will understand the guidelines that are used in wound photography to emphasize select characteristics.

This small single-site study had some limitations. The variability in findings among the novice and expert nurses in this study highlights the limitations of using digital images for evaluation and education related to wound assessment. Restricted by not being able to use the senses of touch and smell with a digital image, there were differences even among the WOC nurses in agreement on color, presence of wound bed tissue types, and periwound characteristics. These restrictions emphasize the importance of having a

The variability in findings among the novice and expert nurses in this study highlights the limitations of using digital images for evaluation and education of wound assessment in education.

standardized format for assessment data that accompanies the images, which not only provides a holistic assessment but also details those wound characteristics that are difficult or impossible to visualize. Although the WOC nurses had some opportunity to verbalize their reasons for selecting various wound characteristics, this option was not available for the homecare nurses. Further qualitative research is needed, which examines the nursing expert’s and novice’s reasons behind wound assessments based on digital images as related to their knowledge base and use of visual cues.

Conclusion

With the large number of patients with wounds in homecare, there is a need to evaluate homecare nurses’ skills in wound assessment and to provide corrective education based on the findings. With the limitations of distance, time, and cost, meeting this need may be possible through the technology offered by digital images. Despite the difficulties in interpreting digital images, wound assessment is a visual art and photographs can add dimensions where word descriptions fail. The findings in this study support the value of using digital images to evaluate nurses’ assessment skills and to educate nurses on the visual aspects of wound assessment, provided that appropriate background information is available and nurses are provided with the stand-
ACKNOWLEDGMENT
The authors thank the following nurses for their participation and support in this collaborative research project: Carolyn Corazza, Judy Derencin, Barbara Djordjevic, Nancy Hartman, Donna McMullen, JeAnne Potter, Mari-Jo Solomon, and Rebecca Wuerstlin.

References
Nutritional Assessment in Chronic Wound Care

Elizabeth Evans

The WOC nurse may be the only clinician available to assess patients’ nutritional status. Thus, the aim of this article is to assist the WOC nurse in any setting to provide a nutritional assessment of all wound care patients. This article reviews the most commonly ordered laboratory tests and provides a brief explanation of how to interpret the findings and why prealbumin levels are the laboratory test of choice for nutritional assessment.

Chronic wounds affect at least 2-3 million adults in the United States. The most common types are pressure ulcers, venous ulcers, and neuropathic wounds. These wounds are costly in terms of both healthcare dollars and effect on general health status and quality of life.¹ Patients at greatest risk for development of a chronic wound are those with a chronic medical condition affecting sensorimotor status, vascular function, or general health and mobility. The wound may be a reflection of the underlying disease process or may be a complication of the immobility and general debilitation associated with the disease. Effective management of any chronic wound begins with a thorough assessment and requires attention to the causative and contributing factors, systemic factors affecting the repair process, and appropriate topical therapy.² Among systemic factors affecting repair, nutritional status is particularly important and is an element of care that is frequently ignored or inadequately addressed. This article addresses current issues and principles in nutritional assessment and intervention for patients with chronic wounds.

Clinical Assessment

Ideally, any patient with a chronic wound undergoes a thorough nutritional assessment completed by either a registered dietician or a nutrition support team member. These resources, however, are not available in all healthcare settings; therefore, the WOC nurse should be able to provide at least a basic nutritional assessment. Baseline assessment usually includes patients’ height and weight, calculation of body mass index (BMI) if indicated, clinical indicators of malnutrition, laboratory studies, determination of current nutrient intake, and determination of nutrient needs.

Height and Weight

The European Pressure Ulcer Advisory Panel (EPUAP) recommends height and weight as baseline screening; recent unplanned weight loss is indicative of a catabolic state and always mandates further assessment.

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Unplanned weight loss is indicative of a catabolic state and always mandates further assessment. The WOC nurse should question the patient specifically about any weight gain or loss during the previous 6 months. Any unplanned weight loss should be quantified as accurately as possible by asking the patient about his or her usual weight and present weight. To determine the percentage of body weight lost, the patient’s present weight should be compared to his or her usual weight. Weight loss of <5% body weight during the past 6 months is classified as mild, 5-10% is considered moderately severe, and >10% is considered severe weight loss. Unplanned weight loss of >10% is typically associated

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with poorer clinical outcomes; these patients may require supplementation with modified anabolic steroids or appetite stimulants in addition to adequate repletion of calories and protein. Daily weight measurements conducted daily at the same time with the same amount of clothing are also a simple way to track any changes in nutritional status and the response to treatment.

**Calculation of BMI**

In addition to screening for evidence of recent weight loss, the clinician should screen the patient for significant obesity. Obesity means excess fat or adipose tissue, not just excess weight. The gold standard for assessing body fat content is a dual-energy x-ray absorptiometry (DXA); however, this test is expensive and needs frequent cross-standardization, and as a result, it is usually reserved for research studies. Bedside assessment of obesity is typically done by calculating BMI, which provides a reasonable approximation of obesity. For adults over 20 years of age, BMI is calculated by dividing weight in kilograms by height in meters squared (or by the formula: “weight in pounds × 704” divided by “height in inches squared”).

There are several online calculators and charts available for determining BMI (eg, www.caloriecontrol.org/bmi/html). The BMI for children and teenagers is referred to as “BMI for age” and is the only BMI that is gender and age specific; the tool and calculator for determining BMI in these populations is provided by the Centers for Disease Control and Prevention (CDC) at www.cdc.gov/nccdphp/dnpa/bmi/bmi-for-age.

Table 1 provides interpretation of BMI results for adults over age 20. In interpreting BMI results, the clinician should be aware that BMI is falsely high in individuals with a great deal of muscle mass, such as weightlifters, and falsely low in individuals who have lost muscle mass, such as the elderly or individuals with prolonged debilitation. In these individuals, a combination of BMI and waist circumference provides a more accurate measurement of obesity than BMI alone. For example, a BMI >25 is typically considered indicative of obesity. A BMI of 26, however, in a bodybuilder with a waist circumference of 36 results from excess muscle. In contrast, a BMI of >25 combined with a waist circumference >35 inches in a female or >40 inches in a male is indicative of obesity and is correlated with increased risk for comorbid conditions, such as diabetes, heart disease, or hyperlipidemia.

To measure waist circumference, the clinician should take the measurement halfway between the superior iliac crest and the rib cage (at the point of the midaxillary line); the tape measure should be snug but should not cause compressions on the skin.

**Nutritional Intake**

In addition to obtaining weight history, height, and BMI (when obesity is suspected), the WOC nurse should conduct a simple nutritional intake history by asking the patient to recall his or her nutrient intake during the past 24 hours, 3 days, or 1 week (depending on the patient’s recall ability); alternatively, the WOC nurse could have the patient (and/or caregiver) record all food and fluid intake for at least 3-7 days. It is also important to query the patient or caregiver regarding factors affecting food intake, eg, “unable to cook, so ate tea and toast”. If the patient and/or caregiver is able to complete a nutritional intake history or chart, the data can be used to generate approximate calorie and protein intake. For patients who are in acute care or long-term care settings, a “calorie count” can be done by the staff to determine current calorie and protein intake.

**Clinical Indicators of Malnutrition**

Other clinical parameters to be assessed include conditions associated with risk for malabsorption or malnutrition (such as diarrhea, gastroparesis, cirrhosis, or Crohn’s disease), functional status and activity level, hydration status, and wound-healing status. Signs of dehydration include hypotension, tachycardia, postural hypotension, mucosal xerosis, and decreased axillary sweating; in contrast, fluid overload is manifested by edema or ascites. Healthy granulation tissue in a wound bed suggests adequate availability of protein, whereas a clean nongranulating wound bed is common in patients who are malnourished with inadequate protein intake.

<table>
<thead>
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<th>Table 1: Body Mass Index Results for Adults Over Age 20</th>
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<tr>
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<td>&lt;18.5</td>
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<tr>
<td>18.5-24.9</td>
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<tr>
<td>25.0-29.9</td>
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<tr>
<td>&gt;30</td>
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<td>&gt;40</td>
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</table>
Other tests that can be used to complement the data provided by visceral protein levels include a complete blood count (CBC), comprehensive metabolic panel (CMP), C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), and total lymphocyte count (TLC).

Other tests that can be used to complement the data provided by visceral protein levels include a complete blood count (CBC), comprehensive metabolic panel (CMP), C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), and total lymphocyte count (TLC). The CBC will demonstrate anemia, cell size, cell shape, platelet count, and white blood cell count. CMP provides an evaluation of electrolyte balance, liver function, kidney function, and albumin. CRP is a protein that is usually not found in the blood in healthy individuals; however, CRP appears rapidly in the blood and body fluids in response to an injury with tissue necrosis. (It can usually be detected within 18 to 24 hours after the injury.) CRP levels are also useful for monitoring the healing process. ESR measures the rate at which erythrocytes settle out of blood; the rate rises in the presence of inflammation or necrosis, because these conditions cause changes in blood proteins that result in clumping of red blood cells (RBCs), and the clumped RBCs settle more rapidly because of their increased weight. ESR is therefore used to monitor the clinical progress of an inflammatory process. Both ESR and CRP can be used to monitor response to treatment of an inflammatory condition; however, CRP levels rise and fall more rapidly than ESR. Lymphocytes are agranulocytes that migrate to the areas of inflammation in both early and late stages; they are the sources of serum immunoglobulins, and they contribute significantly to the cellular immune response and immunologic reactions.
patients contending with illness or injury require 1.0-1.5 g/kg/day to support healing. An 8-oz glass of milk contains 8 g of protein, and 2 oz of tuna provides 15 g. The elderly patient with a BMI of 20 requires at least 65 g of protein per day, which is the equivalent of 8 glasses of milk.

There are several approaches to determine nutrient needs for an individual. One simple approach is to convert the patient’s weight to kilograms and use the following formulas to determine nutrient needs:

- Caloric needs: \[ \text{wt in kg} \times 30-35 = \text{total calories needed per day} \]
- Protein needs: \[ \text{wt in kg} \times 1.0-1.5 = \text{grams of protein needed per day} \]

One problem with this simple approach is that it does not address the altered caloric needs of an individual who is obese. Table 2 outlines a simple method for estimating the caloric needs for hospitalized patients that is based on BMI; this method should be used for calculating the caloric needs of obese patients.

Once nutrient needs are determined and compared to current intake, a nutritional plan can be constructed to fill the nutritional “gap.” This may involve dietary modifications, use of supplements, enteral feedings, or even TPN.

**Conclusion**

Nutritional assessment and intervention is a critical element of effective wound care; the WOC nurse should be able to provide baseline assessment and intervention when registered dietitians are not available. Key elements to be included in nutritional assessment include height and weight, clinical assessment, laboratory studies, determination of current nutrient intake, and determination of nutrient needs. These data are used as the basis for calculating and addressing the nutrient “gap.”

**References**

Thirty Years of Experience Living With a Continent Ileostomy
Bad Restrooms—Not My Reservoir—Decide My Life

Ina Berndtsson ■ Elisabet Lindholm ■ Inger Ekman

OBJECTIVE: This study describes long-term adjustment of people with a continent ileostomy.

SUBJECTS AND METHODS: Subjects were 68 people (25 males and 43 females) who underwent an operation for ulcerative colitis with a continent ileostomy (Kock pouch). The median number of years subjects had lived with a continent reservoir was 31 (range 29-36) at follow-up and the median subject age was 60 (40-89). Subjects completed a 36-item questionnaire designed to assess adjustment to ostomy surgery. Subjects ranked the questionnaire using a 6-point Likert scale; a response alternative “not relevant” was available. Content analysis was conducted on subjects’ responses to an open-ended question covering aspects of their quality of life.

RESULTS: High median adjustment ratings were found for all 36 statements; the maximum median rating of 6 appeared on 28 items. Eight items with the lowest median ratings were in the following domains: embarrassing situations, activity, body image, sexuality, and good care. Five items on medical care and 3 items on sexuality were most frequently considered “not relevant” by respondents. The most frequently mentioned quality-of-life domains were family, health, friends, and employment. Content analysis indicated that respondents were self-reliant, although they indicated that they experienced considerable impediments to bowel evacuation outside of the home.

CONCLUSIONS: In the long-term, people with a continent ileostomy have good self-care. The quality and availability of public restrooms, however, reduces their daily activities away from home.

Chronic ulcerative colitis (UC) is often associated with recurrent attacks of bowel pain, frequent bloody diarrhea, and urgency. Severe attacks may also be associated with general malaise, fever, anemia, and weight loss. Relapses typically occur in an unpredictable manner. Some patients are symptom free for years, whereas others suffer repeated attacks of varying severity. Medical treatment may be effective in bringing the attacks into remission; however, such treatment often fails to prevent relapses. Consequently, some patients feel insecure in planning their daily life, which, in turn, can make them feel uncertain in social relations and performance. In the late 1960s, 2 surgical procedures were offered to patients as a cure for UC: a proctocolecotomy with the resultant permanent ileostomy or the continent fecal diversion called the Kock pouch. With the evolution of the ileostomy technique—in combination with the advent of enterostomal care (stomatherapy and modern appliances)—the inconvenience associated with an ileostomy and pouching system on the abdomen is considerably less, enabling most patients to enjoy a full and active life. Some individuals, however, still experience daily problems, whereas for others, the mere change in body image and feelings of being “different” may lead to serious psychosocial consequences. First introduced in 1967, the continent reservoir, or Kock pouch, has become an attractive alternative for thousands of individuals undergoing surgery for UC. The Kock pouch can be quickly and easily emptied at a convenient moment by catheterization, and this construction eliminates a protruding stoma and obviates the need for an external appliance. These improvements have resulted in lifestyle benefits superior to those offered by conventional ileostomy.
On discharge, patients with a UC who have undergone Kock pouch surgery are provided with ileostomy catheters and instructions detailing how to perform regular evacuation with irrigation routines. During the first year after surgery, patients frequently consult with their specialist surgeon and enterostomal therapist (ET) at outpatient clinics. Because the patients have been taught to prevent peristomal skin problems and techniques to self-managing ostomy care, fewer visits and support are subsequently required. Although patients do not require any special diet per se, they are instructed to take special care with indigestible foods, which may plug their catheter and interfere with pouch evacuation.14,15 This means that patients must adapt to the stoma and must learn how to properly manage the pouch, flush the ileostomy, and practice self-care. Currently, however, we do not know if patients are truly successful in these endeavors in the long-term. Therefore, the purpose of this study was to assess patients’ long-term adjustment to daily life and self-care 30 years after undergoing surgery. This study is part of a larger research program on reservoir functioning and health-related quality of life (QOL) in persons with a continent ileostomy (CI).

First introduced in 1967, the continent reservoir, or Kock pouch, has become an attractive alternative for thousands of individuals undergoing surgery for ulcerative proctocolitis.

Patients and Methods

From 1967 to 1974, 121 people (47 males and 74 females) were operated on for UC with a CI (Kock pouch) at the Sahlgrenska University Hospital, Göteborg, Sweden. The median age for subjects at the time of surgery was 33 years (range 11-74). At the time of this follow-up study, 32 subjects had died and 1 was lost to follow-up, leaving 88 individuals eligible for the authors’ investigation. Subjects were mailed a specially designed questionnaire that focused on reservoir function, adjustment to living with a reservoir, and QOL. Follow-up telephone calls were made to those subjects who did not reply or returned incomplete questionnaires.

Questionnaire Disease-Specific Olbrisch Adjustment Scale (OAS)

The OAS is a 36-item questionnaire designed to assess respondents’ adjustment to physical, psychologic, and social changes that occur after UC surgery. Examples of the questionnaire questions from different categories include: “I think I lead a fairly normal life in spite of my reservoir (ostomy),” “There are many things I would to do if I did not have a reservoir (ostomy),” “I am content with my body and my reservoir (ostomy),” and “I worry that something embarrassing will occur in connection with normal sexual activity.”16 The instrument has been tested in large populations in combination with other instruments.17,18 The modified Swedish version of the instrument has been tested in 3 patient groups: a conventional and continent ostomy group, an ileal pouch-anal anastomosis group, and a straight ileal-anal anastomosis group.19 Ratings were made on a 6-point Likert scale ranging from “disagree sharply” to “agree completely” (with the total scores ranging from 36-216). To indicate when an item did not apply, the instrument included “not relevant” as an alternative. A median score was calculated for each item, and the items were ranked from lowest to highest scores.

Open-Ended Question

To determine aspects of QOL not covered in the instrument, subjects were asked to respond to the open-ended question: “What does quality of life mean to you?”20 Content analysis of the answers was performed and categories were identified.21

Statistical Methods

Wilcoxon’s rank sum test was used, and P < .05 was considered statistically significant. Descriptive data are presented as medians and ranges.

Ethics

The study was approved by the Ethical Committee of Sahlgrenska University Hospital, Sweden.

Results

Sample

Seventy-three of the 88 (83%) subjects replied to the questionnaires. One respondent returned the questionnaire without answering the questions, and 4 reported that their pouch had been excised at an early stage after the operation because of complications. For the remaining 68 (25 males and 43 females), the median age at the time of their operation was 30 years (range 11-59) and the median length of time since undergoing surgery was 31 years (range 29-36). The median age of the respondents at the time the questionnaire was administered was 60 years (40-89): males 57 years (46-75) and females 62 years (40-89). Demographic data for the patient population are presented in Table 1.

Pouch Function

Of the 68 respondents (24 males and 44 females), 26 reported that they had “very good” reservoir function, 33 said they had “good” function, and 9 indicated “poor” function. Those that responded to the questionnaire indicated that they emptied their reservoir a median of 4 times during a 24-hour period (range 2-10), and 39 (57%) indicated they emptied their reservoir ≥5 times during a 24-hour period.
Of the 15 nonrespondents, 12 were contacted by telephone. Ten of those subjects indicated their reservoir function to be “very good” or “good,” whereas 2 reported “poor” function. No differences were found between respondents and nonrespondents or between genders.

Disease-Specific Olbrisch Adjustment Scale (OAS)
The median overall OAS score was 171 (range 67-204). Those individuals reporting good reservoir function had a median score of 172 (67-204). Eight individuals reporting poor function had a median score of 162 (102-189) (n.s.). Median scores on all 36 items were high. The maximum median score of 6 was found on 28 items. The 8 items with the lowest median scores were found in the following domains: embarrassing situations, activity, body image, sexuality, and good care (Table 2). As shown in Table 3, the 5 items concerning medical care and 3 items concerning sexuality were the most likely to be considered relevant by respondents. No gender differences were found.

Open-Ended Question
The open-ended QOL question was answered by 51 respondents (75%). The most frequently mentioned QOL domains were family, health, friends, and employment (Table 4).

Content analysis indicated that the respondents considered themselves to be self-reliant; however, they also experienced considerable impediments to bowel evacuation outside of their home (Table 5). They described self-reliance as: “My ability to adjust to the new life situation,” “take command,” “I can’t imagine of my life without a reservoir,” and “don’t think I am different.” Respondents also reported inconveniences associated with the use of public restrooms and indicated the need to plan in advance for bowel evacuation when outside their home. There was no difference between those reporting satisfactory pouch function and those individuals reporting bad function. When asked about their health, own recourses, and bathrooms facilities, answers for the 2 groups were similar.

To determine aspects of QOL not covered in the instrument, subjects were asked to respond to the open-ended question: “What does quality of life mean to you?”

Discussion
Thirty years after surgery, respondents with a CI, who are now in their 60s, indicated that physiologic aging does not adversely influence functional capacity, and, as such, they appeared to enjoy a reasonably good life. Previous research also shows short-term results in persons with CI to be promising.10-13 The authors’ research on health-related QOL among persons with CI (which is on par with counterparts in the general population) also suggests grounds for optimism.22 Life for individuals with CI is not without problems, however. Consistent with previous reports, 23 respondents in the current study occasionally found it difficult to adjust to embarrassing situations, such as noise from the stoma, foul odors when evacuating at public restrooms, or fecal leakage and soiling of underwear. Some respondents also reported restrictions on traveling, physical exercise, and other activities.

Respondents in this study also scored high on the disease-specific OAS. However, a comparison study assessing outcomes of different UC surgical treatments using the OAS (Figure 1) showed that those with an ileal pouch anal anastomosis (the most common surgical treatment today) reported the highest level of adjustment. An explanation may be that those with an ileal pouch anal anastomosis were younger, and that this procedure is considered to give the most “normal” body image and bowel function.24-26 On the other hand, Burckhardt et al17 noted that patients’ adjust-

<table>
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<th>TABLE 1. Demographic Data of the Study Population</th>
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<td>n = 121</td>
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<td>Died during follow-up</td>
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</tr>
<tr>
<td>Available for the survey</td>
</tr>
<tr>
<td>Age at operation*</td>
</tr>
<tr>
<td>Years of follow up</td>
</tr>
</tbody>
</table>

*Median and range.
Of the OAS items that respondents reported as being not relevant, 3 statements concerned sexuality. Explanations for this finding could be that either these respondents were young with no sexual experience or they were not sexually active because of advanced age or illness or because they did not have a partner. Many respondents in this study reported that they had no contact with healthcare services; they also reported that they did not consider themselves to be patients any longer—a finding that confirms results of a previous study by Stevenson and colleagues.27

According to Orem's self-care theory,28 each person has the resources to perform self-care to preserve their life, health, and well-being. Respondents in the authors' study had adapted their self-care situation, having indicated that they are capable of performing self-care and that they had made plans for maintaining their health. They also indicated that they were adept at managing their pouch and flushing the ileostomy. They similarly indicated competency at emptying the reservoir at regular time intervals.

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Consequently, fears associated with possible embarrassment may lead those with CI to avoid unfamiliar or public situations (e.g., engaging in sport activities or traveling). This problem has been described, and such research indicates that this problem decreases over time, however9,10,23

### TABLE 2.

The Eight Items in the Ostomy Adjustment Scale (OAS) With Lowest Median Scores*  

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Afterwards, I can laugh about embarrassing situations that have happened because of my reservoir&quot;</td>
<td>4.058</td>
<td>1.934</td>
<td>4.5</td>
</tr>
<tr>
<td>&quot;I feel free to travel wherever I want in spite of my reservoir&quot;</td>
<td>4.292</td>
<td>1.8</td>
<td>5</td>
</tr>
<tr>
<td>&quot;I have felt confident enough to participate in sports and physical activities since my reservoir operation&quot;</td>
<td>4.574</td>
<td>1.774</td>
<td>5</td>
</tr>
<tr>
<td>&quot;I limit the number of activity I take part in because of my reservoir—even though it is unnecessary&quot;</td>
<td>4.641</td>
<td>1.703</td>
<td>5</td>
</tr>
<tr>
<td>&quot;Mostly, I forget about my reservoir and am not aware of it&quot;</td>
<td>4.742</td>
<td>1.601</td>
<td>5</td>
</tr>
<tr>
<td>&quot;I am satisfied with my body and my reservoir&quot;</td>
<td>4.758</td>
<td>1.436</td>
<td>5</td>
</tr>
<tr>
<td>&quot;I find it easier to enjoy sexual activities due to better health after my operation&quot;</td>
<td>4.5</td>
<td>1.555</td>
<td>5</td>
</tr>
<tr>
<td>&quot;My operation helped me to decide what things are most important in my life&quot;</td>
<td>4.632</td>
<td>1.623</td>
<td>5</td>
</tr>
</tbody>
</table>

*Higher scores indicate better adjustment.
Respondents indicated that they were careful to chew hard-to-digest foods, such as green vegetables and citrus fruits, which otherwise might plug the catheter and impede evacuation. Moreover, they learned from the ET nurse and through experience to protect their peristomal skin from being injured by mucus secretion. Problems specifically related to bowel habits were also noted by respondents in the current study. For example, patients reported that they emptied their CI at least 4 times each day (range 2-10). The CI evacuation procedure, which takes time and requires special preparations, is typically performed when the patient is sitting on the edge of the toilet while he or she evacuate the intestinal content into the toilet basin. However, because this procedure is often associated with noise, gas, and foul odors, it may be particularly demanding and embarrassing in public restroom settings. Public restrooms are another source of concern for individuals with a CI. Water must be available for patients to rinse their catheter and reservoir. Orem, however, points out that society must assume responsibility to facilitate individuals’ ability to perform self-care, and, as such, public restrooms should be of a sufficient standard (i.e., running water) to ensure that it meets the needs of all people, including those with a CI.

In describing their QOL in the open-ended question, respondents in the authors’ study most frequently mentioned family, health, friends, and employment. This is in accordance with earlier findings.

Results from this study indicate that respondents with a CI can—and do—adjust well to living with their pouch, in terms of both QOL and self-care. However, those engaged in the current study reported that bowel evacuation outside of the home, even after many years of experience living with a Kock pouch, may still result in considerable anxiety and embarrassment, a situation that may impede normal social functioning. Take away anxiety, such con-

| TABLE 4. Domains Rated Most Important in Relation to Quality of Life* |
|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| **Domains** | **n = 51 (%)** | **Family** | 20 (39) | **Health** | 19 (37) | **Friends** | 16 (31) |
| **Employment** | 11 (22) | **Economy** | 7 (14) | **Travel** | 7 (14) | **Handicap** | 4 (8) |
| **Food** | 2 (4) | **Pain** | 2 (4) | **Employment** | 11 (22) | **Economy** | 7 (14) |
| **Travel** | 7 (14) | **Handicap** | 4 (8) | **Food** | 2 (4) | **Pain** | 2 (4) |

*The participants had given none, 1, or more answers.

| TABLE 5. Results of the Content Analysis: Categories Identified and Statements Illustrating the Categories |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| **Own resource** | "Ability to adjust to the new life situations. I have to take new initiatives, not see myself as stricken with illness or handicap."
| **Elimination impediments** | "I have always taken command of my stomach and reservoir. My reservoir does not decide over my life, I am very proud and happy about that. My reservoir has never let me down."
| | "Can’t imagine of my life without my reservoir, I have lived my whole adult life with it. I have a good life; it would probably have been the same even if I hadn’t got ill."
| | "Everything has to do with getting used to the reservoir and I don’t think I am different. It is best to learn to accept one’s situation and make the best of it."
| | "My reservoir does not prevent me from doing things I want to do."
| | "Although my ostomy has worked well for many years, I have many restrictions in my life. I worry about traveling, about when I can empty the reservoir, and if others have to use the toilet after me."
| | "I have to make preparations for how fast I have to get to a restroom. To feel secure and do not fear that the appliance will be not easy to get."
| | "I’m tired of having appliances, tubs, tired of always having to know where the restrooms are and where the next one will be."
| | "People always knock on the restroom door if you take too much time."
| | "Bad restrooms, having to bring what you need into the restroom."

Summary

Results from this study indicate that respondents with a CI can—and do—adjust well to living with their pouch, in terms of both QOL and self-care. However, those engaged in the current study reported that bowel evacuation outside of the home, even after many years of experience living with a Kock pouch, may still result in considerable anxiety and embarrassment, a situation that may impede normal social functioning. Take away anxiety, such con-
Persons with a continent ileostomy (CI) were able to cope on their own; they reported that they did not feel isolated or different from others and that they had enough strength to face life.

Many respondents did not consider themselves to be patients any longer.

Most reported that it was difficult to adjust to embarrassing situations, such as noise from the stoma and foul odors, when evacuating at a public restroom.

KEY POINTS

✔ Persons with a continent ileostomy (CI) were able to cope on their own; they reported that they did not feel isolated or different from others and that they had enough strength to face life.

✔ Many respondents did not consider themselves to be patients any longer.

✔ Most reported that it was difficult to adjust to embarrassing situations, such as noise from the stoma and foul odors, when evacuating at a public restroom.

References

CE Test

Thirty Years of Experience Living With a Continent Ileostomy: Bad Restrooms—Not My Reservoir—Decide My Life

Instructions:
- Read the article on page 321.
- Take the test, recording your answers in the test answers section (Section B) of the CE enrollment form. Each question has only one correct answer.
- Complete registration information (Section A) and course evaluation (Section C).
- Mail completed test with registration fee to: Lippincott Williams & Wilkins, CE Group, 333 7th Avenue, 19th Floor, New York, NY 10001.
- Within 4-6 weeks after your CE enrollment form is received, you will be notified of your test results.
- If you pass, you will receive a certificate of earned contact hours and answer key. If you fail, you have the option of taking the test again at no additional cost.
- A passing score for this test is 13 correct answers.
- Need CE STAT? Visit www.nursingcenter.com for immediate results, other CE activities and your personalized CE planner tool.
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CE TEST QUESTIONS

General Purpose: To familiarize the registered professional nurse with a research study describing the long-term adjustment of persons with a continent ileostomy.

Learning Objectives: After reading this article and taking this test, the nurse will be able to:
1. Describe the use of the Kock pouch in the management of chronic ulcerative proctocolitis.
2. Identify the methodology used to conduct this research study.
3. Outline the results of this study in regards to the health related quality of life in persons with a continent ileostomy.
4. Which of the following statements is true?
   a. Indigestible foods may interfere with pouch evacuation.
   b. Digestible foods may plug the irrigation catheter.
   c. Patients with a Kock pouch require a special diet.
   d. Patients with a Kock pouch typically see their health care provider more often than patients with a permanent ileostomy.

6. Patients who participated in the research study discussed in this article were from
   a. the United States.
   c. Australia.
   d. Sweden.

7. What was the median age of the patients at the time of their surgery?
   a. 17 years
   b. 26 years
   c. 33 years
   d. 38 years

8. Which of the following best describes the primary methodology used in this study?
   a. In-person interviews
   b. Telephone interviews
   c. Written questionnaire
   d. Retrospective chart review

9. The Olbrisch Adjustment Scale is
   a. A quality of life rating scale used by patients with ulcerative colitis.
   b. A questionnaire designed to assess a patient’s adjustment following surgery for ulcerative colitis.
   c. An assessment scale used by health care providers to assess the functionality of the Kock pouch.
   d. A 10-question rating scaled used by health care providers to assess a patient’s adjustment to body altering surgery.

10. Which of the following rating scales was used in the study presented in this article?
    a. Descriptive data scale
    b. Olbrisch scale
    c. Wilcoxon’s scale
    d. Likert scale

11. Which of the following is true regarding the results of the study presented in this article?
    a. Men and women found that embarrassing situation issues were the most relevant to their quality of life.
    b. Women found that body image issues were most relevant to their quality of life.
    c. Men found their sexuality issues were most relevant to their quality of life.
    d. No gender differences were found.
12. Which of the following were the most frequently mentioned quality of life domains according to the results of the study presented in this article?
   a. family, health, friends, and employment
   b. family, friends, and social activities
   c. significant others, sexuality, and body image
   d. embarrassing situations, employment, social activities, and friends

13. According to the study presented in this article, respondents reported
   a. inability to be self-reliant.
   b. inconveniences associated with the use of public restrooms.
   c. inability to maintain full-time employment.
   d. inability to maintain long-term social relationships.

14. Which of the following is true according to the results of the study presented in this article?
   a. Physiological aging does not adversely influence functional capacity.
   b. Long-term results in persons with a continent ileostomy is not very promising due to nutritional deficiencies.
   c. No overall restrictions were found to occur with physical exercise and activities.
   d. Over time, persons with a continent ileostomy were able to adjust to embarrassing situations.

15. According to the study presented in this article, which of the following persons reported the highest level of adjustment?
   a. those with an ileal pouch anal anastomosis
   b. those with an ileal pouch small intestine anastomosis
   c. older persons
   d. younger persons

16. Results of an earlier study by Stevenson and colleagues were confirmed by respondents’ reports that
   a. it was difficult to adjust to embarrassing situations.
   b. they did not consider themselves to be patients any longer.
   c. they had adapted to their self-care situation.
   d. sexuality was a primary concern, no matter what their age.

17. Problems specifically noted by respondents in the study include those related to
   a. age.
   b. financial loss.
   c. bowel habits.
   d. gender.

18. According to the results of the study presented in this article, many respondents considered themselves to be
   a. isolated from family and friends.
   b. disabled.
   c. ill.
   d. healthy.

19. Results of the study presented in this article indicate that which of the following may result in considerable anxiety and embarrassment to persons with a Kock pouch?
   a. fashion and clothing issues
   b. dietary restrictions
   c. bowel evacuation outside of the home
   d. sexuality issues

---

**CE Enrollment Form**

*Journal of Wound, Ostomy and Continence Nursing, September/October 2005:*

**Thirty Years of Experience Living With a Continent Ileostomy: Bad Restrooms—Not My Reservoir—Decide My Life**

**A Registration Information:**

- Last name: [Blank]
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- MI: [Blank]
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**B Test Answers:** Darken one for your answer to each question.

| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15. | 16. | 17. | 18. | 19. |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
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| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

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2. Was the journal home study format an effective way to present the material? □ Yes □ No
3. Was the content relevant to your nursing practice? □ Yes □ No
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Clamping Short-term Indwelling Catheters
A Systematic Review of the Evidence

Ritin S. Fernandez Rhonda D. Griffiths

OBJECTIVE: The objective of this review is to determine the effects of clamping short-term indwelling urethral catheters before removal on the incidence of urinary tract infection, time to first void, voiding dysfunction, incidence of recatheterization, and the length of hospital stay.

MATERIALS AND METHODS: Published and unpublished randomized and quasi-randomized controlled trials, completed between January 1966 and July 2004, in English and other languages that compared the effects of clamping short-term indwelling urethral catheters, were systematically reviewed using multiple electronic databases. Determination of eligibility of trials for inclusion in the review, assessment of methodological quality, and data extraction were undertaken independently by 2 reviewers. Relative risks for dichotomous data and a weighted mean difference for continuous data were calculated with 95% confidence intervals. Where synthesis was inappropriate, a narrative overview has been undertaken.

RESULTS: Three trials that investigated the effect of clamping the indwelling urethral catheter compared to free drainage before removal were eligible for inclusion. Two trials reported no significant difference in the incidence of urinary tract infection (UTI), number of patients who developed urinary retention or required recatheterization, and the length of hospital stay between the 2 groups. Another reported that the postvoid residual urine volume for patients who did not receive reconditioning of the bladder increased from 4.25 mL at baseline to 42.25 mL after removal of the indwelling urethral catheter, whereas the residual urine volume for patients who received reconditioning increased from 17.25 mL at baseline to 22 mL at follow-up.

CONCLUSIONS: The evidence for clamping indwelling urethral catheters before removal remains equivocal. Given the current state of evidence, procedures relating to clamping of indwelling urinary catheters should not be initiated. Until stronger evidence becomes available, however, practices relating to clamping indwelling urethral catheters will continue to be dictated by local preferences and cost factors.

Approximately 15% to 25% of all patients admitted to hospitals are catheterized to monitor urine output during acute illness or after surgery and to treat urinary retention and for investigative purposes. Despite these benefits, insertion of an indwelling urethral catheter is not without complications. Catheter-associated bacteriuria is common and increases by 5-8% each day during the catheterization period. Other documented complications include bladder dysfunction and postoperative voiding impairment, which can lead to UTIs.

Nurses play an extensive role in the insertion and management of urinary catheters; therefore, it is essential that their practice reflect the best available evidence. Extensive literature has been published on the type and maintenance of urinary catheters and techniques for insertion; however, limited attention has been given to the techniques for its removal. Nursing practices relating to the removal of indwelling urethral catheters are generally based on personal preferences, rituals, and established practices rather than on a scientific basis. These practices could be attributed to the limited knowledge relating to catheter management among nurses.

Clamping urethral catheters before removal is one practice that is widely implemented. This practice was first recommended in 1936 because it was believed to improve bladder tone and sensation. In addition, clamping urethral catheters also stimulates normal filling and emptying of the bladder.
before removal. This systematic review investigates and summarizes the evidence relating to clamping urethral catheters before the removal of short-term indwelling urethral catheters. The objective of this review is to determine the effects of clamping short-term indwelling urethral catheters before removal on the incidence of UTI, time to first void, voiding dysfunction, incidence of recatheterization, and the length of hospital stay.

Clamping urethral catheters before removal is one practice that is widely implemented. This practice was first recommended in 1936 because it was believed to improve bladder tone and sensation.

Definition of Terms
For the purpose of this review, a short-term indwelling catheter was defined as a catheter inserted for a period of 1-14 days. The following hypothesis was tested: removal after a period of clamp and release is better than removal of a free-draining catheter.

Methods
Inclusion Criteria
The review included randomized and quasi-randomized controlled trials evaluating the effects of clamping before removal of short-term indwelling urethral catheters in people of all ages and in any setting (hospital, community, nursing home). Trials reporting either objective or subjective measures of patient comfort, patient satisfaction, quality of life, length of hospitalization, incidence of urinary retention, volume of and time to first void, other complications or adverse effects, and cost effectiveness were included.

Exclusion Criteria
Patients with congenital abnormalities of the genitourinary system were excluded from the review. This review also excluded trials that involved suprapubic catheters, intermittent catheterization, and removal of nephrostomy and suprapubic tubes.

Search Strategy
Trials for this review were identified by the Cochrane Incontinence Group. The search strategies are described in detail in the scope of the Cochrane Incontinence Group. Relevant trials were identified from the Cochrane Central Register of Controlled Trials (CENTRAL), and hand searching of journals. The Incontinence Group's specialized trials register was searched using the group's own keyword system, the following search terms used were: ([design.cct*] OR [design.rct*]) AND [topic.mech.cath*]. Date of the most recent search of the Cochrane library was May 2004. The reference lists of potentially eligible trials were perused, and experts in the continence management field were contacted to identify other possibly relevant trials. In addition, pharmaceutical company representatives and investigators were contacted to elicit further published and unpublished trials in the area. Reports in all languages were considered in the review.

The references and abstracts identified from the search were assessed against the inclusion/exclusion criteria independently by 2 reviewers, and the full texts were obtained of relevant reports. If the title and abstract were inconclusive, full texts were obtained for further assessment. Trials that were reported in more than one publication were included only once. Decision for study eligibility was made by both reviewers.

Assessment of Methodological Quality
The methodological quality of the eligible randomized controlled trials was assessed independently by two reviewers using the Cochrane Incontinence Group quality assessment tool. This tool assesses the reported quality of the:

1. Clear descriptions of the inclusion and exclusion criteria used to obtain the sample;
2. Evidence of allocation concealment at randomization;
3. Validity of the method used for assessment of outcomes;
4. Descriptions of withdrawals and dropouts;
5. Potential for bias in outcome assessment.

Any disagreements were resolved by discussion with a third person.

Data Collection
Data extraction from the included trials was undertaken and summarized independently by 2 reviewers using a data extraction tool that was developed for the review and piloted by three independent reviewers before use. Discrepancies between reviewers were resolved by discussion. Data were collected relating to type of biases, patient demographics, patient inclusion/exclusion criteria, types (eg, different lengths and sizes) of short-term indwelling catheters, types of operation categories, description of the
interventions, description of the outcomes, follow-up period, and the number and reasons for withdrawals and dropouts.

**Statistical Analysis**

All calculations were made using the Cochrane statistical package Review Manager (RevMan) Version 4.1. The trials were assessed for clinical heterogeneity by considering the settings, populations, interventions, and outcomes. A fixed-effects model was used to combine data in meta-analyses. Consideration was given to using a random effects model if there was a significant statistical heterogeneity (as judged by the I² test) that could be explained by differences in the characteristics of the included studies. Relative risks and 95% confidence intervals (CI) were calculated for dichotomous data. Analysis of continuous data was undertaken using the mean and standard deviation values reported in the individual trials. The mean differences in outcome between the groups were weighted to account for different sample sizes and differing precision between studies. Analyses based on this effect measure are termed weighted mean difference (WMD) analyses in RevMan and the Cochrane Database of Systematic Reviews (CDSR).

Because of the paucity of data, subgroup/sensitivity analyses by different catheter sizes could not be undertaken. Where synthesis was inappropriate, a narrative overview has been undertaken.

### Results

**Description of Studies**

The search strategy identified a limited number of trials that compared clamping to free drainage. However, after application of the eligibility criteria to the titles and abstracts of the trials, the complete reports of only 7 trials that were considered suitable for this review were obtained. On further assessment, 4 trials were excluded because they did not meet the inclusion/exclusion criteria. Details of these trials and the rationale for their exclusion are presented in Appendix 1. This review, therefore, consists of 3 trials that compared clamping to free drainage. The size of the trials were 8, 106, and 120 participants. One trial involved patients of both genders and 2 included only females. The ages of the patients included ranged from 23 to 84 years. Patients were catheterized after general surgery, vaginal surgery, abdominoperineal resection, and lower bowel resection. One trial identified the type of indwelling urethral catheter used; none reported on the designation of the staff who removed the urethral catheters. Baseline comparability relating to age and operations performed was presented. One trial reported a statistically significant difference in the ages of participants in the intervention and control groups (P = .013). A description of the studies is presented in Table 1.

**Methodological Quality of Included Studies**

The methodological quality of the trials was assessed independently by 2 reviewers using the criteria determined by the Cochrane Incontinence Group. The Kappa statistic was used to calculate the interrater reliability between the reviewers. There was 100% concordance between the reviewers.

Overall, there was a wide variation in the quality of the trials. Only one described all aspects of methodological quality as defined by the Incontinence Group assessment criteria. Details regarding statistical power, clinical differences, and sample size calculation were not reported in any of the trials. A broad description of the inclusion and/or exclusion criteria was provided in all 3 trials; however, the quality of reporting of inclusion and exclusion criteria was extremely variable with precise criteria reported in 2 trials.
<table>
<thead>
<tr>
<th>Author/Participants</th>
<th>Intervention</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guzman13</td>
<td>Group 1: Removal of indwelling catheter within 24 hours after free drainage (n = 37)</td>
<td>Number (%) of patients who developed urinary tract infection</td>
</tr>
<tr>
<td></td>
<td>Group 2: Removal of indwelling catheter within 72 hours after (n = 36)</td>
<td>Group 1</td>
</tr>
<tr>
<td></td>
<td>Group 3: Removal of indwelling catheter within 24 hours + bladder re-education (n = 33)</td>
<td>3/37 (8%)</td>
</tr>
<tr>
<td>Oberst4</td>
<td>Group 1: Indwelling urethral catheters clamped before removal (n = 52)</td>
<td>Number (%) of patients who developed urinary retention</td>
</tr>
<tr>
<td></td>
<td>Group 2: Indwelling urethral catheters not clamped before removal (n = 58)</td>
<td>9/37 (24%)</td>
</tr>
<tr>
<td>Williamson14</td>
<td>Group 1: Bladder reconditioning (n = 4)</td>
<td>Incidence of recatheterization 10 hours after removal of the indwelling urethral catheter in patients after APR</td>
</tr>
<tr>
<td></td>
<td>Group 2: Free drainage (n = 4)</td>
<td>Group 1</td>
</tr>
<tr>
<td></td>
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<td>Incidence of recatheterization at discharge in patients after APR</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
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</tr>
<tr>
<td></td>
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<td>Women 0%</td>
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<td></td>
<td></td>
<td>Mean no. of minutes to first void after APR</td>
</tr>
<tr>
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<td>Group 1</td>
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<td>Men 240 minutes (SD 204)</td>
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<tr>
<td></td>
<td></td>
<td>Women 233 minutes (SD 173)</td>
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<td></td>
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<tr>
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</tr>
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<td>(P &gt; .05)</td>
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quate amounts after removal of the indwelling catheter. Williamson14 defined bladder dysfunction in terms of time lapse before resumption of normal micturition, post-voiding RUV, and subjective symptoms. In the trial by Guzman,13 urinary retention was defined as RUV of more than 100 mL for 2 consecutive micturitions after removal of the indwelling catheter.

An intention-to-treat (ITT) analysis should ideally include data from all those who were randomized. Inclusion of those patients who withdrew or dropped out from the trial is important because losing their data could result in bias.

Effects of Clamping Indwelling Urethral Catheters Before Removal

Three trials4,13,14 involving a total of 224 patients compared clamping the indwelling urethral catheter with free drainage before removal. All 3 used different clamping regimes and different methods for outcome assessment; therefore, the results could not be pooled in a meta-analysis. The available data have been presented for the following outcomes: urinary tract infection,13 time to first void,4,14 voiding dysfunction,4,13,14 incidence of recatheterization,4 and length of hospitalization.14 The data in all comparisons were few, and, hence, the confidence intervals were all wide.

Urinary Tract Infection

The effect of clamping of the indwelling urethral catheter at 24 hours and 72 hours in women after vaginal surgery was reported in 1 trial.13 The findings indicated no significant difference in the incidence of UTI in patients whose indwelling urethral catheters were removed after a clamping period of 72 hours or left on free drainage for either 24 (RR 1.12, 95% CI 0.24 to 5.18) or 72 hours (RR 0.55, 95% CI 0.15 to 2.01) before removal13 (Figure 1).

Time to First Void

Two trials4,14 reported on the time to first void after removal of the indwelling urethral catheter. In the trial by Williamson,14 patients were randomized to receive either reconditioning or no reconditioning of the bladder. Recondition of the bladder included clamping of the indwelling urethral catheters for 3 hours, followed by release of the clamp for 5 minutes for urinary drainage with this cycle repeated twice. Notwithstanding the small sample size, the authors reported that the time to first void was significantly shorter (P < .05) in patients who received bladder reconditioning (1.92 hours) compared to those who did not (2.75 hours). Similar findings were reported for patients having abdominoperineal resection or low anterior bowel resection (WMD -118 min, 95% CI 190 to 45).4 In this trial,4 clamping commenced on the fourth postoperative day. The indwelling urethral catheter was clamped for increasingly longer periods, beginning with a 1-hour interval until the maximum 4-hour interval was reached on day 6. Clamping periods were alternated with drainage periods of 5 minutes. On the first 5 study days, the indwelling urethral catheter was left to straight gravity drainage during the night. On the final day, the clamping continued for a full 24 hours.4

Voiding Dysfunction

All 3 trials investigated the effect of clamping vs free drainage on voiding dysfunction.4,13,14 No significant difference was reported in the number of patients who developed urinary retention after removal of the indwelling urethral after 24 hours (RR 1.74, 95% CI 0.87 to 3.49) or 72 hours (RR 1.39, 95% CI 0.74 to 2.61) compared to removal after 72 hours after a period of clamping13 (Figure 2). Likewise, in another study of 8 women, the authors reported that the measure of the postvoid residual volume after the removal of the indwelling urethral catheter...
demonstrated no significant difference between patients who received reconditioning of the bladder and those who did not. However, the postvoid RUV for patients who did not receive reconditioning of the bladder increased from 4.25 mL at baseline to 42.25 mL after removal of indwelling urethral catheter. The authors propose that the increase in RUV by 10-fold over its mean baseline value was well above what is significantly abnormal physiology, but the clinical significance of this increase is debatable. In contrast, the postvoid residual volume for patients who received reconditioning increased from 17.25 mL at baseline to 22 mL after removal of the indwelling urethral catheter.

There was also no statistically significant difference in voiding dysfunction between those patients whose indwelling urethral catheters were clamped and those whose were not (RR 0.74, 95% CI 0.44 to 1.24) in the third trial. A subgroup analysis, however, indicated that significantly fewer patients who had their indwelling urethral catheter clamped after abdominoperineal resection had voiding dysfunction (RR 0.65, 95% CI 0.37 to 1.14) (Figure 3). Further analysis according to gender indicated that the relative risk of developing voiding dysfunction among female patients who had abdominoperineal resection was 60% lower in patients whose indwelling urethral catheters were clamped before removal (RR 0.40, 95% CI 0.16 to 1.00) (Figure 4). There was no difference in voiding dysfunction between the groups in male patients (RR 0.88, 95% CI 0.44 to 1.78) (Figure 4).

Incidence of Recatheterization

In the only study that measured this outcome, no statistically significant difference was reported in the number of patients who required recatheterization.

Length of Hospitalization

Only 1 study compared clamping urethral catheters vs free drainage before removal. No statistically significant difference in the length of hospital stay was found.

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**FIGURE 2.** Incidence of urinary retention.

**FIGURE 3.** Incidence of postoperative voiding dysfunction according to type of surgery.
Discussion

This systematic review was undertaken to investigate the effect of clamping short-term indwelling urethral catheters before removal in adults and children. An exhaustive review of the literature resulted in only 3 published eligible trials involving male and female adult patients but no children. Because none of the trials included in this review involved children, the findings cannot be generalized to this population. None of the trials were described as either being single or double blind because this was not possible given the nature of the intervention.

Three trials involved 224 patients and comprised mainly women. Two of the 3 trials clearly described the protocol for clamping prior to catheter removal. However, as a result of the heterogeneous nature of the designs a meta-analysis could not be undertaken.

The results obtained from this review emphasize the lack of research in this area. The 3 studies included do not demonstrate a statistically significant reduction in UTI, urinary retention, number of patients who required recatheterization, length of hospital stay, or abdominoperineal resection voiding dysfunction after clamping indwelling catheters before removal. This could result from the trials undertaken being small and underpowered, resulting in failure to reach statistical significance for clinically significant outcomes.

There is modest evidence that clamping decreased the time to first void, but the clinical relevance of this finding is unclear. However, because the results are based on only 2 trials with small sample sizes, the evidence should be considered with caution.

Conclusion

Development of firm recommendations for clinical practice from this review is greatly hampered by the diversity of clamping regimes being compared, various outcome measures used, and the lack of replication of studies. The evidence for clamping indwelling urethral catheters before removal remains equivocal. Given the current state of evidence, procedures relating to clamping indwelling urinary catheters before removal is not recommended. However, until stronger evidence becomes available, practices relating to clamping indwelling urethral catheters may continue to be dictated by local preferences and cost factors.

Implications for Research

This review has provided a guide to future priorities for research.

1. Further randomized trials using larger samples are needed to provide robust evidence of the effects of clamping or free drainage of the indwelling urethral catheters before removal.
2. Outcome measures (e.g., urinary retention) need to be clearly defined to increase the robustness of further trials.
3. Evaluation in wider settings, in populations, and on specific groups of patients would enhance generalizability.

ACKNOWLEDGMENT
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The authors thank the General Managers of the South Western Sydney Area Health Service (Australia) for funding this review. In addition, they acknowledge the assistance of the librarians and library staff of the Liverpool Health Service library for their assistance with the search strategy and the timely retrieval of articles, and Associate Professor, Rosemary Chester, for her support throughout the project. The reviewers also thank Cochrane Incontinence Group referees and editors for their comments to improve the review. Special thanks are due to Peter Herbison for statistical advice.

KEY POINTS

- The aim of this systematic review is to determine the effects of clamping short-term indwelling urethral catheters before removal.
- Clamping urethral catheters before removal is one nursing practice that is widely implemented and is generally based on personal preferences rather than on a scientific basis.
- Only 3 randomized controlled trials were eligible for inclusion in this review.
- The evidence for clamping indwelling urethral catheters before removal remains equivocal.
- Until stronger evidence becomes available, practices procedures relating to clamping of indwelling urinary catheters should not be initiated.

References


Appendix 1. Studies Excluded From This Review

   Reason for exclusion: This trial compared intermittent catheterization.

   Reason for exclusion: This trial compared the effect of threshold clamping compared to free drainage on blood pressure, pulse and blood loss.

   Reason for exclusion: Comparative study of interventions to prevent infection.

   Reason for exclusion: Not a clinical trial.
Women who are diagnosed with breast cancer and undergoing chemotherapy and radiation are at high risk of developing acute radiation dermatitis. The purpose of this case study is to explore an alternative topical therapy for skin toxicity in the post-radiation care of a patient with a history of breast cancer. The patient, a 54-year-old white female, was treated by modified radical mastectomy, chemotherapy, and radiation. During post-radiation therapy the patient developed wet desquamation reaction over the midincision line into the right axilla. Balsam Peru, hydrogenated castor oil, trypsin (Xenaderm Healthpoint, San Antonio, Tex) was trialed to evaluate efficacy in providing wound healing to the denuded skin. Within 14 days of treatment, the area was completely healed and topical therapy stopped. This case study provides the basis for further research into the area of topical therapy for women with moist desquamation after radiation for breast cancer.

The purpose of this case study is to explore an alternative topical therapy for skin toxicity in the post-radiation care of a patient with a history of breast cancer. The treatment described in this case study may offer WOC nurses an alternate therapy for a common post-radiation skin ailment.

**Case History**

The patient is a 54-year-old white female with Stage III breast cancer of the right breast. Her medical history is not contributory. The patient opted for traditional medical and surgical management of breast cancer and had a modified radical mastectomy in February 2003. Her postsurgical course was unremarkable, and the surgical wound healed without incident. In April 2003, she began the first 12-week course of chemotherapies, including adriamycin/cytosin and then began weekly injections of paclitaxel (Taxol, Bristol-Meyers Squibb Co, NY) for a total of 12 weeks. Chemotherapy was followed by radiation therapy for a total of 30 treatments (25 low-dose and then 5 super-boost therapies to the heated incision line).

The patient followed the radiation oncologist’s protocol for skin care during radiation therapy and maintained a detailed diary of her experiences. The treatment plan included using a topical aqueous hydrogel (Radiagel, Carrington Laboratories, Irving, Tex) applied to the radiated area up to 3 times a day for the first 5 therapies. 

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Lynette E. Franklin, MSN, RN, CWOCN, Clinical Nurse Specialist in Wound, Ostomy & Continence Nursing, Medical University of South Carolina.

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Patient stopped this treatment because of local skin irritation characterized by “soreness” but denied erythema. Then she was switched to a topical oat beta glucan product, an oil-and-water emulsion product, which is indicated for dry skin and burns. (Glucan Pro, Brennan Medical, St. Paul, Minn). The patient developed some erythema and increased irritation but continued with this product for the remaining 20 therapies. She sought WOCN assistance when the skin toxicity continued to worsen, despite completion of radiation therapy. A localized wet desquamation reaction appeared over the midincision line and into the right axilla.

A topical product containing balsam peru, castor oil, and trypsin (BCT) used for the treatment of partial-thickness wounds (Xenaderm Healthpoint, Fort Worth, Tex) was trialed to evaluate efficacy in providing a healing wound environment to the denuded skin. The product is purported to stimulate blood flow at the capillary bed and maintain a moist wound bed to maximize healing. Therapy was continued with this ointment because immediate positive effects were noted. It was applied twice a day after cleansing with normal saline (Figure 1). Within 7 days, the patient’s skin was no longer weeping and the patient reported less irritation and drainage. A tertiary advantage was that her clothes no longer “stuck.” The patient did not experience any burning sensation, as may occur per product guidelines. Pain gradually decreased in the axilla region with continued application. Within 14 days, the patient was completely healed and stopped topical therapy. The patient continued to maintain skin suppleness with an over-the-counter topical lotion.

**Discussion**

A review of the literature indicates that numerous treatments are used to manage acute radiation dermatitis, some with better success than others. From the review, therapeutic treatment is addressed at 2 levels: prevention and management of side effects. Level of evidence is currently at level 3 based only on anecdotal and case study articles rather than randomized controlled trials.

Preventive therapies include, but are not limited to, the application of creams, lotions, and other topical treatments. Results vary, and the data are not supported by large repeated clinical trials. Several authors identify friction, such as skin shearing from clothing (bras or tight-fitting garments), and the fabric type of garment (such as synthetic fibers vs cotton and natural fibers) as factors that may interfere with normal skin processes.

If preventive measures fail, dry desquamation is the first sign of skin damage. Dry desquamation is defined as a skin area that is intact, dry, and characterized by flaking skin and pruritis and usually presents at 10-14 days after the first radiation treatment. Again, the literature recommendations for treatment of dry desquamation vary from numerous skin products, including over-the-counter lotions, creams, prescriptive agents, and topical corticosteroids. The choice of product used should be hydrophilic,
with neutral pH, because these products provide moisture to the injured area and decrease discomfort.³

By week 4 of radiation, moist dermatitis can develop, characterized by sloughing of the epidermis and exposure of the dermal layer.⁷ This dermatitis is typically found on the chest wall, supraclavicular region, or axilla or under the intact breast of the patient receiving breast radiation therapy. The goal of treatment is to minimize the trauma and discomfort, as well as promote healing and prevention of infection.⁸ Again, several products are used, including aloe vera, hydrophilic creams, antibiotics ointments, anti-inflammatory creams, silver sulphadiazine, and occlusive hydrocolloid and hydrogel dressings.²,⁸ Because the use of these products is not well supported by research data, effective treatment of moist desquamation requires additional information to establish treatment guidelines.

■ Summary

This case study demonstrates the effectiveness of a topical ointment containing balsam peru, castor oil, and typsin for treatment of moist desquamation after radiation for breast cancer. In comparison to other products the patient tried, she had marked healing within 7 days with the use of the product. Because the product contains metal and can deflect radiation beams if used during therapy, application is indicated only after radiation therapies are completed or on discussion with the radiation oncologist. Because the literature lacks randomized controlled research practice guidelines for this patient population, many of the current best practices are based on case studies. To strengthen the scientific support for use of the product in other radiation skin toxicity applications, further evaluation via controlled research studies is warranted.

■ References


■ Commentary by Mary Arnold Long

Radiation therapy has an incidence of 43 procedures per 1000 persons of all ages in the United States.¹ Two national consensus conferences have determined that breast conservation using lumpectomy and radiation treatment is the preferred treatment in early-stage breast cancer.² The author notes that the incidence of acute radiation dermatitis among women undergoing radiation treatment for breast cancer may be as high as 95%. Radiation dermatitis also can occur in those undergoing radiation treatment for other cancers.

Despite an exhaustive search for skin care guidelines during and after radiation therapy, standard guidelines do not exist. Multiple institutional Web sites were also searched. Two broad themes emerged. First, the skin should be cleansed with only mild soap and water during treatment. Second, the radiologist performing the radiation therapy would advise the patient on treatment of areas of irritation or blistering, should they develop. The potential for varied treatments with unclear outcomes exists because of lack of skin care guidelines during radiation therapy.

During treatment, the preferred skin care is mild soap and water. Based on our knowledge of the normal protective pH of the skin, a pH-balanced product is recommended, such as pHisderm (Chattem Inc, Chattanooga, Tenn), rather than alkaline commercial soaps. Although individuals may advocate emolliating or protecting the skin with such agents as aloe or commercial emulsions (Biafine, Medix Pharmaceuticals Americas, Inc., Largo Fl), no benefit has been proven.³,⁴ It is also important to assess the patient for the use of any products that may increase the risk of radiation dermatitis during radiation therapy. Many medications and herbal supplements increase the risk of photosensitivity, so a thorough assessment of use of prescription and over-the-counter products, including herbal treatments, is necessary.³

If radiation dermatitis occurs during treatment, the skin must be treated with hydrophilic agents so nothing interferes with the radiation beam. Hydrophilic agents include amorphous hydrogels, such as CarraSyn Hydrogel (Carrington Labs, Irving, Tex); emulsions, such as Biafine; or sheet hydrogels, such as Elasto-Gel (Southwest Technologies, Inc, N. Kansas City, Mo). One added benefit of the sheet hydrogels is that they may be removed, placed in the refrigerator, and reapplied. The coolness of the refrigerated hydrogel sheet may provide additional relief.

If radiation dermatitis extends beyond the time of radiation therapy, the need for hydrophilic agents no longer exists, although many practitioners continue the use of these
products until epithelialization occurs. Use of Xenaderm Ointment is innovative because the product provides a barrier between the damaged skin and the external environment and promotes epithelialization. This product is approved for use on partial-thickness ulcerations. However, use of Xenaderm could not be considered during radiation therapy because it is hydrophobic. The manufacturers of Xenaderm recommend the product be used with or without a dressing. Depending on the severity and location of the radiation dermatitis, several dressing options could be considered. A dressing such as Mepitel Soft Silicone Wound Contact Layer (Molynlyke, Newtown, Pa) may be considered because it adheres to intact skin but not to open wounds. Mepitel may be removed to allow application of the Xenaderm and reapplied. Mepitel, however, is challenging to work with because of its adhesion to intact skin. This may make it difficult for the patient to apply and remove. Mepitel generally also requires a secondary dressing. Other nonadherent options include Telfa (Tyco Health Care/Kendall, Mansfield, Mass) or an emulsion-impregnated dressing, such as ADAPTIC Non-adhering Dressing (Johnson & Johnson Medical, Somerville, NJ) or Mepilex Transfer or Mepilex Foam (Molynlyke). Telfa and Mepilex Foam do not require secondary dressings; however, ADAPTIC and Mepilex Transfer do. If the patient’s soft cotton brassiere without under wires or other garments secure dressings satisfactorily, the addition of tape is not necessary.

Cost may be a factor in the selection of interventions for radiation dermatitis during and after radiation therapy. Price for the aforementioned products were compared (Table 1) using the catalog of a mail-order supplier.7 The cost of Xenaderm to the pharmacy was derived by interview with a long-term acute care pharmacist. Because areas of radiation dermatitis are not routinely debrided, Medicare Part B would likely not cover the cost of the dressings. Other healthcare insurance providers may provide some coverage, particularly for the Xenaderm, because it is not available over the counter. Because the sheet hydrogels require less frequent application, they may be more cost-effective than the amorphous hydrogels, particularly because they do not require a secondary dressing. Although the Mepitel or Mepilex Transfer add expense to the use of the Xenaderm, it also may provide a cost benefit because it may be reapplied. Moreover, if epithelialization occurs in 2 weeks, as it did for the patient in the case study, product refills would be unnecessary.

Radiation therapy can affect the skin long after treatment. The patient may recover without difficulty from radiation dermatitis. Any skin exposed to radiation, however, is forever changed. The skin may darkened, and the patient may be at greater risk for impaired skin integrity compared to similar patients not exposed to radiation therapy.8 Should the patient experience a future wound in the irradiated area, that wound will be more difficult to heal. The patient should be counseled to share her history of radiation therapy with healthcare providers.

The use of Xenaderm to promote epithelialization is a novel and viable option for care, as demonstrated by this case study. As with all patient scenarios, however, appropriateness, ease, and cost of care must be evaluated on an individual basis.

## References


### TABLE 1.

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Clinical Manuscript Award


Teri Crawley-Coha

After graduating with a BSN from Northern Illinois University in 1979, Teri Crawley-Coha started her career at Loyola University Medical Center in Chicago, where she worked as a pediatric nurse. Teri then worked 5 years work with a homecare agency, during which time she returned to Loyola University to earn her master's degree in pediatric nursing. In 1990, Teri was hired by the University of Chicago Hospitals, where she was responsible for caring for children with gastrostomy tubes. While there, Teri helped launch a local chapter of the National SafeKids Campaign, The Chicagoland SafeKids Coalition, which aims to prevent common childhood injuries. In recognition for her contribution, Teri received 2 awards: 1 from the National Highway Traffic Safety Administration and 1 from the Illinois Department of Public Health. She has also published several articles on childhood injury prevention.

While at University of Chicago Hospitals, Teri worked with Connie Kelly and the Journal of WOCN Section Editor, Jan Colwell, whom she credits for her interest in caring for patients with ostomies. In 1996, Teri moved to Children's Memorial Hospital, where her responsibilities included caring for children with gastrostomies. Because there were no enterostomal therapists on staff at the time, Teri began working with infants and children with ostomies. Thanks to the flexibility offered by the WEBWOC program, Teri earned her WOC nursing certification in 2002.

Today, Teri cares for patients with gastrostomy tubes, wounds and skin issues, and cecostomies. Teri remains steadfastly passionate about her work and publishes and speaks on the topics of gastrostomy tube management, cecostomies, and wound management in pediatric patients.

Research Manuscript Award


Laura Bolton

Dr Laura Bolton’s involvement in wound healing began 27 years ago while working as a scientist at Johnson & Johnson. In 1987, Laura accepted a position as manager of product development at ConvaTec, where she led the team that developed DuoDERM CGF (ConvaTec, Skillman, NJ). Since 1981, Laura has served as adjunct faculty at the University of Medicine and Dentistry, New Jersey, where she is currently an Adjunct Associate Professor in the Department of Surgery.

In addition to organizing major wound care symposia, such as that resulting in the January 1994 CME supplement to the American Journal of Surgery entitled, “Wound Infection and Occlusion—Separating Fact from Fiction,” Laura has given more than 30 CME or CEU lectures and grand rounds lectures at medical facilities and universities throughout the world. She has published 40 articles in peer-reviewed wound journals and book chapters. She also serves on several editorial boards and is a peer reviewer for other journals in health economics, dermatology, and biomaterials.

In 2001, Laura was honored with the Sharon Baranoski Founder’s Award at the 16th Annual Clinical Symposium for Advances in Skin Care and Wound Care in recognition of a career of mentoring and educating colleagues in wound care. Currently, Dr Bolton is the Global Director of Scientific Affairs for ConvaTec and is actively involved in the Association for the Advancement of Wound Care’s Task Force on Government and Regulatory Affairs.