

TITLE: Dressing Materials for the Treatment of Pressure Ulcers in Patients in Long-Term Care Facilities: A Review of the Comparative Clinical Effectiveness and Guidelines

DATE: 18 November 2013

CONTEXT AND POLICY ISSUES

Pressure ulcers are regions of localized damage to the skin and underlying tissues that usually develop over bony prominences.¹ They occur as a result of uninterrupted pressure exerted on the skin, soft tissues, muscle, and bone leading to the development of localized ischemia, followed by a cascade of processes resulting in necrosis.² Areas of the body commonly predisposed to pressure ulcers include heels, hip, elbows, shoulders, back of the head, knees, thighs, and toes.² Ulcer severity is assessed in a variety of ways, but the US National Pressure Ulcer Advisory Panel (NPUAP) staging system is the most commonly used. The NPUAP system includes a four-stage categorization, representing progressive severity from intact skin with non-blanchable redness of localized area in Stage I, to full thickness tissue loss with exposed bone in Stage IV.²

People with impaired mobility (e.g., stroke or spinal cord injury patients) are most vulnerable to pressure ulcers.³ Conditions such as poor nutrition, poor sensation, urinary and fecal incontinence, and poor overall physical and mental health are predisposing factors to pressure ulcer formation.³ The incidence of pressure ulcers vary according to settings, with a range of 2.2 to 23.9 percent in long-term nursing facilities.² Prevalence of pressure ulcers is used as an indicator of quality for long-term care facilities, and progression of pressure ulcers in hospitalized patients is often considered an avoidable complication representing failure of inpatient management.² Higher prevalence is reported for the elderly, the acutely ill, and those who have sustained spinal cord injuries.⁴ In Canada, pressure ulcer prevalence is reported to range between 5.0% in the hospital setting and up to 30% for spinal cord injured patients in the community.⁵

Three fundamental approaches that may be employed sequentially in pressure ulcer wound care are reduction or elimination of underlying contributing conditions such as modifying support surfaces and providing nutritional support; provision of local wound care, including but not limited to wound dressing and topical applications to promote healing; and surgical repair of the

Disclaimer: The Rapid Response Service is an information service for those involved in planning and providing health care in Canada. Rapid responses are based on a limited literature search and are not comprehensive, systematic reviews. The intent is to provide a list of sources of the best evidence on the topic that CADTH could identify using all reasonable efforts within the time allowed. Rapid responses should be considered along with other types of information and health care considerations. The information included in this response is not intended to replace professional medical advice, nor should it be construed as a recommendation for or against the use of a particular health technology. Readers are also cautioned that a lack of good quality evidence does not necessarily mean a lack of effectiveness particularly in the case of new and emerging health technologies, for which little information can be found, but which may in future prove to be effective. While CADTH has taken care in the preparation of the report to ensure that its contents are accurate, complete and up to date, CADTH does not make any guarantee to that effect. CADTH is not liable for any loss or damages resulting from use of the information in the report.

Copyright: This report contains CADTH copyright material and may contain material in which a third party owns copyright. **This report may be used for the purposes of research or private study only.** It may not be copied, posted on a web site, redistributed by email or stored on an electronic system without the prior written permission of CADTH or applicable copyright owner.

Links: This report may contain links to other information available on the websites of third parties on the Internet. CADTH does not have control over the content of such sites. Use of third party sites is governed by the owners' own terms and conditions.

ulcer, where appropriate.^{1,2} Pressure ulcer wound care modalities are influenced by clinical practice guidelines and local practice patterns, patient-related issues such as comorbidities and nutritional status, and the stage and features of the wound.² Though complete healing with the restoration of functional integrity of skin to highest extent possible is the goal of therapy in most cases, the goal of therapy may be palliative for certain patients such as the terminally ill, focusing on reducing discomfort and/or deterioration of the pressure ulcer.⁴

In a systematic review involving 14,000 patients from 45 health care institutions to determine the prevalence of pressure ulcers in health care settings across Canada, the median prevalence of pressure ulcers in Canada, regardless of health care settings, is reported to be 26%.³ A study in Ontario, Canada showed that pressure ulcers increase the risk of mortality among geriatric patients by as much as 400%, increase the frequency and duration of hospitalization, and decrease the quality of life of affected patients.³ It is a source of significant economic burden, estimated to cost approximately \$9,000 (Cdn) per patient per month in the community setting.³ In the United States, it is estimated that total annual cost of treatment of pressure ulcers is \$11 billion with treatment cost per case ranging between \$37,800 and \$70,000.²

Dressings are an integral part of proper pressure ulcer wound care. They protect ulcers from trauma and contamination, and promote healing by absorbing exudate to prevent maceration while providing moisture balance to prevent desiccation which can hinder epithelial cell migration.^{1,2,4} A wide variety of dressings are available; including many with various combinations of properties such as wound bed preparation (debridement), antimicrobial activity, and moisture control.^{1,2,4} The purpose of this review is to provide information on comparative effectiveness of currently used dressing products to help inform management policy on stage 3 and 4 pressure ulcer.

RESEARCH QUESTIONS

1. What is the comparative clinical effectiveness of the most commonly-used wound-dressing product types for the management of stage three and stage four pressure ulcers in seniors restricted to beds in long-term care facilities?
2. What are the evidence-based guidelines regarding the appropriateness of the use of commonly-used wound dressing products for the management of stage three and stage four pressure ulcers in seniors restricted to beds in long-term care facilities?

KEY FINDINGS

Selection of the right dressing depends on wound-related factors such as presence of heavy exudate, necrotic tissue, desiccation, and infecting pathogens. Location of the pressure ulcer wound and the presence of a comorbidity such as incontinence could also influence the choice of dressing. While differing wound and patient conditions may favour choosing one dressing over another, no evidence in clinical trials was found to support consistent superiority of one dressing over alternatives for Stage 3 and Stage 4 pressure ulcer wound care.

METHODS

Literature Search Strategy

A limited literature search was conducted on key resources including PubMed, Medline, The Cochrane Library (2013, October), University of York Centre for Reviews and Dissemination (CRD), Canadian and major international health technology agencies, as well as a focused Internet search. No methodological filters were applied. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2008 and October 22, 2013.

Selection Criteria and Methods

One researcher screened the citations and abstracts from the literature search and selected articles according to the selection criteria outlined in Table 1, and also examined the full-text publication for the final study inclusion.

Table 1: Selection Criteria

Population	Seniors who are restricted to their beds, in long-term-care (LTC) facilities, with stage 3 or stage 4 pressure ulcers.
Intervention	<ul style="list-style-type: none"> • Hydrofiber dressings with silver (eg. Aquacel AG) • Foam-based dressings (eg. Mepilex) • Absorbent-based dressings (eg. Mextra) • Hydrocolloid dressings (eg. Comfeel) • Australian Sheepskins, direct skin application • Medical Sheepskins
Comparator	Pressure ulcer wound dressings compared to each other
Outcomes	<p>Clinical effectiveness as determined by “non-worsening” of the pressure ulcer, appropriateness of the dressing, when the dressing should be used</p> <p>Appropriateness of the dressing, when the dressing should be used, when it should not be used.</p>
Study Designs	Health technology assessments (HTAs), systematic reviews (SRs), meta-analyses (MAs), randomized controlled trials (RCTs), and clinical practice guidelines

Exclusion Criteria

Articles were excluded if they did not meet the selection criteria in Table 1. Therefore, non-pressure-related ulcers, including, but not limited to, venous ulcers and diabetic foot ulcers, which may differ significantly from pressure ulcers in terms of treatment considerations and modalities were excluded. Studies were also excluded if they were published prior to 2008, if they did not have a comparator group, if they were duplicate publications of a study already selected, or already included in at least one of the selected HTAs or systematic reviews.



Critical Appraisal of Individual Studies

Studies included in this review were appraised for quality using the AMSTAR⁶ tool. The strengths and limitations of individual studies were summarized and presented instead of calculated numerical scores.

SUMMARY OF EVIDENCE

Quantity of Research Available

The literature search provided 512 unique references, of which seven were selected for full-text review for their potential relevance to the topic. After examining full-text articles of this selection, two were excluded because they had been included in other selected systematic reviews or HTAs. Two other studies were excluded because they did not meet the inclusion criteria. The remaining three studies included in this review consist of two HTAs and one systematic review. APPENDIX 1 provides an outline of the selection process in a PRISMA flow chart.

Summary of Study Characteristics

Details of individual study characteristics have been provided in APPENDIX 2.

Country of Origin

The two HTAs and the systematic review included in this report used multi-nationally sourced studies. One HTA³ was performed by investigators in Canada but included studies from different countries.³ Authors of the other HTA² reported that most studies were conducted in the United States or Europe, although several studies were conducted in other parts of the world.² The systematic review¹ also comprised studies from many different countries.

Study setting

The setting for these studies in one HTA² included hospitals, long-term care facilities, wound care clinics, and patients' homes. Some studies were implemented in a variety of settings.² The other HTA³ included studies in long-term, acute and extended care settings. Other settings included rehabilitation wards, home care, nursing home hospitals and the community. The systematic review¹ reported that thirty-eight of the 103 included studies took place in acute care (37%), 25 in mixed settings (24%), 22 in long-term care (21%), 6 in rehabilitation (6%), 4 in ambulatory care (4%), 3 in home care (3%), 1 in palliative care (1%), and 4 did not mention their treatment setting (4%).

Patient population

One HTA² included studies limited to adults aged 18 years and older being treated for existing pressure ulcers. The authors reported that the populations in most studies were elderly patients (mean age typically between 70 and 85) with 11 studies including patients with spinal cord injury who were typically younger (mean age between 30 and 50).² They were stratified by demographics, socioeconomic status, medical comorbidities, and specific known risk factors for pressure ulcers.² The other HTA³ included studies with patients in any setting, with one or more pressure ulcers.³ In the systematic review¹, twenty-two trials (21.4%) included only participants older than 60 years or described participants as elderly and 11 trials (10.7%) included only



participants with spinal cord injuries.¹ None of the reviews included in this report provided a detailed breakdown of gender.

Interventions and Comparators

Interventions employed in the studies included this review can be broadly categorized into support surfaces (mattresses), nutritional supplementation, local wound care applications (topical ointments and solution, various dressings, and biological agents), surgical interventions and adjunctive therapy. In line with the relevance to this review, attention is focused on dressings.

The interventions included in one HTA² comprised a wide range of dressings, including hydrocolloid dressings, adhesive wafers, hydrogel dressings, transparent films, foam and polymeric membrane dressings, silicone dressings, alginate dressings, radiant heat dressings, and gauze dressings.² Similar dressings were used in trials included in the other HTA³ as well as the systematic review.¹

The comparators in most studies were other dressing interventions. In some studies, “usual” or “conventional” care was used as the comparison group. This usually referred to moist gauze dressings, but in some cases it was not defined.¹⁻³

Outcomes measures

One HTA² described outcomes reported in most included studies as complete wound healing, time to complete healing, and/or reduction in wound surface area or volume with few studies reporting pain reduction or wound infection as an outcome² Outcomes of interest in the other HTA³ included proportion of completely healed ulcers, percent change and rate of change in ulcer surface area/volume, mean time to achieve complete healing, treatment-related adverse events, and absorbency and ease of removal of dressings.³ The systematic review¹ included only studies that calculated wound size with wound volume and/or surface area, used evaluation tools that incorporated these measurements, or used complete wound healing as end points.¹

Summary of Critical Appraisal

The two HTAs^{2,3} and systematic review¹ used in this appraisal included studies that investigated various interventions, including dressings, used in adult patients with already existing pressure ulcer wounds at different stages of severity. They all provided a priori study design, details of a comprehensive literature search, and quality assessment of the individual included studies. Conclusions were formulated based on scientific quality of the included studies. Neither the HTAs nor the systematic review provide information about potential publication bias of any of the included studies. Statements about conflict of interest (either absent or potentially present) were provided. APPENDIX 3 provides further details of the critical appraisal of individual studies used in this report.

In one HTA³ which included a total of 18 systematic reviews, 104 RCTs, and 4 observational studies, one researcher screened the citations and abstracts from the literature search and selected articles according to predefined inclusion and exclusion criteria. RCTs were rated for quality based on method of randomization, concealment of allocation, inclusion and exclusion criteria, a priori sample size calculation, blinded assessment of outcomes employed, attrition



reported and explained, and intention-to-treat analysis.³ The quality of observational studies was evaluated based on method of patient selection, sample size, statistical analysis, and completeness of follow-up.³ Revman 4.2 (Cochrane meta-analysis software) was used to test for heterogeneity and to estimate the relative risk (RR) for complete healing of pressure ulcers when appropriate.

The other HTA² comprised 174 studies, including trials and observational studies. Sample sizes were often reported to be small: one HTA² reported that most included studies had fewer than 100 patients, with many having fewer than 50 patients, while the systematic review reported that 15 out of the 103 included studies involved more than 100 participants. Quality of individual studies for the HTA was assessed using adapted methods proposed by Down and Black and the U.S. Preventative Services Task Force. Trials were rated based on descriptions of randomization and allocation concealment; the similarity of compared groups at baseline; maintenance of comparable groups; adequate reporting of dropouts, attrition, crossover, adherence, and contamination; loss to follow-up; the use of intention-to-treat analysis; and ascertainment of outcomes.² A list each was provided for included and excluded studies.

The systematic review¹ included 103 RCTs. Three investigators independently rated the methodological quality of each RCT using 6 elements from the Checklist to Evaluate a Report of a Non-Pharmacological Trial (CLEAR NPT) that are relevant to therapies for pressure ulcers and resolved differences by consensus.¹ Quality elements rated were; adequate allocation sequence generation, concealed treatment allocation, adequate participant blinding, adequate outcome assessor blinding, comparable rates of other treatments and care in each randomized group, and intention-to-treat analysis.

Summary of Findings

APPENDIX 4 provides further details on the individual study findings and authors' conclusions.

1. What is the comparative clinical effectiveness of the most commonly-used wound-dressing product types for the management of stage three and stage four pressure ulcers in seniors restricted to beds in long-term care facilities?

The literature search for this report did not provide any study that confined population of interest to seniors with stage three and stage four pressure ulcers restricted to beds in long-term care. The included studies covered pressure ulcers in adult population in various setting including elderly (seniors) in long-term care. Furthermore, there were no subgroup analyses found that focused exclusively on the population, setting, and ulcer characteristics defined in the question. The following paragraph includes specific findings that relate to the use of dressing in the management of stage III and stage IV ulcers in adults including seniors in long term care. Generalizability of these findings is not certain as four studies out of 103 included in the systematic review, with a total of 184 participants (of 5889 total), reported findings for this specific population. It must be noted that the same four studies were reported in the HTAs, which included a total of 122³ and 174² studies in all settings. The advantages of calcium alginate dressing are reported in one study involving 20 participants.

Four RCTs found in the two HTAs^{2,3} and the systematic review¹ compared radiant heat dressings to other dressings in the treatment of stage III and IV pressure ulcers. Three of the RCTs included patients in long-term care. The mean age of participants in three trials ranged from 69.8 to 78.1 years, while the fourth states patients age 18 or older.¹ Evidence was found that radiant heat dressings produced more rapid wound healing rates than other dressings for stage III and stage IV ulcers. Though wounds healed more rapidly in the radiant heat group, the

number of complete wound healing for stage III and stage IV ulcers was not different compared to other dressing.¹⁻³

In a randomized study in one HTA³, 57 stage III or IV pressure ulcers in 20 geriatric hospitals were treated with calcium alginate for 4 weeks followed by hydrocolloid dressing for 4 weeks while 53 controlled ulcers were treated with the hydrocolloid (DuoDERM) dressing alone for 8 weeks. The mean age of participants in each group was 85 years and 82 years, respectively.³ After the 8-week treatment, ulcers treated with the sequential strategy showed a significantly greater mean absolute and relative reduction in the surface area compared with ulcers treated with hydrocolloid alone [mean (SD) absolute surface area (cm²) reduction = 9.7 (7.1) vs. 5.2 (7.2) ($P < 0.001$)].³ The sequential use of calcium alginate and hydrocolloid was also associated with fewer dressings used per week, less pain during removal, and less odor.³ The systematic review reported one study involving 92 stage III and IV pressure ulcer patients 60 years or older in an ambulatory setting, where calcium alginate dressings reduced wound surface area at 2.39 cm² per week compared with 0.27 cm² ($P < 0.001$) for dextranomer dressing.¹

Authors from one HTA³ reported evidence that hydrogel and hydropolymer may be associated with 50% to 70% more complete healing of pressure ulcers than hydrocolloid dressing; and that polyurethane foam dressings and hydrocellular dressings are more absorbent and easier to remove than hydrocolloid dressings in ulcers with moderate to high exudates.

2. What are the evidence-based guidelines regarding the appropriateness of the use of commonly-used wound dressing products for the management of stage three and stage four pressure ulcers in seniors restricted to beds in long-term care facilities?

The literature search for this report did not provide any study aimed at finding evidence-based guidelines regarding the appropriateness of the use of commonly-used wound dressing products for the management of stage three and stage four pressure ulcers in seniors restricted to beds in long-term care facilities. In a table discussing selection of dressings, one HTA³ suggested that a possible choice of dressing for deep pressure ulcer with cavity or undermining is calcium alginate or hydrofibre dressing.³ Another HTA² concluded that selection of treatments for pressure ulcers is often guided by product availability, local practice patterns, and individualized decision making based on specific patients and the features of a given pressure ulcer. The authors report that the review did not generate many findings to guide those choices based on evidence.² The systematic review¹ concluded that clinicians decide the approach to pressure ulcer therapy based on fundamental wound care principles, cost, ease of use, and patient preference.²

Limitations

The studies included in this report did not specifically investigate dressing with regards to the management of stage three and stage four pressure ulcers in seniors restricted to beds in long-term care facilities. The focus for all the studies was the general management of pressure ulcers including all stages of pressure in adult (included seniors) in different settings (including long-term care). Therefore, it is not known if the conclusions drawn from these studies would be different from studies that include only seniors with stage three and stage four pressure ulcers confined to beds in long-term care facilities.

Another potential limitation is that the studies did not appear to assess publication bias of included studies. One HTA² hints of the potential for biased reporting of results in literature such that only select studies were published and retrievable, and that published studies may have been affected by conflict of interest. The same study cites difficulty of measuring changes in the



size of pressure ulcer for outcome comparison, the relatively short duration of interventions, and poor quality of included studies as limitations.²

The systematic review¹ reports that restricting included studies to RCTs published in English language was a limitation to the potential scope of information available for investigation. Also, the variety of settings examined by the various RCTs may have limited generalizability of their results.¹

In one HTA³, only one investigator review citations and abstracts to select studies to be included. Though this was reported to have been done according to pre-determined criteria, having more than one person perform this task could guard against the influence of bias in the identification and evaluation of studies for inclusion.

CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING

Two HTAs and one systematic review were used to prepare this review. The studies were broad in scope without a special focus on seniors with stage three and stage four pressure ulcers confined to beds in long-term care. Generally, this review did not find evidence to support the use of one type of commonly used wound dressing over another. It is not certain whether this observation can be extended to imply that in the management of stage three and stage four pressure ulcer wounds in seniors confined to beds in long-term care, one dressing will be as good as the other. Though four studies found evidence that radiant heat dressing produced more rapid wound healing rates than other dressings for stage III and stage IV ulcers; and three of the four studies included seniors in long-term care; the clinical implications of this for seniors confined to bed in long-term care is not certain as the studies involved several settings and populations were small.

PREPARED BY:

Canadian Agency for Drugs and Technologies in Health

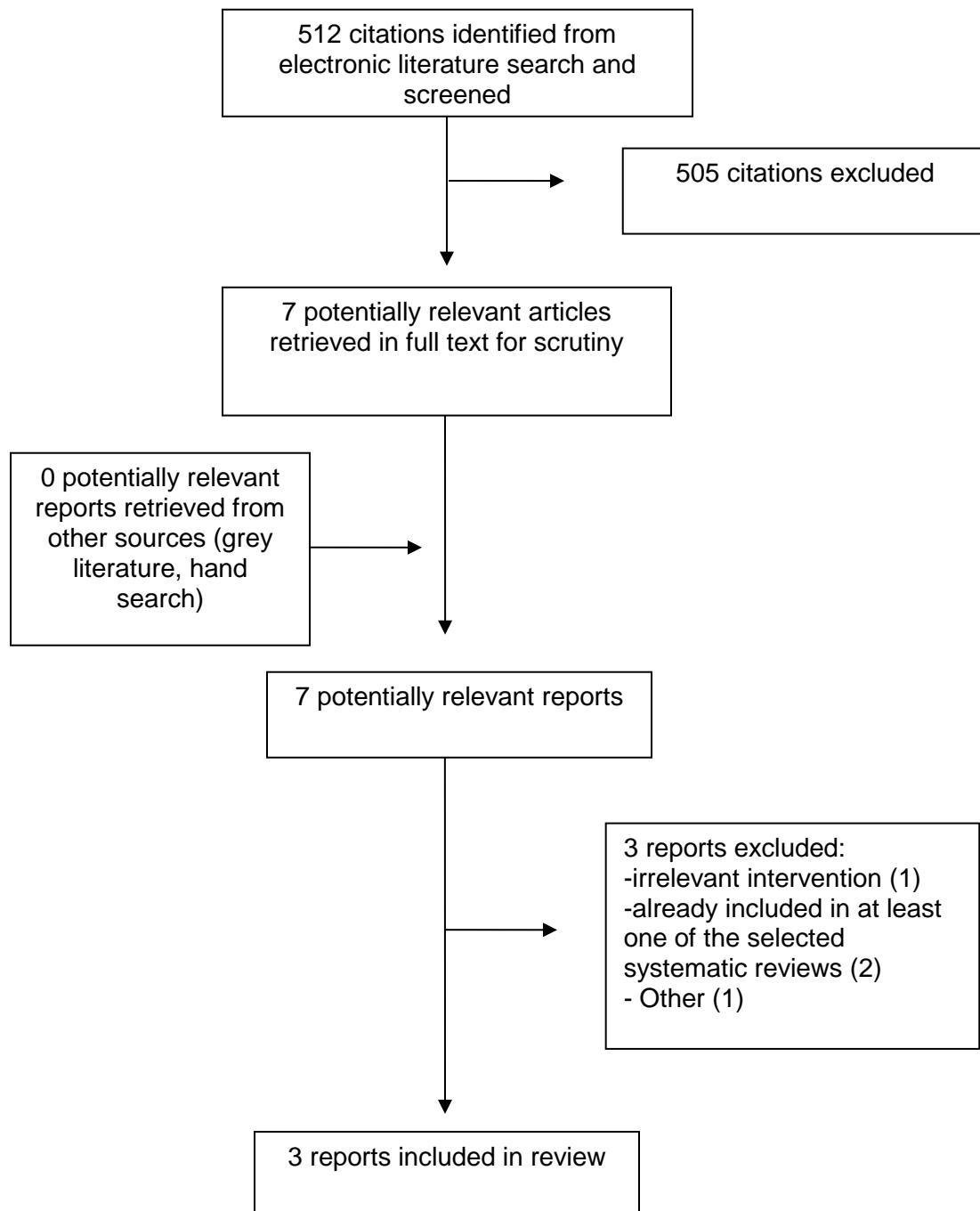
Tel: 1-866-898-8439

www.cadth.ca



REFERENCES

1. Reddy M, Gill SS, Kalkar SR, Wu W, Anderson PJ, Rochon PA. Treatment of pressure ulcers: a systematic review. *JAMA*. 2008 Dec 10;300(22):2647-62.
2. Saha S, Smith MEB, Totten A, Fu R, Wasson N, Rahman B, et al. Pressure ulcer treatment strategies: comparative effectiveness [Internet]. Rockville (MD): Agency for Healthcare Research and Quality; 2013 May. (Comparative Effectiveness Review; No. 90). Contract No.: 290-2007-10057-I. [cited 2013 Oct 25]. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK143657/pdf/TOC.pdf>
3. Health Quality Ontario. Management of chronic pressure ulcers: an evidence-based analysis. *Ont Health Technol Assess Ser* [Internet]. 2009 [cited 2013 Oct 25];9(3):1-203. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3377577/pdf/ohtas-09-203.pdf>
4. Whitney J, Phillips L, Aslam R, Barbul A, Gottrup F, Gould L, et al. Guideline for the treatment of pressure ulcers. *Wound Repair Regen* [Internet]. 2013 [cited 2013 Nov 15];14-663. Available from: <http://www.plasticsurgery.org/Documents/medical-professionals/health-policy/endorsed-guidelines/pressureulcers.pdf>
5. Australian sheepskins for the management of pressure ulcers: a review of the clinical-effectiveness, cost-effectiveness, and guidelines. Ottawa: Canadian Agency for Drugs and Technologies in Health (CADTH); 2009 Sep 21. (Health Technology Inquiry Service (HTIS)). [cited 2013 Nov 15]. Available from: http://www.cadth.ca/media/pdf/L0112_Australian_SheepskinUlcers.pdf
6. Shea BJ, Grimshaw JM, Wells GA, Boers M, Andersson N, Hamel C, et al. Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. *BMC Med Res Methodol* [Internet]. 2007 [cited 2013 Nov 5];7:10. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1810543/pdf/1471-2288-7-10.pdf>

APPENDIX 1: Selection of Included Studies

APPENDIX 2: CHARACTERISTICS OF INCLUDED STUDIES

First Author, Publication year, Country	Study Design	Patient Characteristics	Intervention	Comparator	Clinical Outcome
^a Saha, ² 2013 United States of America	HTA	Adults of 18 years or older with various stages of pressure ulcers in several patient care settings including home, nursing facilities and hospitals	Various wound dressings	Placebo; active control among dressing, usual care.	Measures of wound improvement including complete wound healing and wound size reduction
^a Ontario Health Technology Advisory Committee, ³ 2009 Canada	HTA	Adults patients with various stages of pressure ulcer wounds, with study mean ages ranging between 35.3 to 83.6 years in various settings including long-term and acute care facilities and in the community	Hydrocolloid, hydrogel, polyurethane foam, hydropolymer, hydrocellular and alginate dressing	Interventions compared to each other	Complete healing, time to heal, change in ulcer area
^a Reddy, ¹ 2008 United States of America	Systematic Review	Adults 18 years or older with various stages of pressure ulcers in various care settings	Absorbent wound dressings	Interventions were compared to each other	Complete wound healing, time to healing, and wound surface area.

^a For relevance, interventions and comparators in this table have been restricted to dressings. The actual study had one or more of the following additional interventions and comparators: support surfaces, nutritional supplements, biological agents, surgical repair, and adjunctive therapies, which were analyzed independently of dressings.

APPENDIX 3: SUMMARY OF CRITICAL APPRAISAL OF INCLUDED STUDIES

First Author, Publication year	Strengths	Limitations
Saha, ² 2013	<ul style="list-style-type: none"> • Comprehensive literature search based on pre-defined study design. • Consensus approach by independent reviewers to select studies to include in HTA. Lists of included and excluded studies was provided • Quality analysis of included studies was performed and findings were used to advise interpretation of results and conclusions • Used appropriate statistical tools to assess homogeneity of studies to inform feasibility of pooling results. • No conflicts of interest to declare 	<ul style="list-style-type: none"> • It is not known whether the likely hood of publication bias was assessed. • The study was not designed to focus solely on the population, setting, interventions and outcome measures of specific interest to requestor
Ontario Health Technology Advisory Committee, ³ 2009	<ul style="list-style-type: none"> • Comprehensive literature search based on pre-defined study design. • Quality analysis of included studies was performed and findings were used to advise interpretation of results and conclusions • Used appropriate statistical tools to assess homogeneity of studies to inform feasibility of pooling results. • No conflicts of interest to declare 	<ul style="list-style-type: none"> • One researcher screened citations and abstracts, and selected articles for inclusion and exclusion based on pre-set criteria. Using a sole extractor in this regard decreases objectivity in the process. • Lists of excluded studies not provided • It is not known whether the likely hood of publication bias was assessed. • The study was not designed to focus solely on the population, setting, interventions and outcome measures of specific interest to requestor
Reddy, ¹ 2008	<ul style="list-style-type: none"> • Comprehensive literature search based on pre-defined study design. • Consensus approach by three independent investigators to evaluate quality and select included and excluded studies • Quality analysis of included studies was performed and findings were used to advise interpretation of results and conclusions • Used appropriate statistical tools employed to assess homogeneity of studies to inform feasibility of pooling results. • No conflicts of interest 	<ul style="list-style-type: none"> • Lists of excluded studies not provided • It is not known whether the likely hood of publication bias was assessed. • Details of statistical analyses to assess homogeneity and feasibility of pooling results are not provided • The study was not designed to focus solely on the population, setting, interventions and outcome measures of specific interest to requestor

APPENDIX 4: MAIN STUDY FINDINGS AND AUTHORS' CONCLUSIONS

First Author, Publication Year	Main Study Findings ^a	Authors' Conclusions
Saha, ² 2013	<ul style="list-style-type: none"> • Radiant heat dressings produced more rapid wound healing rates than other dressings in stage III and IV ulcers, but were similar to other dressings in terms of complete wound healing for stage III and IV ulcers. • There is low-strength evidence that hydrocolloid dressings were superior to gauze and moderate evidence that hydrocolloid and foam (hydrocellular or polyurethane) dressings produced similar wound improvement. • Evidence about the comparative effectiveness of other dressings was insufficient to draw conclusions. • Evidence to ascertain comparative effectiveness of dressings by features of the pressure ulcer was insufficient. • Evidence to determine whether comparative effectiveness of or harms associated with dressings differ according to patient care settings, or features of the pressure ulcers, was insufficient. • Evidence that specific dressing types were associated with fewer harms than others was insufficient. 	<p>Evidence from four studies indicated a benefit of radiant heat dressings over other dressings. "Studies generally did not provide evidence to support the use of one type of commonly used wound dressing over another. There was evidence that hydrocolloid and foam dressings performed similarly, but evidence for other dressing types—hydrogels, alginates, transparent films, and silicone dressings—compared with each other or with standard gauze dressings was limited." Pg. ES 28</p>
Ontario Health Technology Advisory Committee, ³ 2009	<ul style="list-style-type: none"> • In deeper ulcers (stage III and IV), the use of alginate with hydrocolloid resulted in significantly greater reduction in the size of the ulcers compared to hydrocolloid alone; 7.0 vs. 1.6 at 4 weeks and 9.7 vs. 5.2 at 8 weeks ($P < 0.001$) • There is evidence that hydrogel and hydropolymer may be associated with 50% to 70% more complete healing of pressure ulcers than hydrocolloid dressing. • There is evidence that polyurethane foam dressings and hydrocellular dressings are more absorbent and easier to remove than hydrocolloid dressings in ulcers with moderate to high exudates. • No statistically significant differences in complete healing were detected among other modern dressings. • Sustained silver-releasing dressing demonstrated a tendency for reducing the risk of infection and promoting faster healing, but the sample sizes were too small for statistical analysis or for drawing conclusions 	<p>"There were no significant differences among modern dressings in influencing complete healing of pressure ulcers except:</p> <ol style="list-style-type: none"> a. Hydrocolloid dressing was associated with significantly more complete healing than saline gauze (5–12 weeks). b. Hydrogel or hyropolymer was associated with more complete healing compared with hydrocolloid dressing. <p>There is evidence that polyurethane foam dressing and hydrocellular dressing have better absorbency and less difficult removal compared with hydrocolloid dressings."³ pg. 139</p>
Reddy, ¹ 2008	<ul style="list-style-type: none"> • Calcium alginate dressing reduced wound surface area at 2.39 cm^2 compared with dextranomer dressing 0.27 cm^2 ($P < 0.001$). • No other study showed that one dressing was superior to the alternatives. 	<p>"Little evidence support the use of a specific support surface or dressing over other alternatives."¹ pg. 2647</p>

^a To maintain relevance to the topic, findings from studies which included only patients with stage I and/or stage II pressure ulcer wounds were not included.