TITLE: Non-Surgical Debridement for Chronic Lower Extremity Wounds: Clinical Effectiveness and Guidelines

DATE: 05 December 2013

RESEARCH QUESTIONS

1. What is the clinical evidence regarding the effectiveness of non-surgical debridement for the treatment and management of chronic, lower extremity wounds?

2. What are the evidence-based guidelines regarding the use of non-surgical debridement for the treatment and management of chronic, lower extremity wounds?

KEY MESSAGE

Five systematic reviews, three randomized controlled trials, eight non-randomized studies, and nine evidence-based guidelines were identified regarding non-surgical debridement for the treatment and management of chronic, lower extremity wounds.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2013, Issue 10), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2009 and November 20, 2013. Internet links were provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.

RESULTS

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and evidence-based guidelines.

Five systematic reviews, three randomized controlled trials, eight non-randomized studies, and nine evidence-based guidelines were identified regarding non-surgical debridement for the treatment and management of chronic, lower extremity wounds. No relevant health technology assessments were identified. Additional references of potential interest are provided in the appendix.

OVERALL SUMMARY OF FINDINGS

Of the systematic reviews, randomized controlled trials, and non-randomized studies that discussed debridement techniques,[1-16] maggot debridement therapy (MDT),[1-2,4,7-11,14,16] enzymatic therapy,[5-6] hydrogels,[4,8,15] and other newer methods[12-13,15] were examined. The majority of studies examining MDT observed it to be a simple and effective debridement technique to treat chronic lower extremity wounds[4,7,8,10,14,16] with the ability to work quickly in the first week of treatment,[7] reduce wound areas,[4] and reduce debridement time.[8] MDT was not observed to significantly increase the rate of healing in one RCT[8] and was associated with pain throughout treatment cycles in one NRS.[11]

The following methods were also observed to be effective in treating lower extremity chronic wounds: hydrogels (increased healing rates in one RCT),[4] enzymatic therapy (equivalent to saline moistened gauze in one RCT),[6] Debrisoft (efficacious simple procedure in one NRS),[12] and Woundcare 18+ (increased healing incidence and desloughing and associated with lower incidence of wound infection when compared to hydrogel in one NRS).[15] Table 1 includes specific information and conclusions from the included studies.

The nine evidence-based guidelines identified[17-25] produced the following recommendations on debridement techniques:

- Hydrocolloidal dressings[17,24]
  - reduced pain associated with its use[24]
  - improves healing when compared to gauze[24]
- Hydrogels[19,22,24]
  - may use topical hydrogel dressings in non-ischemic, non-healing dry wounds with non-viable tissue[22]
- MDT[19,24,25]
  - bagged or loose MDT debrides faster, with similar healing properties of hydrogel, but can be more painful[24]
  - medical grade maggots are required[25]
  - qualified personnel are required[25]
  - can also be used when conventional treatment is not working[25]
  - can be used in wounds where surgical debridement cannot be performed[25]
- Mechanical/Sharp[19,22,24]
  - best at removing tissue or eschar[19] in non-ischemic wounds[22]

- removes non-vital tissue and slough[24]
- less painful[24]
- faster progression with the use of eutectic mixture of local anesthetics (EMLA) cream.[24]

It was recommended that debridement techniques should be determined based on the condition and location of the wound,[20,23,25] its vascularity, the presence of biofilms and/or infection, the amount of necrotic tissue,[20] patient preference, and the clinician's expertise and experience.[23,25]

Two guidelines specified that only physicians with adequate training in wound debridement were recommended to perform the procedures, particularly when they become extensive.[19,23] In addition, clinicians adept in wound debridement should be consulted by less qualified clinicians should the need arise.[19] Pain management strategies were recommended for the pain associated with ulcer debridement and included the administration of EMLA cream[21,24] and ibuprofen-containing foam dressings.[24]

Table 1: Summary of the Clinical Effectiveness of Different Types of Wound Debridement

Author, Year	Patient Condition(s)	Debridement Type(s)	Conclusions
Systematic Reviews and Meta-Analyses			
Tian et al. 2013[1]	DFU	MDT	● Evidence was too weak to routinely recommend MDT.
Game et al. 2012[2]	DFU	Sharp, bed prep with larvae, and hydrotherapy	● Difficulties with analyzing evidence due to poor methodology and lack of controlled studies.
Hoppe et al. 2012[3]	NA	NA	● NA[a]
Edwards et al. 2010[4]	DFU	Hydrogels, MDT, surgical	● Hydrogel increased healing rates compared with gauze dressing/SOC. ● MDT significantly reduced wound area compared to hydrogel.
Ramundo et al. 2009[5]	Cutaneous ulcers and burn wounds	Enzymatic (collagenase)	● Collagenase ointment was safe and effective for cutaneous ulcers and burn wounds.
Randomized Controlled Trials			
Tallis et al, 2013[6]	DFU	Enzymatic (CCO) vs SMG + selective sharp	● CCO was equivalent debridement to SMG. ● CCO found to foster better progress toward healing.
Opletalova et al. 2012[7]	Leg wound	MDT vs conventional treatment	● MDT treatment was significantly faster and occurred in the first week of treatment. ● No significant benefit at day 15 when compared to conventional treatment. ● Suggested that another dressing should be used after 2-3 MDT applications.
Dumville et al. 2009[8]	Leg ulcers (either venous or venous/arterial)	MDT (loose larval or bagged larval) vs hydrogel	● MDT significantly reduced debridement time. ● MDT did not significantly

Table 1: Summary of the Clinical Effectiveness of Different Types of Wound Debridement

Author, Year	Patient Condition(s)	Debridement Type(s)	Conclusions
			increase the rate of ulcer healing.
Non-Randomized Studies			
Igari et al. 2013[9]	PAD	MDT	● MDT was not as beneficial for patients with an ABI lower than 0.6. ● Other patient and therapy characteristics did not appear to contraindicate the use the MDT.
Gilead et al. 2012[10]	Leg wounds (48% DFU)	MDT	● MDT was found to be effective, safe, and simple for the treatment of chronic wounds in ambulatory and hospitalized patients.
Mumcuoglu et al. 2012[11]	Leg wounds (48% bFU)	MDT	● MDT found to cause pain throughout treatment cycle and authors recommended that analgesics (including opioids when indicated) need to be available and titrated. ● Authors suggested that peripheral nerve blocks should be considered for patients who are uncontrolled on systemic medications.
Bahr et al. 2011[12]	Chronic wounds	Debrisoft[b]	● Debrisoft was found to be an efficacious, simple, and short procedure that patients find comfortable.
Neiderer et al. 2011[13]	Chronic wounds	DermaStream[c]	● NR
Wang et al. 2010[14]	Chronically infected lesions (DFU and pressure ulcers)	MDT	● MDT was found to be safe and effective for treating chronically infected lesions.
Gethin et al. 2009[15]	Venous leg ulcers	Woundcare 18+[d] vs hydrogel[e]	● Increased healing incidence, effective desloughing, and lower incidence of infection was observed with Woundcare 18+.
Paul et al. 2009[16]	DFU	MDT (*L. cuprina*) vs conventional treatment	● MDT with *L. cuprina* was as effective as conventional treatment for DFU.

ABI = ankle brachial pressure index; CCO = clostradial collagenase ointment; DFU = diabetic foot ulcers; MA = meta-analysis; MDT = maggot debridement therapy; NA = not available; NR = not reported; NRS = non-randomized study; PAD = peripheral artery disease; prep = preparation; RCT = randomized controlled trial; SOC = standard of care; SMG = saline moistened gauze; vs = versus.

[a] Abstract not available.
[b] New monofilament fibre product.
[c] A novel continuously streaming device for chronic wounds.
[d] Manuka honey
[e] IntraSite Gel.

REFERENCES SUMMARIZED

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses

1. Tian X, Liang XM, Song GM, Zhao Y, Yang XL. Maggot debridement therapy for the treatment of diabetic foot ulcers: a meta-analysis. J Wound Care. 2013 Sep;22(9):462-9. PubMed: PM24005780

2. Game FL, Hinchliffe RJ, Apelqvist J, Armstrong DG, Bakker K, Hartemann A, et al. A systematic review of interventions to enhance the healing of chronic ulcers of the foot in diabetes. Diabetes Metab Res Rev. 2012 Feb;28 Suppl 1:119-41. PubMed: PM22271737

3. Hoppe IC, Granick MS. Debridement of chronic wounds: a qualitative systematic review of randomized controlled trials. Clin Plast Surg. 2012 Jul;39(3):221-8. PubMed: PM22732371

4. Edwards J, Stapley S. Debridement of diabetic foot ulcers. Cochrane Database Syst Rev. 2010;(1):CD003556. PubMed: PM20091547

5. Ramundo J, Gray M. Collagenase for enzymatic debridement: a systematic review. J Wound Ostomy Continence Nurs. 2009 Nov;36(6 Suppl):S4-11. PubMed: PM19918148

Randomized Controlled Trials

6. Tallis A, Motley TA, Wunderlich RP, Dickerson JE Jr, Waycaster C, Slade HB, et al. Clinical and economic assessment of diabetic foot ulcer debridement with collagenase: results of a randomized controlled study. Clin Ther. 2013 Nov;35(11):1805-20. PubMed: PM24145042

7. Opletalova K, Blaizot X, Mourgeon B, Chene Y, Creveuil C, Combemale P, et al. Maggot therapy for wound debridement: a randomized multicenter trial. Arch Dermatol. 2012 Apr;148(4):432-8. PubMed: PM22184720

8. Dumville JC, Worthy G, Soares MO, Bland JM, Cullum N, Dowson C, et al. VenUS II: a randomised controlled trial of larval therapy in the management of leg ulcers. Health Technol Assess. 2009 Nov;13(55):1-182, iii-iv. PubMed: PM19925723

Non-Randomized Studies

9. Igari K, Toyofuku T, Uchiyama H, Koizumi S, Yonekura K, Kudo T, et al. Maggot debridement therapy for peripheral arterial disease. Ann Vasc Dis [Internet]. 2013 [cited 2013 Dec 5];6(2):145-9. Available from:

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3692982
PubMed: PM23825493

10. Gilead L, Mumcuoglu KY, Ingber A. The use of maggot debridement therapy in the treatment of chronic wounds in hospitalised and ambulatory patients. J Wound Care. 2012 Feb;21(2):78, 80, 82-5.
PubMed: PM22584527

11. Mumcuoglu KY, Davidson E, Avidan A, Gilead L. Pain related to maggot debridement therapy. J Wound Care. 2012 Aug;21(8):400, 402, 404-5.
PubMed: PM22885313

12. Bahr S, Mustafi N, Hattig P, Piatkowski A, Mosti G, Reimann K, et al. Clinical efficacy of a new monofilament fibre-containing wound debridement product. J Wound Care. 2011 May;20(5):242-8.
PubMed: PM21647069

13. Neiderer K, Walters J, Armstrong DG, Inhat D, Kimbriel H. Feasibility, safety, and primary efficacy of DermaStream: a novel continuously streaming device for chronic wounds. Foot Ankle Spec. 2011 Aug;4(4):222-5.
PubMed: PM21868795

14. Wang SY, Wang JN, Lv DC, Diao YP, Zhang Z. Clinical research on the bio-debridement effect of maggot therapy for treatment of chronically infected lesions. Orthop Surg. 2010 Aug;2(3):201-6.
PubMed: PM22009949

15. Gethin G, Cowman S. Manuka honey vs. hydrogel--a prospective, open label, multicentre, randomised controlled trial to compare desloughing efficacy and healing outcomes in venous ulcers. J Clin Nurs. 2009 Feb;18(3):466-74.
PubMed: PM18752540

16. Paul AG, Ahmad NW, Lee HL, Ariff AM, Saranum M, Naicker AS, et al. Maggot debridement therapy with Lucilia cuprina: a comparison with conventional debridement in diabetic foot ulcers. Int Wound J. 2009 Feb;6(1):39-46.
PubMed: PM19291114

Guidelines and Recommendations

17. Registered Nurses' Association of Ontario (RNAO). Assessment and management of foot ulcers for people with diabetes [Internet]. 2nd ed. Toronto: RNAO; 2013 Mar. [cited 2013 Dec 5]. Available from: http://rnao.ca/sites/rnao-ca/files/AssessmentManagementFootUlcerDiabetes.pdf
See: Caution box, pg. 40
Debridement, pg.40-41, includes Caution box
Appendix R: A Guide to Dressing Foot Wounds

18. Rodd-Nielsen E, Brown J, Brooke J, Fatum H, Hill M, Morin J, et al. Canadian Association for Enterostomal Therapy evidence-based recommendations for conservative sharp wound debridement: an executive summary. J Wound Ostomy Continence Nurs. 2013

May;40(3):246-53.
PubMed: PM23652697

19. Lipsky BA, Berendt AR, Cornia PB, Pile JC, Peters EJ, Armstrong DG, et al. 2012 Infectious Diseases Society of America clinical practice guideline for the diagnosis and treatment of diabetic foot infections. Clin Infect Dis [Internet]. 2012 Jun [cited 2013 Dec 5];54(12):e132-173. Available from: http://cid.oxfordjournals.org/content/54/12/e132.long
Summary available from: http://www.guideline.gov/content.aspx?id=37220
See: Section III, #10
Section IX, #41
Section X, #42a
Contraindications

20. Wound, Ostomy, and Continence Nurses Society (WOCN). Guideline for management of wounds in patients with lower-extremity neuropathic disease. Mount Laurel (NJ): WOCN; 2012 Jun 1. (WOCN clinical practice guideline series; no. 3).
Summary available from: http://www.guideline.gov/content.aspx?id=38248
See: B. Interventions for Patients with LEND and Ulcers, #5b, c

21. Australian and New Zealand clinical practice guideline for prevention and management of venous leg ulcers [Internet]. [Osborne Park, Australia]: Cambridge Publishing, on behalf of The Australian Wound Management Association Inc. and the New Zealand Wound Care Society Inc.; 2011 Oct. [cited 2013 Dec 5]. Available from: http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/ext003_venous_leg_ulcers_aust_nz_0.pdf
See: Section 7.2 EMLA cream Recommendation
Section 8.2.3 Wound debridement Recommendations

22. National evidence-based guideline: prevention, identification and management of foot complications in diabetes [Internet]. Melbourne, Australia: Commonwealth of Australia; 2011 Apr. [cited 2013 Dec 5]. Available from: http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/diabetes_foot_full_guideline_23062011.pdf
See: Interventions for ulcer management, Section Wound debridement EO 8 and EBR 6, pg. 26

23. Diabetic foot problems: inpatient management of diabetic foot problems [Internet]. London: National Institute for Health and Clinical Excellence; 2011 Mar. [cited 2013 Dec 5]. (NICE clinical guideline 119). Available from: http://publications.nice.org.uk/diabetic-foot-problems-cg119
See: Management of diabetic foot ulcers, Section 1.2.31, 1.2.32

24. Association for the Advancement of Wound Care (AAWC) venous ulcer guideline [Internet]. Malvern (PA): AAWC; 2010 Dec. [cited 2013 Dec 5]. Available from: http://aawconline.org/wp-content/uploads/2012/03/AAWC-Venous-Ulcer-Guideline-Update+Algorithm-v28.pdf
Summary available from: http://www.guideline.gov/content.aspx?id=36081
See: D. Local Wound Care, #2a-f, 6a-c, and 7b
Potential Harms

25. Clinical practice guideline for the treatment of acute and chronic wounds with maggot debridement therapy [Internet]. Mexico City, Mexico: Asociación Mexicana para el Cuidado Integral y Cicatrización de Heridas A.C. [Mexican Association for Wound Care and Healing]; 2010. [cited 2013 Dec 5]. Available from: http://aawconline.org/wp-content/uploads/2011/09/GPC_larvatherapy.pdf
See: Patient Evaluation, Section 1.1
Patient selection and Indication, Section 2.1, 2.2, 2.3, 2.4, 2.8, 2.11
Contraindications and Precautions, Section 4.1, 4.2.1, 4.2.3, 4.2.8

PREPARED BY:

Canadian Agency for Drugs and Technologies in Health
Tel: 1-866-898-8439
www.cadth.ca

APPENDIX – FURTHER INFORMATION:

Clinical Practice Guidelines – Methodology Uncertain

26. Heywood N. Conservative sharp debridement protocol [Internet]. Bath, UK: Royal United Hospital Bath, NHS Trust; 2012 Oct 19. [cited 2013 Dec 5]. Available from: http://www.ruh.nhs.uk/about/policies/documents/clinical_policies/blue_clinical/Blue_7024_Conservative_Sharp_Debridement.pdf

Review Articles

27. Cazander G, Pritchard DI, Nigam Y, Jung W, Nibbering PH. Multiple actions of Lucilia sericata larvae in hard-to-heal wounds: larval secretions contain molecules that accelerate wound healing, reduce chronic inflammation and inhibit bacterial infection. BioEssays. 2013 Dec;35(12):1083-92.
PubMed: PM24123092

28. Madhok BM, Vowden K, Vowden P. New techniques for wound debridement. Int Wound J. 2013 Jun;10(3):247-51.
PubMed: PM23418808

29. Pritchard I, Nigam Y. Maximising the secondary beneficial effects of larval debridement therapy. J Wound Care. 2013 Nov 14;22(11):610-6.
PubMed: PM24225601

30. Strohal R, Dissemond J, Jordan O'Brien J, Piaggesi A, Rimdeika R, Young T, et al. EWMA document. Debridement: an updated overview and clarifcation of the principle role of debridement. J Wound Care [Internet]. 2013 [cited 2013 Dec 5];22(Suppl. 1):S1-S52. Available from: http://ewma.org/fileadmin/user_upload/EWMA/pdf/EWMA_Projects/Debridement/EWMA_Debridement_Document_JWCfinal.pdf

31. Blueman D, Bousfield C. The use of larval therapy to reduce the bacterial load in chronic wounds. J Wound Care. 2012 May;21(5):244-53.
PubMed: PM22584743

32. Menon J. Maggot therapy: a literature review of methods and patient experience. Br J Nurs. 2012 Mar 8;21(5):S38-42.
PubMed: PM22489341

33. Zarchi K, Jemec GB. The efficacy of maggot debridement therapy--a review of comparative clinical trials. Int Wound J. 2012 Oct;9(5):469-77.
PubMed: PM22248310

34. Davydov L. Maggot therapy in wound management in modern era and a review of published literature. J Pharm Pract. 2011 Feb;24(1):89-93.
PubMed: PM21650065

35. Gottrup F, Jorgensen B. Maggot debridement: an alternative method for debridement. Eplasty [Internet]. 2011 [cited 2013 Dec 5];11:e33. Available from:

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3136394
PubMed: PM21776326

36. Hall S. A review of maggot debridement therapy to treat chronic wounds. Br J Nurs. 2010 Aug 12;19(15):S26, S28-31.
PubMed: PM21032937

37. Jones M. An overview of maggot therapy used on chronic wounds in the community. Br J Community Nurs. 2009 Mar;14(3):S16, S18, S20.
PubMed: PM19452661

Additional References

38. Butcher G, Pinnuck L. Wound bed preparation: ultrasonic-assisted debridement. Br J Nurs. 2013 Mar 28;22(6):S36, S38-43.
PubMed: PM23587975

39. Kelly J, McGrath A, Wildman S. UrgoClean: a new dressing for desloughing exuding wounds. Br J Community Nurs. 2013 Jun;Suppl:S42, S44-9.
PubMed: PM24156171

40. Doerler M, Reich-Schupke S, Altmeyer P, Stucker M. Impact on wound healing and efficacy of various leg ulcer debridement techniques. J Dtsch Dermatol Ges. 2012 Sep;10(9):624-32.
PubMed: PM22591415

41. Felder JM 3rd, Hechenbleikner E, Jordan M, Jeng J. Increasing the options for management of large and complex chronic wounds with a scalable, closed-system dressing for maggot therapy. J Burn Care Res. 2012 May;33(3):e169-175.
PubMed: PM21983646

42. Marineau ML, Herrington MT, Swenor KM, Eron LJ. Maggot debridement therapy in the treatment of complex diabetic wounds. Hawaii Med J [Internet]. 2011 Jun [cited 2013 Dec 5];70(6):121-4. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3233395
PubMed: PM22162609