



TITLE: Diphoterine for Chemical Burns: Clinical Effectiveness and Guidelines

DATE: 09 September 2010

RESEARCH QUESTIONS:

1. What is the clinical effectiveness of Diphoterine for the management of chemical burns in the pre-hospital setting?
2. What are the evidence-based guidelines for the management of chemical burns in the pre-hospital setting?

METHODS:

A limited literature search was conducted on key health technology assessment resources, including PubMed, Ovid EMBASE, EBSCOhost's CINAHL, the Cochrane Library (Issue 8, 2010) University of York Centre for Reviews and Dissemination (CRD) databases, ECRI (Health Devices Gold), EuroScan, international health technology agencies, and a focused Internet search. The search was limited to English language articles published between January 1, 2000 and August 25, 2010. No filters were applied to limit the retrieval by study type. 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:

HTIS 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.

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Two non-randomized studies were identified pertaining to the clinical effectiveness of Diphoterine for the management of chemical burns. Four evidence-based guidelines regarding the management of chemical burns in the pre-hospital setting were identified. No relevant health technology assessment reports, systematic reviews, meta-analyses, or randomized controlled trials were identified. Additional information that may be of interest is included in the appendix.

OVERALL SUMMARY OF FINDINGS:

One non-randomized study reported that Diphoterine decontamination was associated with the prevention of chemical burns¹ and fewer instances of blistering¹ when compared with water. A review of occupational medical records showed that patients treated with Diphoterine did not develop chemical burns or require burn treatment.² The identified non-randomized studies examined the use of Diphoterine for both acid² and alkali^{1,2} chemical splashes to the skin^{1,2} and eyes.²

The included guidelines recommend the following for the management of chemical burns in the pre-hospital setting:

Skin Burns

- Flush effected area with copious amounts of water⁶ for a duration of 20 minutes³ to one hour.⁵
- Refer to the chemical container for specific management instructions.³
- Remove the chemical and any clothing from the affected area.³
- Do not attempt to neutralize the chemical with another agent.³

Eye burns

- Flush effected eye or eyes with copious amounts of water.^{3,5,6} (i.e. at least one litre⁴).
- Specialized medical attention should be sought either urgently³ or within 24 hours.^{4,5}

None of the guidelines gave specific guidance regarding sulphuric acid, sodium hydroxide, or sodium carbonate.

Overall, although evidence from two non-randomized studies suggests that Diphoterine may be effective in preventing chemical burns caused by both acid² and alkali^{1,2} chemical splashes to the skin^{1,2} and eyes,² the identified guidelines recommend water irrigation³⁻⁶ for the management of chemical burns in the pre-hospital setting.

REFERENCES SUMMARIZED:

Health technology assessments

No literature identified.

Systematic reviews and meta-analyses

No literature identified.

Randomized controlled trials

No literature identified.

Non-randomized studies

1. Donoghue AM. Diphoterine for alkali chemical splashes to the skin at alumina refineries. *Int J Dermatol.* 2010;49(8):894-900.
2. Nehles J, Hall AH, Blomet J, Mathieu L. Diphoterine for emergent decontamination of skin/eye chemical splashes: 24 cases. *Cutan Ocul Toxicol* [Internet]. 2006 [cited 2010 Aug 25];25(4):249-58. Available from: http://www.prevor.com/FR/sante/RisqueChimique/Diphoterine/02_publications/2004/Media/24_Cases_Mannesmann_2006.pdf PubMed: PM17162412.

Guidelines and recommendations

3. Guideline 8.5: burns [Internet]. Melbourne: Australian Resuscitation Council; 2008 Nov [cited 2010 Aug 25]. Available from: http://www.resus.org.au/policy/guidelines/section_8/burns.htm
See Chemical Burns
4. Eye. Corpus Christi (TX): Work Loss Data Institute; 2008 [cited 2010 Aug 25]. Summary available from: <http://www.guideline.gov/content.aspx?id=12666&search=diphoterine>
See Chemical Burns
5. New Zealand Guidelines Group. Evidence-based practice guideline: management of burns and scalds in primary care [Internet]. Wellington: Accident Compensation Corporation (NZ); 2007 Jun [cited 2010 Aug 25]. Available from: http://www.nzgg.org.nz/guidelines/0139/Burns_full.pdf
See Chapter 7 Management of Chemical Injury
6. Part 10: first aid. *Circulation* [Internet]. 2005 Nov 29 [cited 2010 Aug 25];112(22 Suppl):III 115-III 125. Available from: http://circ.ahajournals.org/cgi/reprint/112/22_suppl/III-115
See Toxic Exposure and Chemical Burns

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APPENDIX – FURTHER INFORMATION:

Protocol

7. Chau J, Lee D, Lo S. Eye irrigation for patients with ocular chemical burns: a systematic review [Internet]. Adelaide (AU): Joanne Briggs Institute; 2009 May [cited 2010 Aug 25]. Available from: <http://www.ioannabriggs.edu.au/protocols/Protocol252.pdf>

Non-randomized studies- hospital setting

8. Merle H, Donnio A, Ayeboua L, Michel F, Thomas F, Ketterle J, et al. Alkali ocular burns in Martinique (French West Indies): evaluation of the use of an amphoteric solution as the rinsing product. Burns [Internet]. 2005 Mar [cited 2010 Aug 25];31(2):205-11. Available from: <http://www.firstresponseaustralia.com.au/publications/Alkali%20ocular%20burns-max%20gerard%20burns%202005%5B2%5D.pdf> PubMed: PM15683694

Review articles

9. Hall AH, Cavallini M, Mathieu L, Maibach HI. Safety of dermal diphoterine application: an active decontamination solution for chemical splash injuries. Cutan Ocul Toxicol [Internet]. 2009 [cited 2010 Aug 25];28(4):149-56. Available from: http://www.prevor.com/FR/sante/RisqueChimique/Diphoterine/02_publications/2007/medi a/COT2009_Hall_Safety_dermal_Diphoterine.pdf PubMed: PM19888884.
10. Palao R, Monge I, Ruiz M, Barret JP. Chemical burns: pathophysiology and treatment. Burns [Internet]. 2010 May [cited 2010 Aug 25];36(3):295-304. Available from: http://www.prevor.com/EN/sante/RisqueChimique/diphoterine/02_publications/2007/media /Burns_juil2009_Chemical%20burns_pathophysiology.pdf PubMed: PM19864073
See Section 5.2 Neutralizing Agents
11. Hall AH, Blomet J, Mathieu L. Diphoterine for emergent eye/skin chemical splash decontamination: a review. Vet Hum Toxicol [Internet]. 2002 Aug [cited 2010 Aug 25];44(4):228-31. Available from: <http://www.firstresponseaustralia.com.au/publications/Vet%20Hum%20Toxicol-2002%5B2%5D.PDF> PubMed: PM12136973

Additional references

12. Mathieu L, Blomet J, Girard M, Uellner H, Nehles J. A review about diphoterine: the solution for emergency decontamination of eye/skin chemical splashes [Internet]. Poster presented at: Occupational Hygiene 2000; 2000 Apr 11-13 [cited 2010 Aug 25]. Manchester, UK. Available from: http://www.prevor.com/EN/sante/RisqueChimique/diphoterine/02_publications/2000/pdf/m anchester.pdf
13. Simon F. Comparison water/diphoterine: rinsing of more than 600 chemical splashes during 7 years in the factory ATOCHEM SAINT-AVOLD [Internet]. Poster presented at: Congrès National de la Société Française d'Etude et des Traitement des Brulures

(SFETB); 2000 Jun 3-6 [cited 2010 Aug 25]. Toulouse, FR. Available from:
http://www.prevor.com/EN/sante/RisqueChimique/diphoterine/02_publications/2000/trad%20poster%20atochem%20ang.htm