EBM IN ACTION

Is isopropyl alcohol swabbing before injection really necessary?

Clinical Question

A patient having her skin swabbed before an intramuscular injection asked her general practitioner "What is the value of cleaning the skin like that?". This prompted the GP to wonder whether sterilising the skin for one to three seconds with 70% isopropyl alcohol conferred any benefit. He wanted to know if it actually prevented sepsis at the site of injection.

Search Question

The revised question was: "Compared with no cleansing, does swabbing the skin with 70% isopropyl alcohol before puncture with a sterile needle reduce the risk of infection at the injection site?". The ideal study design to answer this question would be a randomised controlled trial comparing complication rates at injection sites swabbed, or not swabbed, with isopropyl alcohol.

Search

We searched two online databases, *Cochrane Library* and *SUMSearch* (<<http://sumsearch.uthscsa.edu/search/form4.htm>>), using the search terms "injection", "sterile swab", "isopropyl alcohol", "sepsis", "skin piercing", and "skin puncture".

Summary of Findings

Three controlled trials, two of which were randomised, examined the benefit of isopropyl swabbing before injection in preventing subsequent infection.

In a randomised single-blind controlled trial, patients having venesection either had their skin prepared with isopropyl alcohol ($n=93$) or had no skin preparation ($n=101$).¹ There were no statistically significant differences in complications at the venepuncture site between the two groups.

The second randomised controlled trial evaluated the effects of skin disinfection with isopropyl alcohol versus

no disinfection in patients having intravenous cannulation. No significant differences were found between the two groups in intraluminal contamination rates, colony counts or organisms isolated.²

Five seconds of isopropyl alcohol swabbing was compared with no skin cleansing in a cross-over trial of 13 patients with diabetes.³ (Patients with diabetes are suitable for this type of study because they have many injections and may be more prone to infection.) With cleansing, bacterial counts, estimated by culture, were reduced by 82%–91%. However, over a period of three to five months, skin preparation before insulin injection was omitted every second week and no signs of local or systemic infection were observed.

Outcome

We reported to the GP that the studies showed that omitting skin preparation with 70% isopropyl alcohol did not increase incidence of infection at the injection site. He has stopped swabbing patients with isopropyl alcohol before injection.

Christopher B Del Mar
Professor

Paul P Glasziou
Professor

Anneliese B Spinks
Research Officer

Sharon L Sanders
Research Officer
Centre for General Practice, Medical School
University of Queensland, Herston, QLD
cdelmar@cgp.uq.edu.au

References

1. Sutton CD, White SA, Edwards R, Lewis MH. A prospective controlled trial of the efficacy of isopropyl alcohol wipes before venesection in surgical patients. *Ann R Coll Surg Engl* 1999; 81: 183-186.
2. Grabe N, Jakobson CJ, Damm MD. Skin disinfection before intravenous cannulation. Intraluminal contamination after disinfection with 70% isopropyl alcohol. *Acta Anaesthesiol Scand* 1985; 29: 764-766.
3. Koivisto VA, Fellig P. Is skin preparation necessary before insulin injection? *Lancet* 1978; 1: 1072-1075.

DISABILITY EVALUATION (ALSO KNOWN AS THE DEMETER BOOK)

What's the difference between an impairment and a disability?

It's not always easy to distinguish the two — especially where impairment in one profession may be a disability in another. This resource was designed to make the decision easier by providing specific evaluation guidelines. *Disability Evaluation*, the companion guide to the *Guides to the Evaluation of Permanent Impairment*, helps you clarify the critical differences between impairment and disability by showing you how to determine the degree to which impairments affect work performance or specific jobs.

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risk. But do these studies provide evidence that in the long run there is no difference in infection risk with or without swabbing?

One of the studies cited by Del Mar et al³ refers to an earlier article by Dann⁴ that suggests a complication rate for venepuncture without skin cleaning/swabbing of less than one in 5000. It would be impossible to detect differences in incidence around such a low base rate without very large sample sizes. Assuming a true infection rate as high as 1% (whether swabbed or not), a standard calculation shows that for a study to have 80% power of rejecting a difference as large as a doubling of the rate of infection (ie, to 2%) in the non-swabbed population (at the 95% confidence level) would require about 900 subjects per experimental arm.

The best evidence against the need to swab may be in Dann's estimate of the rate of complications (assuming it is based on a valid study),⁴ not on the controlled trials, which were unable to answer the real question. If the unswabbed risk of infection were of the order of one in 5000, it is unlikely that any further reduction due to swabbing would be worthwhile. Another concern with the evidence of Del Mar et al is that one of the trials reported no infections and focused entirely on bacterial contamination,⁵ which has a tenuous connection with infection risk.

Our observations on the quality of the evidence used by Del Mar et al highlight the importance of using appropriate criteria for assessing the value of a study before using it to support an assertion of evidence-based medicine. Published evidence in the form of randomised controlled trials may be inadequate to answer some questions, in which case clinical decisions must be based on other sources of evidence, including best scientific judgement. This example highlights a common problem — bridging the gap between "absence of evidence" and "evidence of absence" of an effect. It can be difficult to prove a negative.

Christopher B Del Mar,* Paul P Glasziou,†
Anneliese B Spinks,‡ Sharon L Sanders‡

*Professor and Director, †Associate Professor,
‡Research Officers, Centre for General Practice,
Medical School, University of Queensland, Herston,
QLD 4006
c.delmar@cgp.uq.edu.au

IN REPLY: One of the most exciting outcomes of practising evidence-based medicine (EBM) is when something counterintuitive emerges from looking at the best available research. Our finding disturbs Burn, especially when he reads an article critical of EBM¹ and looks at a discoloured alcohol swab with which he has just scrubbed the skin before an injection.

EBM changes the emphasis away from pathophysiological mechanisms and towards the empirical. Ideally these agree. Cleaning the skin sounds as if it should be safer than not doing so. However, swabbing the skin conferred no advantage when tested in three trials.² Why would there be no detectable difference between swabbing and non-swabbing? Firstly, using alcohol wipes on the skin for the usual five seconds is unlikely to kill bacteria — at least two minutes would be required (as recommended in preparing the skin before intrathecal or intra-articular injections).³ Secondly, as Elder, Carlin and Rich indicate, the three trials were not large enough to rule out rare harms from not using alcohol swabs (but this is true of using them, too).

Burn, Elder and Carlin and Rich might take heart from Dann's experience: in the course of giving about 5000 injections in his general practice, for which he cleaned the skin only rarely (to remove obvious dirt), not a single infection resulted.³ In another study (a crossover trial of 42 people with diabetes), insulin injections through clothing were compared with insulin injections after alcohol swabbing: after 6890 injections of each type, there were no cases of erythema, induration, or abscesses.⁴ It is also of note that dentists routinely give injections without preparing the gum, despite the mouth being full of bacteria. What further evidence would we require to make us change our mind?

Celemajer's criticisms of EBM centre on the facts that the best available evidence might be suboptimal or available for patient groups that are not identical to the patient in a particular case or involve an area of medicine less well researched than others.¹ These make the application of EBM more tricky, and in our EBM workshops we explicitly teach approaches to deal with these challenges.

Like everything else in medicine, we have to do the best we can with what we have, with evidence as well as suboptimal resources, drugs, interventions, hospital beds, numbers of doctors and nurses and everything else. We make no claims that "EBM is unassailable fact". The evidence is merely the best that is available. The pity is that such rich sources of research are so rarely tapped to inform clinical practice.

1. Celemajer DS. Evidence-based medicine: how good is the evidence? *Med J Aust* 2001; 174: 293-295.
2. Del Mar CB, Glasziou PP, Spinks AB, Sanders SL. Is isopropyl alcohol swabbing before injection really necessary? *Med J Aust* 2001; 174: 306.
3. Dann TC. Routine skin preparation before injection: an unnecessary procedure. *Lancet* 1969; 2: 96-98.
4. Fleming DR, Jacobson SJ, Vandenburg MA, et al. The safety of injecting insulin through clothing. *Diabetes Care* 1997; 20: 244-247. □

Complementary and alternative medicine commonly used by cancer patients

David Chapman-Smith

Editor, *The Chiropractic Report*, 3080 Yonge Street,
Suite 5065, Toronto, Ontario M4N 3N1, Canada
tcr@chiropracticreport.com

TO THE EDITOR: The primer on complementary and alternative medicine (CAM) for cancer patients¹ has misinformation on chiropractic from an author, Professor Ernst, with established bias. His similar commentary on chiropractic in the *British Medical Journal*² was dismissed by medical leaders in the field of back pain as an embarrassing example of "interprofessional confrontation" under the "guise of scientific objectivity"³ and "an unduly cynical picture" based on self-interest.⁴

Ernst's article was meant to be about treatments for cancer, but his discussion of chiropractic hardly mentions the subject. He commences with an archaic definition of chiropractic which erroneously implies that chiropractors claim to cure most diseases, including cancer. They do not. A contemporary definition of chiropractic by the World Federation of Chiropractic, of which the Chiropractors' Association of Australia is a member, is "the diagnosis, treatment and prevention of mechanical disorders of the musculoskeletal system, and the effects of these disorders on the function of the nervous system and general health."⁵

Surveys consistently report that most chiropractic patients present with musculoskeletal pain, and when chiropractors treat cancer patients this is principally palliative care for concomitant musculoskeletal pain,

1. Celemajer DS. Evidence-based medicine: how good is the evidence? *Med J Aust* 2001; 174: 293-295.

2. Del Mar CB, Glasziou PP, Spinks AB, Sanders SL. Is isopropyl alcohol swabbing before injection really necessary? *Med J Aust* 2001; 174: 306.

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4. Dann TC. Routine skin preparation before injection: an unnecessary procedure. *Lancet* 1969; 2: 96-98.

5. Grabe N, Jakobson CJ, Dann MD. Skin disinfection before intravenous cannulation. Intraluminal contamination after disinfection with 70% isopropyl alcohol. *Acta Anaesthesiol Scand* 1985; 29: 764-766. □