

REVIEW OF LITERATURE

TEAM UNDERTAKING REVIEW: Infection Control Team, Healthcare Associated Infection & Infection Control Section, Health Protection Scotland (formerly Scottish Centre for Infection and Environmental Health (SCIEH))			
CONTACT PERSON: Infection Control Team (SCIEHInfectionControl@hps.scot.nhs.uk)			
TOPIC: Skin disinfection prior to intradermal, subcutaneous, and intramuscular injection administration.			
PRINCIPAL RESEARCH QUESTION/OBJECTIVE: To assess the evidence in relation to skin disinfection prior to intradermal, subcutaneous, and intramuscular injection administration. For the purposes of this review, the term injection refers to: <ul style="list-style-type: none"> • intradermal injections • subcutaneous injections • intramuscular injections • it does not include intravenous injections. 			
SUMMARY OF CONCLUSIONS: <ul style="list-style-type: none"> ∅ The evidence reviewed suggests that the skin should be clean prior to administration of an intradermal, subcutaneous or intramuscular injection. ∅ If soiled, skin should be cleaned with soap and water. There is no clear evidence for the use of disinfection (e.g. alcohol swabs). ∅ If skin is visibly unsoiled and disinfection is still performed according to decisions taken at local level to undertake this practice, care should be taken to disinfect the area properly with a pre-medicated 70% alcohol swab. The injection site should be cleaned for 30 seconds with an alcohol swab and allowed to dry for a further 30 seconds to ensure bacteria are rendered inactive and injections are given safely. 			
METHODOLOGY			
i) Search strategy for identification of studies			
<i>Period of publication</i>	1966-2004		
<i>Strategy key words</i>	skin		
	disinfection\$		
	preparation\$		
	administration\$		
	injection\$		
	infection\$		
<i>Electronic databases (tick as appropriate)</i>	MEDLINE	X	PsycINFO
	Science Direct	X	EMBASE X
	CINAHL	X	SIGLE X
	Cochrane Library	X	Other

Additional Resources (tick as appropriate)	References checked for relevant articles	<input checked="" type="checkbox"/>
	Review of abstracts of professional meetings/conferences	<input checked="" type="checkbox"/>
	Personal libraries consulted	<input type="checkbox"/>
	Experts consulted (give details if applicable)	<input checked="" type="checkbox"/>
	- Colleagues within HPS	
	Handsearching of journals (name relevant journals)	<input type="checkbox"/>
	Others (provide details):	
	UK Guidance on Best Practice in Vaccine Administration (October 2001)	
	Consulted following websites for relevant guidance and advice:	
	Scottish Executive – www.scotland.gov.uk	
	Department of Health – www.dh.gov.uk	
	Health Protection Agency www.hpa.org.uk	
Centers for Disease Control and Prevention (CDC) – www.cdc.gov		
ii) Selection criteria for inclusion of studies		
Sample	Studies involving all injection user groups in all settings were considered. The search was not limited to healthcare settings.	
Outcome measure	Skin preparation prior to intradermal, subcutaneous and intramuscular injection and the subsequent rate of infection following injection.	
Other inclusion criteria	<ul style="list-style-type: none"> - Studies, review papers and related guidance were considered. - Studies involving injection of any area of the body (e.g. arm, stomach, thigh) were considered for inclusion. 	
Language Limitations	Only English language papers were included.	
ii) Quality assessment		
Study quality assessment	Rigidity of study design and application was evaluated.	
Data collation and analysis	Following initial selection of studies, evaluation of data collection tools and statistical analyses undertaken. Qualitative analysis of the findings was performed.	
Critical appraisal	Roe's model of critical appraisal applied to those studies identified and included (Roe B (1993) Undertaking a critical review of the literature <i>Nurse Researcher</i> 1(1): 38-9).	

RESULTS

Issues Addressed:

- Ø Advantages/disadvantages of disinfection
- Ø Evidence to support disinfection/non-disinfection.

Perceived Advantages/Disadvantages of Disinfection With Pre-medicated 70% Alcohol Swab

Advantages

Reduction in skin bacterial counts

Less time consuming than using soap and water

Disadvantages

Alcohol rendered inactive if skin is soiled with organic matter

To be effective, 30 seconds for disinfection and 30 seconds for drying.

Hardening of skin

Potential for pain if skin not allowed to dry

Evidence to support disinfection/non-disinfection

Following review of the studies identified, there appears to be little evidence at this time to support the need for skin disinfection prior to intradermal, subcutaneous or intramuscular injection. Research conducted by Koivisto & Felig (1978) with diabetic patients indicated that although skin preparation with alcohol prior to injection markedly reduced skin bacterial counts, such disinfection is not necessary to prevent infection at injection sites¹. More recently, a study conducted by McCarthy, Covarrubias & Sink (1993), also involving diabetic patients, corroborated these findings and suggested that, generally, there was insufficient contamination of skin to cause infection following injection without disinfection and that skin cleansing was an unnecessary procedure². Further studies have since suggested that there is no increased risk of infection if skin disinfection is not undertaken^{3,4,5,6}.

UK Guidance on Best Practice in Vaccine Administration and the Position Statement on Injection Techniques published by the Royal College of Paediatrics and Child Health (March 2002) further reinforces these views by recommending that no formal skin disinfection is required^{7,8}. Comments from the Hospital Infection Society's Discussion Forum (2004) suggest that individuals working in the healthcare setting, likewise, consider skin disinfection prior to injection not to be necessary⁹. Hutin and colleagues carried out a review of evidence-based best practices in relation to the prevention of injection associated infection which appeared in the World Health Organisation Bulletin in 2003. Their review led to the conclusion that if the skin is 'clean' there should be no need to swab the injection site whether it be the arm, thigh, stomach or other body part¹⁰. Workman (1999) reinforces the importance of ensuring that the skin of the patient

<p>RESULTS (contd)</p>	<p>is physically clean and that the healthcare worker maintains a high standard of hand hygiene for the procedure¹¹.</p> <p>There appears to be no difference when considering the administration of ‘live’ vaccines although searching of the literature has uncovered limited information on this topic. The only recommendation to emerge, as published by the Centers for Disease Control and Prevention (CDC), outlines guidance for smallpox vaccine administration specifically. It states that ‘alcohol, soap and water, or chemical agents are not needed for preparation of the skin for vaccination unless grossly contaminated. If needed, soap and water are the preferred agents. Skin must be thoroughly dry in order to prevent inactivation of the vaccine’¹².</p> <p>Robust, scientific evidence to support the use of soap and water for skin cleansing in general is limited, however, this has long been accepted as good practice. Specifically, the physical action of washing has been long accepted for the mechanical removal of transient flora which may contaminate the skin¹³.</p> <p>As it has also been practice for some to use pre-medicated 70% alcohol swabs to cleanse skin prior to injection (perhaps based on ease of use and perceived need for cleanliness), several studies have underlined the importance of ensuring that care is taken when alcohol swabbing to ensure effective disinfection. In particular, it should be noted that alcohol cannot be used on skin which is soiled with organic matter^{14,15}. Furthermore, Simmonds specifies that if an alcohol swab is used to clean the skin prior to injection then the area should be cleaned for 30 seconds and then left to dry for a further 30 seconds otherwise it may fail to render bacteria inactive¹⁶. In addition, failing to allow the skin to dry can cause increased pain for the patient¹⁷.</p> <p>Summary</p> <ul style="list-style-type: none"> Ø Little evidence to support the need for disinfection of the skin prior to any intradermal, subcutaneous or intramuscular injection. Ø If soiled, however, skin should be cleaned, based on basic commons standards, with soap and water. Ø If skin is visibly unsoiled and disinfection is still performed, according to decisions taken at local level to undertake this practice, care should be taken to disinfect the area properly with a pre-medicated 70% alcohol swab. The injection site should be cleaned for 30 seconds with an alcohol swab and allowed to dry for a further 30 seconds to ensure bacteria are rendered inactive and injections are given safely.
-------------------------------	---

CONCLUSIONS	<ul style="list-style-type: none"> ∅ The evidence reviewed suggests that the skin should be clean prior to administration of an intradermal, subcutaneous or intramuscular injection. ∅ If soiled, skin should be cleaned with soap and water. There is no clear evidence for the use of disinfection (e.g. alcohol swabs). ∅ If skin is visibly unsoiled and disinfection is still performed according to decisions taken at local level to undertake this practice, care should be taken to disinfect the area properly with a pre-medicated 70% alcohol swab. The injection site should be cleaned for 30 seconds with an alcohol swab and allowed to dry for a further 30 seconds to ensure bacteria are rendered inactive.
RECOMMENDATIONS (if applicable)	<p>We support recommendations that the skin should be clean prior to injection, but that skin disinfection is not necessarily essential. Risk assessment of potentially contaminated skin should be conducted to ensure appropriate cleaning of the skin is undertaken where required with soap and water. If disinfecting is still performed, according to decisions taken at local level to undertake this practice, the appropriate steps should be followed to ensure effective and safe decontamination is achieved (as above).</p>
PRACTICAL APPLICATION	<p>If the skin is visibly soiled and requires cleaning, this should be done with soap and water which should, hopefully, be achievable in most care settings. If the skin is not visibly soiled, it does not require cleaning; however, if decisions are taken at local level to undertake disinfection this can be done using a pre-medicated 70% alcohol swab.</p>
RESOURCE IMPLICATIONS	<ul style="list-style-type: none"> ∅ This review should have no impact on resources relating to this practice as recommendations concur with current practices. ∅ Education and awareness raising on current recommended practice may be beneficial.
REFERENCES	<ol style="list-style-type: none"> 1. Koivisto VA & Felig P (1978), Is skin preparation necessary before insulin injection? <i>Lancet</i>, i:1072-1073. 2. McCarthy JA, Covarrubias B & Sink P (1993), Is the traditional alcohol wipe necessary before an insulin injection? <i>Diabetes Care</i>, 16 (1): 402. 3. Borders LM, Bingham PR, Riddle MC (1984), Traditional insulin-use practices and the incidence of bacterial contamination and infection, <i>Diabetes Care</i>, 7: 121-127. 4. Dann TC (1969), Routine skin preparation before injection; an unnecessary procedure, <i>Lancet</i>, 2: 96-98.

REFERENCES (Contd)	<ol style="list-style-type: none"> 5. Binswanger IA, Kral AH, Bluthenthal RN, Rybold DJ, Edlin BR (2000), High prevalence of abscesses and cellulites among community recruited injection drug users in San Francisco, <i>Clinical Infectious Diseases</i>, 30: 579-581. 6. Stepanas TV, Turley H, Tuohy EA (1982), Reuse of disposable insulin syringes, <i>Medical Journal of Australia</i>, 1: 311-313. 7. The Vaccine Administration Taskforce (2001), <i>UK Guidance on Best Practice in Vaccine Administration</i>, Shire Hall Communications, London. 8. Royal College of Paediatrics and Child Health (2002), <i>Position Statement on Injection Technique</i>, 50 Hallam Street, London W1W 6DE www.rcpch.ac.uk/publications/recent_publications/Injections1.pdf 9. Hospital Infection Society Forum Website – www.his.org.uk 10. Hutin Y, Hauri A, Chiarello L et al (2003), Best infection control practices for intradermal, subcutaneous, and intramuscular needle injections, <i>Bulletin of the World Health Organisation</i>, 81 (7): 491-500. 11. Workman B (1999), Safe injection techniques, <i>Nursing Standard</i>, 13 (39): 47-53. 12. Centres for Disease Control and Prevention, Department of Health and Human Services (2002), <i>Smallpox Vaccine Administration</i>, CDC, Atlanta, USA. 13. Rotter M (1999), <i>Hand washing and hand disinfection</i>. In: Mayhall CG, ed. <i>Hospital epidemiology and infection control</i>, 2nd edition, Philadelphia, PA: Lippincott Williams & Wilkins. 14. Heenan ALJ (1996), Handwashing Solutions. <i>Professional Nurse</i>, 11, 9: 615-22. 15. Kerr J (1998), Handwashing. <i>Nursing Standard</i>, 12, 51: 35-42. 16. Simmonds BP (1983), CDC guidelines for the prevention and control of nosocomial infections: guidelines for prevention of intravascular infections, <i>American Journal of Infection Control</i>, 11(5): 183-189. 17. Springhouse Corporation (1993), <i>Medication Administration and IV Therapy Manual</i>. 2nd edition. Pennsylvania, Springhouse Corporation.
---------------------------	---

EXPERT GROUP	Meeting convened 9 March 2004 at SCIEH to discuss relevant literature. Evidence gathered was reviewed and key areas discussed. Attendees included Professor Mary Henry (Consultant Nurse Epidemiologist), Claire Kilpatrick (Nurse Consultant in Infection Control), Gillian Irvine (Senior Nurse Infection Control), Beth Cullen (Epidemiologist) from SCIEH.
PEER REVIEW	Dr John Cowden (Consultant Nurse Epidemiologist, SCIEH) reviewed document.
REVIEW STATUS (delete as appropriate)	Ongoing /Complete
DATE ISSUED	September 2005
REVIEW DATE	This literature review will be updated through automatic alerts from the NHS E-Library and revised on an annual basis.