

REVIEW OF LITERATURE

TEAM UNDERTAKING REVIEW: Parts A and B – Health Protection Scotland. Part C – Welsh Healthcare Associated Infection Programme (WHAIP)	
CONTACT PERSON: Dawn Hill	
TOPIC: Hand hygiene, nails and nail polish	
PRINCIPAL RESEARCH QUESTION/OBJECTIVE: To assess the evidence in relation to the effect of nail hygiene on general hand hygiene.	
METHODOLOGY	
i) Search strategy for identification of studies	
<i>Period of publication</i>	Part A: 1966 - 2004 Part B: 2004 – 2006 Part C: 2007-2008

<p>Strategy key words for Part C</p> <p><i>From Health Protection Scotland literature review [2007]</i></p> <p><i>Supplemented with terms from SURE proposal to HTA</i></p>	<p>Hand hygiene, hand washing, handwashing, hand sanitizing, hand cleansing, hand decontamination, Hand\$1 adj2 wash\$.ti,ab Hand\$1 adj2 clean\$.ti,ab Hand\$1 adj2 decontamin\$.ti,ab Hand\$1 adj2 saniti\$.ti,ab Hand\$1 adj2 antiseptis\$.ti,ab Hand\$1 adj2 disinfect\$.ti,ab Exp hand/ Exp sterilization/ Cross infection Nosocomial Healthcare associated infection Health-care associated infection Healthcare acquired infection Hospital acquired infection Compliance,Adherence,Attitudes Perceptions,Professional compliance Health behaviour , health behaviour Attitude , attitude of health personnel Health knowledge, attitudes, practice/ Comply\$4.ti,ab Complies\$41.ti,ab Adher\$.ti,ab, obey\$.ti,ab, conform\$.ti,ab, follow\$3.ti,ab , fulfil\$.ti,ab observ\$.ti,ab abide\$.ti,ab Barrier\$.ti,ab obstacle\$.ti,ab hurdle\$.ti,ab obstruct\$.ti,ab facilitate\$.ti,ab enable\$.ti,ab assist\$.ti, ab help\$.ti,ab promot\$3.ti,ab encourage\$1.ti,ab encouraging.ti,ab attitude\$1.ti,ab practice\$.ti,ab practising.ti,ab practicing.ti,ab Knowledge\$.ti,ab difficult\$.ti,ab impede\$.ti,ab hinder\$.ti,ab hindrance\$.ti,ab Care, care equipment, environment, contaminated contact , delivery of health care, exp Equipment and supplies, hospital/ Health facility environment, hospital, healthcare, occupational transmission, focal infection, cross infection/ Exp Hospitals/ Occupational diseases/ Infection/ focal infection/ infection control/ Bacteri\$, virus\$, equipment contamination. Handwashing solution, hand washing solution, procedure, soaps, chlohexidine, air dryer, paper towel\$, hand towel\$, soap, liquid soap, soap solution, alcohol rub, alcohol solution, alcohol, alcohol\$ adj2 handrub\$4.ti,ab Surgical scrub\$.ti,ab Ring\$, jewellery, nail\$ nail polish, nails/ Cosmetics,</p>	
<p>Electronic databases for Part C</p> <p><i>(tick as appropriate)</i></p>	<p>MEDLINE ✓</p> <p>Science Direct</p> <p>CINAHL ✓</p> <p>Cochrane Library ✓</p> <p>HMIC ✓</p>	<p>PsycINFO</p> <p>EMBASE ✓</p> <p>SIGLE</p> <p>British Nursing Index ✓</p> <p>Health Technology Assessment ✓</p>

<i>Specialist web sites / portals for Part C</i>	Bandolier, EPIC, JBI-connect, national Electronic Library – Infections, National Library of Guidelines, CDC, Welsh Assembly Government (WAG), Scottish Executive health Dept. (SEHD), health protection Agency (HPA), Health protection Scotland (HPS), Department of health (DH), National patient Safety Agency – Cleanyourhands, Healthcare Associated Infection research Network, Department of health & Social Services & Public Safety (DHSSPS-NI) Northern Ireland, health Information and Quality Authority (Republic of Ireland – health), National Resources Infection Control (NRIC), WHO, Hospital Infection Society, Infection Prevention Society, Society for Healthcare Epidemiology of America (SHEA), NPHS Knowledge Base
<i>Hand searching journals (2008 only)</i>	American Journal of Infection Control, British Journal of Infection Control, BMJ, Infection Control and Hospital Epidemiology, Journal of Hospital Infection
ii) Selection criteria for inclusion of studies	
<i>Sample</i>	All health and social care workers.
<i>Outcome measure(s)</i>	Bacterial count on hands following intervention.
<i>Other inclusion criteria</i>	N/A
<i>Language Limitations</i>	English language only.

iii) Quality assessment	
<i>Study quality assessment</i>	
<i>Part A (1966 – 2004)</i>	Identified articles were reviewed according to Roe’s model. Guidance documents, however, were unable to be subjected to all such criteria.
<i>Part B (1966 – 2004) and Part C (2007-2008)</i>	Identified articles were reviewed according to either the ROE model for critical appraisal of scientific studies, Sign 50 methodology for systematic reviews and meta-analyses and the AGREE instrument for the evaluation of guidance documents as appropriate.
<i>Data collation and analysis</i>	Qualitative analysis of data performed on studies uncovered was undertaken using a case study approach. Guidance documents reviewed for any relevant commentary.

RESULTS

Part A (1966 – 2004)

On review of the literature, a considerable amount of research has been uncovered which considers the effect of nail hygiene on general hand hygiene, including the maintenance of nails and the wearing of nail polish.

At the centre of this literature are the guidelines both from Boyce & Pittet (2002) in conjunction with the Infection Control Practitioners Advisory Committee (CDC) and from the Association for Professionals in Infection Control and Epidemiology (APIC) on handwashing and hand antisepsis in health care settings, published by Larson in 1995. These guidelines both make reference to the work of McGinley et al. (1988) who suggested that nails are best kept short as the majority of flora on the hands is found under the nails. This informed some work by Larson in 1989 which recommended that particular attention be paid to cleaning underneath nails.

For the evidence, keeping nails short would, therefore, appear to decrease the likelihood of microorganisms harbouring beneath the nails. Furthermore, Larson (1995) highlights the fact that long nails may cause gloves to tear.

Although cleaning beneath the nails is recommended, Ward's (2000) review of handwashing facilities in the clinical area, underlines the fact that nail brushes should not be used to clean under nails. This review does not take into account the cleaning of nails during the surgical scrub technique. It should be noted, however, that brushing can cause minor abrasions which can then pose as a port entry for microorganisms. This view is corroborated by the BMA (1989), Larson (1995) and Kerr (1998).

Several studies have considered the wearing of nail polish and its effect on hand hygiene. According to Baumgardner et al (1993), nail polish on natural nails appears to have no detrimental influence if nails are short. However, Boyce & Pittet (2002) highlight Wynd's (1994) evidence to suggest that chipped polish may harbour greater numbers of microorganisms than polish which is freshly applied. If nail polish is worn, clear polish would be best, according to the 1995 APIC guidelines, as dark colours may obscure the subungal space making it more difficult to clean.

	<p>With the increase in popularity in recent years of artificial nails, Pottinger et al (1989) conducted research to assess the potential for contamination of such nails. Their findings indicated that artificial nails increase the microbial load on nails. Consequently, the Association of Perioperative Registered Nurses (AORN), among others, recommends that artificial nails should not be worn by theatre personnel. Indeed, staff wearing artificial nails have been epidemiologically implicated in a number of outbreaks of infection, primarily caused by gram negative bacilli (Passaro et al., 1997, Foca et al., 2000, Parry et al., 2001).</p> <p>Although key studies have addressed the effect on microbial load of nail length, nail polish and artificial nails, it is important to consider the possibility that the length of nails, the wearing of nail polish and/or the donning of artificial nails could lead to less rigorous handwashing which would compromise this infection control measure.</p>
<p>Part B (2004 – 2006)</p>	<p>The original literature review covered a considerable amount of published research concerned with the effect of nails on general hand hygiene and included maintenance of nails and wearing of artificial nails and polish. This review aims to address any additional information or guidance, which has been published in the intervening period to determine if changes to guidance in the model policy are required.</p> <p>The literature search using the described strategies identified only one paper within the period under review, which was specifically concerned with nails and hand hygiene. This paper (Gupta <i>et al.</i>, 2004), describes an outbreak of Extended-Spectrum Beta-Lactamase-Producing <i>Klebsiella Pneumoniae</i> in a neonatal intensive care unit in the USA, which was traced to a healthcare worker (HCW), who was found to be harbouring the organism under artificial nails. Based on the results of this investigation, the authors recommended that short well-groomed natural nails should be mandatory for HCWs. This advice has been reiterated in the recently available WHO guidelines on Hand Hygiene (WHO, 2006), which are currently available as an advanced draft for consultation, which state that artificial nails should not be worn and that natural nails should be kept short.</p> <p>Therefore there are no changes recommended to the Hand Hygiene policy associated with nails and nail care as a result of this annual review.</p>

<p>Part C (2007-2008)</p>	<p>This review aims to identify, review and critique any scientific studies or guidance, which have been published in the intervening period since the last literature review, to determine if changes to guidance are required.</p> <p>In practice, there have been few relevant publications. The epic2 guidelines set out standards pertaining to nails and hand hygiene practices as follows:</p> <p>* Fingernails should be kept short, clean and free from nail polish. False nails must not be worn by clinical staff.</p> <p><i>Gordin et al. (2007)</i>, show the relevance of these guidelines when they describe a cluster of hemodialysis-related bacteremias linked to artificial nails. A cluster of 5 haemodialysis patients who dialysed via tunnelled catheters developed gram-negative bacteraemias. A nurse used an artificial fingernail to open a vial of heparin and make up a bag of saline that was used throughout the day to flush dialysis catheters. The <i>S. marcescens</i> isolated from the artificial fingernail and patients were identical on the basis of 2 typing procedures.</p>
<p>CONCLUSIONS</p>	
<p>Part A (1966 – 2004)</p>	<p>Evidence would suggest that nails harbour the majority of hand microorganisms and, therefore, require particular attention when cleaning.</p> <p>Short nails harbour fewer organisms, are easier to clean and are less likely to tear gloves.</p> <p>Nail brushes are not recommended as they can cause abrasions, leaving the potential for infection.</p> <p>Fresh nail polish does not appear to increase microbial load. However, chipped polish should be removed as this can harbour increased numbers of microorganisms.</p> <p>Clear polish would be best as dark colours can make cleaning difficult.</p> <p>Artificial nails appear to increase microbial load.</p> <p>Artificial nails, long nails and wearing nail polish may lead to less rigorous handwashing.</p>
<p>Part B (2004 – 2006)</p>	<p>There are limited additional publications produced within the period of this annual review of the model policies. The only study, which has been published, further strengthens the case against wearing of artificial nails by HCWs and that nails should be well groomed and short.</p>

<i>Part C (2007-2008)</i>	No further new evidence exists on nails/nail care and hand hygiene, but there is further strengthening of evidence that artificial nails must not be worn when providing clinical care.
RECOMMENDATIONS <i>Part A (1966 – 2004)</i>	<p>Health and social care workers should pay particular attention to cleaning their nails when washing their hands (by utilising the steps as described in the review relating to how hands should be decontaminated).</p> <p>Nails should be kept short to avoid harbouring of microorganisms.</p> <p>If worn, nail polish should be clear to avoid obscuring of the subungual space.</p> <p>Nail brushes are not recommended for use as they may increase the risk of infection. (This does not apply when undertaking a surgical scrub technique.)</p> <p>Artificial nails should not be worn.</p>
<i>Part B (2004 – 2006)</i>	No change to present guidance recommended in literature review available 10/08/05.
<i>Part C (2007-2008)</i>	As a result of the literature review for Part C, nothing additional needs to be added to Infection Prevention Model Policy/Procedure 2 (version1).
PRACTICAL APPLICATION	As the hand hygiene measures described have been recommended for some time, no significant change to practice should be required, however, the standards set down must be achieved.
RESOURCE IMPLICATIONS	As per current policies. All resources required for dealing with hand hygiene should already be in place.
KEY REFERENCES	
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Part C (2007-2008)	<p>Gordin, F. M., Schultz, M. E., Huber, R., Zubairi, S., Stock, F., and Kariyil, J. (2007) A cluster of hemodialysis-related bacteremia linked to artificial fingernails. <i>Infection Control & Hospital Epidemiology</i>, 28(6), 743-744.</p> <p>Pratt, R.J., Pellowe, C.M., Wilson, J.A., Loveday, H.P., Jones, S.R., McDougall, C., and Wilcox, M.H. (2007) epic2: national evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. <i>Journal of Hospital Infection</i>, 65(Suppl).</p>
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