

**Infection Prevention Model Policy and Procedure**  
**Hand Hygiene as an Infection Control Measure – why?**

**REVIEW OF LITERATURE**

<b>TEAM UNDERTAKING REVIEW:</b> Parts A and B - Health Protection Scotland. Part C – Welsh Healthcare Associated Infection Programme (WHAIP)	
<b>CONTACT PERSON:</b> Dawn Hill	
<b>TOPIC:</b> Hand hygiene as an infection control measure – why?	
<b>PRINCIPAL RESEARCH QUESTION/OBJECTIVE:</b> To assess the evidence in relation to hand hygiene being a method of reducing the spread of infection.	
<b>METHODOLOGY</b>	
<b>i) Search strategy for identification of studies</b>	
<i>Period of publication</i>	Part A: 1966 – 2004 Part B: 2004 – 2006 Part C: 2007 - 2008

<p><b>Strategy key words for Part C</b></p> <p><i>From Health Protection Scotland literature review [2007] 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><b>Electronic databases for Part C</b></p> <p><i>(tick as appropriate)</i></p>	<p>MEDLINE ✓</p>	<p>PsycINFO</p>
	<p>Science Direct</p>	<p>EMBASE ✓</p>
	<p>CINAHL ✓</p>	<p>SIGLE</p>
	<p>Cochrane Library ✓</p>	<p>HMIC ✓</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	
<b>ii) Selection criteria for inclusion of studies</b>		
<i>Sample</i>	All health and social care workers.	
<i>Outcome measure(s)</i>	Effectiveness of hand hygiene as a measure for preventing the spread of infection.	
<i>Other inclusion criteria</i>	N/A	
<i>Language Limitations</i>	English language only	
<b>iii) Quality assessment</b>		
<b>Study Quality Assessment</b>		
<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 (2004 – 2006) 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.	

<p><b><u>RESULTS</u></b></p> <p><b><i>Part A (1966 – 2004)</i></b></p>	<p>Almost one hundred and fifty years ago, Semmelweis (1861) insisted doctors washed their hands before delivering babies. This action was considered instrumental in the subsequent reduction of maternal mortality due to streptococcal puerperal sepsis from 22% to 3%. Today, handwashing is recognised as the most effective means of preventing cross infection (Boyce &amp; Pittet, 2002).</p> <p>The importance of hand hygiene in the prevention of the spread of infection was made plain by Gould’s (1997b) statement that hands used to ‘care, treat and comfort may potentially become instruments of harm’ and this statement is supported by Larson’s (1995) guidelines for handwashing and hand antisepsis in health care settings produced for the Association for Professionals in Infection Control and Epidemiology (APIC). This guidance indicates that handwashing produces a significant reduction in the carriage of potential pathogens on hands (Steele &amp; Mallison, 1975; Garner &amp; Favero, 1986).</p>
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	<p>Furthermore, the Yale New Haven Hospital Infection Control Manual highlights, in particular, its effectiveness in preventing the spread of nosocomial infections. Indeed, many studies and guidance papers have confirmed that decontamination of healthcare workers' hands between patients can reduce hospital associated infection (HAI) rates. No specific figure, however, is available within the literature as many of the studies conducted are multi modal in nature and fail to take into account the potential impact of other factors involved in healthcare which may have a role to play. The terms hand hygiene and hand decontamination are used interchangeably in research in this field to describe the process by which handwashing or hand antisepsis is achieved to remove microorganisms from the skin:</p> <p>Resident microorganisms are generally harmless and form part of normal skin flora. They are not readily transferred to other people or surfaces. Infection may sometimes result in patients undergoing surgery or other invasive procedures or those who are immunocompromised.</p> <p>Transient microorganisms include different potentially pathogenic microorganisms, primarily bacteria. Hands acquire microorganisms from other sites on an individual's body, from other people and from the environment. Transient organisms do not normally survive for long periods on individuals' hands and so either die or are passed to objects or others through touch contact. The ease with which these organisms can be passed to and from the hands makes them extremely efficient vectors for infection (AAHB Control of Infection Manual, 4th Edition).</p> <p>Most transient microorganisms are removed by washing with liquid soap and water. Resident microorganisms are largely left on the skin after washing with soap and water, but can be greatly reduced when using an antiseptic detergent wash and a surgical scrub technique. The agent used is dependent on the degree of antisepsis required.</p> <p>Despite the high profile of handwashing as an infection control measure, studies have shown healthcare workers frequently do not comply with guidance. Evidence indicates that compliance is sub-optimal, leaving patients and staff more susceptible to infection.</p> <p>Of those studies undertaken over the course of the 1990s, Dubbert (1990) found an average rate of compliance with intensive care units of 32%. Little improvement was seen towards the end of that decade when Pittet et al. (1999) undertook a large hospital wide survey and found a compliance rate of 36% within ICUs.</p>
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	<p>Wilson (2001) underlined several factors, including poor staffing levels, inadequate sinks and poor water temperature controls, as reasons which discourage handwashing. Skin irritation is also perceived to be a significant barrier to compliance with hand hygiene (Larson, 1995). However, further studies are required to determine the effect of individual factors on compliance as the majority of those conducted to date have been multi modal in nature and as a result have produced data which are difficult to interpret. A number of recent initiatives have been launched to address some of these issues and to improve compliance amongst healthcare staff, including the National Patient Safety Association's 'Clean Your Hands Campaign', the English Bulletin recommending hand gels at each bed, the NHS Scotland HAI Task Force Mandatory Training Programme, NHS Education Scotland's Cleanliness Champions Programme and the RCN and ICNA initiatives</p>
<p><b>Part B (2004 – 2006)</b></p>	<p>The annual review aims to identify, review and critique any scientific studies or guidance, which have been published in the intervening period since the original literature review, to determine if changes to guidance are required.</p> <p>There were a number of scientific studies published within the review period which provided additional evidence to support the importance of hand hygiene (Gordin <i>et al.</i>, 2005, Johnson <i>et al.</i>, 2005, King, 2004, Rosenthal <i>et al.</i>, 2005). These studies were particularly concerned with the reduction of nosocomial infection rates following introduction of alcohol hand rub regimes into healthcare settings. In addition, some studies focussed on evaluation of actual microbiological contamination levels on the hands of healthcare workers (HCWs) before and after different hand hygiene techniques (Kac <i>et al.</i>, 2005). One study reported that achievement in reduction of rates of HAI, particularly in ICU settings is a multi-factorial process, of which hand hygiene forms only a part (Silvestri <i>et al.</i>, 2005).</p> <p>A number of observational studies published within the period of the review, demonstrated that rates of compliance with hand hygiene are still relatively low, despite introduction of alcohol hand rub, sufficient and accessible hand hygiene facilities, staff education etc (Chudleigh <i>et al.</i>, 2005, Creedon, 2005, Parry <i>et al.</i>, 2005, Pessoa-Silva <i>et al.</i>, 2004, van de Mortel &amp; Murgu, 2006).</p>

	<p>Several recently published studies have therefore been concerned with methods of improving compliance; such as use of the 6- Sigma Process and performance feedback of hand hygiene (Eldridge et al., 2006, Kampf, 2004, MacDonald et al., 2004). Evaluation of the use of these methods all report a degree of success with increased compliance with hand hygiene demonstrated within the period of the reports. Therefore the introduction and use of improvement programmes to raise staff awareness and compliance with hand hygiene may be useful to support implementation of guidance.</p> <p>In this respect, there has been a recently launched Hand Hygiene Campaign (HPS, 2006) which is a media campaign, designed to raise public awareness of the importance of hand hygiene and also, a specific NHS campaign to raise awareness of hand hygiene within healthcare settings, which aims to target NHS Scotland staff, patients and visitors.</p>
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<p><b>Part C (2007 – 2008)</b></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>An integrative review by <i>Beckman et al. (2008)</i> looking at the evidence on the relationship between hand hygiene interventions (HHIs) and the incidence of healthcare-associated infections (HCAIs) concluded that although the number of publications in this area was large, methodological issues with studies remained significant. The multiple interventions used and diverse factors related to the presence of HCAI's made it difficult or impossible to isolate the specific effects of hand hygiene or any other component of the interventions. The review demonstrates that the evidence linking HHI's and HCAI's is present, but is not well quantified and concludes that more robust analytical research designs are needed to obtain better evidence on which HHIs are associated with reductions in incidences of which HCAIs, in a variety of settings.</p> <p><i>Aiello et al. (2008)</i> carried out a meta-analysis on the effect of hand hygiene on infectious disease risk in the community setting. This meta-analysis was carried out to quantify the effect of hand-hygiene interventions in the community on rates of gastrointestinal and respiratory illnesses, and to identify the interventions which provide greatest efficacy. The researchers conclude that improvements in hand hygiene resulted in reductions in gastrointestinal illness of 31% and reductions in respiratory illness of 21%. The most beneficial intervention was hand hygiene education with the use of nonbacterial soap. Use of antibacterial soap showed little added benefit compared with the use of non-bacterial soap, and there was little evidence for an additional impact of new alcohol-based hand sanitizers. Results like these, may help in formulating consistent community based hand hygiene guidelines. However there would be a need to include microbiological assessments of the agents that may be associated with clinical symptoms so that agent-specific targeted hand hygiene practices can be evaluated.</p> <p>Literature reviewed in the <i>EPIC 2: National evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England</i>, suggests that effective hand decontamination can reduce cross-transmission and cross-infection rates (<i>Pratt et al., 2007</i>). However, overall compliance with hand hygiene measures by healthcare workers remains low (<i>Bahal et al. 2007, Dedrick et al. 2007</i>). Bahal's observational study on ICU's and surgical wards in Birmingham and Sydney showed that , although remaining low, post-patient contact with hand hygiene measures was slightly better than pre-patient contact, and compliance after glove removal was very poor.</p>
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<b>CONCLUSIONS</b>	
<b><i>Part A (1966 – 2004)</i></b>	<p>Historically, hand hygiene has been an important measure in reducing the spread of infection.</p> <p>Handwashing is often referred to as the single most effective means of preventing the spread of infection.</p> <p>Handwashing can reduce the spread of nosocomial infections.</p> <p>Handwashing compliance has been recognised as sub-optimal.</p>
<b><i>Part B (2004 – 2006)</i></b>	<p>Scientific studies have shown a decrease in nosocomial infection rates following the introduction of alcohol hand rub regimes into healthcare facilities.</p> <p>Recently published scientific studies still show relatively low levels of compliance with hand hygiene.</p> <p>Details and evaluation of a number of improvement programmes have been reported, all of which demonstrated a resulting increased compliance with hand hygiene after introduction, e.g. use of performance feedback etc.</p> <p>Improvement programmes could be used effectively at local level to support implementation of guidance and improve compliance with hand hygiene.</p> <p>There has been a recently launched Hand Hygiene Campaign designed to raise the awareness of the importance of hand hygiene aimed at the general public and NHS Scotland staff, patients and visitors.</p>
<b><i>Part C (2007 – 2008)</i></b>	<p>Evidence linking hand hygiene interventions (HHIs) and healthcare-associated infections (HCAs) is present, but is not well quantified.</p> <p>More robust analytical research designs are needed to obtain better evidence on which HHIs are associated with reductions in incidences of which HCAs, in different settings.</p> <p>Hand hygiene interventions are beneficial in community settings.</p> <p>Overall compliance with hand hygiene measures by healthcare workers remains low.</p>
<b>RECOMMENDATIONS</b>	
<b><i>Part A (1966 – 2004)</i></b>	All health and social care workers should adhere to hand hygiene policy.

<b>Part B (2004 - 2006)</b>	No change to present guidance recommendations in literature review available 10/08/05.
<b>Part C (2007 – 2008)</b>	Nothing additional needs to be added to Infection Prevention Model Policy/Procedure 2 (version1) as a result of the literature review for Part C.
<b>PRACTICAL APPLICATION</b>	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.
<b>RESOURCE IMPLICATIONS</b>	As per current policies. All resources required for dealing with hand hygiene should already be in place.
<b><u>KEY REFERENCES</u></b> <b>Part A (1966 – 2004)</b>	<p>Ayliffe GAJ (1992), Efficacy of handwashing and skin disinfection. <i>Current Opinion in Infectious Diseases</i>, 5, 4: 542-6, 603.</p> <p>Ayrshire &amp; Arran NHS Board Control of Infection Manual, 4th Edition.</p> <p>Baumgardner CA, Maragos CS, Larson EL (1993) Effects of nail polish on microbial growth of fingernails: dispelling sacred cows. <i>AORN</i>, 58: 84-8.</p> <p>Boyce JM &amp; Pittet D. (2002) Guideline for hand hygiene in healthcare settings. Recommendations of the Healthcare Infection Control Practitioners Advisory Committee and the ICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. <i>MMWR</i>, 51(RR16): 1-44.</p> <p>Editorials (1999) Handwashing – a modest measure with big effects. <i>British Medical Journal</i>, 318: 686.</p> <p>Ferigold (1997) <i>In Cutaneous Infection and Therapy</i>, p.15-25.</p> <p>Garner JS &amp; Favero MS (1985) CDC guideline for handwashing and hospital environmental control. <i>Infection Control</i>, 7: 23 1-43.</p> <p>Gould D (1992), Hygienic hand decontamination. <i>Nursing Standard</i>, 6, 32: 33-36.</p> <p>Gould D (1994), The significance of hand-drying in the prevention of infection. <i>Nursing Times</i>, 90, 47: 33-5.</p> <p>Gould D (1994a), Nurses’ hand decontamination practice: results of a local study. <i>Journal of Hospital Infection</i>, 28, 15: 30.</p> <p>Gould D. (1997b), Giving infection control a big hand. <i>Community Nursing Notes</i>, 15 (1), 3-6.</p>

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**Part B (2004-2006)**

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