Infection Prevention Model Policy and Procedure
Hand Hygiene as an Infection Control Measure – when should it be applied?

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 as an infection control measure – when should it be applied?	
PRINCIPAL RESEARCH QUESTION/OBJECTIVE: To assess the evidence in relation to hand hygiene and its application.	
METHODOLOGY	
i) Search strategy for identification of studies	
Period of publication	Part A: 1966 – 2004 Part B: 2004-2006 Part C: 2007 - 2008

Strategy key words for Part C ***From Health Protection Scotland literature review [2007] Supplemented with terms from SURE proposal to HTA***	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$1 adj2 antisepsis$.ti,ab Hand$1 adj2 disinfec$.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,	
Electronic databases for Part C (tick as appropriate)	MEDLINE √	PsycINFO
	Science Direct	EMBASE √
	CINAHL √	SIGLE
	Cochrane Library √	HMIC √
	British Nursing Index √	Health Technology Assessment √

Specialist web sites / portals for Part C	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
Hand searching journals (2008 only)	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	
Sample	All health and social care workers.
Outcome measure(s)	Bacterial count on hands following intervention.
Other inclusion criteria	N/A
Language Limitations	English language only.

iii) Quality assessment	
Study quality assessment	
Part A (1966 – 2004)	Identified articles were reviewed according to Roe's model. Guidance documents, however, were unable to be subjected to all such criteria.
Part B (2004 – 2006) and Part C (2007-2008)	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.
Data collation and analysis	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)***	This literature review has uncovered some studies which provide data to support the need for hand hygiene when undertaking certain clinical procedures. However, guidance appears to be based largely on common sense and best practice, identifying times when hands are most likely to be significantly contaminated and, therefore, need to be cleaned. The most recent and most comprehensive guidance in this area, published by Boyce & Pittet (2002), outlines a series of recommendations which indicate when handwashing/hand antisepsis should be undertaken while acknowledging the lack of data available in relation to those health care activities most likely to result in transmission of microorganisms (Sanderson & Weissler, 1992; Pittet et al, 1993). The recommendations are detailed below: When hands are visibly dirty or contaminated with proteinaceous material or are visibly soiled with blood or other body fluids, wash hands with either a non-antimicrobial soap and water or an antimicrobial soap and water. If hands are not visibly soiled, use an alcohol based hand rub for routinely decontaminating hands in all other clinical situations described in items 1C-J (IA). Alternately, wash hands with an antimicrobial soap and water in all descriptions described in 1C-J (IB). Decontaminate hands before having direct contact with patients. Decontaminate hands before donning sterile gloves when inserting a central intravascular catheter. Decontaminate hands before inserting indwelling urinary catheters, peripheral vascular catheters, other invasive devices that do not require a surgical procedure.

	Decontaminate hands after contact with a patient's intact skin (e.g. when taking a pulse or blood pressure, and lifting a patient). Decontaminate hands after contact with body fluids or excretions, mucous membranes, non-intact skin and wound dressings if hands are not visibly soiled. Decontaminate hands after contact with inanimate objects (including medical patient care equipment) in the immediate vicinity of the patient. Decontaminate hands after removing gloves. Before eating and after using a toilet, wash hands with a non-antimicrobial soap and water or an antimicrobial soap and water. Antimicrobial impregnated wipes may need to be considered if there is an interruption to the water supply; however, it should be noted that they are not as effective as alcohol based rubs or washing hands with an antimicrobial soap and water for reducing bacterial counts on hands of healthcare workers (HCWs) and, therefore, should not be considered as a substitute for using an alcohol based hand rub or antimicrobial soap. Wash hands with non-antimicrobial soap and water or with antimicrobial soap and water if exposure to *Bacillus anthracis* is suspected or proven. The physical action of washing and rinsing hands under such circumstances is recommended because alcohols, chlorexidine, iodophors and other agents have poor activity against bacterial spores, protozoan oocysts, and certain non-enveloped viruses. Recently, it has been considered that *Clostridium difficile* may also fall into this category. This situation will have to be monitored, specifically, within the healthcare setting. The recommendations outlined above are generally consistent with other policies available in the UK. Further documentation and literature is available in relation to the appropriateness and application of hand hygiene in healthcare settings, however, the detail of this is limited. CDC recommendations (1998) specify the need to wash hands after contact with blood, other body fluids containing visible blood, as well as semen, vaginal secretions, CSF, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid or amniotic fluid to reduce the potential for the transmission of blood borne viruses. These recommendations were put in place as evidence indicates that these fluids could pose a risk of transmission of infection if hands were not decontaminated.

	Other studies also suggest antiseptic agents/soap should also be available at sinks for use following handwashing for those staff involved in invasive procedures, dealing with infectious patients or body fluids (Heenan, 1996). It has been highlighted in the literature that it is especially important to decontaminate hands when patients or staff have dermatological conditions. These individuals can often have higher rates of skin colonization with organisms such as *Staphylococcus aureus* and as such may be instrumental in passing on organisms. In addition, they can be more susceptible to picking up infections and again be a source of contamination. Evidence to support the recommendations highlighted by this review is at present sparse. Limited studies have considered in detail individual procedures and the risk of contamination involved. Until such time as this becomes available, guidance will have to rely on the general principles of infection control and limited evidence to drive best practice.
Part B (2004-2006)	The original literature review covered a considerable amount of published research concerned with when hand hygiene should be performed. 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. An interesting study has recently been published regarding the possible links between patient's hands and HAI (Banfield & Kerr, 2005). This is an area which has not previously been studied extensively, but it is clear that raising public awareness in hand hygiene generally, as in the recently launched Hand Hygiene Campaign, (HPS, 2006), will help raise patient awareness of their possible part in the 'chain of infection'. The importance of the performance of hand hygiene after entering case notes has also been highlighted in a recent publication (Panhotra et al., 2005), which looked at levels of contamination found on patient files in Intensive Care Units (ICUs). The results showed that ~85% of patients' case notes in ICUs were contaminated with pathogenic and potentially pathogenic bacteria, including MRSA. The contamination on patients' case notes was found to be lower in surgical wards, however it still represented ~25% of patient files which were contaminated with potentially pathogenic organisms. This stresses the importance of the requirement to perform hand hygiene after contact with inanimate objects around the patient / client. It may be useful to specifically mention patient files and case notes as an example to provide further clarification on the guidance

Part C (2007 – 2008)	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. The epic2 guidelines *(Pratt et al., 2007)* suggest that in deciding when it is necessary to decontaminate hands prior to patient contact, four key factors need to be considered: the level of the anticipated contact with patients or objects; the extent of the contamination that may occur with that contact; the patient care activities being performed and the susceptibility of the patient. They state that hands must be decontaminated before every episode of patient care that involves direct contact with patients' skin, their food, invasive devices or dressings. Also that current expert opinion recommends that hands need to be decontaminated after completing an episode of patient care and following the removal of gloves to minimize cross contamination of the environment. An observational study by *Dedrick et al. (2007*), highlights the problems of compliance of healthcare workers (HCWs) with hand hygiene (HH) practices. The objective of the study was to identify characteristics of encounters between HCWs and patients that correlated with HH adherence amongst HCWs. 767 patient encounters were observed. In all instances there was HCW contact with either the patient or the patients' environment. Adherence with HH practices occurred in 45% of observed encounters. Adherence was correlated with duration of encounter, and adherence to HH practices was lowest after brief patient encounter (< 2 minutes). In multivariate analyses, longer encounter duration, contact precautions status, patient contact, and nursing occupation were independently associated with adherence to HH recommendations. The study identified that alcohol-based rubs were underused and suggested that better use of these products could possibly address compliance issues after short duration patient or environment encounters. *Hayden et al. (2008),* carried out a structured observational study the objective being to estimate the level of hand or glove contamination with vancomycin-resistant enterococci (VRE) amongst healthcare workers (HCWs) who touch colonized patients and/or the colonised patients' environment during routine care. Samples were obtained from 22 patients colonized with VRE, and from specific sites within their environment. 17% (+/- 12%) of environmental samples grew VRE. The PFGE patterns of VRE isolates from patients matched those from the environment in all episodes. 44% of HCW's touched only the patient environment, whilst 56% touched both the patient and the patient's environment. No HCW touched only the patient. Culture samples were obtained from HCWs' hands and gloves before and after care. Of 103 HCWs whose hands were negative for VRE when they entered

	the patient's room, 52% contaminated their hands or gloves after touching the environment only, and 70% contaminated their hands or gloves after touching the patient and their environment. 5% of those who wore gloves for contact had hands that were contaminated with VRE, emphasizing the need for for HH after glove removal.. The authors highlight the need to view touching the environment of a patient colonized with VRE as an activity that poses a high risk for hand contamination. *Gould et al. (2008)* carried out a systematic review of interventions that improve hand hygiene (HH) compliance in patient care. They identified studies which investigated the effectiveness of interventions to increase HH compliance in the short term and longer term, and tried to determine their success in terms of HH compliance and subsequent effects on rates of healthcare-associated infections. Of the 48 studies and 1 thesis identified, only 2 studies met the stringent inclusion criteria. Studies remain small, poorly controlled and follow up data collection is stopped too soon to establish the impact of interventions in the longer term Designs were found to be insufficiently robust to attribute any observed changes to the interventions. The review authors discuss how investigators might design future studies to better address the unanswered questions. The low compliance of HCWs with hand hygiene is an acknowledged problem. Two standards from the epic2 guidelines *(Pratt et al., 2007)* state that hand hygiene resources and individual practice should be audited at regular intervals and the results fed back to HCWs, and that education and training in risk assessment, effective hand hygiene and glove use should form part of all HCWs annual updating. Improving staff compliance with hand hygiene measures remains a major issue for healthcare providers. One group used a novel technology to improve compliance *(Swoboda et al., 2007)*. However, *Sax et al. (2007)* used a user-centred design approach incorporating strategies of human factors engineering, cognitive behaviour science and elements of social marketing which has resulted in a concept for recognising when hand hygiene should be carried out, as well as training, performance assessment and reporting of these activities. "**My five moments for hand hygiene**" describes the fundamental points for HCWs when hand hygiene is required to effectively interrupt microbial transmission- (1) before patient contact (2) before an aseptic task (3) after body fluid exposure (4) after patient contact and (5) after contacts with patient surroundings. It proposes a unified view which provides a solid basis to understand, teach, monitor and report hand hygiene practices.

CONCLUSIONS	
Part A (1966 – 2004)	Handwashing/ hand antisepsis should be undertaken if health or social care workers' hands come into contact with blood or other body fluids. Handwashing/ antisepsis should be undertaken if health or social care workers are involved in any of the procedures detailed overleaf. Handwashing/antisepsis should be undertaken if patients are highly susceptible to infection Handwashing/ antisepsis should be undertaken if the health or social care worker suffers from dermatological problems to minimise risk both to him/herself and to highly susceptible patients.
Part B (2004 – 2006)	Patient's case notes or files may be a source of contamination and therefore, it may be useful to add this as an example of an inanimate object around the patient / client, requiring hand hygiene after contact with. Patient hand hygiene may be a factor in HAI and patient awareness of the importance of hand hygiene should be raised (i.e. by the use of public campaigns such as the recently launched Hand hygiene Campaign (HPS, 2006)).
Part C (2007 – 2008)	The epic2 guidelines set out key factors to consider and standards to adhere to when deciding when to decontaminate hands. The compliance of healthcare workers with hand hygiene standards remains a problem area. Healthcare workers are failing to recognize short duration patient contact or contact with the patient's environment as key times to apply hand hygiene measures. Alcohol-based hand rubs are underused. "My 5 moments for hand hygiene" describes the fundamental points for healthcare workers to decontaminate their hands and effectively interrupt microbial transmission. This framework can provide a unified view for understanding, teaching, monitoring and reporting hand hygiene practices. Hand hygiene practices should be monitored and fed back to healthcare workers.
<u>RECOMMENDATIONS</u> ***Part A*** ***(1966 – 2004)***	Handwashing/antisepsis should be carried out under the conditions detailed earlier.

Part B ***(2004 – 2006)***	No change to present guidance recommendations in literature review available 11/08/05, although perhaps may be helpful to add this example to the list of when hand hygiene should be performed e.g. after updating patient files or casenotes.
Part C ***(2007-2008)***	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.

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