

GUIDELINES
FOR PREVENTION
OF INFECTION
AND CROSS INFECTION
IN THE DOMESTIC
ENVIRONMENT



Second Edition 2004

Intramed Communications s.r.l.

Via Traiano 7

20149 Milano, Italy

Tel. 02/345451 - Fax 02/33106875

© 1998 by Intramed Communications s.r.l., Milan - Italy

All rights reserved.

No part of this Publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior permission of the Copyright owners.



EDITORIAL BOARD

DR RIJKELT BEUMER

Laboratory of Food Microbiology, Wageningen University, Wageningen, THE NETHERLANDS

PROFESSOR SALLY F BLOOMFIELD

London School of Hygiene and Tropical Medicine, London, UK

PROFESSOR DR MARTIN EXNER

Director, Hygiene-Institute, University of Bonn, GERMANY

PROFESSOR GAETANO M FARA

Director, Department of Public Health Sciences "G Sanarelli", "La Sapienza" University, Rome, ITALY

DR ELIZABETH SCOTT

Co-Director, Simmons Center for Hygiene and Health in Home and Community Settings, Simmons College, Boston, MA, USA

PROFESSOR KJ NATH

President, Institute of Public Health Engineers, Calcutta, INDIA

IFH

P.O. Box 1106, 1211 Geneva I, Switzerland

CONTENTS

INTRODUCTION	4	3. GUIDELINES FOR PERSONAL HYGIENE	20
INFECTION POTENTIAL IN THE HOME	6	3.1. Handwashing	20
TRANSMISSION OF INFECTION IN THE DOMESTIC ENVIRONMENT	8	3.2. General personal hygiene	20
PRINCIPLES OF HYGIENE IN THE DOMESTIC ENVIRONMENT	9	3.3. Personal hygiene materials	20
GUIDELINES FOR PREVENTING INFECTION AND CROSS INFECTION IN THE DOMESTIC ENVIRONMENT	11	4. GUIDELINES FOR WATER QUALITY	21
I. GUIDELINES FOR GENERAL HOME HYGIENE	12	5. GUIDELINES FOR HOME HEALTHCARE	22
1.1. Reservoir sites	13	5.1. Groups with reduced resistance to infection	24
1.2. Reservoir/disseminators	13	5.1.1. The very young	24
1.3. Hand and food contact surfaces	14	5.1.2. The elderly	24
1.4. Other surfaces	14	5.1.3. Pregnant women	24
1.5. Laundry hygiene	15	5.1.4. Immunocompromised people/patients discharged from hospital	24
1.6. Hygiene issues for homes with young children	15	5.1.5. Medical equipment and dressing in the home	25
1.7. Hygiene issues for homes with pets	16	5.1.6. Contact lens wearers	26
1.8. Home hygiene to reduce the risk of infection from airborne disease	16	5.2. The infected family member as a source of infection	26
1.9. Home hygiene in emergency situations	17	5.2.1. Symptomless carriers of infectious disease	26
2. GUIDELINES FOR FOOD HYGIENE	18	5.2.2. Family members suffering infectious outbreaks	27
2.1. Food preparation	18	5.3. Treatment of minor injuries	27
2.2. Cooking	19	APPENDIX I: DEFINITIONS	28
2.3. Meal preparation of cooked food or food to be eaten raw	19	APPENDIX II: INSTRUCTIONS FOR EFFECTIVE HAND WASHING	29
2.4. Storage of food	19	APPENDIX III: SELECTED GUIDELINES	30
		REFERENCES	32

INTRODUCTION

The objective of this document is to give guidance to doctors, pharmacists, veterinary surgeons, community nurses, midwives, health visitors, environmental health officers, teachers of home economics and other healthcare professionals who are involved in advising the public on all aspects of hygiene in their daily lives.

Procedures to prevent infection and the transmission of infection are used in a variety of domestic situations, and collectively may be termed home hygiene procedures. For the purposes of these guidelines, the practices which are used in home hygiene are categorised into four main areas, namely:

- GENERAL HOME HYGIENE
- FOOD HYGIENE
- PERSONAL HYGIENE
- HOME HEALTHCARE

The term general home hygiene is used here to define the routine procedures employed in the home to prevent cross contamination and cross infection via domestic sites and surfaces. Food hygiene and personal hygiene procedures are also routine home hygiene measures performed on an ongoing basis to reduce the risk of infection and cross-infection. Home healthcare includes specific situations of increased risk such as the care in the home of the very young, the elderly and those who are immuno-compromised through underlying disease or drug treatment. Procedures such as decontamination of areas of faecal contamination or other spillage material, and procedures such as the disinfection of contact lenses can also be considered as home healthcare. Social and demographic changes and changes in health service structures mean that the number of people in the home needing special care, because they are at particular risk of infection, has significantly increased and will continue to do so. Increasingly, home healthcare includes infection control measures associated with the use of inhalation or catheterisation equipment, home nursing of immunocompromised family members, and family members who are carriers of infectious diseases, such as the human

immunodeficiency virus (HIV), hepatitis viruses, methicillin resistant *Staphylococcus aureus* (MRSA) and *E. coli* O157 (Parry et al. 1998; Rhinehart 2001; Simmons et al. 1990).

At the present time these various components of home hygiene tend to be regarded as separate issues rather than a series of interrelated procedures based on the same underlying microbiological principles. Since all of these aspects of home hygiene may be under the control of a single person, the home manager, it is reasonable to expect that an integrated approach to the understanding of these issues, and the implementation of suitable procedures, is likely to be beneficial in achieving and improving standards of home hygiene (Bloomfield and Scott 1997; Jones 1998). It is also essential that the home, and home hygiene, is not viewed in isolation. The home and family are central elements of a community, since there is a dynamic interaction between the home, its occupants, and the community-wide structures such as day-care centres, schools, work places, eating establishments and healthcare facilities.

The aim of this document is to provide guidelines for preventing infection and cross infection in the domestic environment. It is anticipated that these guidelines will be continually updated to take account of new research in the area of home hygiene. The guidelines are based on a risk assessment approach which specifies that infection prevention through reduced exposure to pathogens is most effectively achieved by identifying the sites and situations in the home which represent the greatest infection transmission risk and targeting hygiene procedures or practices at these sites, at the appropriate time. The document focuses on specifying where and when hygiene procedures should be applied in order to reduce the risk of exposure to pathogens. Subsequent to the development of these guidelines, the IFH have also produced a set of "Recommendations for selection of suitable hygiene procedures for use in the domestic environment" which detail the procedures to be used where a hygiene risk is identified. The recommendations address both general situations in the home and situations of specific risk.

Where appropriate these Guidelines have been cross referenced

to the “Recommendations for selection of suitable hygiene procedures for use in the domestic environment” for more detailed information on choosing and applying the most appropriate hygiene procedures in any given situation. In addition, these guidelines refer to other published guidelines for healthcare professionals which provide more detailed information on specific infection control measures which are either not within the scope of this document or are dealt with only briefly.

In collaboration with the UK Infection Control Nurses Association, the IFH has now produced a teaching/self learning resource “Home hygiene: prevention of infection at home” for practising health professionals in the community. This resource describes the targeted approach to home hygiene in simple practical language for those who have the responsibility to teach home hygiene to the public. It can be used for the training of any group (including those who may have little scientific background) that requires an understanding of home hygiene, such as doctors, pharmacists, public health and social care workers, community nurses, health promotion organisations, food standards authorities, school teachers, consumer groups and commercial organisations. The training resource is available from www.icna.co.uk

DEFINITIONS OF TERMS

Although the state of being free from viable organisms is defined by the term “sterile”, there is no accepted term which describes a state in which surfaces are not just visibly clean (i.e., free from visible dirt) but where microbial contamination has been reduced to a level that, whilst not being sterile, is microbiologically safe for its intended use. Although it is recognised that the term hygiene has much wider connotations, for the purposes of this document the word has been adopted to describe such a state. For the purposes of this document the definitions presented in Appendix I apply. To avoid misunderstandings it is recommended that these are read before the rest of the document.

INFECTION POTENTIAL IN THE HOME

Fundamental to the formulation of a strategy for improving hygiene at home is the recognition that home hygiene is the sum total of measures for preventing cross-infections, which includes food hygiene (cooking, storage and handling of food and drinking water), personal hygiene, general domestic and peridomestic hygiene (i.e. the home and its immediate environment) and hygiene related to medical care.

There is a growing list of infections associated with the domestic environment, the occurrence of which may be reduced or prevented by good hygiene practice (Scott 1996).

Food and water-borne infections represent a significant social and economic problem both in developed and developing areas of the world (Todd 1997, 2001; Schmidt 1998). Schmidt (1998) concluded that in European countries most food-borne infectious intestinal disease (IID) occurs in the home.

Common gastrointestinal, respiratory and other infections such as eye, ear and skin infections occurring in the community have considerable epidemiological significance, but their prevalence and impact on health and the economy are frequently underestimated. Although surveillance data provides information on disease trends which is vital in formulating health policy, community-based studies in UK, Holland and Ireland now indicate that the prevalence of infectious intestinal disease (IID) in the community is significantly underestimated by current surveillance methods (Wheeler et al. 1999; de Wit et al. 2001, Anon 2003b). The UK study concluded that at least 9.5 million people (1 in 5 of the population) in the community suffer from IID each year of which only 6% visit their general practitioner. The most recent estimate from Ireland suggests that 6 out of 10 people suffer a bout of IID each year. In contrast to prevailing attitudes, data from European countries indicate that the greater part of these infections arise in the home.

Most gastrointestinal infections probably result from consumption of contaminated food, but it is known that cross contamination via hands and other surfaces is a contributory factor in a significant proportion of outbreaks, as well as direct

hand to mouth transfer in some cases. An estimate from the UK Food Standards Agency states that the proportion of total IID cases that are food borne is between 17 and 50%, which means that between 50 to 83% are not food borne (FSA 2000). In addition, data from the UK Communicable Disease Surveillance Centre (CDSC) indicates that approximately 19% of Salmonella outbreaks may be transmitted not by food but by other means (Le Baigue et al. 2000). The data also suggests that fewer than half of E. coli O157 outbreaks are food borne and less than 3% of the very large numbers of norovirus infections. A study of E. coli O157:H7 infections from hamburgers prepared at home implicated poor hand and surface hygiene as the cause (Meade et al. 1997). In homes where there was an infant infected with Salmonella, environmental sources, infected family members and pets, were found to be more significant risk factors than contaminated foods (Schutze et al. 1999). Other important infections known to be associated with poor hygiene include dysentery caused by Shigella sonnei (Kotloff et al. 1999)

Increasingly there is evidence that cross contamination is responsible for spread of viral infections including rotavirus, norovirus and rhinovirus infections. Viruses can survive in the environment for significant periods (up to several days or weeks) and the infectious dose may be very small (<10 infectious particles). One aspect of infectious disease prevention which is generally overlooked is the considerable evidence showing that influenza, and particularly cold viruses, can be spread via hands and surfaces such as handkerchiefs and tissues, tap and door handles, telephones etc. Indications are that virus transfer via the fingers to the nasal mucosa or the conjunctiva of the eye is the route of infection.

Although many of the respiratory and gastrointestinal infections (particularly those caused by viruses) are normally considered as relatively mild and self-limiting (coughs and colds, etc.) for the increasing numbers of people with reduced immunity to infection who are now cared for at home, the consequences of infection can be much more serious, and may result in hospitalisation with the associated additional costs.

Groups at extra risk of infection include:

- people who are generally healthy, but:
 - have an increased risk of infection (the very young, the elderly, pregnant women)
 - live in poor living conditions or have an unhealthy lifestyle
- people who are at greater risk of infection:
 - due to underlying disease or drug treatment including people with indwelling catheters, surgical wounds, immunosuppression, etc.
 - require use of medical equipment and dressings

Despite advances in the fight against infectious diseases, the risk posed by old and new pathogens is likely to increase. The emergence of new pathogens, such as *E. coli* O157:H7, has implications for community and home hygiene (Anon 1996). More recently, the FDA has identified *Enterobacter sakazakii* as a rare but serious emerging foodborne pathogen that can cause sepsis, meningitis or necrotizing enterocolitis in newborn infants. Antibiotic resistance is now considered as a major health threat (Anon 1997). The implication from this is that greater emphasis must now be placed on preventive hygiene practices as opposed to an increasing reliance on antibiotic therapy. This situation in turn demands that complacency about home hygiene is no longer acceptable. Although antibiotic resistance has largely been considered as a hospital-based problem, control of MRSA, for example, is now a community as well as a hospital problem. This also highlights the dynamic interaction between the community and the home.

As part of its work and as a basis for the preparation of these guidelines, the IFH has prepared a detailed review of the scientific data assessing the infection potential in the home (Beumer et al. 2001).

TRANSMISSION OF INFECTION IN THE DOMESTIC ENVIRONMENT

SOURCES OF INFECTION

The main sources of infection in the home are people, domestic animals, raw food and water. Fungal contamination can also sometimes be introduced via the air. There is also evidence that certain areas or sites in the home environment where stagnant water and organic residues accumulate such as sinks, sink and basin U-tubes, toilets, wet cleaning cloths and facecloths will readily support the growth of potentially harmful bacteria and fungi and thus become a source or "reservoir" of infection.

THE TRANSMISSION OF INFECTION IN THE DOMESTIC ENVIRONMENT

Transmission of infection in the home can occur in a number of ways:

1. In many cases infection arises as a result of direct contact with infected people or animals. Prevention of these infections is related to patterns of social behaviour and it is the responsibility of the healthcare professional to ensure family members and the public are aware of the mechanisms of transmission. The importance of measures to prevent the transmission of these infections cannot be overemphasised but are outside the scope of this document.
2. A proportion of infections arise by self-infection from the body's own flora, such as cystitis, and personal hygiene plays a major role in reducing this risk of infection.
3. Gastrointestinal infections most usually arise by ingestion of contaminated food but sometimes also occur as a result of direct hand-to-mouth transmission (Linton et al. 1977). In addition, other infections, such as hepatitis A, can occur through ingestion of contaminated food or through direct hand to mouth contact (Hadler 1991; Shapiro et al. 1993).
4. A proportion of infections are transmitted indirectly, for example by transfer via surfaces. Although bacteria do not grow in the absence of water, and will eventually die on a dry surface, most species can survive on surfaces in sufficient numbers for a sufficient period of time to represent an infection hazard. Organisms transferred in small numbers via surfaces to cooked foods can multiply rapidly if the food is stored at ambient temperature. This also applies to organisms picked up onto wet cleaning cloths which are then left at ambient temperatures. Viruses and parasites may also survive long enough on inanimate surfaces to cause infections. As far as domestic hygiene is concerned the most important of these surfaces are the hands, hand and food contact surfaces and cleaning utensils. Currently there is insufficient awareness of the potential for cross contamination via, not only hands, but also apparently clean surfaces and apparently clean cloths in the home.
5. Insects, other household pests and also pets can also act as the vector for transfer of infection.
6. Airborne transmission of infection can occur, most particularly via contaminated skin scales and aerosol droplets.

A detailed review of the scientific data assessing the transmission of infectious agents in the home has been prepared by the IFH (Beumer et al. 2001).

PRINCIPLES OF HYGIENE IN THE DOMESTIC ENVIRONMENT

1. The implied purpose of applying a hygiene procedure in any particular situation in the home is to achieve a reduction in the number of viable organisms to a level where there is no longer a threat to health i.e. no longer a risk of further spread. This level is variable according to specific circumstances and will dictate what acceptable measures are required. Cross infection in the domestic environment does not always result in an infectious disease. The risk of infectious disease arising from transfer of infection in the domestic environment is highly variable and depends on a number of factors:

- The presence and pathogenicity of the organism.
- The infective dose - there is a direct correlation between the size of the infecting dose and the risk of infection.
- The length of time micro-organisms exist on surfaces in conditions favourable for growth to infective doses.
- The susceptibility of the host. The very young, the elderly, pregnant mothers and other immunocompromised people are at increased risk of infection. Even for healthy adults, susceptibility to infection can be altered by various factors e.g. stress, alcohol use, and even the use of medications such as antacids which reduce the effectiveness of the acid barrier.
- The route by which the organism enters the body e.g. oral, topical etc.
- The degree of occupancy of the home and the climatic conditions.

2. The main principles for achieving high standards of infection control in the domestic environment are concerned with:

- Preventing the outgrowth of pathogenic micro-organisms and preventing their spread from these sources.
- The reduction or elimination, where feasible, of sources/reservoirs of infection (which includes the proper cooking of contaminated raw foods).
- Education of the public in good hygiene practices.

Since in many situations there is continual recontamination of surfaces or sites, the emphasis in these situations is on

managing these risks through high standards of hygiene practices which prevent infection transfer.

3. In the last decade the concept of HACCP (Hazard Analysis Critical Control Point - the process of identifying critical sites and situations hazards and focussing hygiene at these points) has been used successfully to control microbial risks in food and other manufacturing environments. It is now accepted that a similar approach in the domestic environment is necessary to devise hygiene policy which has real health benefits (Bloomfield and Scott, 1997; Jones, 1998; Griffiths et al. 1998, Scott 1999). When applied to the home this approach has come to be known as "targeted hygiene".

In devising a risk assessment or targeted approach to home hygiene the first step, hazard characterisation, involves identifying the sites and surface in the home where pathogens are most likely to be found. Consideration must also be given to whether these microbes are likely to be present in numbers which represent an infectious dose. Risk assessment depends on considering this information together with an assessment of the probability of human exposure to the hazard. Based on this risk assessment, the most appropriate prevention strategies can be selected.

4. Cleaning and hygienic cleaning - for surfaces where the risk of spread of pathogenic micro-organisms is low (e.g. floors) cleaning to remove visible dirt is usually sufficient. Cleaning can be achieved by vacuum cleaning, damp dusting, or washing with warm water and detergent. Cleaning removes dirt and some micro-organisms but does not necessarily reduce them to a 'safe' level.

Where the risk of spread of pathogenic micro-organisms is significant (e.g. hands, raw food preparation) hygienic cleaning is vital. Hygienic cleaning means removing dirt and getting rid of as many micro-organisms as possible, either by removing them, or killing them by disinfecting.

A number of procedures can be applied in order to reduce levels of contamination of sites and surfaces. These include:

- **DETERGENT-BASED CLEANING.** In many situations, such as for cooking and eating utensils and handwashing, hygienic cleaning or decontamination can be achieved by the use of a detergent-based cleaning product and water. However, since decontamination in these situations is largely achieved by mechanical removal of the contaminating micro-organisms, this method is only effective in achieving a hygienically clean surface if applied in conjunction with mechanical action (i.e. wiping or scrubbing) and a rinsing process. This process is thus not effective on fixed surfaces, such as some food preparation surfaces, taps, handles etc, which cannot be effectively rinsed.
- **HEAT.** Although heat is an effective method for decontamination of small items such as clothes, cleaning utensils and linens, it is not the most convenient method for decontamination of areas and surfaces in the home and can be unreliable in unskilled hands. Heat is the method used to reduce microbial contamination of foods to a level which is safe for consumption.

- **DISINFECTANT CLEANERS AND CHEMICAL DISINFECTANTS.**

Disinfectant cleaners and chemical disinfectants are used for decontamination of sites and surfaces in situations where the former methods are either impractical or deemed to be inadequate for the particular situation. Information on the choice of a suitable disinfectant or disinfectant cleaning product can be obtained from standard texts or from available national guideline documents such as the British Standard document BS 7152 Guide to Choice of Chemical Disinfectants or the List of Disinfectants published by the Disinfectant Commission of the German Society for Hygiene and Microbiology (Anon 1991, 1999; Ascenzi 1996)

5. It must be borne in mind that the effectiveness of any hygiene procedure applied in the home depends not only on the effectiveness of the procedure (e.g. the disinfectant cleaner or the disinfectant) but also on the way in which it is applied i.e. in the right way and at the right time. Effective hygiene in the home requires good hygiene practices, which in turn are dependent on good hygiene education. It is important to raise and maintain the awareness of the need for consistent standards of hygiene. It is important that the home manager understands the fact that a lapse in hygiene practices which does not result in an infection outbreak does not imply that the procedure is not important.

GUIDELINES FOR PREVENTING INFECTION AND CROSS INFECTION IN THE DOMESTIC ENVIRONMENT

Procedures to prevent infection and the transmission of infection are used in a variety of domestic situations. These may be categorised into four main areas, namely general home hygiene, food hygiene, personal hygiene and home healthcare. In the following sections guidelines for infection control in each of these areas is described. It is important to restate, however, that general home hygiene, food hygiene, personal hygiene and home healthcare should not be regarded as separate issues, and the basic underlying principles are the same for all these hygiene areas.

I. GUIDELINES FOR GENERAL HOME HYGIENE

In order to formulate a policy for day-to-day general home hygiene which achieves maximum benefit it is necessary to identify those sites and surfaces which are most frequently contaminated with potentially infectious organisms and which are most likely to spread contamination, as compared with other sites and surfaces where the hazards are less. It is important that these areas are given priority in the application of hygiene procedures. In some cases, cleaning to remove visible dirt is sufficient whilst in others (most particularly those most likely to represent a cross contamination hazard), hygienic cleaning is required to achieve a satisfactory level of decontamination.

A policy for general home hygiene, based on risk assessment, can best be identified if sites and surfaces are grouped under different headings: reservoirs; reservoir/disseminators; hand and food contact surfaces; other surfaces (Table I). When the frequency of occurrence of significant contamination for each of these categories of sites/surfaces is combined with the risk of contamination transfer, it is possible to assess the relative need for decontamination and suggest a suitable approach to achieving this (Bloomfield and Scott 1997; Jones 1998). A general approach to home hygiene based on risk assessment is summarised in Table 2.

TABLE I. CATEGORISATION OF SITES AND SURFACES IN THE HOME BASED ON RISK ASSESSMENT

CATEGORY	TYPE OF SITE
RESERVOIRS	Wet sites: Toilet bowls, all sink U-tubes, plastic washing bowls, draining boards, nappy buckets
RESERVOIR/DISSEMINATORS	Wet-cleaning utensils: dishcloths, dish sponges, floor cloths, mops, washing-up brushes, scouring pads Bathroom objects: face cloths, bath sponges and cloths, nail brushes, tooth brushes.*Shower heads, humidifiers
CONTACT SURFACES	Hand contact surfaces: Toilet flush handles, toilet seats, door handles, tap handles, basin and bath surfaces Other household objects which are frequently touched by more than one person such as telephones Hand and food contact surfaces: Chopping/cutting boards, kitchen work surfaces, fridge and freezer surface, cooking hob, eating and cooking utensils, baby feeding materials. Objects handled by children such as toys**
OTHER SURFACES	All floors (carpeted and non-carpeted) walls etc., other bedroom and living surfaces, furniture etc.

*Hygiene issues regarding personal cleaning materials are reviewed in Section 3.3.

**Hygiene issues concerning children are discussed in detail in Section 1.6.

TABLE 2. THE INFECTION HAZARD ASSOCIATED WITH THE FOUR CATEGORIES OF ENVIRONMENTAL SITE

SITE	FREQUENCY OF SIGNIFICANT CONTAMINATION	RISK OF CONTAMINATION TRANSFER	ASSESSMENT OF NEED FOR DECONTAMINATION
RESERVOIR	High	Occasional	Relatively little (except where there is increased risk of infection (see section 5)
RESERVOIR/DISSEMINATOR	High	Constant	Constant
HAND/FOOD CONTACT SURFACE	Medium	Risk to person handling laundry	Constant
LAUNDRY: SOILED	Medium	Low	Relatively little
UNSOILED	Low	Occasional	Relatively little (except e.g if contaminated with vomit or faeces)
OTHER SITES	Low		

Adapted from Bloomfield SF, Scott E. *Journal of Applied Microbiology* 1997, **83**, 1-9

1.1. RESERVOIR SITES

Although the probability of contamination at these sites is high, indications are that the risk of transfer under normal conditions in the home is relatively low. Transfer from reservoirs may occur through direct contact with contaminated reservoir site surfaces e.g. by directly touching toilet bowl surfaces. Although there is some evidence of cross contamination from toilets and sink U-tubes by splashing or aerosol formation, the evidence for this is conflicting and further studies are required. For reservoir sites, therefore, the following procedures should be applied:

- Reservoir sites must be regularly cleaned to remove visible dirt and soil, and well maintained. The frequency of the cleaning and maintenance procedures depends on the usage of the site, such as the number of occupants in the home and on the ambient conditions.
- Hygienic cleaning using a disinfectant cleaner or a chemical disinfectant may be beneficial particularly in specific circumstances e.g. in risk situations as outlined in Section 5 (Anon 1991).
- Although, chemical disinfectants are effective at these sites and surfaces it is important to be aware that contaminating organisms can grow quite rapidly in the aqueous environment which these sites provide and that in order to achieve maximum benefit, a continuous release or sustained action disinfectant product should ideally be used.
- Procedures for cleaning or hygienic cleaning of toilets and other reservoir sites such as sink and bath U-tubes, overflows, drains are specified in section 6.4 of the "Recommendations for selection of suitable hygiene procedures for use in the domestic environment".

1.2. RESERVOIR/DISSEMINATORS

For items which act as reservoir/disseminators a high risk of contamination is combined with a constant risk of transfer of contamination. In the home, reservoir/disseminators represent a situation which has the highest risk of transfer. If cleaning cloths or other cleaning utensils in the kitchen or bathroom are left in damp conditions they can support the growth of micro-organisms which can then be spread to other objects or surfaces. Where possible, the use of disposable cloths should be encouraged. However, for re-usable wet-cleaning items such as dishcloths, floor cloths/mops, washing-up brushes and scouring pads the following procedures should be rigorously applied:

- All items which can serve as reservoir/disseminators, such as wet-cleaning cloths, must be hygienically cleaned every time after contact with any contaminated surface or material (e.g. after wiping raw food, after wiping up spills, cleaning nappy buckets). At minimum, used wet-cleaning cloths should be decontaminated at least once a day even if they have not come into contact with a contaminating source.
- Ensure that all cloths are hygienically clean, not just visibly clean, before use in risk handling procedures (e.g. for cleaning surfaces used in the preparation of cooked food or food to be eaten raw - see Section 2.1).
- Cloths and other wet cleaning utensils can be decontaminated by hot machine washing (at least 60°C), by boiling, or by use of a chemical disinfectant as described in section 6.3 of the "Recommendations for selection of suitable hygiene procedures for use in the domestic environment". Non-metal utensils and cloths which intend to be reused may be decontaminated by microwaving (1 min at full power). Soap and water washing is relatively ineffective for decontamination of cloths (Scott and Bloomfield 1990b).
- After decontamination of reusable cloths, they must be dried as rapidly as possible. If cloths are left in a damp condition residual contamination not destroyed by the decontamination process will rapidly multiply at ambient temperatures.
- Mops used to clean up heavily contaminated areas, such as spills of faeces or vomit, should be cleaned, rinsed with a disinfecting solution, wrung as dry as possible and then dried as rapidly as possible, preferably at elevated temperatures.
- There is some evidence that aerosols generated from shower heads and humidifiers can cause infection, although this is only likely to occur with "at risk" groups. Showerheads should be designed and maintained so as to avoid the accumulation of stagnant water. If not used for more than a week, the showerhead should be contaminated by running hot water (>65°C) for 10 minutes. Humidifiers should regularly be emptied, disinfected and refilled with fresh water.
- Procedures for hygienic cleaning of other reservoir disseminators including humidifiers, showerheads, tap filters and nebulizers are specified in section 6.4 of the "Recommendations for selection of suitable hygiene procedures for use in the domestic environment".

1.3. HAND AND FOOD CONTACT SURFACES

Although micro-organisms will not grow in the absence of water, there is evidence to show that bacteria and viruses can survive on a dry surface for relatively long periods of time (2-4 hours or up to 24 hours or more for some species) in sufficient numbers to represent a cross infection hazard (Scott and Bloomfield 1990a, 1990b; Sattar et al. 1993; Hendley et al. 1973). Surfaces which represent the greatest hazard in the home are hand and food contact surfaces. For these surfaces there is a constant risk of infection transfer, indicating the need for regular and rigorous decontamination. The following procedures should be applied:

- Hand and food contact surfaces must be hygienically cleaned or decontaminated after contact with contaminated material (e.g. after contact with raw meat or processing of nappies/diapers).
- Ensure that all hand and food contact surfaces are hygienically clean, not just physically clean, most particularly before use in risk handling procedures (e.g. before using surfaces (including utensils) for preparation of cooked food or food to be eaten raw).
- Procedures recommended for hygienic cleaning of hand and food contact surfaces in different situations (both general and risk situations) are specified in section 6.2 of the "Recommendations for selection of suitable hygiene procedures for use in the domestic environment". In general:
 - hand and food contact surfaces (e.g. cutting boards or cooking and feeding utensils) can be hygienically cleaned by washing with hot water and detergent provided this is followed by thorough rinsing. Where this is not feasible (e.g. for large surfaces where rinsing cannot be applied, or for hand contact surfaces such as taps, toilet seats, toilet flush handles and door and fridge handles) the surface should be decontaminated using a disinfectant cleaner or by wiping to remove soil followed by application of a chemical disinfectant. This is particularly important after touching contaminated surfaces e.g. when washing hands after raw meat preparation, especially poultry, tap handles may become contaminated. Wiping with a cloth impregnated with only a cleaning product will not decontaminate surfaces.

- Where detergent-based hygienic cleaning without disinfection is applied, surfaces must be washed/cleaned/rinsed with safe and potable water. For effective cleaning and mechanical removal of dirt and germs, the quality and quantity of water is a critical factor, either or both of which could be a problem in some countries.

- Hands must be washed after contact with contaminated material and before risk handling procedures. Hand washing is reviewed in Section 3. Personal Hygiene.
- After decontamination of surfaces, where possible they should be rapidly dried and maintained in a dry condition.
- Contact surfaces that apply particularly to children are reviewed in Section 1.6.

1.4. OTHER SURFACES

These surfaces generally combine a low risk of contamination with a low risk of transfer.

- All other surfaces should be regularly cleaned to remove visible dirt, kept dry to prevent the growth of micro-organisms, and well maintained.
- Hygienic cleaning is only necessary where there is a known high risk (e.g. MRSA contamination) or where there is known contamination such as vomit or faecal material.
- Hygienic cleaning may, however, be beneficial for floors in hotter, more humid climates where the possible rates of growth of micro-organisms (and potential transfer by, for example, insects) are considerably greater.
- Procedures recommended for cleaning or hygienic cleaning of floors walls and furnishings are specified in section 6.6 of the "Recommendations for selection of suitable hygiene procedures for use in the domestic environment".

1.5. LAUNDRY HYGIENE

The laundering of clothing and other fabrics is strongly related to well-being and comfort, alongside its function of reducing microbial contamination, particularly where the ill, disabled or infants are concerned. Clothing, bedlinens, towels and other items which are in constant or intermittent contact with the body may form an important route of transmission of infection for “at risk” groups (see Section 5). The following procedures should ensure effective laundry hygiene:

- During laundering, modern cleaning products effectively remove substrates from soiled fabrics which may support the growth of micro-organisms.
- Fabrics which may be contaminated with micro-organisms can be hygienically cleaned or decontaminated using soap/detergent and hot water washing (60°C) or above, or at 40-60°C using an activated bleach-based powder. If lower temperature washes are used (<45°C), the addition of hypochlorite bleach to white fabrics will promote decontamination.
- Procedures recommended for cleaning or hygienic cleaning of laundry in different situations (both general and risk situations) are specified in section 6.5 of the “Recommendations for selection of suitable hygiene procedures for use in the domestic environment”.
- Laundering of cloths, towels etc. which are used in association with food preparation should be carried out separately from laundering of clothes and bedlinens.
- Hands should be washed after contact with soiled laundry.

1.6. HYGIENE ISSUES FOR HOMES WITH YOUNG CHILDREN

When there are young children in a home, such as crawling toddlers, a number of surfaces with which they come into close contact may become contaminated. These may include toys that children put in their mouths (Hale and Polder 1996), cot/crib rails, food preparation surfaces, nappy (diaper) changing areas, nappy changing mats, toilet training equipment, floor surfaces and carpets. Parents of neonates should receive education on the importance of hygiene regarding the preparation of feeding bottles. Nappy hygiene is as important for young children as for babies:

- Spills of body fluids from children such as faeces, nasal and eye discharges, saliva, urine and vomit should be cleaned immediately and any contaminated surfaces cleaned and disinfected.
- Nappy (diaper) hygiene is described in Section 5.1.1.

1.7. HYGIENE ISSUES FOR HOMES WITH PETS

Owners of pets need to be made aware of the potential infection hazards associated with their pets (Wall et al. 1996b). These may include cats, dogs, especially when young, reptiles and birds. There is evidence to show that the presence of pets in the home is associated with increased levels of contamination in the kitchen and bathroom (Scott 1981). Domestic cats, dogs and other types of pets, although apparently healthy, can act as carriers of enteric pathogens such as Salmonella and Campylobacter; in homes where there was an infant infected with Salmonella, pets were found to be a significant risk factor (Schutze et al. 1999). Pets such as cats and dogs may also bring pathogens into the home on their paws and contaminate kitchen food surfaces as well as floor surfaces. In these situations, additional hygiene measures need to be considered:

- Pets such as dogs or cats should be appropriately immunised from disease.
- Pets are best housed and fed elsewhere than in the kitchen.
- Pet living quarters and items such as cat litter boxes, should be cleaned on a daily basis. Faecal material should be removed from the surface of the litter tray using gloved hands and paper towels and flushed down the toilet.
- Avoid cleaning pet cages and tanks in the kitchen sink.
- Floor surfaces used by pets and pet feeding areas should be regularly decontaminated using a disinfectant cleaner, or by cleaning followed by disinfection.
- Pets should not be allowed to come into contact with food preparation surfaces. Any of these surfaces which may have been contacted by a pet should be hygienically cleaned before food preparation (see Section 2.3).
- Pet feeding utensils should be decontaminated using a disinfectant cleaner or by cleaning followed by application of a disinfectant.
- Hands should be washed after handling pets, pet cages, pet feeding utensils or other pet objects. Children most particularly must be taught to wash their hands after handling their pets.

- Spills from pets such as faeces, urine and vomit should be cleaned immediately and any contaminated surfaces cleaned and disinfected.
- If a pet appears unwell, it should be taken to a veterinarian. Veterinarians should also advise parents about pets that are suitable for children.
- Pets in the home may be a particular risk in those groups of people whose immune defence systems are less than those of the normal healthy adult. This is reviewed in Section 5.

1.8. HOME HYGIENE TO REDUCE THE RISK OF INFECTION FROM AIRBORNE DISEASE

Indoor bioaerosols generated in the home may include bacteria (including actinomycetes) and fungi, (yeasts and moulds). Although mould spores can occur in isolation, bacteria and viruses in the air are usually associated with skin scales, or mucous droplets generated by sneezing. Although these airborne micro-organisms do not generally represent an infection hazard to the normal healthy individual, the following advice should be given:

- Airborne contamination from bacteria, viruses and fungi can best be avoided by good ventilation and by the use of cleaning procedures that involve vacuum extraction.
- Excessive mould in the home should be avoided.
- Regular cleaning of surfaces where mould is likely to grow is important to prevent accumulation to levels that may become hazardous.

I. GUIDELINES FOR GENERAL HOME HYGIENE

ALLERGIC REACTIONS FROM AIRBORNE CONTAMINATION

The relationship between damp housing, mould growth and symptomatic health state has been well established (Strachan and Elton 1986; Martin et al. 1987; Platt et al. 1989; Strachen et al. 1990) and it has been concluded that damp and mouldy living conditions have an adverse effect on health, especially among children. Moulds can exacerbate asthma and other respiratory diseases and allergens from house dust mite faeces are also implicated in respiratory disease such as asthma. Although these are allergic reactions and are outside the scope of this document, the following advice, in addition to published advice for asthmatics, should be considered:

- As a temporary measure, moulds should be wiped away with a diluted solution of bleach and areas of mould growth treated with approved products. More severe problems of damp housing and mould growth suggest poor ventilation and may need to be referred to relevant environmental housing departments.
- Regularly remove dust from sites where dust mites and dust mite faeces may accumulate to reduce their occurrence.

I.9. HOME HYGIENE IN EMERGENCY SITUATIONS

Following emergency situations and natural disasters, such as flooding, the home may become dangerously contaminated and the risk of infection increased. In these situations local authorities will usually provide advice and support for affected homes and make provision in case of loss of power and running water.

2. GUIDELINES FOR FOOD HYGIENE

The evidence suggests that within Europe and the USA the greater proportion of reported food poisoning outbreaks arise in the domestic environment. In 2003, the World Health Organisation reported that as much as 40% of all foodborne infections are a result of food eaten within the home Anon (2003). The majority of these outbreaks result from inadequate temperature control (either inadequate cooking or storage of food under unsuitable conditions; Roberts 1990). In a significant proportion of incidents, cross contamination via surfaces (either food preparation surfaces or the hands) is a contributory, or even the causative, factor (Roberts 1986, 1990). UK surveillance data (Evans et al 1998) suggest that in the home the most common cause of food-borne outbreaks (up to 50%) is inappropriate storage whilst inadequate heating accounts for 11% of outbreaks. Poor hygiene involving hands and other surfaces is cited as a contributory factor, in up to 39% of domestic food poisoning outbreaks (Ryan et al 1996). Although consumption of contaminated foods is a primary cause of IID, increasingly it is acknowledged that spread of IID in the community is by no means all food-borne, and that secondary spread within families, particularly of viral infections, is often the cause. Person-to-person spread via hands or surfaces, via food prepared in the home by an infected person, or by airborne spread can all occur particularly during the vomiting or diarrhoeal phase of gastrointestinal infections.

2.1. FOOD PREPARATION

- Certain raw foods or ingredients have a high risk of contamination such as meats, fish, poultry and eggs. When brought into the home these can act as vehicles for spreading contamination throughout kitchen surfaces. Other foods may have a medium risk of contamination such as certain vegetables, which may have been contaminated during production, or which are soiled.
- A chopping board should be used for preparation of high-risk raw foods likely to be contaminated. After preparation of high-risk raw foods all surfaces which have come into contact with the food should be immediately decontaminated either with a detergent wash and rinse, or using a disinfectant cleaner, or by wiping to remove soil followed by application of a chemical disinfectant*. It is recommended that separate chopping boards should be used for raw meat and fish, for fresh fruit and vegetables and for other items.
- Hands must be washed immediately after handling raw food (see Section 3.1). It is important to be aware that, during and after handling high-risk raw food, ANY surface subsequently touched with the hands (even tap handles, refrigerator doors and cooker control knobs) will be contaminated with micro-organisms from the food.
- Dishcloths and hand cloths used during the preparation of raw food must be hygienically cleaned and dried. Cloths can be hygienically cleaned by hot machine washing, boiling or by use of a chemical disinfectant*. Soap and water washing is relatively ineffective for decontamination of cloths. The use of disposable cloths/paper towels is recommended.
- After decontamination, cloths should be dried as rapidly as possible. If cloths are left in a damp condition residual contamination not destroyed by the decontamination process can rapidly multiply at ambient temperatures.

*Procedures recommended for hygienic cleaning of food contact surfaces and cloths are specified in section 6.2 and 6.3 of the "Recommendations for selection of suitable hygiene procedures for use in the domestic environment".

2.2. COOKING

- To cook meat safely so that commonly implicated foodborne pathogens such as *E. coli* O157, *Salmonella*, *Campylobacter* and *Listeria* are killed, the centre of the meat must reach and maintain a temperature of 70°C for a minimum of 2 minutes or an equivalent core cooking temperature and time, or until the juices run clear. Note: cooking may not kill ALL of the bacteria present in food, but must be sufficient to reduce the numbers to a “safe” level.
- Food cooked from frozen, or re-heated chilled food must also be cooked for a sufficient period of time such that ALL of the food maintains a satisfactory temperature for a sufficient period of time as described above for raw food.
- Cooking equipment should be properly maintained to achieve consistently the required cooking temperatures and times.
- It is advisable that the cooking process should be routinely monitored (e.g. by using a meat thermometer).
- Users of microwave ovens should refer to the manufacturer's instructions on the appropriate times and power settings for cooking or defrosting food. As with conventional ovens, microwaves have hot and cold spots so foods must be turned or stirred to prevent uneven heating.
- The internal surfaces of microwaves should be regularly cleaned and decontaminated.

2.3. MEAL PREPARATION OF COOKED FOOD OR FOOD TO BE EATEN RAW

- Hands must always be washed before handling cooked foods (see Section 3.1).
- Ensure that all meal preparation/serving surfaces are hygienically clean, not just visibly clean, before use in the preparation of cooked food or food to be eaten raw*.
- Ensure that all cloths are hygienically clean, not just visibly clean, before use*.
- Cooked foods must never be allowed to come into contact with raw food, or with utensils, cloths or other surfaces contaminated by contact with raw food.

*Procedures recommended for hygienic cleaning of food contact surfaces and cloths are specified in section 6.2 and 6.3 of the “Recommendations for selection of suitable hygiene procedures for use in the domestic environment”.

2.4. STORAGE OF FOOD

- Cooked food should be cooled as quickly as possible in order to prevent the growth of pathogenic micro-organisms, and then stored in a refrigerator or freezer.
- Refrigerators and freezers should be checked regularly to ensure that they maintain the required temperature. The temperature of a domestic refrigerator should be between 7°C and 4°C and that of a freezer -18°C (Eley 1996).
- Refrigeration only reduces the rate of growth of micro-organisms. It does not prevent it. Food should only be stored in the refrigerator for a limited period and sell-by dates on product packaging strictly adhered to. Leftover food should not be kept in the refrigerator for more than 2-3 days.
- Raw food must always be stored separately from cooked food in the refrigerator. It is important to ensure that the juices from raw, potentially contaminated foods such as raw meat, do not drip onto foods stored below which will not be cooked.
- Cooked foods or raw foods that are not cooked or heated before eating should be covered when stored in the refrigerator.
- Avoid mould growth on food residues and food storage areas.
- Refrigerator surfaces should be cleaned regularly or decontaminated using a disinfectant cleaner or by cleaning followed by chemical disinfection*.
- Freezing of foods prevents bacterial growth for an indefinite period. Food, which is safe for consumption, can be maintained in that state by rapid freezing.

*Procedures recommended for hygienic cleaning of food contact surfaces and cloths are specified in section 6.2 and 6.3 of the “Recommendations for selection of suitable hygiene procedures for use in the domestic environment”.

More detailed information on food hygiene in the home is given by Scott and Sockett (1998) and Farber and Todd (1998).

3. GUIDELINES FOR PERSONAL HYGIENE

3.1. HANDWASHING

One of the most important routes for transmission of infection is via the hands. It is vital to raise and maintain awareness of the fact that ANY item, surface or object (including human skin) touched by the hands after contact with a contaminated source will be contaminated with micro-organisms from that source. The major contamination sources may include raw food, pets, soiled nappies, contaminated surfaces and reservoir sites such as toilets, sneezing, coughing and transfer of nasal secretions to the hands. Transient microbial contamination picked up onto the hands by contact with a contaminated source can be effectively removed by thorough handwashing with soap and running water.

HANDS SHOULD BE WASHED:

- Before handling food.
- Before eating.
- After using the toilet.
- After handling pets, pet cages, pet feeding utensils or other pet objects.
- After coming into contact with body fluids, such as nasal secretions, saliva, vomit etc., or after changing nappies.
- After hands have come into contact with a potentially contaminated reservoir site (e.g. a drain) or reservoir/disseminator (e.g. a wet-cleaning cloth).
- Whenever hands are visibly dirty.
- Before giving or applying medication to another person.
- Before applying contact lenses.

Procedures recommended for hygienic cleaning of hands in different situations (both general and risk situations) are specified in section 6.1 of the "Recommendations for selection of suitable hygiene procedures for use in the domestic environment". Guidelines on an effective handwashing procedure are given in Appendix II.

3.2. GENERAL PERSONAL HYGIENE

All areas of the skin and mucous membranes such as the mouth and nose are colonised with micro-organisms, which although not harmful under "normal" conditions to the carrier, can produce infection if transferred to other areas of the body e.g. the urinary tract, or if transferred to another person who is susceptible to infection (see Section 4). It is impossible and undesirable to eradicate the normal resident microbial flora from the body. Regular bathing/showering and good general personal hygiene can reduce the risks of self as well as cross infection.

3.3. PERSONAL HYGIENE MATERIALS

Materials such as bath sponges, nail brushes, tooth brushes and towels which are used for personal hygiene can become contaminated and can act as reservoir/disseminators if not correctly maintained (see Section 1.2). Therefore, the following procedures are advised:

- Face cloths, bath sponges, nail brushes and toothbrushes should be thoroughly rinsed under running water after use and then dried as rapidly as possible. If face cloths or other items are left in a damp condition residual contamination will rapidly multiply at ambient temperatures. Particular care of these items required if there is a person with infection in the home.
- Face cloths and sponges should be regularly laundered (see Section 1.5).

4. GUIDELINES FOR WATER QUALITY

Water quality is of prime importance not only for drinking but also because of its central role in the practice of home hygiene. Where good quality i.e. potable water is not available, boiling or other methods should be applied to produce safe water. Where water must be stored in the home, conditions of handling and storage are of extreme importance. Water storage vessels should be thoroughly cleaned before refilling by rinsing with good quality (i.e., potable) water. They should also be disinfected periodically. Hand contact with stored drinking water or water used for hygienic cleaning must be avoided.

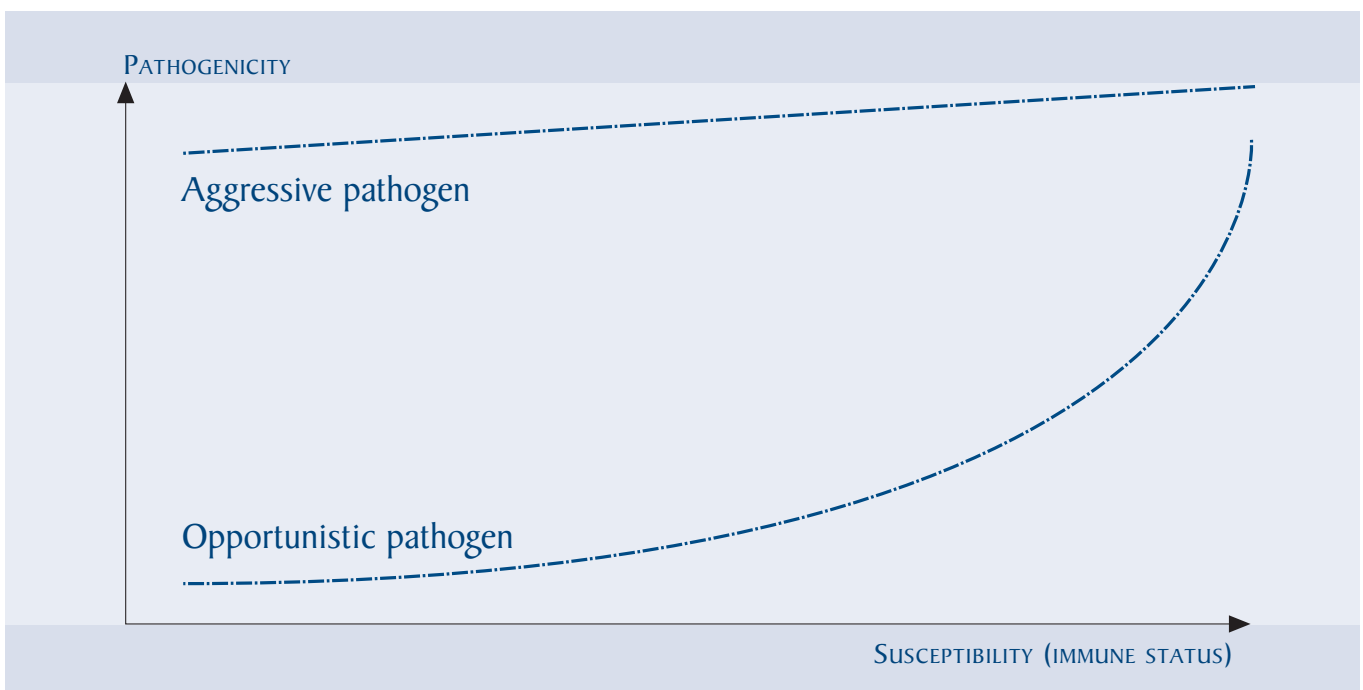
Guidelines for storage, handling and disinfection of drinking water are given in section 6.7 of the "Recommendations for the selection of suitable hygiene procedures for use in the domestic environment".

5. GUIDELINES FOR HOME HEALTHCARE

As stated previously, it must be borne in mind that cross infection in the domestic environment does not always result in an infectious disease. The risk of infectious disease arising from transfer of micro-organisms in the domestic environment depends on a number of factors including the type of organism and its pathogenicity, the infective dose, the susceptibility of the host (the very young, the elderly, pregnant women and other

immunocompromised people are at increased risk of infection) and the route by which the organism enters the body. It is not possible to quantify the risks of infection for a particular organism in relation to a particular host. Figure I gives an illustration of the way in which the infection risk increases according to the nature of the infecting micro-organisms and the susceptibility of the host.

FIGURE I. A SIMPLIFIED ILLUSTRATION SHOWING THE INCREASING RISK OF INFECTION ACCORDING TO THE PATHOGENICITY OF THE INFECTING MICRO-ORGANISM AND THE IMMUNE STATUS OF AN INDIVIDUAL.



The aim of this Section is to give guidance on preventing infection and cross infection in the home where there is increased risk of infection. This happens more often, and is more serious than people often think:

- Up to one person in six of the population in Europe is at extra risk of infection.
- For these people, infections are likely to be more serious and may require hospitalisation.

Those at greater risk of infection include:

- people who are generally healthy:
 - but have an increased risk of infection
 - including people who live in poor living conditions or have an unhealthy lifestyle
- people are at greater risk of infection:
 - due to underlying disease or treatment including people with indwelling catheters, surgical wounds
 - including people who require use of medical equipment and dressings
- people who have an infection and pose a risk to other family members.

A person can have more than one risk factor at the same time.

In situations where there is more risk, preventing infection, for the most part, still means applying hygiene procedures in situations where there is risk of spread of microbial contamination. In situations where there is more risk, the major differences are that:

- in addition to good basic hygiene practices it may be necessary to handle invasive devices, such as catheters, dispose of contaminated waste, deal with medical equipment such as hoists, or cope with living conditions where basic hygiene facilities (e.g. washbasins) are inadequate
- if hygiene practices are not correctly carried out, the risk of, and from, infection is much greater.

5.1. GROUPS WITH REDUCED RESISTANCE TO INFECTION

5.1.1. THE VERY YOUNG

The very young (0-1 years old) are at increased risk of infection. In addition, procedures such as nappy/diaper changing carry an increased risk of transmission of gastrointestinal infection through faecal contamination of hands and hand contact surfaces, and most particularly of face cloths and sponges where organisms can grow at ambient temperatures to establish permanent reservoirs of contamination. Disposal of nappies/diapers also poses an increased risk of faecal contamination of reservoir sites such as the toilet water, toilet bowl and toilet seat.

In addition to normal hygiene routines the following situations therefore require rigorous hygiene procedures: hygiene of infant feeding utensils, personal hygiene to prevent infection and self infection (particularly eye infection), nappy hygiene and the hygiene of toilet training equipment (potties).

HYGIENE OF FEEDING UTENSILS:

- Feeding utensils should be decontaminated by boiling or by use of a suitable disinfectant product. Note: these products are often referred to commercially as “sterilising products” whereas in practice they achieve disinfection.

NAPPY/DIAPER CHANGING:

- Used disposable nappies should be sealed in a plastic receptacle and placed in the waste.
- Reusable nappies should be placed in a nappy bucket and disinfected using a disinfectant product. After disinfection the contents of the nappy bucket should be flushed down the toilet - NOT poured down the kitchen sink.
- Vessels used for washing and cleaning nappies may also become heavily contaminated. In these situations, additional measures need to be considered.
- After disinfection soiled reusable nappies together with any other soiled clothing should be laundered (see Section 1.5).
- All objects and surfaces which were touched and may have become contaminated with faecal material during and after nappy changing should be cleaned and disinfected.

5.1.2. THE ELDERLY

There are increasing numbers of elderly people who will be living at home, either alone or as part of a family group, who may be at increased risk of infection, including foodborne infection, due to the effects of ageing on their immune system.

A proportion of elderly people may also be bedridden or incontinent, requiring particular attention towards laundry hygiene.

5.1.3. PREGNANT WOMEN

Pregnant women in the home are at increased risk from infections, such as *Listeria*, rubella, varicella, and should be given appropriate advice on the prevention of acquiring these infections in the home environment.

Although primarily recognised as a foodborne pathogen, *Listeria* species are common in the domestic setting and may be found outside the kitchen, particularly in wet areas. Advice on the prevention of *Listeria*-associated foodborne illness is provided by the Centers for Disease Control in the United States (Anon 1992b).

Toxoplasmosis represents a significant problem in pregnant women, who should take precautions to avoid contact with or cross-infection from cats that sometimes harbour this pathogen.

5.1.4. IMMUNOCOMPROMISED PEOPLE/PATIENTS DISCHARGED FROM HOSPITAL

Immune compromised patients discharged from hospital into the home are at increased risk from all types of infection and should be given appropriate advice on the prevention of acquiring these infections in the home environment.

- Persons infected with HIV living at home should receive advice on the prevention of opportunistic infections. Advice to HIV patients about the avoidance of exposure to opportunistic pathogens has been published (Anon 1995a).
- People who are immunocompromised because of a particular treatment, e.g. chemotherapy for cancer or immunosuppression following transplantation, should also ask their healthcare professional about specific advice regarding infection prevention.
- Patients and caregivers need to take special precautions regarding the monitoring, insertion, use and maintenance of intravenous catheters in the home healthcare setting. Guidelines for i.v. care have been published and patients or caregivers can be taught to maintain the i.v. system according to these guidelines (Simmons et al. 1982; Simmons et al. 1990).

5. GUIDELINES
FOR HOME
HEALTHCARE

5.1.5 MEDICAL EQUIPMENT AND DRESSINGS IN THE HOME

For patients discharged from hospital, attending out-patient clinics, the elderly or disabled, procedures such as catheter or

dressings replacement, put them at very high risk of infection. Risks of infection vary according to what the item is, how it is used and what it is used for (see Table 3 below).

TABLE 3. RISK OF INFECTION ASSOCIATED WITH MEDICAL EQUIPMENT

RISK	WHY?	WHAT?	WHAT TO DO
HIGH	The item enters the body or touches broken skin or mucous membranes	<ul style="list-style-type: none"> • Bladder and suction catheters • Intravenous lines and needles • Wound and other dressings • Indwelling urinary catheters and drainage bags • Invasive lines such as PEG tubes and Hickman lines 	Use sterile items*. Wrap in plastic and throw them away when finished with.
MEDIUM	Equipment touches unbroken skin/membranes but can become soiled when used	<ul style="list-style-type: none"> • Peak flow meter mouth pieces • Mouth care items and tongue depressors • Enteral feeding equipment • Suction equipment • Nebulisers and humidifiers • Thermometers 	Wash, dry and disinfect between uses, or use disposable items and throw away.**
LOW	Equipment does not normally touch broken skin or has little direct contact with the user	<ul style="list-style-type: none"> • Commodes, lifts/bath hoists • Mattresses, wash bowls, nebuliser masks • Pressure relieving mattresses and cushions • Pumps and machinery • Stored dressing packs 	Wash and dry between uses. Disinfect if soiled with body fluids. Keep items stored above floor level and dust free.

Follow any manufacturer's special cleaning and care instructions for equipment.

* Sterile items marked as 'single use' items must be thrown away after use, never re-used.

** Equipment marked as 'single patient use' can be hygienically cleaned and re-used on the same person. Throw away when no longer needed and never use on another person.

5. GUIDELINES FOR HOME HEALTHCARE

Although there will be fewer facilities in the home, and circumstances may be difficult, the risk of infection can be minimised by observing the following:

- Care procedures such as dressing changes or enteral feeding should only be carried out by carers or others who have received specific training.
- Ensure that the area and surfaces around the person being cared for are kept clean and tidy.
- Hands must always be washed before and after undertaking any care procedure, and after handling any equipment. Use alcohol hand gel if soap and water is not available.
- Store high and medium risk equipment in a clean cupboard or box.
- Place high risk equipment on a hygienically clean surface to prepare for use.
- Always wash hands after cleaning equipment or disposing of equipment/dressings.

5.1.6. CONTACT LENS WEARERS

The eye is at great risk from contamination by contact lenses and these should be disinfected using a recognised preparation. The method for employing these preparations should be carried out rigorously according to the manufacturer's instructions.

5.2. THE INFECTED FAMILY MEMBER AS A SOURCE OF INFECTION

5.2.1. SYMPTOMLESS CARRIERS OF INFECTIOUS DISEASE

There are a number of categories of people who may be present in the home and who represent a source of serious, and in some cases life-threatening, infection in the home. These include, for example, symptomless carriers of primary pathogens, such as Salmonella, MRSA, HIV and hepatitis viruses.

In many cases it is not possible to identify these people as carriers, but where they are identified rigorous hygiene precautions as outlined in these guidelines should be implemented. It is important that the families of infected people are educated about how the diseases are transmitted so that appropriate precautions are taken but also to promote ordinary family interactions by alleviating concerns about transmission. For carriers of bloodborne diseases such as HIV and hepatitis B and C universal blood and body fluid precautions should be implemented in the home healthcare environment (Anon 1987; Anon 1988).

Generally, the following procedures are recommended:

- Whenever contact with blood or body fluids is anticipated, safe practices and appropriate barrier precautions should be used to prevent percutaneous, mucous membrane and skin exposures to bloodborne pathogens.
- Gloves should be used for touching blood, body fluids, mucous membranes or areas of broken skin and for handling items soiled with blood or body fluids.
- Hands should be washed after removing gloves which have come into contact with these sources.
- Blood and blood-containing fluids spilled on surfaces should be promptly removed and the contaminated surfaces cleaned with a disinfectant product (Simmonds and Chanock 1993).
- Gloves should be used during cleaning and decontaminating procedures.
- Carriers of bloodborne infections should not share razors, toothbrushes or any other object which may become contaminated with blood.

5. GUIDELINES FOR HOME HEALTHCARE

For carriers of MRSA, guidelines on its control have been published and include the following recommended procedures (Anon 1995b):

- Handwashing is one of the most important practices in preventing the spread of MRSA and MRSA carriers should be encouraged to practice good hygiene.
- The carrier as well as other family members should adhere to good infection control procedures.

For carriers of pathogens which are primarily transmitted through the faecal-oral route, such as hepatitis A or enteric pathogens such as Salmonella, Shigella, Campylobacter and rotavirus, particular attention to personal hygiene and handwashing will minimise the risk of transmission.

5.2.2. FAMILY MEMBERS SUFFERING INFECTIOUS OUTBREAKS

In addition to symptomless carriers of infectious diseases, family members suffering infectious outbreaks such as diarrhoea, acute hepatitis A, skin or eye infections, must follow more rigorous personal hygiene procedures to minimise the risk of transmission to other family members.

5.3. TREATMENT OF MINOR INJURIES

Animal bites, insect bites and stings, abrasions, cuts, burns and scalds may be responsible for a range of injuries in the home which may become susceptible to infection or a source of cross-infection to others.

- A first aid kit should be kept fully stocked in all homes for the treatment of minor injuries. This must be kept out of the reach of any children. Typical contents of a first aid kit are recommended by the Red Cross.
- The application of antiseptics may, in the case of a dirty wound, contribute to prevention of infection. There is however a body of opinion which suggests that the use of antiseptics can delay healing of healthy tissues, and this practice is therefore no longer encouraged for minor "clean" injuries.

First aid measures for a range of conditions or injuries are listed in a handbook for child care providers published by the Centers for Disease Control and may be equally applied for injuries occurring in the home (Hale and Polder 1996).

APPENDIX I: DEFINITIONS

For the purpose of this document the following definitions apply. Some of the definitions are taken from agreed national and European standards e.g. British Standards. For some hygiene processes referred to in this document there is no agreed definition or the definitions are currently under discussion within ISO (International Standards Organisation) or CEN (Comité Européen de Normalisation) bodies:

BACTERICIDE (BS 5283): A product that kills vegetative bacteria under defined conditions. (The adjective derived from "bactericide" is "bactericidal").

CHEMICAL DISINFECTION (European Standard EN1276): Reduction of the number of micro-organisms in or on an inanimate matrix, achieved by action of a product on their structure or metabolism, to a level judged to be appropriate for a specified defined purpose.

CLEANING/CLEANER: A physical process or product that removes soil, organic material and microbes from an object or surface, but does not have bactericidal, sporicidal, virucidal, fungicidal activity and does not necessarily reduce microbial contamination to a safe level.

CLEAN SURFACE: Visibly clean surface - A surface (hands or other surface) which shows no evidence of visible dirt.

Hygienically clean surface - A surface which does not constitute a threat to health as a result of the presence of micro-organisms.

DECONTAMINATION: The destruction (by physical or chemical agents) or removal of micro-organisms, but not usually bacterial spores: it does not necessarily kill all micro-organisms, but reduces them to a level acceptable for a defined purpose, for example a level which is harmful neither to health nor to the quality of perishable goods.

DISINFECTANT CLEANER: A product that removes soil or organic material from an object or surface and also causes destruction of micro-organisms through an inherent bactericidal, virucidal or fungicidal activity: the combination of soil removal and destruction reduces contamination to a level where there is no longer a threat to health by transmission of the micro-organisms.

FUNGICIDE (EN1276): A product that kills fungi (moulds and yeasts) and their spores under defined conditions. (The adjective derived from "fungicide" is "fungicidal").

HYGIENIC CLEANING: A procedure that removes soil or organic material from an object and also reduces the number of micro-organisms on that surface to a level where there is no longer a threat to health by transmission of micro-organisms. The reduction in the number of micro-organisms is achieved by removal of the micro-organisms by detergent-based cleaning followed by rinsing, by the action of an agent which has a bactericidal, virucidal or fungicidal activity, or by a combination of both processes.

HYGIENE: A procedure or system of procedures or activities used to reduce microbial contamination on environmental sites and surfaces etc. in order to prevent the transmission of infectious disease.

HYGIENE PROCEDURE: A procedure that is applied to reduce the number of viable organisms to a level which is considered safe for its intended use. This may be achieved by a process of removal of the microbes, or by inactivation in situ using heat or a disinfectant. A combination of both processes may also be used.

HYGIENIC SURFACE: A surface on which the number of microbes has been reduced to a level which is considered microbiologically safe for its intended use.

INFECTION: Colonisation of the body with a pathogenic or potentially pathogenic organism.

INFECTIOUS DISEASE: Colonisation of the body with a pathogenic or potentially pathogenic organism which is associated with symptoms of disease.

SPORICIDE (EN1276): A product that kills dormant bacterial spores under defined conditions. (The adjective derived from "sporicide" is "sporicidal").

VIRUCIDE (EN1276): A product that inactivates viruses under defined conditions. (The adjective derived from "virucide" is "virucidal").

OTHER COMMONLY USED DEFINITIONS

ANTIBACTERIAL: A product or process, which kills bacteria or inhibits their growth.

Germ: A micro-organism capable of causing an infectious disease

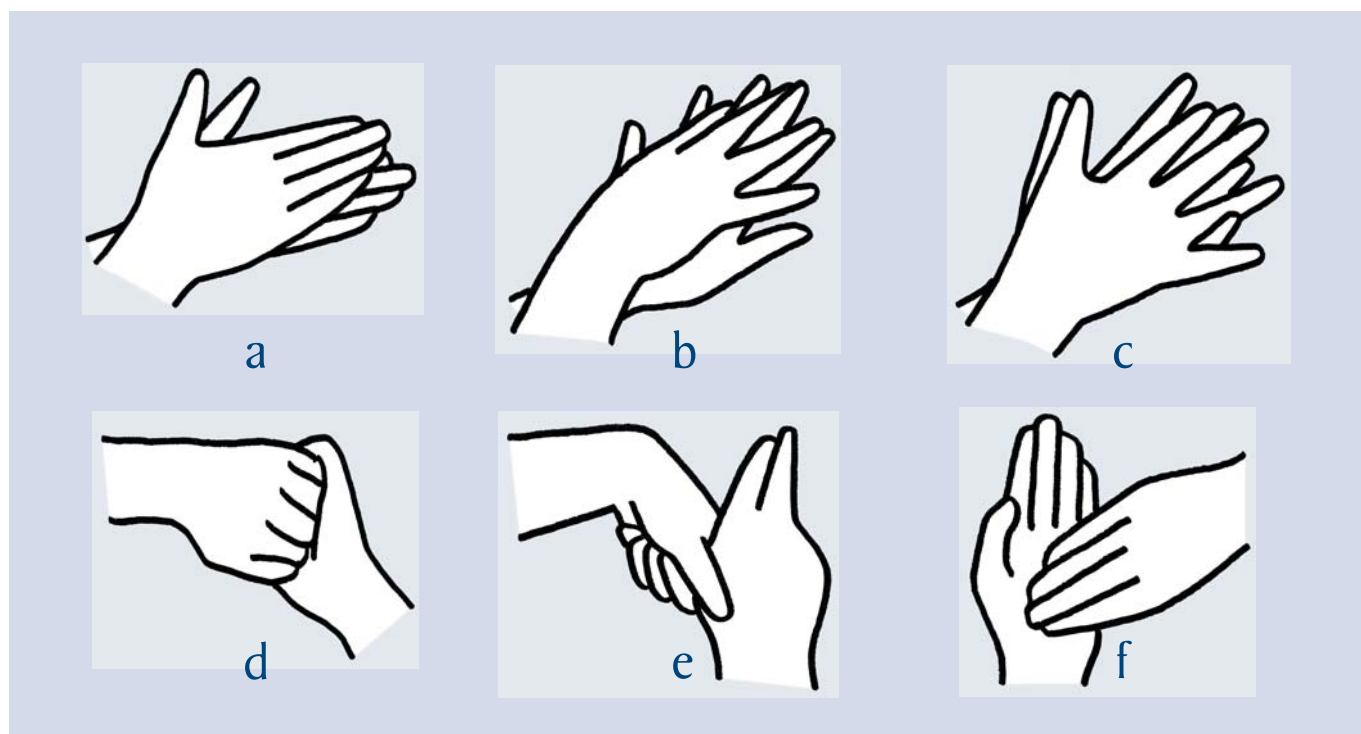
STERILE (EN 556): The state of being free from viable organisms.

Note: the theoretical probability of there being a viable organism present should be less than or equal to 1×10^6 .

APPENDIX II: INSTRUCTIONS FOR EFFECTIVE HAND WASHING

These instructions may be helpful in distributing to parents in order to provide them with a method for effective handwashing.

1. Use warm running water and preferably a liquid soap.
2. Apply a small quantity of soap to the hands.
3. Rub hands together vigorously and ensure soap and water is applied to all surfaces of the hands. Be sure to scrub between fingers, under fingernails and around the tops and palms.
4. Rinse hands under running water. Leave the water running while drying hands.
5. Dry hands with a clean towel.
6. Turn the tap off. Wherever possible try to avoid touching the tap directly with washed hands since there is the possibility of recontamination.



SUGGESTED SEQUENCE FOR HAND WASHING:

- a. palm to palm
- b. with the palm over the back of the hand
- c. palm to palm with fingers interlaced
- d. the back of the fingers with the opposing palm
- e. rotational rubbing of the thumbs in the palm of the hand
- f. rotational rubbing of the fingers in the palm

APPENDIX III: SELECTED GUIDELINES

This document and the “Recommendations for selection of suitable hygiene procedures for use in the domestic environment” can be obtained from IFH or can be downloaded from the IFH website (www.ifh-homehygiene.org):

- “Guidelines for prevention of infection and cross infection the domestic environment.”
<http://www.ifh-homehygiene.org/2public/2pubgu00.htm>
- “Recommendations for selection of suitable hygiene procedures for use in the domestic environment”.
<http://www.ifh-homehygiene.org/2public/2pub04.htm>

OTHER GUIDELINES DOCUMENTS INCLUDE:

Guidelines on the control of methicillin-resistant *Staphylococcus aureus* in the community. *Journal of Hospital Infection* (1995) 31,1-12.

British Standard document BS 7152. (1991) Guide to Choice of Chemical Disinfectants. London: BSI Standards.

Hygiene code for the private household, based on the Dutch situation (1999), Netherlands Nutrition Center, 2508 CK The Hague, The Netherlands.
<http://www.voedingscentrum.nl/pdf/HygieneCodeEngels.pdf>

Hand Hygiene. *Bundesgesundheitsblatt* (2000) 43 (3) 230-233.

Anon (2002) Hand decontamination guidelines. Infection Control Nurses Association, www.icna.co.uk.

APIC guidelines for handwashing and hand antisepsis in health care settings. Larson, E.A. (1995) *American Journal of Infection Control*, 251-269.

Management of hospital outbreaks of gastro-enteritis due to small round structured viruses. Chadwick, P.R., Beards, G., Brown, D., Caul, E.O., Cheesborough, J., Clarke, I., Curry, A., O'Brien, S., Quigley, K., Sellwood, J. and Westmoreland, D.

Journal of Hospital Infection, (2000) 45, 1-105.

German National Hygiene Guideline for Household Cleaning and Surface Disinfection. *Bundesgesundhbl*, January 2004 (in press).

CHILDREN

Hale, C.M. and Polder, J.A. (1996) *The ABCs of Safe and Healthy Child Care. A handbook for child care providers.* Department of Health and Human Services, US Public Health Service, Centers for Disease Control and Prevention.

DISINFECTANT GUIDELINES

Anon (1991) British Standard document BS 7152. Guide to Choice of Chemical Disinfectants. London: BSI Standards.

List of disinfectants tested according to the “Guidelines for testing chemical disinfectants” and found effective by the German Society for Hygiene and Microbiology. Disinfectants Commission of the German Society for Hygiene and Microbiology. (2000) Wiesbaden: mph-Verlag GmbH.

E. COLI O157:H7

Anon (1992c) Preventing foodborne illness: *Escherichia coli* O157:H7. US Department of Health and Human Services, Centers for Disease Control, Division of Bacterial and Mycotic Diseases. CDC.

HIV

Anon (1995a) USPHS/IDSA guidelines for the prevention of opportunistic infections in persons infected with HIV. *Morbidity and Mortality Weekly Report* 44, 1-34.

I.V. CARE

Simmons, B.P., Hanton, T.M., Wang, E.S. and Allen, J.R. (1982) Guidelines for prevention of intravascular infections. *Infection Control* 3, 61-72.

LISTERIOSIS

Anon (1992b) Preventing foodborne illness: Listeriosis. US

department of Health and Human Services, Centers for Disease Control, Division of Bacterial and Mycotic Diseases. CDC.

MRSA

Anon (1995b) Guidelines on the control of methicillin-resistant *Staphylococcus aureus* in the community. *Journal of Hospital Infections* 31, 1-12.

UNIVERSAL BLOOD AND BODY FLUID PRECAUTIONS

Anon (1987) Centers for Disease Control. Recommendations for precautions of HIV transmission in health care settings. *Morbidity and Mortality Weekly Report* 36 Suppl 2S, 1-18S.

Anon (1988) Centers for Disease Control. Universal precautions for prevention of transmission of human immunodeficiency virus, hepatitis B virus and other bloodborne pathogens in health-care settings. *Morbidity and Mortality Weekly Report* 37, 377-382/387-388.

REFERENCES

- Anon (1987) Centers for Disease Control. Recommendations for precautions of HIV transmission in health care settings. *Morbidity and Mortality Weekly Report* 36 Suppl 2S, 1-18S.
- Anon (1988) Centers for Disease Control. Universal precautions for prevention of transmission of human immunodeficiency virus, hepatitis B virus and other bloodborne pathogens in health-care settings. *Morbidity and Mortality Weekly Report* 37, 377-382/387-388.
- Anon (1991) British Standard document BS 7152. Guide to Choice of Chemical Disinfectants. London: BSI Standards.
- Anon (1992a) FAO/WHO Collaborating Centre. WHO Surveillance Program for Control of Food-borne Infections and Intoxications in Europe. Fifth Report 1985-1989.
- Anon (1992b) Preventing foodborne illness: Listeriosis. US department of Health and Human Services, Centers for Disease Control, Division of Bacterial and Mycotic Diseases. CDC, 1992.
- Anon (1995a) USPHS/IDSA guidelines for the prevention of opportunistic infections in persons infected with HIV. *Morbidity and Mortality Weekly Report* 44, 1-34.
- Anon (1995b) Guidelines on the control of methicillin-resistant *Staphylococcus aureus* in the community. *Journal of Hospital Infections* 31, 1-12.
- Anon (1996) Memorandum on the threat posed by infectious diseases. Need for reassessment and a new prevention strategy in Germany. Rudolphe Schulke Foundation. Weisbaden: mph-Verlag GmbH.
- Anon (1997) BMA submission to the Lords Select Committee into antimicrobial resistance. British Medical Association: London.
- Anon (1999) List of Disinfectants published by the Disinfectant Commission of the German Society for Hygiene and Microbiology.
- Anon (2002) FDA Health Professionals Letter on *Enterobacter sakazakii* infections associated with use of powdered (dry) infant formulas in neonatal intensive care units. <http://www.cfsan.fda.gov/~dms/inf-ltr3.html>
- Anon (2003a) (8th) report on the surveillance programme for control of foodborne infections and intoxications in Europe. World health Organisation: http://www.bfr.bund.de/internet/8threport/8threp_fr.htm
- Anon (2003b) Communicable Disease Surveillance Centre Northern Ireland CDSC(NI). Acute Gastroenteritis in Ireland, North and South: A telephone survey. www.cdscni.org.uk
- Ascenzi, J.M. (ed.) (1996) *Handbook of Disinfectants and Antisepsis*. Marcel Dekker, Inc.
- Bloomfield, S.F. and Scott, E. (1997) Cross-contamination and infection in the domestic environment and the role of chemical disinfectants. *Journal of Applied Microbiology* 83, 1-9.
- de Wit, M.A., Kortbeek, L.M., Koopmans, M.P., de Jager, C.J., Wannet, W.J., Bartelds, A.I., and van Duynhoven, Y.T. (2001) A comparison of gastroenteritis in a general practice-based study and a community-based study. *Epidemiology of Infection* 127, 389-397.
- Eley, A.R. (1996) *Microbial Food Poisoning*. 2nd Edition, London: Chapman and Hall.
- Evans, H.S., Madden, P., Douglas, C., Adak, G.K., O'Brien, S.J., Djuretic, T., Wall, P.G. and Stanwell-Smith, R. (1998) General outbreaks of infectious intestinal disease in England and Wales: 1995 and 1996. *Communicable Disease and Public Health* 1, 165-171.
- Farber, J.N. and Todd, E.C.D. eds. (1998) *Safe handling of food*. Marcel Dekker, in press.
- Flannigan, B., McCabe, E.M. and McGarry, F. (1991) Allergenic and toxigenic microbes in houses. *Journal of Applied Bacteriology* 70, (suppl) 615-735.
- FSA (2000) Foodborne Disease Workshop: Introduction. 21/22 Nov 2000. Food Standards Agency, London. http://www.foodstandards.gov.uk/farm_fork/foodborne.htm
- Gerba, C.P., Rose, J.B. and Haas, C.N. (1996) Sensitive populations: who is at greatest risk? *International Journal of Food Microbiology* 30, 113-123.
- Hadler, S.C. (1991) Global impact of hepatitis A virus infection: changing patterns. In: Hollinger, F.B., Lemon, S.M. and Margolis, H.S., eds. *Viral hepatitis and Liver Disease*. Baltimore: Williams & Wilkins, 14-20.
- Hale, C.M. and Polder, J.A. (1996) The ABCs of Safe and Healthy Child Care. A handbook for child care providers. Department of Health and Human Services, US Public Health Service, Centers for Disease Control and Prevention.
- Hendley, J.O., Wenzel, R.P. and Gwaltney, J.M. (1973) Transmission of rhinovirus colds by self-inoculation. *New England Journal of Medicine* 288, 1361-1364.
- Jones, M. (1998) Application of HACCP to identifying hygiene risks in the home. *Int Biodeter Biodegrad* 41, 191-199.
- Kotloff, K.L., Winickoff, J.P., Ivanoff, B., Clemens, J.D., Swerdlow, D.L., Sansonetti, P.J., Adak, G.K. and Levine, M.M. (1999) Global burden of Shigella infections: implications for vaccine development and implementation of control strategies. *Bull World Health Organisation* 77, 651-666.
- Kusch, O.D.W. and Klare, H.J. (1992) Possibilities and limitations of explanation of food-borne infections. Proceedings of the Third World Congress on Food-borne Infections and Intoxications, 76.
- Le Baigue, S., Long, S., Adak, G.K. and O'Brien, S.J. (2000) Infectious intestinal disease – it's not all foodborne! PHLS 25th Annual Scientific Conference, Sept 2000, University of Warwick.
- Linton, A.H., Howe, K., Bennett, P.M., Richmond, M.H. and Whiteside, E.J. (1977) The colonization of the human gut by antibiotic-resistant *Escherichia coli* from chickens. *Journal of Applied Bacteriology* 43, 465-469.
- Martin, C.J., Platt, S.D. and Hunt, S.M. (1987) Housing conditions and ill-health. *British Medical Journal* 294, 1125-1127.

- Meade, P.S., Finelli, L., LambertFair, M.A., Champ, D., Townes, J., Hutwagner, L., Barrett, T., Spitalny, K. and Mintz, E. (1997) Risk factors for sporadic infection with *Escherichia coli* O157:H7. *Archives of Internal Medicine* 157, 204-208.
- Parry, S.M., Salmon, R.L., Willshaw, J.A. and Cheasty, T. (1998) Risk factors for, and prevention of, sporadic infections with vero cytotoxin (Shiga toxin) producing *Escherichia coli* O157. *Lancet* 351, 1019-1022.
- Platt, S.D., Martin, C.J., Hunt, S.M. and Lewis, C.W. (1989) Damp housing, mould growth, and symptomatic health state. *British Journal of Medicine* 298, 1673-1678.
- Rhinehart, E. (2001). Infection control in home care. *Emerging Infectious Diseases* 7(2): 208-211.
- Roberts, D. (1986) Factors contributing to outbreaks of foodborne infection and intoxication in England and Wales 1970-1982. In *Proceedings of the World Congress of Foodborne Infections and Intoxications* 1. pp. 157-159. Berlin: Institute of Veterinary Medicine.
- Roberts, D. (1990) Foodborne illness; sources of infection: food. *Lancet* 336, i, 859-861.
- Ryan, M.J., Wall, P.G., Gilbert, R.J., Griffin, M., Rowe, B. (1996) Risk factors for outbreaks of infectious intestinal disease linked to domestic catering. *Commun. Dis. Rep. CDR. Rev.* 13, R179-182.
- Sattar, S.A. (1986) Institutional outbreaks of rotavirus diarrhoea: potential role of fomites and environmental surfaces as vehicles for virus transmission. *Journal of Hygiene, Cambridge* 96, 277-289.
- Sattar, S.A., Jacobsen, H., Springthorpe, S., Cusack T.M. and Rubino, J.R. (1993) Chemical disinfection to interrupt the transfer of Rhinovirus Type 14 from environmental surfaces to hands. *Applied and Environmental Microbiology* 59, 1579-1585.
- Schmidt, K. (1998) Situation of Foodborne Diseases in Europe, 1992-1996. In *Proceedings of the 4th World Congress Foodborne Infections and Intoxications 7-12 June 1998*, Volume 1 pp262-266. Federal Institute for Health Protection of Consumers and Veterinary Medicine. Berlin, BgVV.
- Schutze, G.E., Sikes, J.D, Stefanova, R. and Cave, M.D. (1999). The home environment and Salmonellosis in children. *Paediatrics* 103, E11-E15.
- Scott E. (1981) Bacteriological contamination in the domestic environment and its control. MPhil thesis, University of London.
- Scott, E. and Bloomfield, S.F. (1990a) Survival and transfer of microbial contamination via cloths, hands and utensils. *Journal of Applied Bacteriology* 68, 271-278.
- Scott, E. and Bloomfield, S.F. (1990b) Investigation of the effectiveness of detergent washing, drying and chemical disinfection on contamination of cleaning cloths. *Journal of Applied Bacteriology* 68, 279-283.
- Scott, E.A. (1996). Foodborne disease and other hygiene issues in the home. *Journal of Applied Bacteriology* 80, 5-9.
- Scott, E.A. and Sockett, P. (1998) *How to prevent food poisoning*. John Wiley, in press.
- Scuderi, G. et al. (1996) Foodborne outbreaks caused by Salmonella in Italy, 1991-4. *Epidemiology and Infection* 116, 257-265.
- Shapiro C.N. and Margolis H.S. (1993) Worldwide epidemiology of hepatitis A virus infection. *Journal of Hepatology* 18(Suppl 2), S11-S14.
- Sheard, J.B. (1986) Food poisoning in England and Wales during 1983. *Environmental Health* 94, 57.
- Simmonds, R.J. and Chanock, S. (1993) Medical issues related to caring for human immunodeficiency virus-infected children in and out of the home. *Pediatric Infectious Diseases* 12, 845-852.
- Simmons, B., Trusler, M., Roccaforte, J., Smith, P. and Scott, R. (1990) Infection control for home health. *Infection Control and Hospital Epidemiology* 11, 362-370.
- Simmons, B.P., Hanton, T.M., Wang, E.S. and Allen, J.R. (1982) Guidelines for prevention of intravascular infections. *Infection Control* 3, 61-72.
- Socket, P.N. (1993) Food-borne disease statistics: Europe and North America. *Encyclopaedia of Food Science, Food Technology and Nutrition*. London: Academic Press, pp. 2023-2031.
- Socket, P.N., Cowden, J.M., Le Baigue, S. et al. (1993) Food-borne disease surveillance in England and Wales 1989-1991. PHLS, Communicable Disease Surveillance Centre, Vol. 3.
- Strachan, D.P. and Elton, R.A. (1986) Relationship between respiratory morbidity in children and the home environment. *Family Practitioner* 3, 137-142.
- Strachen, D.P., Flannigan, B., McCabe, E.M. and McGarry, F. (1990) Quantification of airborne moulds in the homes of children with and without wheeze. *Thorax* 45, 382-387.
- Todd, E.C.D. (1997) Epidemiology of foodborne diseases: a worldwide review. *Rapp. Trimest. Sanit. Mond.* 50, 30-50.
- Todd E.C.D. (2001) Foodborne and waterborne disease in developing countries – Africa and Middle East. *Dairy, Food and Environmental Sanitation* 21, 110-122.
- Wall, P.G., de Louvois, J., Gilbert, R.J. and Rowe, B. (1996a) Food poisoning: notifications, laboratory reports and outbreaks - where do the statistics come from and what do they mean. *CDR Review* 6, R93-R99.
- Wall, P.G., Threlfall, E.J., Ward, L.R. and Rowe, B. (1996b) Multiresistant *Salmonella typhimurium* DT104 in cats: a public health risk. *Lancet* 348, 471.
- Wheeler, J.G., Sethi, D., Cowden, J.M., Wall, P.G., Rodrigues, L.C., Tompkins, D.S., Hudson, M.J. and Roderick, P.J. (1999) Study of infectious intestinal disease in England: rates in the community, presenting to general practice, and reported to national surveillance. *British Medical Journal* 318, 1046-1050.



P.O. Box 1106, 1211 Geneva I, Switzerland - www.ifh-homehygiene.org