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HALT Healthcare Associated Infections in European Long Term Care Facilities

ecdc EUROPEAN CENTRE FOR DISEASE PREVENTION AND CONTROL

Prevalence Survey of Healthcare Associated Infections in Long Term Care Facilities (HALT study)

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Purpose and Summary of Document: Summary of the findings in Wales of the point prevalence surveillance of healthcare associated infections in European long term care facilities

Contents

Acknowledgments

Thanks to all the care homes that participated in this study and to the Health Protection Nurses Sue Morgan, Carol Roberts and Ceri Harris for their support.

1 Introduction

HALT (Healthcare Associated Infections in Long-Term Care Facilities) is a project funded by the European Centre for Disease Prevention and Control (ECDC). The overall aim of the project is to support the control of healthcare associated infections (HAI), antimicrobial resistant micro-organisms, and antibiotic use and to process indicators for infection control practices in long-term care facilities (LTCF) in Europe.

Due to an ageing population, the number of elderly people in need of care in LTCF across Wales, and indeed elsewhere, continues to increase markedly. Residents of these facilities often are at higher risk for the acquisition and development of healthcare associated infections and antimicrobial resistant micro-organisms. This is due to the increase in underlying conditions, such as diabetes, dementia and physiological limitations, brought on by natural age advancement. In addition, they often receive antimicrobial therapy for acute and chronic infections and have multiple admissions and earlier discharge to and from acute care hospitals, which increase the risk of import of resistant micro-organisms to the LTCF.

Because data on healthcare associated infections and antibiotic use in LTCFs are scarce, the HALT project intends to develop and implement a sustainable methodology to estimate the prevalence of these problems. Trends in European LTCFs can therefore be followed into the future and the needs for intervention, training and/or additional infection control resources can be identified to ensure the safety of the residents in LTCFs and the ageing population in general.

2 Aims and Objectives

The aims of the HALT project were to develop and implement a sustainable methodology to allow the following to be estimated in care home settings in Europe:

- Assess the prevalence and types of HAI in care homes.
- Assess the prevalence and types of antimicrobials used in care homes.

Additionally, to produce a report on the findings of the survey and include the results within a European report.

3 Methodology

Nursing homes were recruited for the study on a volunteer basis by the Health Protection nurses from each of the Health Boards in Wales. At least two nursing homes from Wales were required as a minimum for participation in the HALT study.

The methodology used for the study followed the user guide provided by ECDC (available at:

http://halt.wiv-isp.be/manual/Study%20documents%20PPS2/Forms/AllItems.aspx)

The point prevalence study was based on the identification of residents with conditions of interest ("antibiotic use AND/OR infections") on the day of the study. This information was collected via two questionnaires provided for the study by ECDC:

I. A facility questionnaire was completed for each participating facility on the day of their survey (See Appendix 1).

II. A resident questionnaire was completed on the day of the survey for each eligible resident, presenting signs/symptoms of infection and/or receiving antibiotic therapy (See Appendix 1).

McGeer definitions (McGeer et al 1991) were used for identification of infections (See Appendix 2).

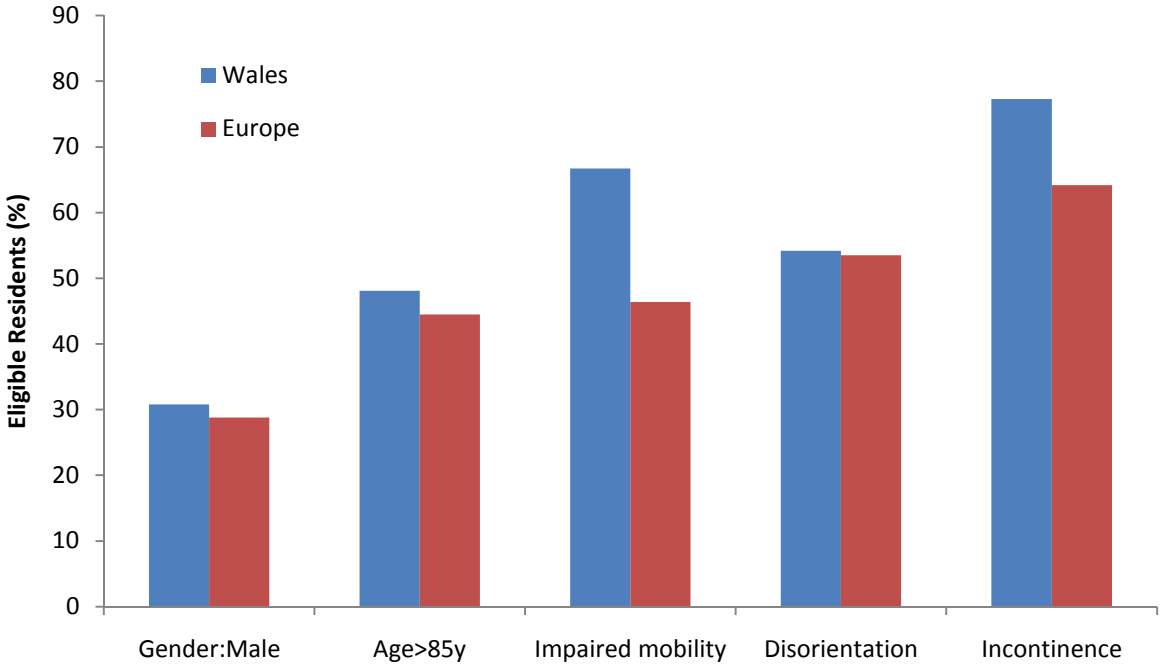
Data collection took place between May and July 2010 and was undertaken by staff from Public Health Wales NHS Trust. Questionnaires were completed on paper then entered into the HALT database, provided by ECDC. Data were exported to ECDC on 30th August 2010. All Wales analysis was carried out in MS Excel.

4 Results

A total of 19 Nursing Homes (895 beds) in Wales were included in the study: 2 facilities from each of the 7 Health Boards in Wales, plus an additional 5 from the Betsi Cadwaladr locality. This represented 6% (CSSIW 2011) of the total number of facilities in Wales which met the LTCF criteria provided by ECDC (Appendix 3). The size of the participating care homes ranged from 24 to 99 available beds with a median of 38 and bed occupancy was 92% on the day of the study.

A total of 819 residents from 19 care homes were surveyed. Of the residents surveyed 31% were male, 49% were over 85 years, 67% were non ambulant, 55% were disorientated and 78% were incontinent. The prevalence of residential care load is detailed in Figure 1.

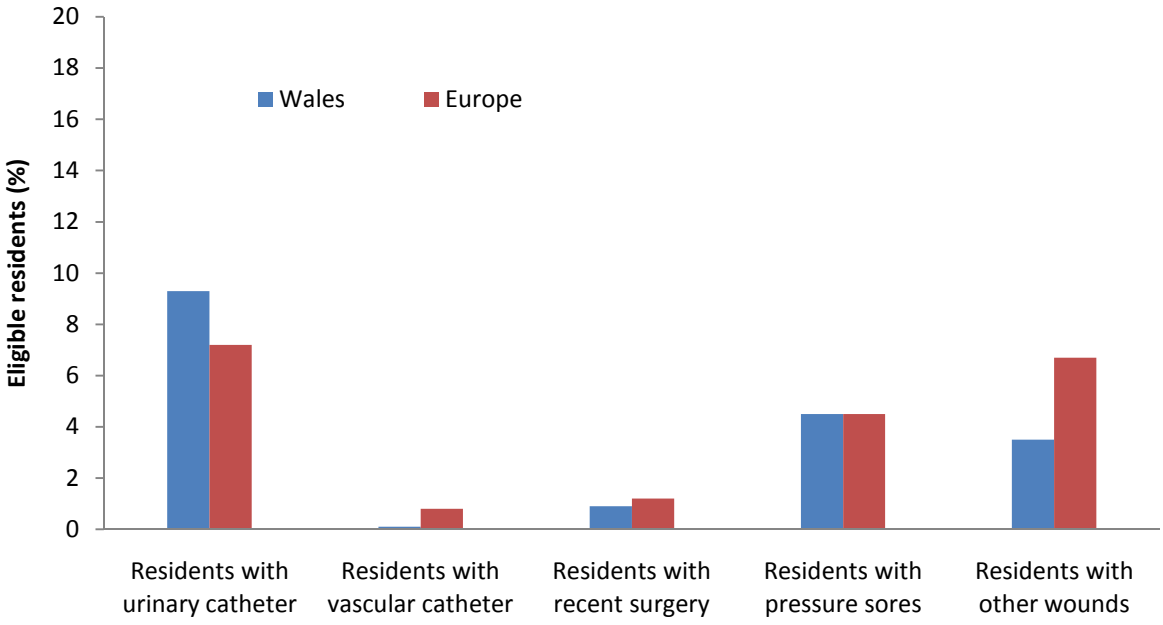
Figure 1 Residential Care Load in Long Term Care Facilities surveyed in the HALT Study, 2010



4.1 Risk Factors for Infection

As part of the facilities questionnaire, a number of risk factors associated with healthcare associated infections were collected. The presence of medical devices *in-situ* always poses a risk to residents, as well as any breakage in the skin such as pressure sores and wounds. Figure 2 gives a breakdown of the number of residents with such risk factors within the facilities in Wales and in Europe.

Figure 2 Resident Risk Factors in Long Term Care Facilities surveyed in the HALT Study, 2010



4.2 Infection Rates

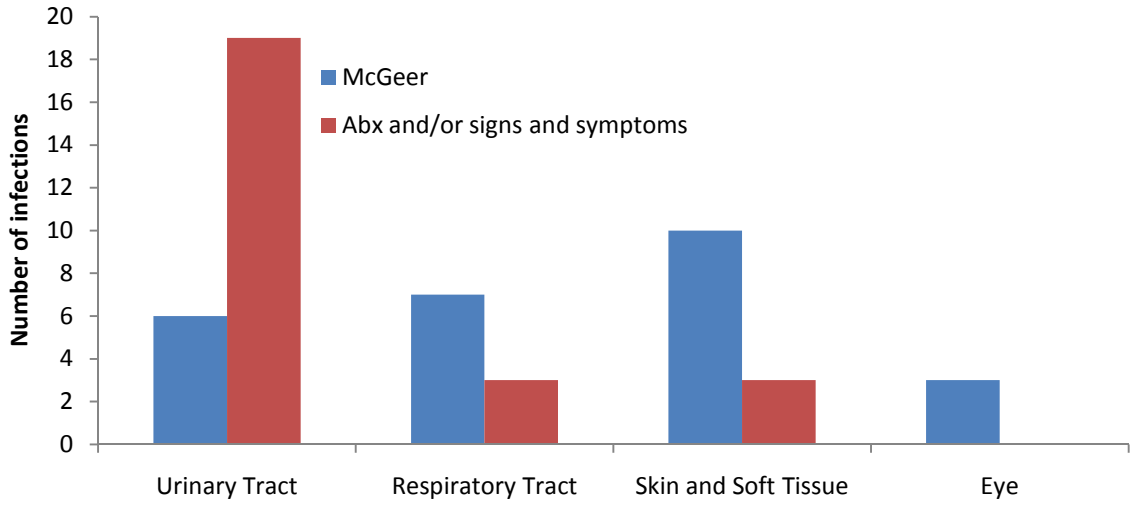
In the 819 residents surveyed, signs and symptoms of 51 HAI episodes were identified in 50 residents, giving a crude prevalence of infected residents of 6.1%. The prevalence of HAI by care home ranged from 0% to 26%. When the McGeer infection definitions were applied, 26 infections met the definitions in 26 residents, giving a prevalence of defined HAI of 3.2%.

Table 1 Number and percentage of HAI by signs/symptoms and McGeer definitions in Long Term Care Facilities in Wales surveyed in the HALT Study, 2010

HAI	Number of residents surveyed	Number of HAI identified (%)	Number of residents with HAI (%)
Signs and symptoms	819	51 (6.2%)	50 (6.1%)
McGeer/HALT Definitions	819	26 (3.2%)	26 (3.2%)

The breakdown by infection type using the two methods for defining infections is provided in Figure 3. Overall the commonest infection for which residents had any signs and symptoms was urinary tract, but the majority of these did not have sufficient evidence to meet the McGeer definitions. The most common of the McGeer defined infections was the skin and soft tissue category, representing 39% of the total McGeer defined infections.

Figure 3 Number of infections meeting the HALT signs and symptoms and the McGeer Definitions by infection type in Long Term Care Facilities surveyed in the HALT Study, 2010



Breakdowns of the number of patients with the signs and symptoms for each infection type are provided in Tables 2 to 5. Please note that some patients had multiple signs/symptoms for each infection.

Table 2 Signs and symptoms for urinary tract infections (UTI) identified in Long Term Care Facilities in Wales surveyed in the HALT Study, 2010

Signs & symptoms (UTI)	***Number of residents with signs & symptoms***
Indwelling urinary catheter	5
Fever (> 38°C)	2
Chills	1
New or increased burning pain on urination	6
New or increased frequency on urination	3
New or increased urgency on urination	1
New flank or suprapubic pain or tenderness	3
Change in character of urine (or smell)	21
Worsening of mental or functional status	15
Diagnosed by the attending physician	6

Table 3 Signs and symptoms for skin and soft tissue infections (SSTI) identified in Long Term Care Facilities in Wales surveyed in the HALT Study, 2010

Signs & symptoms (skin & soft tissue infections)	***Number of residents with signs & symptoms***
Pus present at a wound, skin, or soft tissue site	5
Fever (> 38°C)	0
Worsening of mental or functional status	1
New or increasing heat at the affected site	2
New or increasing redness at affected site	10
New or increasing swelling at affected site	9
New or increasing tenderness or pain at the affected site	10
New or increasing serous drainage at the affected site	6
Diagnosed by the attending physician	10

Table 4 Signs and symptoms of respiratory tract infections (RTI) identified in Long Term Care Facilities in Wales surveyed in the HALT Study, 2010

Signs & symptoms (RTI)	***Number of residents with signs & symptoms***
Interpretation of a chest radiograph findings	0
New or increased cough	9
New or increased sputum production	5
Fever (> 38°C)	0
Pleuritic chest pain	0
Physical findings on chest examination (rales, rhonchi, wheezes, bronchial breathing)	4
Shortness of breath or respiratory rate >25/min.	3
Worsening mental or functional status	2
Pneumonia diagnosed by the attending physician (focus of crepitant rales on chest examination)	0
Other lower respiratory tract infection diagnosed by the attending physician	7

Table 5 Signs & Symptoms of eye infections identified in Long Term Care Facilities in Wales surveyed in the HALT Study, 2010

Signs & symptoms (eye infections)	***Number of residents with signs & symptoms***
Pus appearing from eyes, present for at least 24 hours	3
Conjunctiva redness, with or without itching or pain present for at least 24 hours	0
Diagnosed by the attending physician	1

4.3 Antibiotic prescribing

A total of 58 residents were reported to be receiving antimicrobial therapy (this included all oral, rectal, intramuscular, intravenous or inhalation treatments with: antibacterials or antimycotics for systemic use or drugs for the treatment of tuberculosis), with 2 residents receiving more than one antibiotic. The prevalence of antimicrobial use (patients on antimicrobials) was 7.1%. The prevalence of antimicrobial use by care home ranged from 0% to 26%.

There were a total of 60 antimicrobials prescribed at the time of the survey, with 77% prescribed as therapy. The most commonly prescribed antimicrobial was trimethoprim (33%). Table 6 outlines the breakdown of antibiotic class prescribed during the survey.

Table 6 Prescribed antimicrobials in Wales and Europe by antibiotic class in Long Term Care Facilities surveyed in the HALT Study, 2010

Antibiotic class	***Regimes***	***Wales***	***Europe***
β-lactam penicillins	18	30.0%	28.9%
Other β lactam antibacterials	13	21.7%	14.4%
Sulfonamides & trimethoprim	20	33.3%	13.4%
Macrolides, lincosamides & streptogramines	5	8.3%	5.5%
Quinolones	1	1.7%	15.3%
Other antibacterials	3	5.0%	20.0%

5 Discussion

This report presents the prevalence of HAI and antimicrobial prescribing in a total of 19 nursing homes across Wales. There are important caveats that must be acknowledged and the results should be interpreted with caution. The survey included a volunteer sample of nursing homes which may not be representative of all care homes in Wales. Additionally, whilst prevalence surveys offer a fast, consistent and robust method for measuring HAI in settings without the resources for incidence surveillance, they only measure a snapshot in time and are subject to variation.

Participation in the HALT study has provided us with some knowledge as to the occurrence of healthcare associated infections within long term healthcare facilities within Wales, as well as background information on the physical and mental condition of the residents and the prevalence of some risk factors. Information on healthcare-associated infection in LTCF is limited with reports from other European studies indicating many shortcomings around HCAI prevention and control (Moro et al 2010).

Results show that infection rates are low at 3.2% and that the most common infections were SSTI, UTI and RTI. These results are similar to those of the pilot study undertaken by the HALT team (http://halt.wiv-isp.be/report/Reports/HALT-1/HALT%20Report%20Pilot%20Survey%20Nov%202009.pdf) and the provisional overall HALT results for 2010 (http://halt.wiv-isp.be/report/Newsletters/HALT-1/HALT%20bulletin%203rd%20edition.pdf), as well as other studies highlighting RTI, UTI and SSTI as the common infection identified within long term care facilities.

In addition to residents with defined infections, there were also a number of residents who displayed some signs and symptoms of infection, without meeting the definition (6.1%). All signs and symptoms of infection will affect the quality of life of the resident and the workload of the staff caring for them, regardless of whether they meet an infection definition.

6 References

Care and Social Service Inspectorate Wales. (2011). *Care and Social Service Inspectorate Wales Information Brief*. Retrieved April 30, 2011, from Care and Social Service Inspectorate Wales (CSSIW): http://wales.gov.uk/cssiwsubsite/newcssiw/publications/annualreports/annrep0910/?lang=en

McGeer A, Cambell B, Emori TG et al: (1991) Definitions of Infections for Surveillance in Long-term Care facilities. *American Journal of Control* 19(1):1-7.

Moro ML, Jans B, Cookson B, Fabry J (2010) The burden of healthcare associated infections in European long term facilities. *Infection Control & Hospital Epidemiology* 31 (Suppl 1) S59-S63

7 Appendices

7.1 Appendix 1 – Survey Questionnaire

Resident questionnaire

Healthcare associated infections, antimicrobial resistance, antibiotic use and infection control resources in European long term care facilities

RESIDENT QUESTIONNAIRE

RESIDENT DATA

GENDER	☐	*Male*	☐	*Female*
BIRTH YEAR	☐☐☐☐			*(YYYY)*
LENGTH OF STAY IN THE FACILITY	☐	*Less than 1 year*		
	☐	*1 year or longer*		
ADMISSION TO A HOSPITAL IN THE LAST 3 MONTHS	☐	*Yes*	☐	*No*
SURGERY IN THE PREVIOUS 30 DAYS	☐	*Yes*	☐	*No*
PRESENCE OF:				
- URINARY CATHETER	☐	*Yes*	☐	*No*
- VASCULAR CATHETER	☐	*Yes*	☐	*No*
- INCONTINENCE (URINARY AND/OR FAECAL)	☐	*Yes*	☐	*No*
- WOUNDS				
- PRESSURE WOUNDS	☐	*Yes*	☐	*No*
- OTHER WOUNDS	☐	*Yes*	☐	*No*
- DISORIENTED (in time and/or space)	☐	*Yes*	☐	*No*
- MOBILITY	☐	*Ambulant*	☐	*Wheelchair* ☐ *Bedridden*

On the day of the survey, the resident:

- ☐ RECEIVES AN **ANTIBIOTIC THERAPY** → **COMPLETE PAGE 2 OF THIS QUESTIONNAIRE**
- ☐ PRESENTS **SIGNS/SYMPTOMS** OF AN INFECTION (not present or in incubation at admission) → **COMPLETE PAGE 3/4 OF THE QUESTIONNAIRE**
- ☐ BOTH: **AB** AND **SIGNS/SYMPTOMS** OF INFECTION → **COMPLETE ALL THESE PAGES**

Important remark:

We strongly recommend you to write the resident study number on each of following pages (right top of each page), in order to keep data from one single resident together.

ANTIBIOTIC TREATMENT DATA

	Antibiotic – 1	Antibiotic – 2	Antibiotic – 3	Antibiotic – 4
ANTIBIOTIC NAME (capital letters)	……………………	……………………	……………………	……………………
TOTAL PRESCRIBED DAILY DOSE	……………………	……………………	……………………	……………………
UNIT	☐ *gr./ day* ☐ *mg./ day* ☐ *I.U./ day*	☐ *gr./ day* ☐ *mg./ day* ☐ *I.U./ day*	☐ *gr./ day* ☐ *mg./ day* ☐ *I.U./ day*	☐ *gr./ day* ☐ *mg./ day* ☐ *I.U./ day*
ADMINISTRATION ROUTE	☐ *Oral* ☐ *IM or IV* ☐ *Inhalation* ☐ *Rectal*	☐ *Oral* ☐ *IM or IV* ☐ *Inhalation* ☐ *Rectal*	☐ *Oral* ☐ *IM or IV* ☐ *Inhalation* ☐ *Rectal*	☐ *Oral* ☐ *IM or IV* ☐ *Inhalation* ☐ *Rectal*
TYPE OF AB TREATMENT	☐ *Prophylactic* ☐ *Therapeutic*	☐ *Prophylactic* ☐ *Therapeutic*	☐ *Prophylactic* ☐ *Therapeutic*	☐ *Prophylactic* ☐ *Therapeutic*
AB THERAPY GIVEN FOR *Specify:*	☐ *Urinary tract* ☐ *Skin or wound* ☐ *Respiratory tract* ☐ *Gastrointestinal* ☐ *Eye* ☐ *Ear, nose, mouth* ☐ *Systemic infection* ☐ *Unexplained fever* ☐ *Other*	☐ *Urinary tract* ☐ *Skin or wound* ☐ *Respiratory tract* ☐ *Gastrointestinal* ☐ *Eye* ☐ *Ear, nose, mouth* ☐ *Systemic infection* ☐ *Unexplained fever* ☐ *Other*	☐ *Urinary tract* ☐ *Skin or wound* ☐ *Respiratory tract* ☐ *Gastrointestinal* ☐ *Eye* ☐ *Ear, nose, mouth* ☐ *Systemic infection* ☐ *Unexplained fever* ☐ *Other*	☐ *Urinary tract* ☐ *Skin or wound* ☐ *Respiratory tract* ☐ *Gastrointestinal* ☐ *Eye* ☐ *Ear, nose, mouth* ☐ *Systemic infection* ☐ *Unexplained fever* ☐ *Other*
WHERE PRESCRIBED?	☐ *In this facility* ☐ *In the hospital* ☐ *Elsewhere*	☐ *In this facility* ☐ *In the hospital* ☐ *Elsewhere*	☐ *In this facility* ☐ *In the hospital* ☐ *Elsewhere*	☐ *In this facility* ☐ *In the hospital* ☐ *Elsewhere*
WHO PRESCRIBED?	☐ *GP* ☐ *Specialist* ☐ *Pharmacist* ☐ *Nurse* ☐ *Other*	☐ *GP* ☐ *Specialist* ☐ *Pharmacist* ☐ *Nurse* ☐ *Other*	☐ *GP* ☐ *Specialist* ☐ *Pharmacist* ☐ *Nurse* ☐ *Other*	☐ *GP* ☐ *Specialist* ☐ *Pharmacist* ☐ *Nurse* ☐ *Other*
FOR URINE: DIPSTICK BEFORE AB-THERAPY	☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*
WAS A CULTURE SAMPLE TAKEN?	☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*

ISOLATED MICROORGANISMS

NAME OF ISOLATED MICROORGANISM (please use code-list)	└┴┴┴┴┴┘	└┴┴┴┴┴┘	└┴┴┴┴┴┘	└┴┴┴┴┴┘
	└┴┴┴┴┴┘	└┴┴┴┴┴┘	└┴┴┴┴┴┘	└┴┴┴┴┴┘
	└┴┴┴┴┴┘	└┴┴┴┴┴┘	└┴┴┴┴┴┘	└┴┴┴┴┴┘

SIGNS AND SYMPTOMS OF AN INFECTION

URINARY TRACT INFECTION

- ☐ Fever (> 38°C)
- ☐ Chills
- ☐ New or increased burning pain on urination
- ☐ New or increased frequency on urination
- ☐ New or increased urgency on urination
- ☐ New flank or suprapubic pain or tenderness
- ☐ Change in character of urine (or smell)
- ☐ Worsening of mental or functional status (may be a new or increased incontinence)
- ☐ Diagnosed by the attending physician

SKIN INFECTION

Cellulitis/soft tissue/ wound infection

- ☐ Pus present at a wound, skin, or soft tissue site
- ☐ Fever (> 38°C)
- ☐ Worsening of mental or functional status
- ☐ New or increasing heat at the affected site
- ☐ New or increasing redness at affected site
- ☐ New or increasing swelling at affected site
- ☐ New or increasing tenderness or pain at the affected site
- ☐ New or increasing serous drainage at the affected site
- ☐ Diagnosed by the attending physician

- ☐ Local antibiotic used for treatment (antibiotic ointment, unguent, etc …)

Fungal skin infection

- ☐ Maculopapullar rash
- ☐ Physician diagnosis or laboratory confirmation

Herpes simplex & herpes zoster infection

- ☐ Vesicular rash
- ☐ Physician diagnosis or laboratory confirmation

Scabies

- ☐ Maculopapullar and/or itching rash
- ☐ Physician diagnosis or laboratory confirmation

RESPIRATORY TRACT INFECTION

Common cold syndromes/pharyngitis

- ☐ Runny nose or sneezing
- ☐ Stuffy nose (e.g., congestion)
- ☐ Sore throat or hoarseness or difficulty in swallowing
- ☐ Dry cough
- ☐ Swollen or tender glands in the neck (cervical lymphadenopathy)
- ☐ Diagnosed by the attending physician

Influenza-like illness

- ☐ Fever (> 38°C)
- ☐ Chills
- ☐ New headache or eye pain
- ☐ Myalgias
- ☐ Malaise or loss of appetite
- ☐ Sore throat
- ☐ New or increased dry cough
- ☐ Diagnosed by the attending physician

Pneumonia/ other lower respiratory tract infections (bronchitis, tracheobronchitis)

- ☐ Interpretation of a chest radiograph as demonstrating "pneumonia", "probable pneumonia", or the presence of an infiltrate. If a previous radiograph exists for comparison, the infiltrate should be new.
- ☐ New or increased cough
- ☐ New or increased sputum production
- ☐ Fever (> 38°C)
- ☐ Pleuritic chest pain
- ☐ Physical findings on chest examination (rales, rhonchi, wheezes, bronchial breathing)
- ☐ Shortness of breath or respiratory rate > 25 per min.
- ☐ Worsening mental or functional status

- ☐ Pneumonia diagnosed by the attending physician (focus of crepitant rales on chest examination)
- ☐ Other lower respiratory tract infection diagnosed by the attending physician

SIGNS AND SYMPTOMS OF AN INFECTION

GASTROINTESTINAL TRACT INFECTION

- ☐ Diarrhoea: two or more loose or watery stools within a 24-hour period
- ☐ Vomiting: two or more episodes of vomiting in a 24-hour period
- ☐ A stool culture positive for a pathogen (Salmonella, Shigella, E. coli 0157:H7, Campylobacter, Clostridium difficile) and/or a toxin assay positive for C. difficile toxin
- ☐ Nausea
- ☐ Abdominal pain or tenderness
- ☐ Diagnosed by the attending physician

EYE, EAR, NOSE AND MOUTH INFECTIONS

Conjunctivitis

- ☐ Pus appearing from eyes, present for at least 24 hours
- ☐ Conjunctival redness, with or without itching or pain present for at least 24 hours (also know as "pink eye")
- ☐ Diagnosed by the attending physician

- ☐ Local antibiotic used for treatment (antibiotic drops, ointment, etc …)

Ear infection

- ☐ New drainage from one or both ears (non purulent drainage must be accompanied by additional symptoms, such as ear pain or redness.
- ☐ Diagnosed by the attending physician

Mouth and perioral infection

- ☐ Diagnosed by the attending physician

Sinusitis

- ☐ Diagnosed by the attending physician

SYSTEMIC INFECTION

Primary bloodstream infection

- ☐ Two or more blood cultures positives for the same organism
- ☐ A single blood culture documented with an organism thought not to be a contaminant
- ☐ Fever (> 38°C)
- ☐ New hypothermia (< 34.5°C)
- ☐ A drop in systolic blood pressure of > 30 mmHg from baseline
- ☐ Worsening mental or functional status
- ☐ Diagnosed by the attending physician

UNEXPLAINED FEBRILE EPISODE

- ☐ The resident must have documentation in the medical record of fever (> 38°C) on two or more occasions at least 12 hours apart in any 3-day period, with no known infectious or non-infectious cause
- ☐ Diagnosed by the attending physician

☐ OTHER

please specify

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7.2 Appendix 2 – McGeer Definitions

Listed below are the infection definitions that were used during the survey. For a full list of the definitions see McGeer et al (1991).

7.2.1 Urinary Tract Infections (only symptomatic)

Definition: Urinary Tract Infection (only symptomatic) must meet at least one of the following criteria:

Criterion1:

Resident does not have an indwelling urinary catheter

and

has at least *three* of the following signs and symptoms:

a. Fever (≥ 38°C) or chills
b. New or increased burning pain on urination
c. New or increased frequency or urgency
d. Recent or increased incontinence
e. New flank or suprapubic pain or tenderness
f. Change in character of urine
g. Worsening of mental or functional status

Criterion2:

Residents has an indwelling catheter

And

Has at least two of the following

a. Fever (≥ 38°C) or chills
b. New flank or suprapubic pain or tenderness
c. Change in character of urine
d. Worsening of mental or functional status

7.2.2 Respiratory Tract Infections

Definition: Other lower respiratory tract infection (bronchitis, tracheobronchitis). The residents must have at least *three* of the following signs and symptoms

a. New or increased cough

b. Fever (≥ 38°C)

c. Pleuritic chest pain

d. New or increased physical findings on chest examination (rales, rhonchi, wheezes, bronchial breathing)

e. One of the following indications of change in status or breathing difficulty:

- New/increase shortness of breath
- Respiratory rate >25 per minute
- Worsening mental or functional status

7.2.3 Skin Infections

Definition: Cellulitis / Soft tissue / wound infection must meet at least one of the following criteria:

Criterion 1: Pus present at a wound, skin or soft tissue site

Criterion2: The residents must have *four* or more of the following signs and symptoms

a. Fever (≥ 38°C) or worsening mental /functional status and/or, at the affected site the presence of new or increasing

b. Heat

c. Redness

d. Swelling

e. Tenderness or pain

f. Serous drainage

7.2.4 Eye infections

Definition: Conjunctivitis must meet at least *one* of the following criteria

Criterion 1: Pus appearing from one or both eyes, present for at least 24hrs

Criterion 2: New or increased conjunctival redness, with or without itching or pain, present for at least 24 hours (also known as "pink eye")

7.3 Appendix 3 – ECDC LTCF Definition

A minimum enrolment of two high-skilled nursing homes was required for participation in the study.

High-skilled nursing homes were defined as institutions where elderly stay temporarily (long or short) or permanently and where qualified nursing staff are mostly available 24/24h. The residents of these facilities need contact supervision (24/24h) and high-skilled nursing care, are medically stable and not in need of constant specialised medical care or invasive medical procedures.

Available at: http://halt.wiv-isp.be/report/Reports/HALT-1/HALT%20Report%20Pilot%20Survey%20Nov%202009.pdf