Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

hpsc

European Point Prevalence Survey on

Healthcare Associated Infections and Antibiotic use

in Long-Term Care Facilities

National Report – Republic of Ireland

November 2010

Executive Summary

- 4,170 residents were surveyed in 69 Irish long term care facilities (LTCFs) in June 2010.
- The size of participating LTCFs ranged from 10 to 382 beds (median 47 beds) with the proportion of single rooms per 100 beds ranging from 0 – 87 (median = 17). (Table 1)
- 34.3% of the residents were over 85 years of age.
- Medical care was provided by general practitioners (GPs) in 35 LTCF (51%), medical staff employed by the facility in 24 (35%) and by both in 10 (14%). (Fig 1)
- Twelve (17%) participating LTCFs had no infection prevention and control practitioner in place whereas 56 (81%) had. In 25% of LTCFs this person was working in the facility. (Fig 5)
- With respect to risk factors for healthcare-associated infection (HCAI), 2101 (52.4%) residents had impaired mobility, 2530 (63%) were incontinent, 2110 (50.6%) were disorientated, 234 (5.6%) had an indwelling urinary catheter and 12 (0.3%) a vascular catheter. Pressure sores were reported in 120 (2.9%) residents, 391 (9.4%) had other wounds (e.g., leg ulcers, gastrostomy) and 44 (1.1%) had recent surgery at the time of the survey. (Fig 8)
- 472 (11.3%) residents had either signs/symptoms of infection (260 residents, 6.2%) or were on antibiotics (426 residents, 10.2%). (Fig 9)
- Ninety-nine (2.4% HCAI prevalence) residents had a HCAI as strictly defined by McGeer definitions and 149 (3.6% HCAI prevalence) when adapted McGeer definitions were applied (i.e. physician diagnosis of infection was included as a criterion in all categories of infection). (Table 4 & Appendix A)
- The most common HCAI were urinary tract infections (62 residents, 40%), respiratory infections (43 residents, 28%) and skin infections (31 residents, 20%).
- Antibiotics were prescribed by GPs (75%), specialists (12%) and other (9%). (Fig 11) Of the 426 (10.2%) residents on antibiotics, 25 (6%) were prescribed two or more antibiotic types. Antibiotics were prescribed for treatment of infection (58%, n=245 residents) and for prophylaxis (42%, n=179 residents). (Fig 12)
- The most common indications for therapy included respiratory tract infection (20.3%), urinary tract infection (18.5%) and skin infection (12.6%). Coamoxiclav and flucloxacillin were the most frequently prescribed antibiotics. (Table 8) Forty-six (57%) residents prescribed antibiotics for urinary tract infection had a specimen taken for culture.
- Prophylactic antibiotics were predominantly prescribed for prevention of urinary tract infection with trimethoprim most frequently prescribed. Seventeen (10.7%) residents on urinary tract infection prophylaxis had a urinary catheter *in situ.*

1. Background

1.1 The HALT Study

Healthcare associated infection (HCAI) and the consequences of increasing rates of antimicrobial resistance (AMR) are potentially serious health threats for frail elderly people, including those living in long-term care facilities (LTCF). Residents can acquire multidrug-resistant organisms (e.g., meticillin resistant *Staphylococcus aureus* (MRSA) or extended spectrum B-lactamase (ESBL) producing *E. coli*) in both hospital and LTCF settings. Infection with these organisms is more difficult to treat because of the limited choice of appropriate antibiotics available, specifically reduced choice of oral antibiotics which necessitates intravenous therapy. In addition, if appropriate infection prevention and control standards are not maintained, these organisms may spread to other residents. Good infection prevention and control practices and antibiotic stewardship is essential in all healthcare setting to prevent HCAI and the emergence of AMR.

The European Centre for Disease Prevention & Control (ECDC) coordinated a point prevalence survey on HCAI and antibiotic use in European LTCF in summer 2010 (HALT study). Participating LTCFs were asked to survey residents on one day only, thereby providing a snapshot of HCAI and antibiotic use on that particular day. Data was collected for each resident on antibiotic therapy and/or with signs of infection on the day of the survey. ECDC provided an IT tool that enabled participating LTCFs to receive immediate feedback of their own results in order to commence evaluating their results and plan further preventive programmes. This preliminary national report summarised the overall results from Irish participating LTCFs. A final report, containing European results will be published by ECDC in 2011.

1.2 HCAI and Antibiotic Use in Irish LTCF

The HALT study is the first national prevalence study of HCAI and antibiotic use in Irish LTCFs. While a number of European countries have on-going HCAI surveillance in LTCFs, this is the first time we will have this information in Ireland. In 2009 two point prevalence surveys (April and November 2009) were co-ordinated by ESAC (European Surveillance of Antimicrobial Consumption) to measure antibiotic use in European LTCF. In April 2009, 304 LTCF took part across 20 countries. In Ireland, 18 LTCF participated, in which antibiotics were prescribed to a total of 175 of 1662 residents (overall prevalence of 10.5%, median 12.4%, range 2.8 – 27.8%)(Oza, 2010) compared to the European overall prevalence of 5.9%, median of 5.4% and a range of 0 – 30%. By country, the medians ranged from 0.6% to 15.1%. In November 2009, 11 Irish LTCF participated with an overall prevalence of 10.1% (range 2.3 – 22.0%).

There are few publications of HCAI/AMR from Irish LTCF and those available suggest the importance of LTCF as a reservoir of multidrug resistant organisms. Two prevalence studies conducted in 1994–1995 in six Eastern Health Board elderly nursing homes evaluated the prevalence of MRSA. In this study, MRSA prevalence of 8.6% and 10.1% was reported with the prevalence in individual LTCFs ranging from 1% to 27% (O'Sullivan and Keane 2000). Twenty six of 56 (46%) residents were reported to have acquired MRSA within the nursing home suggesting that infection control interventions could have an impact on MRSA prevalence within nursing homes. Risk factors for MRSA colonisation included age over 80, residence in the nursing home for less than six months, hospitalisation during the previous six months, presence of pressure sores, and antibiotic therapy during the previous three months. A recent study in Northern Ireland of 16 LTCF reported that 17% of residents were colonised with MRSA, 4.5% had urinary catheters *in situ* and 13% had received antibiotics in the three months prior to the study. While educational programmes did not appear to reduce MRSA prevalence over the study period, they did result in LTCF having higher infection control audit scores (Baldwin et al. 2010). 42% of residents of 20 LTCF in Northern Ireland were found to be colonised with ESBL-producing *E.coli* with prevalence rates in individual LTCF ranging from 0% to 75% (median 51%). Over 70% of residents had received recent antibiotic therapy and 20% were colonised with MRSA.

2. Aims

The aims of the HALT study are:

- To evaluate the prevalence of HCAI and antibiotic use in Irish LTCFs.
- To describe current infection prevention and control and antimicrobials stewardship practices and resources in Irish LTCFs.

3. Methods

The HALT study took place in Ireland in June 2010. The HSE-Health Protection Surveillance Centre (HPSC) was the national coordinating centre. LTCFs were invited to participate in the study. The study was carried out as described in the HALT protocol (European Centre Disease Control 2010, www.hpsc.ie). Residents present in the LTCF for at least 24 hours, living there full-time and present at 8am on the day of the survey were included ('eligible' residents). Participating LTCFs completed two types of questionnaires:

a. **Institutional questionnaire**: Each participating LTCF collected an institutional questionnaire which detailed general information about the facility including: staffing and bed capacity, number of single rooms, medical care and coordination, infection control & antibiotics stewardship practices and protocols and a summary of HCAI risk factors for eligible residents on the day of the survey. HCAI risk factors included number of residents aged over 85 years, recent surgery, antibiotic therapy, presence of indwelling medical devices, pressure sores or wounds, disorientation / mobility and incontinence.

b. **Resident questionnaire:** This was completed for all residents who were on antimicrobial therapy and/or had signs and symptoms of infection on the day of the survey. This questionnaire collected baseline data including resident demographics, recent hospital admissions and surgery, presence of indwelling medical devices, incontinence, disorientation and mobility. Data on antimicrobial therapy was collected including: number and type of antimicrobial agents, route, indication, (prophylaxis or therapeutic) and prescriber details. Information on the following types of infections were collected;

- Urinary tract infection
- Skin infections (cellulitis/ wound infection , fungal infection, Herpes simplex or Herpes zoster infection and scabies)
- Respiratory tract infection (common cold, pharyngitis, influenza-like illness, pneumonia and other lower respiratory tract infections)
- Gastrointestinal tract infection
- Eye, ear, mouth and perioral infection
- Sinusitis
- Systemic infection
- Unexplained febrile illness

Data collection was undertaken by staff from each nursing home. Education workshops were provided for the data collectors by the HPSC. Participating centres were requested to validate 10% of their resident forms.

In the initial analysis of Irish results, the McGeer definitions were used to define HCAI (McGeer et al. 1991). For all subsequent analysis of the results, the McGeer definitions were adapted to incorporate a physician diagnosis of infection as a criterion in all categories of infection, which better reflect practice in LTCFs in Ireland (Appendix A).

4. Results

4.1 LTCF Demographics and Medical Coordination

4.1.1 Description of Participating LTCFs

A total of 4222 beds were occupied on the day of the survey. Of these 52 residents were ineligible to participate, 15 of whom were hospitalised at the time of the survey. In total 4,170 eligible residents in 69 LTCFs were surveyed, 1664 (40%) males and 2506 (60%) females. Thirty-four percent (1430) of eligible residents were over 85 years. The size of participating LTCFs ranged from ten to 382 beds (median 47 beds) with the proportion of single rooms per 100 beds ranging from 0 – 87 (median = 17) (Table 1). The median bed occupancy was 93% (68.8% – 100%). Table 2 summarises the demographics of participating LTCFs by type and average length of stay.

Table 1 Breakdown of participating LTCFs by region and ownership

Category	Count of LTCFs	Total residents surveyed	Median residents surveyed/LTCF (range)	Median single rooms/100 beds (range)	Median bed occupancy/100 beds
By Ownership					
Public	61	3706	38 (9 - 359)	16 (0 - 80)	93
Private	8	464	54 (42 - 112)	61 (30 - 87)	93
By HSE Region					
HSE - Dublin North East	7	520	51 (10 - 159)	17 (9 - 41)	87
HSE - Dublin Mid-Leinster	18	1555	60 (12 - 359)	15 (0 - 77)	94
HSE - South	9	717	60 (19 - 157)	13 (1 - 60)	90
HSE - West	35	1378	29 (9 - 148)	19 (0 - 87)	93
National	**69**	**4170**	**42 (9 - 359)**	**17 (0 - 87)**	**93**

Table 2 Breakdown of participating LTCFs by LTCF type and average length of stay

by LTCF type	n (%)
General nursing home	27 (39.1)
Residential home	1 (1.4)
Psychiatric LTCF	3 (4.3)
Intellectually disabled	7 (10.1)
Physical disabled	1 (1.4)
Rehabilitation centre	1 (1.4)
Palliative care facility	1 (1.4)
A mix of some of the above	27 (39.1)
Other	1 (1.4)
by LTCF average length of stay	
Temporary short (<3 months)	1 (1.4)
Temporary medium (3-12 months)	4 (5.8)
Temporary long (>12 months but not definitive)	3 (4.3)
Definitive stay (until end of life)	42 (60.9)
Other	19 (27.5)

4.1.2 Medical Coordination

Twenty-four hour qualified nursing care was available in all participating LTCFs. Medical care was provided by general practitioners (GPs) in 51% (n=35), medical staff employed by the facility in 35% (n=24) and by both in 14% (n=10) (Figure 1). There was considerable regional variation in the provision of medical care; GPs provided medical care in 74% (26/35) of LTCFs in HSE-West, 14% (1/7) of LTCFs in HSE-Dublin North East, 33% (6/18) in Dublin Mid-Leinster and 22% (2/9) in HSE-South (Figure 1). In the 35 LTCFs under GP medical care, there was a wide range in the number of GPs by LTCF size (range 1-24, median = 6) (Figure 2).

Coordination of medical activity was provided in 45% (n=31) of LTCFs by either a designated GP (13%, n = 9), a designated medical doctor employed by the LTCF (28%, n = 19) or an external physician (4%, n = 3) (Figure 3). There was no coordination of medical activity in 53.6% (n=37) of the LTCFs surveyed. On average 57 hours a month was devoted to medical coordination but this varied considerably by LTCF (range 6 – 202 hours). Tasks performed by coordinating physicians are summarised in Figure 4.

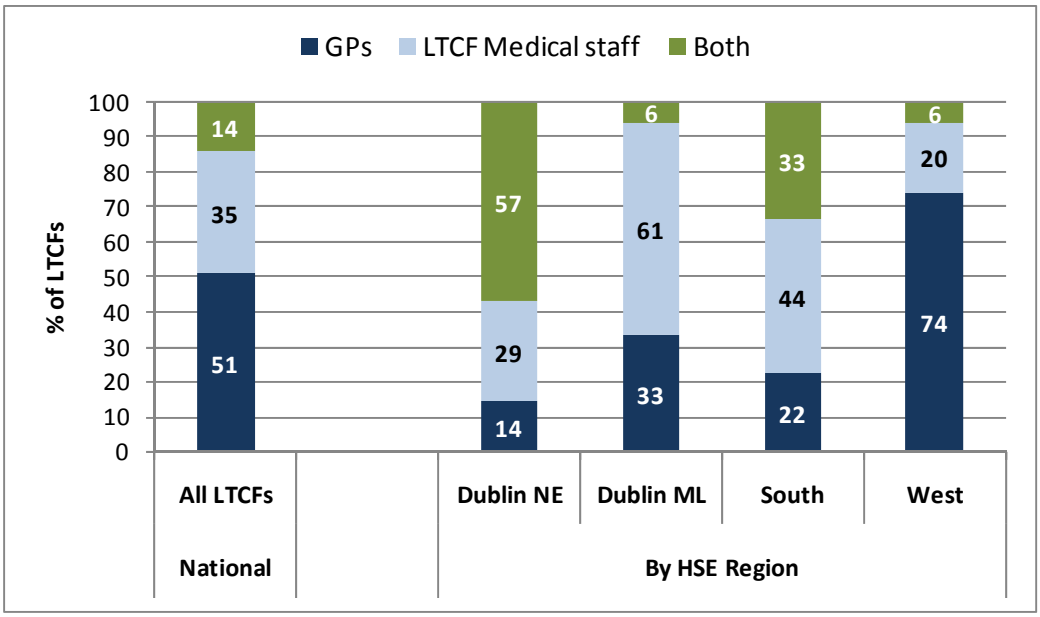


Figure 1: Provision of medical care in LTCFs nationally and by HSE region

NE: North East **ML: Mid Leinster**

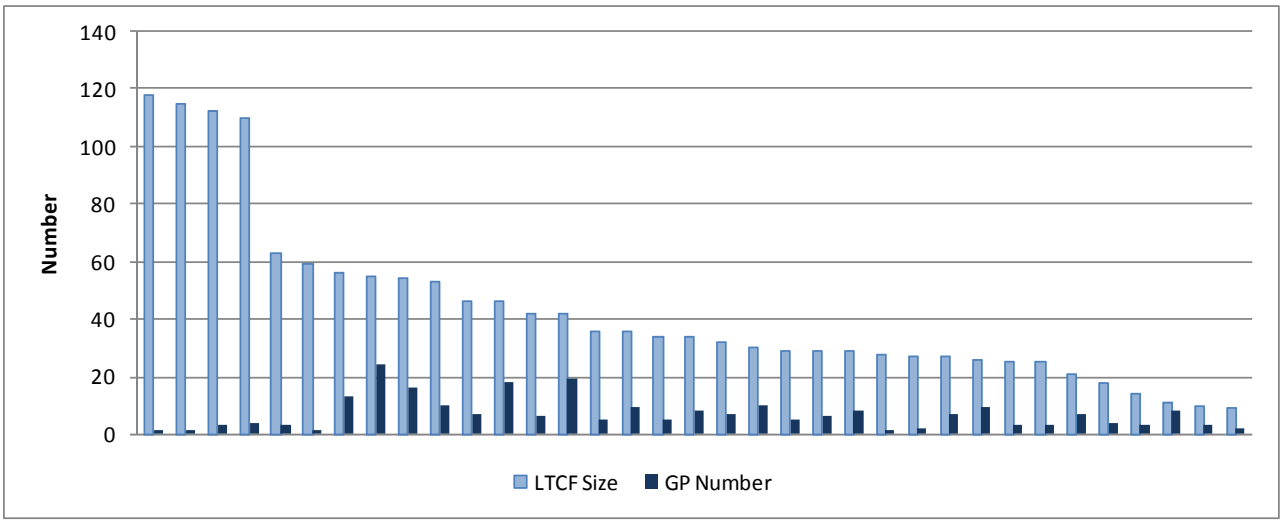


Figure 2: Number of GPs providing medical care in participating LTCFs by LTCF size

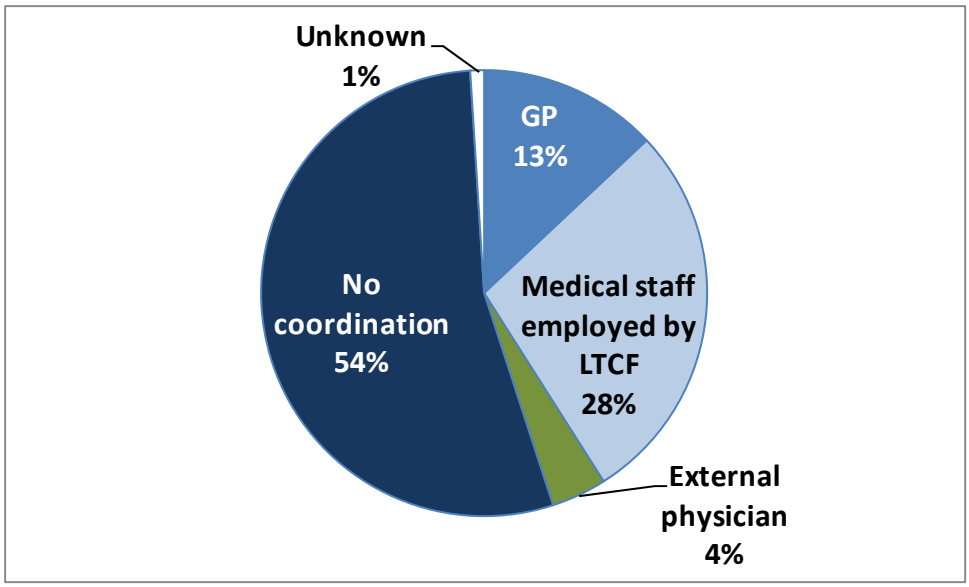


Figure 3: Breakdown of coordination of medical care in LTCFs

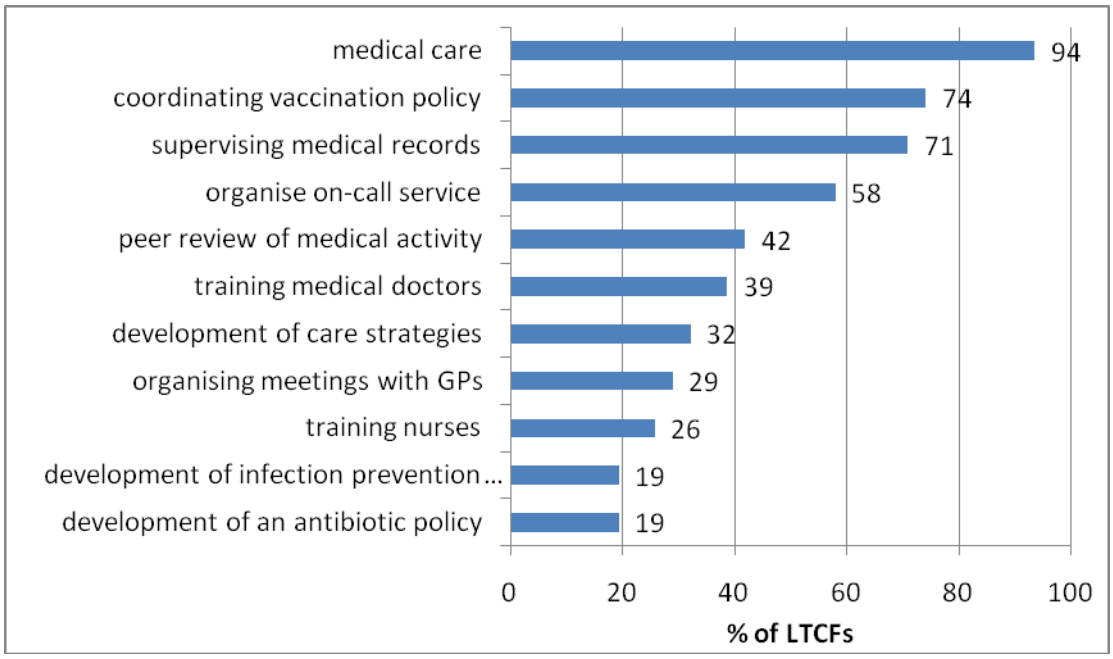
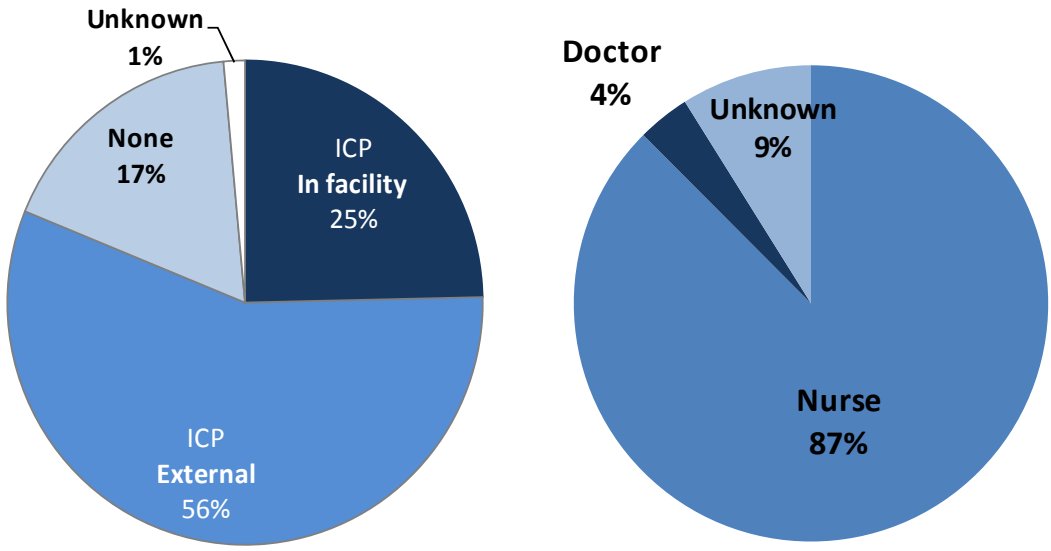


Figure 4: Tasks performed by physician coordinating medical activities in 31 LTCFs

4.2 Infection Prevention and Control Practice

In 81% (n = 56) of LTCFs, a person with training in infection prevention and control (IPC) (nurse 87.5% (n = 49), doctor 3.6% (n = 2), unknown 8.9% (n = 5)) was in charge of IPC in the facility (Figure 5). In 25% of LTCFs this person was based in the facility. In 17% (n=12) of participating LTCFs there was no IPC practitioner in place.



A. Breakdown of IPC presence

B. Breakdown of IPC type

Figure 5: Description of infection prevention and control practitioners in LTCFs.

Sixty-one (88%) LTCFs had access to infection prevention and control advice, four (6%) had none and for four it was unknown (6%). Thirty five (51%) LTCFs had an infection control committee which met a median of four times (range 1 - 10) in the previous year. Details of infection control activities are detailed in Table 3.

Table 3: Description of infection control activities in participating LTCFs

Infection Prevention & Control Activities	Number (%)
ICP* training of nursing/paramedical staff	59 (86)
Hand hygiene activities	58 (84)
Management of outbreaks	57 (83)
Decisions on transmission-based precautions for residents	54 (78)
Development of care protocols	52 (75)
Offering immunisation for flu to all residents	50 (72)
Supervision of disinfection/sterilization of material	39 (57)
Monitoring multi-drug-resistant microorganisms	38 (55)
Audits on infection policies and procedures	33 (48)
Feedback of surveillance results	26 (38)
ICP* training of GPs/medical staff	15 (22)
Written protocols	
Hand hygiene	68 (99)
Management of MRSA	67 (97)
Management of urinary catheter care	62 (90)
Enteral feeding	59 (86)
Venous catheter care	43 (62)
Programme of surveillance of HCAI	
Yes	14 (20.3)
No	52 (75.4)
Unknown	3 (4.3)
Hand hygiene training organised in the previous year	
Yes	61 (88.4)
No	7 (10.1)
Unknown	1 (1.4)
Usage of hand hygiene products	
Alcohol hand gel	68 (98.6)
Wipes (alcoholic)	14 (20.3)
Liquid soap (antiseptic/other)	65 (94.2)
Bar soap	1 (1.4)

***ICP: Infection Control Practitioner**

4.3 Antibiotic Policy

Guidelines for appropriate antibiotic use were available in 28% (n=36) of LTCFs. In the 31 facilities with a coordinating physician, antibiotic guidelines were available in 45% (n=14) compared with 14% (n=5) in the facilities without a coordinating physician. Details of antibiotic stewardship activities in all facilities are outlined in figure 7.

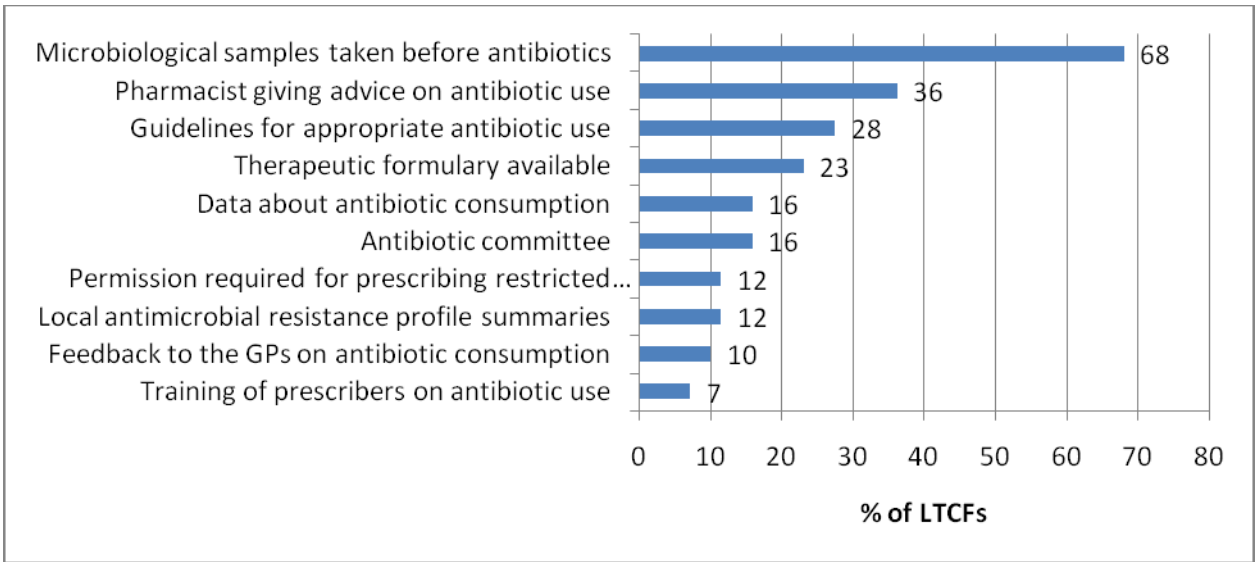
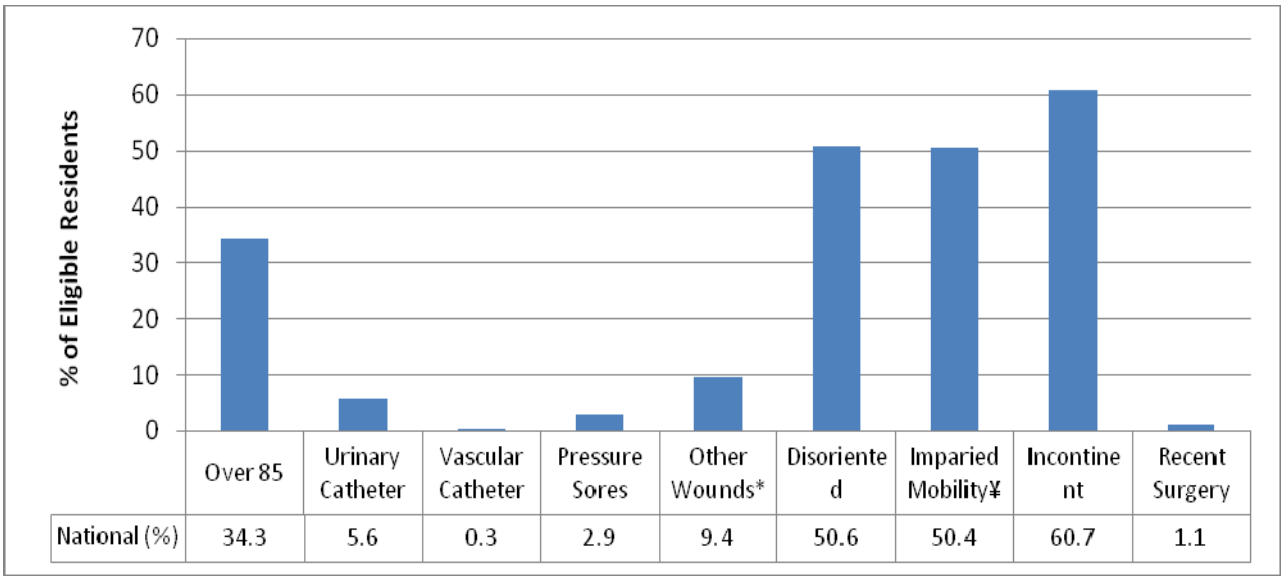


Figure 7: Summary of antibiotic stewardship activities in all facilities

4.4 Healthcare-associated Infection (HCAI)

4.4.1 Risk Factors

The prevalence of HCAI risk factors in the 4170 residents surveyed are outlined in figure 8.



	Over 85	Urinary Catheter	Vascular Catheter	Pressure Sores	Other Wounds*	Disoriented	Imparied Mobility¥	Incontinent	Recent Surgery
National (%)	34.3	5.6	0.3	2.9	9.4	50.6	50.4	60.7	1.1

Figure 8: Presence of risk factors for HCAI in the survey population

*Other wounds include leg ulcers, traumatic or surgical wounds, colostomy, urostomy and gastrostomy insertion sites. ¥Impaired mobility includes wheelchair users or bedridden residents

4.4.2 Antimicrobial Use and Signs/Symptoms of Infection in the Survey Population

Of the 4,170 residents surveyed, 472 (11.3%) had either signs/symptoms of infection (n = 260, 6.2%) or were on antibiotics (n = 426, 10.2%). (Figure 9) Of these 472 residents, the median age was 83 years (range 26-101 years), 143 (30.3%) were present in the LTCF for less than a year, 325 (69%) were present for longer than a year and 18.2% were hospitalised in the previous three months.

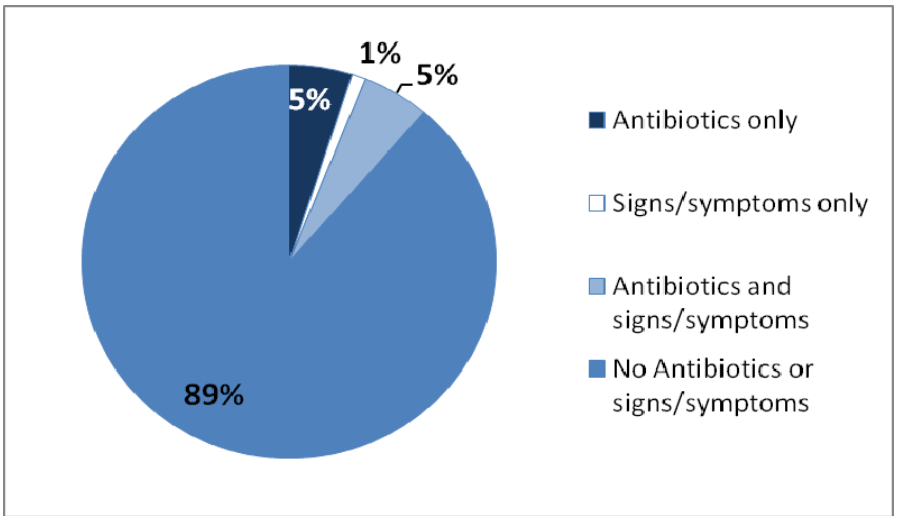


Figure 9: Overview of signs/symptoms of infection and antibiotic use in the survey population.

4.4.3 HCAI Prevalence using McGeer and Adapted McGeer Definitions

Of 4170 residents surveyed, 99 residents had 102 infections (2.4% HCAI prevalence) as strictly defined by McGeer definitions and 149 residents had 156 infections (3.6 % HCAI prevalence) when physician diagnosis of infection was included as a criterion in each category of infection (adapted McGeer) (Table 4 and Appendix A). Seven patients had more than one HCAI type present. Table 5 and Figure 10 summarise the overall HCAI prevalence by HCAI type using adapted McGeer definitions as described in methods. The most common infections were urinary tract (62 residents, 40%), respiratory (44 infections in 43 residents, 28%) and skin infections (31 residents, 20%). Of the 62 residents with a urinary tract infection (UTI), 19.2% had a urinary catheter *in situ* and 74.2% were incontinent. Of the residents with a skin infection, 22.6% had a pressure sore, 58.1% had other wounds and 32.2% had a urinary catheter *in situ*. Table 6 summaries demographic and risk factor data for residents with UTI, respiratory tract infection (RTI) and skin infection.

Table 4: HCAI prevalence using McGeer and adapted McGeer definitions

Number of residents surveyed	4170
Number of residents with reported SS	260 (6.2%)
McGeer	
Number of residents with an infection	99
Number of infections	102
HCAI prevalence*	2.4%
National range	0 - 14.8%
National median rate	1.70%
Adapted McGeer¥	
Number of residents with an infection	149
Number of infections	156
HCAI prevalence	3.6%
National range	0 - 18.5%
National median rate	2.7%

* **HCAI Prevalence** is the number of infected residents per total eligible residents surveyed
¥**Adapted McGeer:** McGeer definition using physician diagnosis as one of the criteria in each category of infection
ss **Signs and/or symptoms**

Table 5: HCAI prevalence by infection type [a]

HCAI Type	Number of infections	%	HCAI Prevalence*
Urinary Tract Infection	**62**	**39.7**	**1.5**
Respiratory Tract Infection	**44**	**28.2**	**1**
Cold	15	9.6	0.4
Flu	0	0	0
Pneumonia	6	3.8	0.1
Other [b]	23	14.7	0.6
Eye, Ear, Nose, Mouth	**11**	**7.1**	**0.3**
Eye	6	3.8	0.1
Ear	2	1.3	0
Nose	0	0	0
Mouth	3	1.9	0.1
Skin	**31**	**19.9**	**0.7**
Cellulitis	29	18.6	0.7
Fungal	2	1.3	0
Herpes	0	0	0
Scabies	0	0	0
Gastrointestinal Infection	**8**	**5.1**	**0.2**
Systemic	**0**	**0**	**0**
Primary Bloodstream Infection	0	0	0
Unexplained febrile episode	0	0	0
Total	**156**	**100**	**3.6**

[a] **Adapted McGeer:** McGeer definition using physician diagnosis as one of the criteria
[b] **Other**: Other lower respiratory tract infections (e.g. bronchitis, tracheobronchitis)
*** The HCAI prevalence** of infection is calculated as the number of infected residents per total eligible residents. Please note that seven residents had more than one infection.

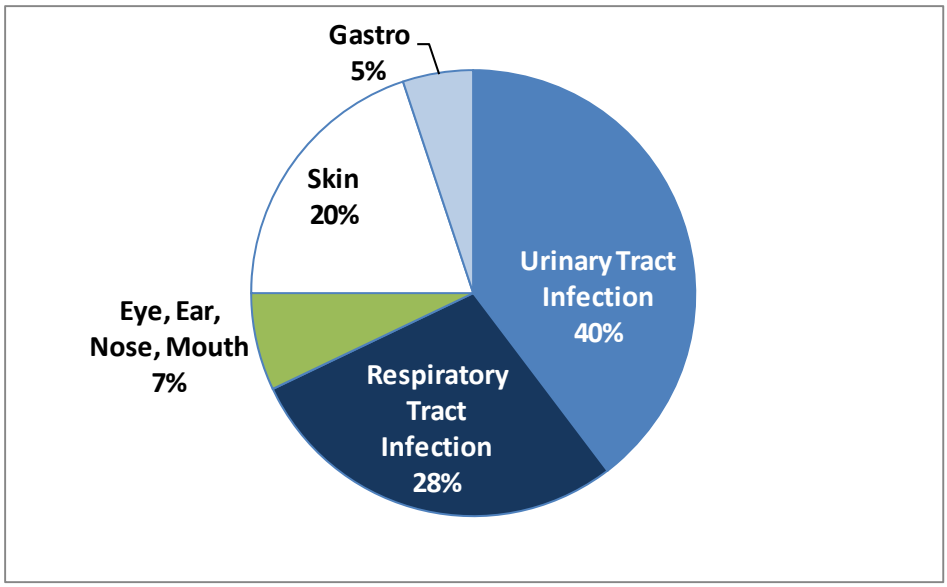


Figure 10: Breakdown by HCAI type

Table 6: Summary of residents with urinary, respiratory and skin infections and demographic and HCAI risk factor risk data.

Resident Demographics and Risk Factors	Infection Type			Total Residents with HCAI (%) Total = 149
	Urinary Tract (%) Total = 62	Respiratory Tract (%) Total = 43	Skin (%) Total = 31	
Median Age	83	84.5	80	**83**
Gender: Male	38.7	40.9	35.5	**34.3**
Gender: Female	59.7	54.5	64.5	**65**
Length of stay: < 1 year	27.4	13.6	19.4	**30.3**
Length of stay: > 1 year	71	81.8	80.6	**68.9**
Hospital Admission in previous 3 months	14.5	9.1	16.1	**18.2**
Surgery in previous 30 days	3.2	0	3.2	**1.9**
Urinary Catheter	19.4	9.1	32.3	**11.9**
Vascular Catheter	3.2	2.3	9.7	**1.5**
Incontinence	74.2	63.6	71	**66.3**
Disorientation	38.7	54.5	48.4	**53.2**
Impaired Mobility	41.9	34.1	22.6	**58.8**
Pressure Sores	9.7	4.5	22.6	**4.9**
Other Wounds	8.1	6.8	58.1	**19.5**

4.5 Antibiotic Use:

Of the 4170 LTCF residents, 426 (10.2%) residents were prescribed antibiotics (median = 9.5%; range = 0 – 41.7%) and of these, 25(6%) residents were prescribed two or more antibiotic types. Antibiotics were prescribed for residents by GPs (76%), specialists (12%) and other prescribers (12%). (Figure 11) The majority of antibiotics were prescribed in the LTCF (85%) though 7% and 4% were prescribed in the hospital and elsewhere, respectively.

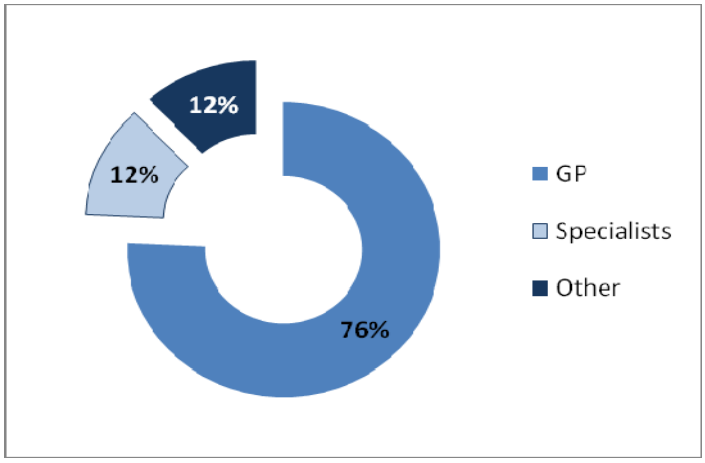


Figure 11: Breakdown of antibiotic prescribers

A breakdown of the five most frequently prescribed antibiotics is provided in table 7.

Table 7: Top five most frequently prescribed antibiotics

Antibiotics	% of prescriptions
Trimethoprim	21.6
Co-amoxiclav	19
Nitrofurantoin	13.2
Flucloxacillin	7.7
Ciprofloxacin	4.6
Other	33.8

Antibiotics were prescribed for treatment of infection in 58% of cases (n = 245 residents) and for prophylaxis in 42% of cases (n = 179 residents). In 2 cases the type of treatment was not specified. Indications for prophylactic and therapeutic antibiotics are outlined in Figure 12. The most common indications for treatment of infection included respiratory tract infections (RTI, 20.3% of all prescriptions), urinary tract infections (UTI, 18.5%) and skin infections (12.6%). The most common indication for prophylactic antibiotic use was prevention of UTI (35.8% of total prescriptions). In the case of 45 (22%) residents on therapeutic antibiotics, information on signs and symptoms was not supplied.

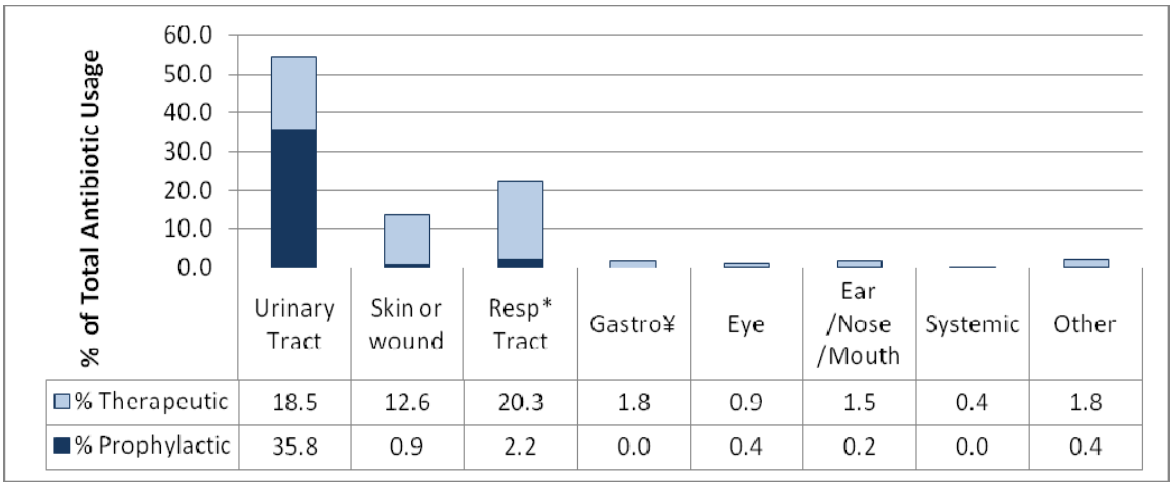


Figure 12: Indications for prophylactic and therapeutic antibiotics

*Resp Tract: Respiratory tract; ¥Gastro: Gastro-intestinal

The most frequently prescribed antibiotic for RTI, UTI and skin are outlined in table 8.

Table 8: Top five most frequently prescribed antibiotics for urinary tract (prophylaxis and infection), respiratory tract infection and skin infection

% Residents on antibiotic prophylaxis for UTI	
Trimethoprim	48.1
Nitrofurantoin	29
Cefradine	5.6
Co-amoxiclav	5.6
Cefalexin	3.7
Other	8
% Residents on antibiotic therapy for UTI	
Co-amoxiclav	23.8
Trimethoprim	19
Nitrofurantoin	15.5
Ciprofloxacin	10.7
Amoxicillin	10.7
Other	20.2
% Residents on antibiotic therapy for RTI	
Co-amoxiclav	52.2
Clarithromycin	12
Cefaclor	7.6
Ciprofloxacin	6.5
Cefuroxime	5.4
Other	16.3
% Residents on antibiotic therapy for skin infections	
Flucloxacillin	54.4
Phenoxymethylpenicillin	8.8
Metronidazole	5.3
Co-amoxiclav	5.3
Lymecycline	5.3
Other	21.1

Of note, 86% (n = 70) of residents prescribed antibiotics for urinary tract infection had a dipstick performed before antibiotic therapy commenced and 57% (n = 46) had a specimen taken for culture. Prophylactic antibiotics were predominantly prescribed for prevention of UTIs (159 residents - 89% of all residents on prophylactic antibiotics) with trimethoprim the most frequently prescribed antibiotic. Seventeen (10.7%)

residents on UTI prophylaxis had a urinary catheter *in situ*. Of the total number of patients on antibiotics for treatment of an infection, 35 had culture results available. Of these, the most common organisms isolated included nine (24%) *Staphylococcus aureus* (MRSA = 3), seven *Clostridium difficile*, and seven *E. coli* (one multidrug resistant – defined as resistant to third generation cephalosporin antibiotics). The remaining culture results were a variety of gram-positive and gram-negative organisms.

5. Conclusions and Recommendations

This is first time that data on HCAI has been collected in Irish LTCFs. Sixty-nine facilities volunteered to participate in the study. In 2009, the total number of LTCFs in Ireland was 598 (453 (75%) private and 145 (25%) public) (Source: HSE and Nursing Homes Ireland). Therefore, 11.3% of all Irish LTCFs (42% public, 1.7% private) participated. It is expected that those LTCFs with an IPC practioner in post were more likely to participate than those without, hence recruitment bias is likely.

- **Provision of medical care:** There was a wide variation in the delivery of medical care in LTCFs. The number of GP's providing medical care varied greatly within each region (figure 1) and the number of attending GPs did not correlate with LTCF size (figure 2). There was no coordination of medical activities in over 50% of the facilities surveyed which is an area that should be targeted for future improvements. For example, LTCFs with a coordinating physician were more likely to have antibiotic prescribing guidelines to help guide prescribers, thereby helping to reduce the emergence of AMR and/or the consequences of inappropriate antibiotics (e.g., *C. difficile* infection).
- **IPC resources and activities:** The majority of participating LTCF (81%) had a trained IPC practitioner in charge of IPC. The availablility of written protocols was impressive (hand hygiene 99%, MRSA management 97%, management of urinary catheters 90%). However it is difficult to imply that this is truly representative of infection control activities and resources at a national level as the IPC practitioners promoted recruitment for participation in this study. There is need for a comprehensive national survey on infection control activities and resources in the long term care facility setting in order to inform future preventative strategies.
- **Antibiotic prescriptions:** The antibiotic use reported in this study (10.2%), corresponds with the 2009 Irish ESAC results (overall prevalence 10.9%) which is higher than the European overall prevalence of 5.9%. The proportion of antibiotics that were prescribed for prophylactic use (42%) is of concern, specifically prophylaxis of UTI in catheterised patients highlighting the need for national antimicrobial stewardship guidelines for LCTFs and education of prescribers.
- **Risk factors for HCAI:** The prevalence of HCAI risk factors in the population surveyed reflects a high dependency level in Irish LTCFs. The low rate of pressure sores (2.9%) and urinary catheter use

(5.6%) despite a high proportion of incontinent and/or immobile residents reflects high quality nursing and medical care provided within in the facilities.

- **HCAI:** While the prevelance of HCAI reported in this study (3.6%) was lower than that previously reported from other European countries, a wide range was observed (0-22.2%) between individual facilities which may reflect differences in the actual LTCFs themselves (e.g., type of care required by resident differs according to dependency level). A survey of Scottish LTCFs reported a prevelance of 9.3% (Mullings 2010), and in Norway a prevalence of 6.6% (2003) and 7.6% (2004) was reported (Eriksen et al. 2004). The most common HCAI were urinary tract, respiratory and skin/soft tissue infection. No influenza infections were reported, which likely reflects the seasonality of influenza infection as the study was undertaken in June. The McGeer definitions for pneumonia mandates a chest x-ray for diagnosis, however this is not routine practice in Irish LTCFs and hence the adapted McGeer omits this criterion. This may limit comparability with other studies.

Undertaking this study was the first opportunity for Irish LTCFs to undertake HCAI surveillance using a standardised protocol, thereby allowing facilities to benchmark themselves and assess the impact of future HCAI/AMR preventative strategies. The level of participation and enthusiasm demonstrated by staff in all participating LTCFs reflects their commitment to evaluating and improving the care delivered to their residents. The rationale for undertaking surveillance is to provide information from which actions points can be developed and implemented. It will be important to repeat this prevalence study again to assess the impact of such changes and to encourage increased participation from all Irish LTCF.

Dr. Fiona Roche[1], Ms. Sheila Donlon[1], Dr. Meaghan Cotter[2],

Ms. Helen Byrne[1], Dr. Fidelma Fitzpatrick[1,2]

HSE- Health Protection Surveillance Centre, Dublin. [1]

Department of Clinical Microbiology Beaumont Hospital, Dublin. [2]

References

Baldwin, N.S., Gilpin, D.F., Tunney, M.M., Kearney, M.P., Crymble, L., Cardwell, C., & Hughes, C.M. 2010. Cluster randomised controlled trial of an infection control education and training intervention programme focusing on meticillin-resistant Staphylococcus aureus in nursing homes for older people. *J Hosp Infect*, 76, (1) 36-41 available from: PM:20451294

Eriksen, H.M., Iversen, B.G., & Aavitsland, P. 2004. Prevalence of nosocomial infections and use of antibiotics in long-term care facilities in Norway, 2002 and 2003. *J Hosp Infect*, 57, (4) 316-320 available from: PM:15262392

McGeer, A., Campbell, B., Emori, T.G., Hierholzer, W.J., Jackson, M.M., Nicolle, L.E., Peppler, C., Rivera, A., Schollenberger, D.G., Simor, A.E., & . 1991. Definitions of infection for surveillance in long-term care facilities. *Am J Infect Control*, 19, (1) 1-7 available from: PM:1902352

Mullings, A. et al . 2010. Healthcare associated infection in care homes for older people in Scotland: results from a pilot study. *Journal of Infection Prevention OnlineFirst* 1-5 Accessed 10/11/2010

O'Sullivan, N.R. & Keane, C.T. 2000. The prevalence of methicillin-resistant staphylococcus aureus among the residents of six nursing homes for the elderly. *J Hosp Infect*, 45, (4) 322-329 available from: PM:10973751

Oza, A. Cunney R. HPSC Annual Report 2009 - in print (Nov 2010)

Appendix A: Adapted McGeer* definitions of infection for surveillance in long-term care facilities

***** McGeer *et al*. 1991. Definitions of infection for surveillance in long-term care facilities. *Am J Infect Control*, 19, (1) 1-7. The additional criteria of **diagnosis by physician** is hightlighted in bold.

Respiratory tract infection

Common cold syndromes/pharyngitis

The resident must have at least two of the following signs or symptoms:

(a) Runny nose or sneezing
(b) Stuffy nose (i.e., congestion)
(c) Sore throat or hoarseness or difficulty in swallowing
(d) Dry cough
(e) Swollen or tender glands in the neck (cervical lymphadenopathy)
(**f) Diagnosis by physician**

Comment: Fever may or may not be present. Symptoms must be new, and care must be taken to ensure that they are not caused by allergies.

Influenza-like illness

Both of the following criteria must be met:

1. Fever (38^{o}C)*
2. The resident must have at least three of the following signs or symptoms:
   (a) Chills
   (b) New headache or eye pain
   (c) Myalgia
   (d) Malaise or loss of appetite
   (e) Sore throat
   (f) New or increased dry cough
   (**g) Diagnosis by physician**

Comment: This diagnosis can be made only during influenza season. If criteria for influenza-like illness and another upper or lower respiratory tract infection are met at the same time, only the diagnosis of influenza-like illness should be recorded.

Pneumonia

Both of the following criteria must be met:

1. **Diagnosed by physician**
2. The resident must have at least two of the signs and symptoms (from a – f) described under "other lower respiratory tract infections," not including diagnoses by physician

Comment: Non-infectious causes of symptoms must be ruled out. In particular, congestive heart failure may produce symptoms and signs similar to those of respiratory infections.

Other lower respiratory tract infection (bronchitis, tracheobronchitis)

The resident must have at least three of the following signs or symptoms:

(a) New or increased cough
(b) New or increased sputum production
(c) Fever (~38 ^{o} C)
(d) Pleuritic chest pain
(e) New or increased physical findings on chest examination (rales, rhonchi, wheezes, bronchial breathing),

(f) One of the following indications of change in status or breathing difficulty: new/increased shortness of breath or respiratory rate ~25 per minute or worsening mental or functional status[#]

(g) Diagnosed by physician

Comment: This diagnosis can be made only if no chest film was obtained or if a radiograph failed to confirm the presence of pneumonia.

*A single temperature of ~38 ^{o} C, taken at any site

Significant deterioration in the resident's ability to carry out the activities of daily living or in the resident's cognitive status, respectively.

Urinary tract infection

Symptomatic urinary tract infection

One of the following criteria must be met:

1. The resident does not have an indwelling urinary catheter and has at least three of the following;
   (a) Fever (~38^{o} C) or chills
   (b) New or increased burning pain on urination, frequency or urgency
   (c) New flank or suprapubic pain or tenderness
   (d) Change in character of urine*
   (e) Worsening of mental or functional status (may be new or increased incontinence)
   (f) Diagnosis by physician
2. The resident 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.
   (f) Diagnosis by physician

*Change in character may be clinical (e.g., new bloody urine, foul smell, or amount of sediment) or as reported by the laboratory (new pyuria or microscopic haematuria). For laboratory changes, thus means that a previous urinalysis must have been negative

Eye, ear, nose, and mouth infection

Conjunctivitis

One of the following criteria must be met:

1. Pus appearing from one or both eyes, present for at least 24 hours.
2. New or increased conjunctival redness, with or without itching or pain, present for at least 24 hours (also known as "pink eye").
3. **Diagnosis by physician**

Comment: Symptoms must not be due to allergy or trauma to the conjunctiva.

Ear infection

One of the following criteria must be met:

1. Diagnosis by physician[#] of any ear infection
2. New drainage from one or both ears. (Non-purulent drainage must be accompanied by additional symptoms, such as ear pain or redness)

Mouth and perioral infection

Oral and perioral infections, including oral candidiasis, must be diagnosed by a physician or a dentist.

Sinusitis The diagnosis of sinusitis must be made by a physician.

[#] Requires a written note or a verbal report from a physician specifying the diagnosis. Usually implies direct assessment of the resident by a physician. An antibiotic order alone does not fulfill this criterion. In some homes, it may be appropriate also to accept a diagnosis made by other qualified clinicians (e.g., nurse practitioner, physician associate).

Skin infection

Cellulitis/soft tissue/wound infection

One of the following criteria must be met:

1. Pus present at a wound, skin, or soft tissue site.
   OR
2. The resident must have four or more of the following:
   a) Fever (~38 °C) or worsening mental/functional status
   b) At the affected site, the presence of new or increasing heat
   c) At the affected site, the presence of new or increasing redness
   d) At the affected site, the presence of new or increasing swelling
   e) At the affected site, the presence of new or increasing tenderness or pain
   f) At the affected site, the presence of new or increasing serous drainage
   g) **Diagnosis by physician**

Fungal skin infection

The resident must have both:

(a) A maculopapular rash *and*
(b) Either physician diagnosis or laboratory confirmation.*

Herpes simplex and herpes zoster infection

For a diagnosis of cold sores or shingles, the resident must have both:

(a) A vesicular rash *and*
(b) Either a physician diagnosis or laboratory confirmation.

Scabies

The resident must have both:

(a) A maculopapular and/or itching rash *and*
(b) Either a physician diagnosis or laboratory confirmation.

Comment Care must be taken to ensure that a rash is not allergic or secondary to skin irritation.

*For Candida or other yeast, laboratory confirmation includes positive smear for yeast or culture for Candida sp.; for herpetic infections, positive electron microscopy or culture of scraping or swab; for scabies, positive microscopic examination of scrapings

Gastrointestinal tract infection

Gastroenteritis

One of the following criteria must be met:

1. Two or more loose or watery stools above what is normal for the resident within a 24-hour period.
2. Two or more episodes of vomiting in a 24-hour period.
3. Both of the following:

(a) A stool culture positive for a pathogen (Salmonella, Shigellosis', *E. coli* 0157:H7, Campylobacter) or a toxin assay positive for *C. difficile* toxin *and*
(b) At least one symptom or sign compatible with gastrointestinal tract infection (nausea, vomiting, abdominal pain or tenderness, diarrhea).

Comment: Care must be taken to rule out noninfectious causes of symptoms. For instance, new medications may cause both diarrhea and vomiting; vomiting may be associated with gallbladder disease.

Systemic infection

Primary bloodstream infection

One of the following criteria must be met:

1. Two or more blood cultures positive for the same organism
2. A single blood culture documented with an organism thought not to be a contaminant and at least one of the following:
    (a) Fever (~38 ^{o} C)
    (b) New hypothermia (~34.5^{o} C, or does not register on the thermometer being used),
    (c) A drop in systolic blood pressure of ~30 mm Hg from baseline
    (d) Worsening mental or functional status

Comment: Bloodstream infections related to infection at another site are reported as secondary bloodstream infections and are not included as separate infections.

Unexplained febrile episode

The resident must have documentation in the medical record of fever (≥38 ^{o} C) on two or more occasions at least 12 hours apart in any 3-day period, with no known infectious or noninfectious cause.