Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

hpsc

Second National Prevalence Survey on Healthcare Associated Infections and Antibiotic use in Irish Long-Term Care Facilities

National Report

August 2011

Contents

Executive Summary

A national prevalence survey took place in May 2011. In total 5,922 residents were surveyed in 108 long term care facilities (LTCFs), 84 of which were public and 24 private, an increase from 69 LTCFs in 2010 (Table 1, page 8). 39.3% (2,331) of the residents were over 85 years of age. LTCF size ranged from 10 to 226 beds (median 50 beds) with the proportion of single rooms per 100 beds ranging from 0 – 100 (median = 21). The majority of the LTCFs were classified as general care type (63 LTCFs). Other care types included intellectually disabled (15 LTCFs), psychiatric (5 LTCFs), residential (1 LTCF), physical (1 LTCF), rehabilitation (1 LTCF), and palliative care (1 LTCF) (Table 2, page 9). Twenty - one were a mix of care types.

Healthcare-Associated Infection (HCAI):

- 4.1% (242) residents had an infection on the day of the survey. This represents an increase from 3.6% in 2010 (Table 3, page 9), (See Appendix 2 for HCAI definitions).
- The most common infections were respiratory (1.4%, 83 residents), urinary (1.3%, 79 residents) and skin infections (1%, 57 residents), (Figure 1, Table 4, page 10).
- With respect to risk factors for HCAI, 49.7% (2,945) of residents had impaired mobility, 59% (3,512) were incontinent, 48.6% (2,878) were disorientated, 6% (353) had an indwelling urinary catheter and 0.6% (33) had a vascular catheter. Pressure sores were reported in 3.7% (217) of residents, 9.9% (586) had other wounds (e.g., leg ulcers, gastrostomy) and 1.1% (66) had recent surgery at the time of the survey, (Figure 2, page 11). This is a similar profile to 2010.
- Residents with an infection were more likely to be older (over 85 years), have a medical device (e.g., urinary catheter) in place and recently had surgery. Urinary infections were associated with the presence of a urinary catheter, skin infections with the presence of pressure sores and respiratory infections with older age (over 85 years).

Antibiotics:

- 10.1% (601) residents were on antibiotics and 0.6% (34) were prescribed two or more antibiotic types (Table 6, page 12). This is similar to what was reported in 2010.
- Antibiotics were prescribed predominantly in the facility by GPs (includes doctors employed by the facility) (75%), and specialists (15%) (Table 7, page 12). There was relatively little nurse prescribing (0.3%, 2 LTCFs). Coamoxiclav and trimethoprim were the most frequently prescribed antibiotics (Table 8, page 15).
- Antibiotics were prescribed for treatment of infection (58%, 340 residents) and for prophylaxis (39%, 244 residents) (Figures 3-5, pages 13-14). This is a similar profile to 2010.

- The most common infections treated by antibiotics included respiratory infection, urinary infection and skin infection (Figure 5, page 14). Only 45% (55) of residents that were prescribed antibiotics for a urinary infection had a specimen taken for culture.
- Prophylactic antibiotics were predominantly prescribed for the prevention of urinary infection with trimethoprim the most frequently prescribed. 61.7% of all antibiotics prescriptions for the urinary tract were for prophylactic use (Figure 5, page 14). 11.5% (23) of residents on prophylaxis for a urinary infection had a urinary catheter.

Medical Care:

- Medical care for residents was provided by general practitioners (GPs) in 46% (50) of LTCFs, by medical staff employed by the facility in 41% (43) and by both in 12% (13) of LTCFs (Figures 6-8, pages 17-18). Medical care provision varied regionally (Figure 6) and by LTCF ownership (Figure 7).

Medical Coordination:

- In 39% (42) of LTCFs, a designated medical doctor was responsible for standardisation of practices and policies and coordination of medical activities. This included staff education, development of infection prevention and control and antibiotic stewardship policies and coordination of medical rotas and staff vaccination (Figure 9-11, pages 20-21). This was provided by either a designated GP (8%, 9 LTCFs), a designated medical doctor employed by the LTCF (28%, 30 LTCF) or an external physician (3%, 3 LTCFs). There was no coordination of medical activity in 56% (61) of the LTCFs surveyed and in 4% it was unknown.

Infection Prevention and Control:

- In 37% (40) of LTCFs there was no infection prevention and control practitioner in place whereas 63% (68) had (Figures 12-13, page 22). In 62% (42) of LTCFs with an infection prevention and control practitioner, this person was not working in the facility. Infection prevention and control activities are summarised in Table 14, page 24.

Antibiotic Stewardship:

- Only 12% of LTCFs surveyed had an antibiotic committee, 8% ran annual regular training on appropriate antibiotic prescribing and 19% had written guidelines (Table 16, page 25).
- Presence of a coordinating doctor was significantly associated with the availability of written antibiotic guidelines and presence of an antibiotic committee was more likely to occur in public rather than private LTCFs. Antibiotic stewardship activities are summarised in Figure 14, page 26.

Recommendations

1. **Participating long term care facilities (LTCF) should feedback the results of this study to medical, nursing, allied health and management staff. Results should be used to plan preventative programmes. Participants from 2010 can compare their results with 2011; however, because of the heterogeneity of LTCFs, comparisons with other LTCF may not be valid.**
2. **One of the most common infections recorded was respiratory infection. LTCFs should review their vaccination policies and ensure that influenza and pneumococcal vaccination protocols are in line with national guidance and part of the infection prevention and control plan. This vaccination policy must include annual influenza vaccination of LTCF staff.**
3. **There is no evidence that prophylactic antibiotics prevent the onset of urinary infection (UTI) in elderly residents. The use of prophylactic antibiotics needs to be assessed on a case by case basis. Inappropriate antibiotic use increases the risk of *Clostridium difficile* infection and the emergence of antibiotic resistant organisms.**
4. **Urinary dipsticks should be used to exclude UTI. Residents with suspected UTI should have a specimen sent for culture before antibiotic therapy is commenced and antibiotic therapy altered appropriately on the basis of culture and susceptibility results.**
5. **LTCFs should ensure that procedures are in place (e.g., care bundles, checklists etc) as recommended by national guidelines, to prevent HCAI associated with risk factors including medical devices such as urinary catheters, wounds and inappropriate antibiotic use (which can cause *C. difficile* infection). As relevant national guidelines are published, they should be implemented accordingly.**
6. **A national strategy for the prevention and control of HCAI in LTCFs to include antibiotic stewardship should be developed and implemented in conjunction with relevant HSE clinical care and quality and patient safety programmes, LTCF prescribers and LTCF staff.**

1. Why a Second National Survey?

1.1 The HALT Survey 2010

The European Centre for Disease Prevention and Control (ECDC) coordinated a point prevalence survey on healthcare-associated infection (HCAI) and antibiotic use in European long term care facilities (LTCFs) in summer 2010 (HALT survey). The HSE-Health Protection Surveillance Centre (HPSC) was the national coordinating centre for Ireland. Seven hundred and twenty-two LTCFs in 25 European countries participated. Participating LTCFs were asked to survey residents on one day only, thereby providing a snapshot of HCAI and antibiotic use on that particular day. ECDC provided the information technology (IT) tool that enabled participating LTCFs to receive immediate feedback of their own results so that they could commence evaluating them and plan further preventive programmes. In September 2010, HPSC circulated participating LTCF with a summary report enabling comparison with the national dataset. The national report for the Republic of Ireland was published in November 2010.[1] The final ECDC report summarising the European results is due to be published in mid to late 2011.

In the Republic of Ireland, 4,170 residents in 69 LTCF (61 in public and eight in private ownership) participated in HALT in June 2010. Thirty-nine percent (27) were classified as general nursing homes, 10% (7) as intellectually disabled and the remaining 51% (35 provided a mix of care (including residential, psychiatric, physically disabled, rehabilitation, palliative, sanatorium or other). The mean number of beds per LTCF was 67 with a range of 10 to 382 beds and a median of 47. Only 27% of the beds were single rooms. Overall, 11.3% (472) residents had either signs/symptoms of infection (6.2%, 260 residents) or were on antibiotics (10.2%, 426 residents). HCAI prevalence was 2.4% as strictly defined by McGeer definitions[2] and 3.6% when adapted McGeer definitions were applied (i.e. physician diagnosis of infection was included as a criterion in all categories of infection).

1.2 Why a second national prevalence survey?

The 2010 HALT survey in Ireland was the first time national information on HCAI was available from Irish LTCF. Results highlighted the heterogeneity of LTCF themselves in terms of case mix and therefore HCAI risk, the frequency of prophylactic antimicrobial prescribing and provided an important baseline on HCAI, antimicrobial stewardship activities and antimicrobial consumption in Irish LTCFs to inform future preventative strategies. Evaluation of participants revealed that participation was a positive experience for all in terms of staff education and raising awareness of HCAI and antibiotic use. Many LTCFs instituted improvement programmes on the basis of their results. It was therefore decided to repeat

the HALT survey in Ireland in 2011. The aim was to increase the number of participating LTCFs from both public and private sectors and to expand the national steering group to include membership from the relevant HSE clinical care programmes and offices so that the results could inform planning of relevant national programmes (Appendix 1). The 2010 protocol was used (including the ECDC IT tool) to enable national and local comparisons with the previous year. Three regional educational days were coordinated by HPSC. In addition to education on the survey protocol, additional lectures on prevention of urinary infection (including care bundles) and feedback of the 2010 results were delivered.

2. Aims

The aims of the second LTCF prevalence survey are:

- To increase the number of participating LTCFs from 2010.
- To evaluate the prevalence of HCAI and antibiotic use in Irish LTCFs.
- To describe infection prevention and control and antimicrobials stewardship practices and resources in Irish LTCFs.
- To make comparisons where relevant with 2010 results.
- To inform national LTCF strategies.
- To provide timely feedback to participating LTCFs.

3. Methods

The HALT survey took place in May 2011. LTCFs were defined as institutions where the resident's stay is either temporary (long or short) or permanent. Residents in these institutions require constant supervision (i.e., more than 'basic' nursing care and assistance with activities of daily living), are medically stable and do not require constant specialised medical care (i.e., care administered by specialised physicians) or invasive medical procedures (e.g., ventilation). In these institutions, registered nursing staff are present at all times, different types of residents are treated in the facility, even if some of the wards could be more specialised, e.g. in dementia care. Residents in sheltered care, day centres, home-based centres, resident flats and protected living were excluded. Participation was voluntary and coordinated by HPSC. A call for participation was disseminated in February 2011 through representative professional organisations, the HSE and Nursing Home Ireland. In addition, infection prevention and control nurses working in the community were specifically contacted and asked to encourage LTCFs in their catchment area to participate. Three regional education days (Dublin, Sligo, Cork) coordinated by HPSC were conducted in

May 2011. The survey was carried out as described in the HALT protocol.[3] 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:

Institutional questionnaire:[3] 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 recorded included number of residents aged over 85 years, recent surgery, antibiotic therapy, presence of indwelling medical devices, pressure sores or wounds, disorientation, impaired mobility and incontinence.

Resident questionnaire: [3] 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 was collected;

- Urinary 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 participating LTCF. Participating centres were requested to validate 10% of their resident forms. In the analysis of results, the McGeer definitions of HCAI [2] 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 2). The ECDC IT tool enabled participating LTCF to generate a summary report immediately once all data was entered into the database. HPSC circulated participants with a summary report of HCAI and antibiotic use in June 2011. Statistical analyses were

carried out using OpenEpi Version 2.3. The infection prevalence figures were calculated as the proportion of all eligible residents. The Chi-squared test or Fisher's exact test were used for statistical analysis on categorical variables as appropriate.

4. Results

4.1 Description of Participating LTCF

A total of 5987 beds were occupied on the day of the survey. Of these, 1% (65) residents were ineligible to participate. In total 5,922 eligible residents in 108 LTCFs were surveyed, (84 public, 24 private), an increase from 69 LTCFs in 2010. In 2009, there were 598 LTCFs in Ireland, 453, 75% private and 145, 25% public - Source: HSE and Nursing Homes Ireland. Assuming that this figure has not changed, 18% of the countries LTCF participated (57.9% public and 5.3% private). The majority of residents were female 63% (3750). Thirty-nine percent (2331) of eligible residents were over 85 years. The size of participating LTCFs ranged from ten to 226 beds (median 50 beds) with the proportion of single rooms per 100 beds ranging from 0 – 100 (median = 21) (Table 1). Private LTCFs had significantly more single rooms per 100 beds than public LTCFs (p-value = < 0.0001). The median bed occupancy was 95% (range: 50% – 100%). There was a greater representation of private LTCFs this year (24) compared to 2010 (8) with an increase in the participation levels in all HSE regions.

Table 1: Breakdown of participating LTCFs by region and ownership

Category	Number of LTCFs	Total residents surveyed	Median residents surveyed/LTCF (range)	Median single rooms/100 beds (range)	Median bed occupancy/100 beds
By Ownership					
Public	84	4400	35 (3 - 221)	18 (0 - 100)	93
Private	24	1522	57 (23 - 134)	64 (3 - 100)	96
By HSE Region					
HSE - Dublin North East	10	604	48 (20 - 126)	13 (0 - 100)	95
HSE - Dublin Mid-Leinster	35	2308	54 (8 - 221)	53 (3 - 100)	96
HSE - South	24	1530	57 (3 - 153)	18 (1 - 93)	93
HSE - West	39	1480	28 (9 - 133)	20 (4 - 90)	95
National	**108**	**5922**	**43 (3 - 221)**	**21 (0 - 100)**	**95**

Table 2 summarises participating LTCFs by type and average length of stay. The majority of LTCFs were classified as general care type (63 LTCFs) with most residents staying definitively until the end of their life in the LTCF (91 LTCFs).

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

by LTCF type	Number of LTCFs (%)
General nursing home	63 (58.3)
Residential home	1 (0.9)
Psychiatric LTCF	5 (4.6)
Intellectually disabled	15 (13.9)
Physical disabled	1 (0.9)
Rehabilitation centre	1 (0.9)
Palliative care facility	1 (0.9)
A mix of some of the above	21 (19.4)
by LTCF average length of stay	
Temporary short (<3 months)	4 (3.7)
Temporary medium (3-12 months)	5 (4.6)
Temporary long (>12 months but not definitive)	1 (0.9)
Definitive stay (until end of life)	91 (84.3)
Other	7 (6.5)

4.2 Healthcare-associated Infection (HCAI)

4.2.1 How common are HCAIs?

Of the 5922 residents surveyed, 6.5% (384) had signs and symptoms of an infection. Using the adapted McGeer definitions (see Appendix 2), 242 residents had 253 infections corresponding to a prevalence of infection of 4.1 %, (Table 3). Eleven residents had more than one HCAI type present. The 2011 prevalence represents an increase when compared to 2010 (HCAI prevalence of 3.6%), (Table 3).

Table 3: Healthcare associated infection in LTCFs using adapted McGeer definitions

Residents surveyed	2010	2011
Number of residents surveyed	4170	5922
Number of residents with signs/symptoms of an infection	266	384
Adapted McGeer[a]		
Number of residents with infections	149	242
Number of infections	156	253
Residents with more than one infection	7	11
Percentage of residents with a HCAI (prevalence)	3.6%	4.1%
National range	0 - 18.5%	0 - 26.1%

[a] *Adapted McGeer: McGeer definition using physician diagnosis as one of the criteria. See Appendix 2 for definitions.*

4.2.2 What types of infections are present in residents?

The most common infections were respiratory tract (RTI), 1.4% of all residents surveyed, (83 residents) urinary (UTI), 1.3 % (79 residents) and skin infections, 1% (57 residents) (Figure 1 and Table 4). There were no systemic infections reported. This is similar to 2010 with the exception of RTI.

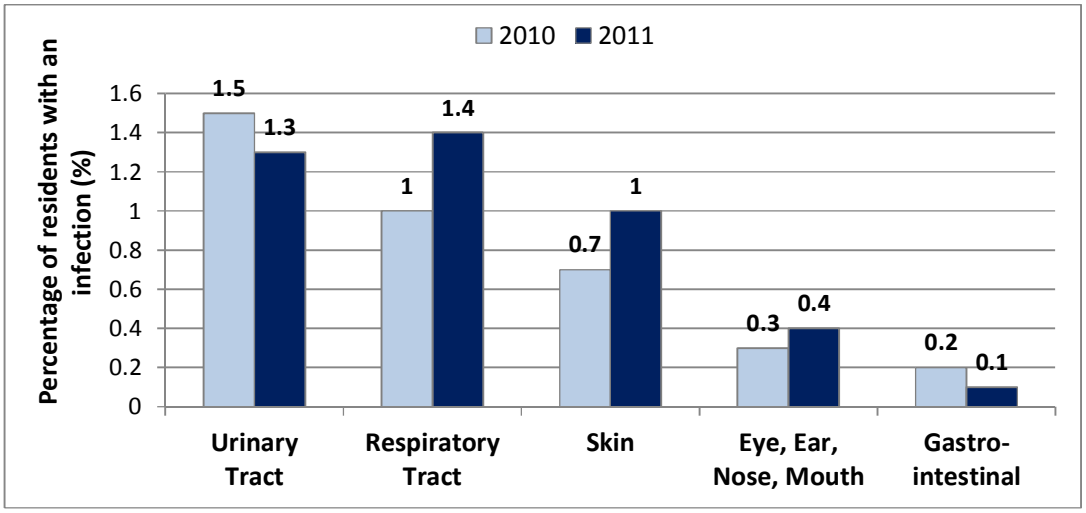


Figure 1: Breakdown of infection types in 2010 and 2011

Table 4: Breakdown of Infections by Infection Type

Infection Type	2010		2011	
	Number of infections	% of residents with infection[a]	Number of infections	% of residents with infection[a]
Urinary Tract Infection	**62**	**1.5%**	**79**	**1.3%**
Respiratory Tract Infection	**44**	**1%**	**88**	**1.4%**
Cold		*0.4%*	*32*	*0.5%*
Flu		*0%*	*2*	*0.03%*
Pneumonia		*0.1%*	*11*	*0.2%*
Other[b]		*0.6%*	*43*	*0.7%*
Skin	**31**	**0.7%**	**57**	**1%**
Cellulitis		*0.7%*	*54*	*0.9%*
Fungal		*0.05%*	*1*	*0.02%*
Herpes		*0%*	*2*	*0.03%*
Eye, Ear, Nose, Mouth	**11**	**0.3%**	**25**	**0.4%**
Eye		*0.1%*	*14*	*0.2%*
Ear		*0.05%*	*4*	*0.1%*
Mouth		*0.1%*	*7*	*0.1%*

[a] *The percentage of residents with an infection is calculated as the number of infected residents per total eligible residents.*

[b] ***Other**: Other lower respiratory tract infections (e.g. bronchitis, tracheobronchitis)*

4.2.3 Risk factors for HCAI

With respect to risk factors for HCAI, 49.7% (2,945) of residents had impaired mobility, 59.3% (3,512) were incontinent, 48.6% (2,878) were disorientated, 6% (353) had an indwelling urinary catheter and 0.6% (33) had a vascular catheter. Pressure sores were reported in 3.7% (217) of residents, 9.9% (586) had other wounds (e.g., leg ulcers, gastrostomy) and 1.1% (66) had recent surgery at the time of the survey, (Figure 2). The overall distribution of HCAI risk factors of residents is similar to 2010.

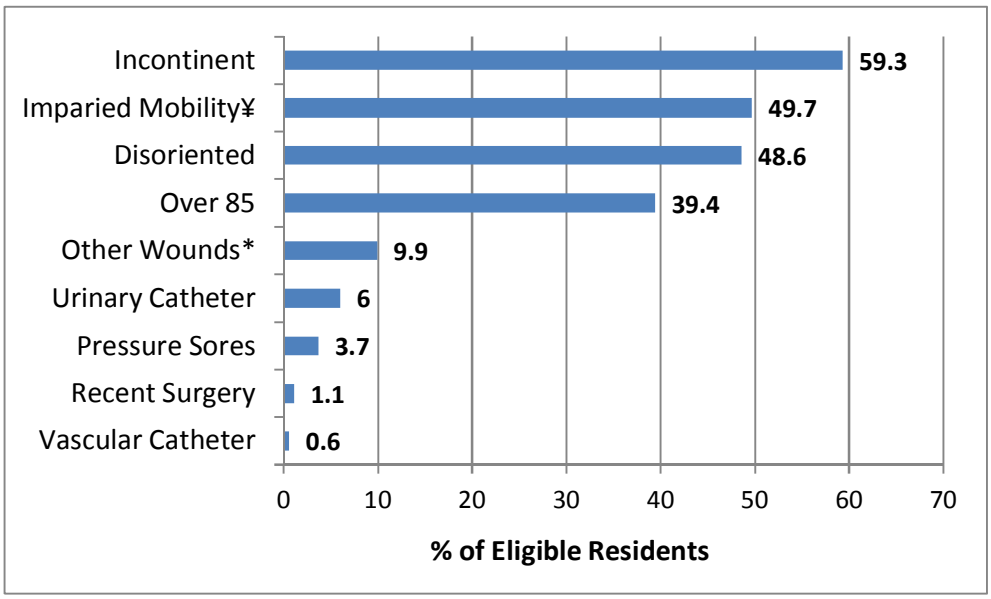


Figure 2: Presence of risk factors for HCAI in the survey population

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

Residents with an infection were more likely to be older (over 85 years), have a medical device (urinary catheter or IV line) in place and recently had surgery ($p=0.02$, $p<0.001$ and $p=0.006$ respectively). Residents with a urinary catheter had an increased prevalence of UTI (10.2%) when compared to residents with none (3.7%, $p< 0.001$). Skin infections were associated with the presence of pressure sores ($p< 0.001$). Residents with RTI were more likely to be over 85 years ($p=0.002$).

4.3 Antibiotic Use

4.3.1 Overall Summary

Of the 5,922 residents surveyed, 10.1% (601) were prescribed antibiotics (median = 9.9%; range = 0 – 100%) and 0.6% (34) were prescribed two or more antibiotic types (Table 6). In one LTCF all three eligible residents were prescribed antibiotics (i.e., 100% of residents). When this LTCF was removed from the analysis, the range of antibiotics prescribed was 0-50% which is similar to the range reported in 2010 (0-41.7%).

Table 6: Antibiotic use in LTCFs, 2010 and 2011

	2010	2011
Overview		
Number of residents surveyed	4170	5930
Number of residents on antibiotics, (% of total)	426 (10.2%)	601 (10.1%)
Number of residents on more than one antibiotic, (%)	25 (0.6%)	34 (0.6%)
Number of antibiotics prescribed	453	636

Antibiotics were prescribed predominantly in the facility by GPs (includes doctors employed by the facility) (75%), and specialists (15%), (Table 7). There was relatively little nurse prescribing (0.3%, 2 LTCFs).

Table 7: Breakdown of where antibiotics are prescribed and who prescribes them

	2010	2011
Where are antibiotics prescribed		
In this facility	85%	81%
In the hospital	7%	9%
Elsewhere	4%	3%
Unknown	4%	7%
Who prescribes the antibiotics		
GP*	76%	75%
Specialist	12%	15%
Nurse	0%	0.3%
Other	8%	4%
Unknown	4%	6%

** includes doctors employed by the facility*

4.3.2 Why were antibiotics prescribed?

Antibiotics were prescribed for treatment of infection ('therapeutic'), 58%, 340 residents and for prevention of infection ('prophylaxis'), 39%, 244 residents (Figure 3). This is similar to what was reported in 2010. It is unknown why 3% of antibiotics were prescribed.

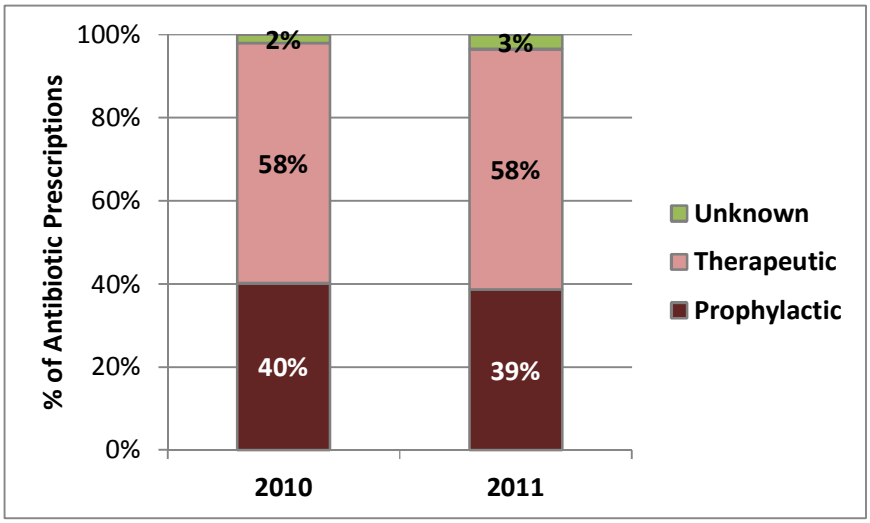


Figure 3: Overall Summary - Why were antibiotics prescribed; prevention or treatment?

4.3.3 What were the top three indications for antibiotic use?

51% of all antibiotics (both prophylactic and therapeutic antibiotics) were prescribed for UTI, 23% for RTI, 16% for skin or wound infections and 10% for other infection types (Figure 4). A similar breakdown was observed in 2010.

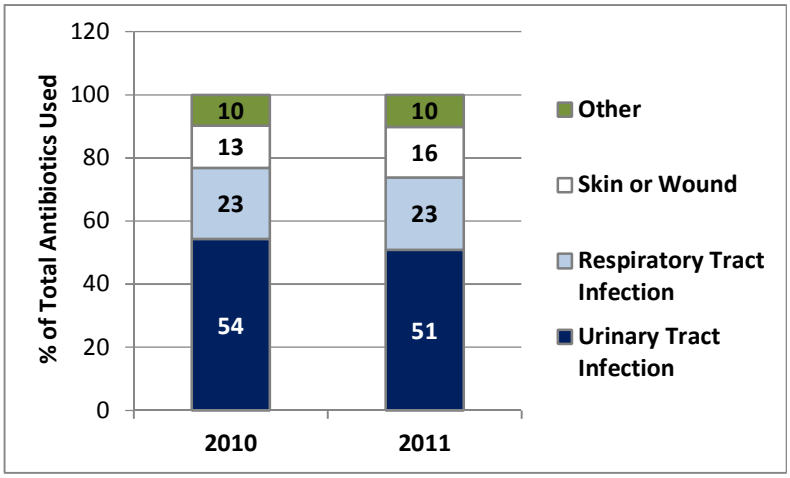
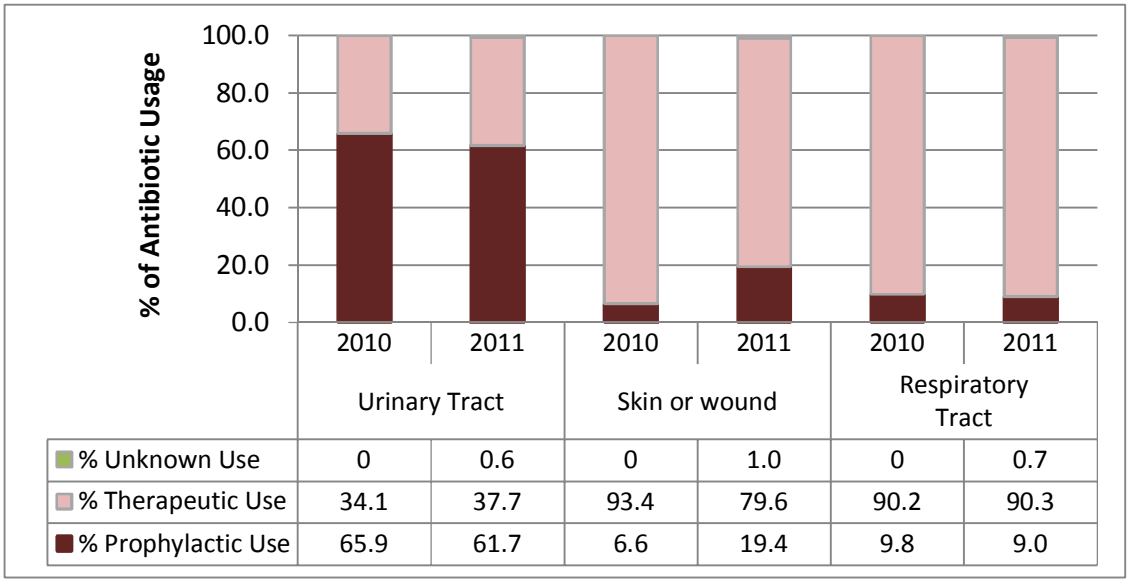


Figure 4: Top three indications (prophylactic and therapeutic) for antibiotic use – 2010 and 2011

4.3.4 Breakdown of why antibiotics were prescribed

4.3.4. i Prevention

Out of 5922 residents surveyed, 4% (244 residents) were on prophylactic antibiotics, which is similar to 2010. The majority of antibiotics prescribed for prophylactic use were for UTI prevention (81% of all prophylactic antibiotics prescribed). 61.7% of all antibiotics prescriptions for the urinary tract were for prophylactic use (Figure 5). This is similar to what was reported in 2010 (65.9%). Trimethoprim was the most frequently prescribed prophylactic antibiotic. 11.5% (23) of residents on UTI prophylaxis had a urinary catheter in place. Prophylactic antibiotics were also prescribed to prevent RTI (9% of antibiotics prescribed for the respiratory tract) and skin and wound infections (19.4%), an increase from 6.6% reported in 2010.



	Urinary Tract 2010	Urinary Tract 2011	Skin or wound 2010	Skin or wound 2011	Respiratory Tract 2010	Respiratory Tract 2011
% Unknown Use	0	0.6	0	1.0	0	0.7
% Therapeutic Use	34.1	37.7	93.4	79.6	90.2	90.3
% Prophylactic Use	65.9	61.7	6.6	19.4	9.8	9.0

Figure 5; Indications for antibiotic prescriptions: Infection type and reason for the prescription

4.3.4. ii Treatment

6% (340 residents) of all residents surveyed were on antibiotics for therapeutic use, the same as that reported in 2010. The most common infections treated by antibiotics included UTI, RTI and skin infection (Figure 5). Only 45% (55) of residents that were prescribed antibiotics to treat a UTI had a specimen taken for culture before antibiotic therapy commenced and 81% had a dipstick performed. In contrast to UTI, antibiotics were predominantly prescribed for treatment purposes for skin and the respiratory tract (79.6% and 90.3%, respectively).

4.3.5 Types of antibiotics used:

Table 8 outlines the five most frequently prescribed antibiotics and Table 9 the most frequently prescribed antibiotic for urinary, respiratory and skin indications.

Table 8: Top five most frequently prescribed antibiotics

Antibiotics	% of Prescriptions
Co-amoxiclav	20%
Trimethoprim	17%
Nitrofurantoin	15%
Flucloxacillin	7%
Clarithromycin	5%
Other	36%

Table 9: Most frequently prescribed antibiotics for urinary, respiratory and skin indications

Antibiotics prescribed for UTI prevention	
Trimethoprim	44%
Nitrofurantoin	34%
Cefalexin	6%
Co-amoxiclav	5%
Cefuroxime	3%
Other	9%
Antibiotics prescribed for treatment of UTI	
Co-amoxiclav	32%
Nitrofurantoin	19%
Trimethoprim	14%
Ciprofloxacin	12%
Cefalexin	10%
Other	14%
Antibiotics prescribed for treatment of respiratory infections	
Co-amoxiclav	46%
Clarithromycin	21%
Amoxicillin	10%
Ciprofloxacin	5%
Cefuroxime	3%
Other	15%
Antibiotics prescribed for treatment of skin infections	
Flucloxacillin	48%
Phenoxymethylpenicillin	10%
Co-amoxiclav	9%
Doxycycline	5%
Metronidazole	5%
Other	22%

4.3.6 Microbiology culture results

Of 340 residents on antibiotics for treatment of an infection, 20% (69) had culture results available on the day of the survey (Table 10).

Table 10: Summary of microbiology culture results of 69 residents on antibiotic therapy

Culture result	Number
Mycobacterium tuberculosis complex	4
C. difficile infection	0
E. coli	26
- *E. coli* resistant to third generation cephalosporin antibiotics	0
Proteus spp.	8
Pseudomonas spp.	6
Extended spectrum B-lactamase (ESBL) producing organisms	1
Shigella spp.	1
S. aureus	9
- Meticillin resistant *S. aureus* (MRSA)	3
- Meticillin susceptible *S. aureus* (MSSA)	6
Enterococcus spp.	6
- Vancomycin resistant *Enterococcus* spp. (VRE)	0

4.4 HCAI and Antibiotic Use by LTCF Care Type:

Table 11 summarises the main care types of LTCFs surveyed and their associated HCAI and antibiotic prevalence. No difference was observed in the percentage of residents with a HCAI between the three main LTCF care types (general, mixed and intellectually disabled). The intellectually disabled group reported a lower percentage of residents on antibiotics (6%) compared to the general (10%) and mixed (11%) LTCF care types. This was predominantly due to a decrease in prophylactic antibiotic use, though a decrease in therapeutic antibiotic use was also observed (Table 11). There were too few LTCFs in the psychiatric, palliative, residential, physical and rehabilitation care types to make any comparisons.

Table 11: Breakdown of HCAI and antibiotic usage by LTCF care type

	Number of LTCFs (% of total)	Number of Residents	% Residents with a HCAI	% Residents on antibiotics	% Residents on Prophylactic antibiotics	% Residents on Therapeutic antibiotics
National	**108 (100%)**	**5922**	**4.1%**	**10.1%**	**4%**	**6%**
by LTCF Care Type*						
General	**63 (58%)**	**3910**	**4%**	**10%**	4%	**6%**
Mixed	**21 (19%)**	**1008**	**4%**	**11%**	5%	**6%**
Intellectually Disabled	**15 (14%)**	**740**	**4%**	**6%**	2%	**3%**
Psychiatric	**5 (5%)**	**137**	**2%**	**8%**	4%	**4%**

** There was only one of each of the following facilities care types: Palliative care, residential care, physical care, and rehabilitation LTCF.*

4.5 Medical Care and Coordination

4.5.1 Medical Care

Twenty-four hour qualified nursing care was available in all participating LTCFs. Medical care for residents was provided by general practitioners (GPs) in 46% (50) of LTCFs, by medical staff employed by the facility in 41% (43) and by both in 12% (13) LTCF (Figure 6).

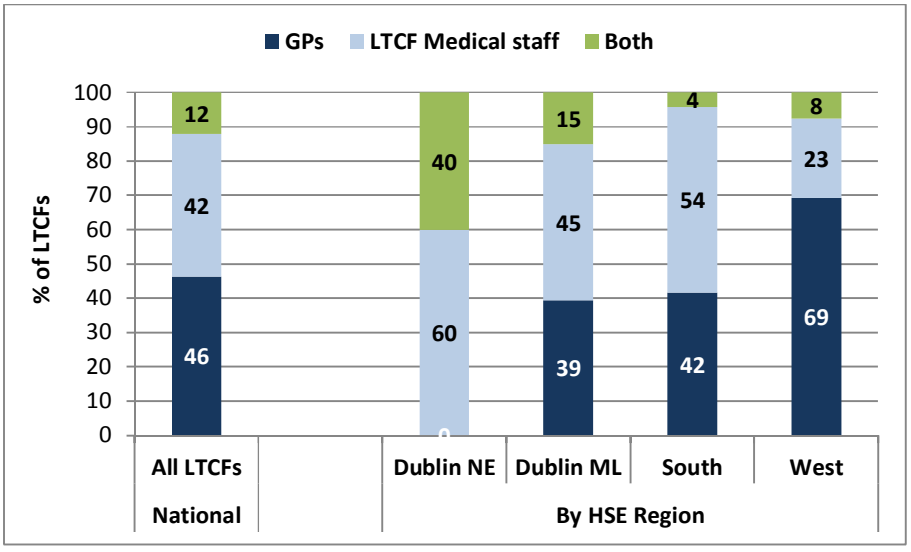


Figure 6: Provision of medical care in LTCFs nationally and by HSE region

NE: North East ML: Mid Leinster

As in 2010, regional variation in the provision of medical care was observed (Figure 6). The majority of medical care (91.7%) in private facilities was delivered by GPs when compared to public facilities (33.3%), (Figure 7).

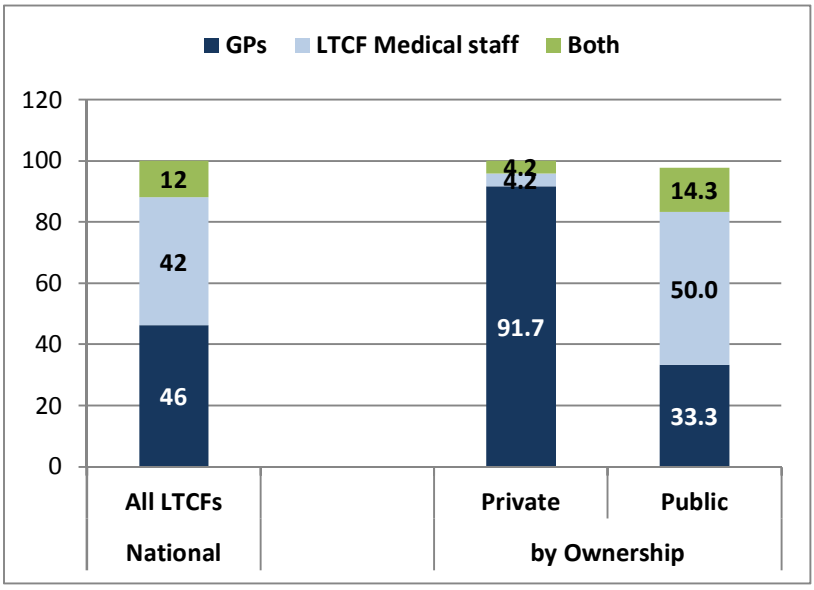


Figure 7: Provision of medical care in public and private LTCFs

In the 50 LTCFs under GP medical care, there was no association between the number of GPs providing medical care and LTCF size (Figure 8). Though private LTCFs surveyed are on average larger (median = 61 beds) than public LTCFs (median = 40 beds) with medical care predominantly provided by GPs, the average ratio of GP to LTCF size is similar between public and private facilities (1 GP for every 5 residents).

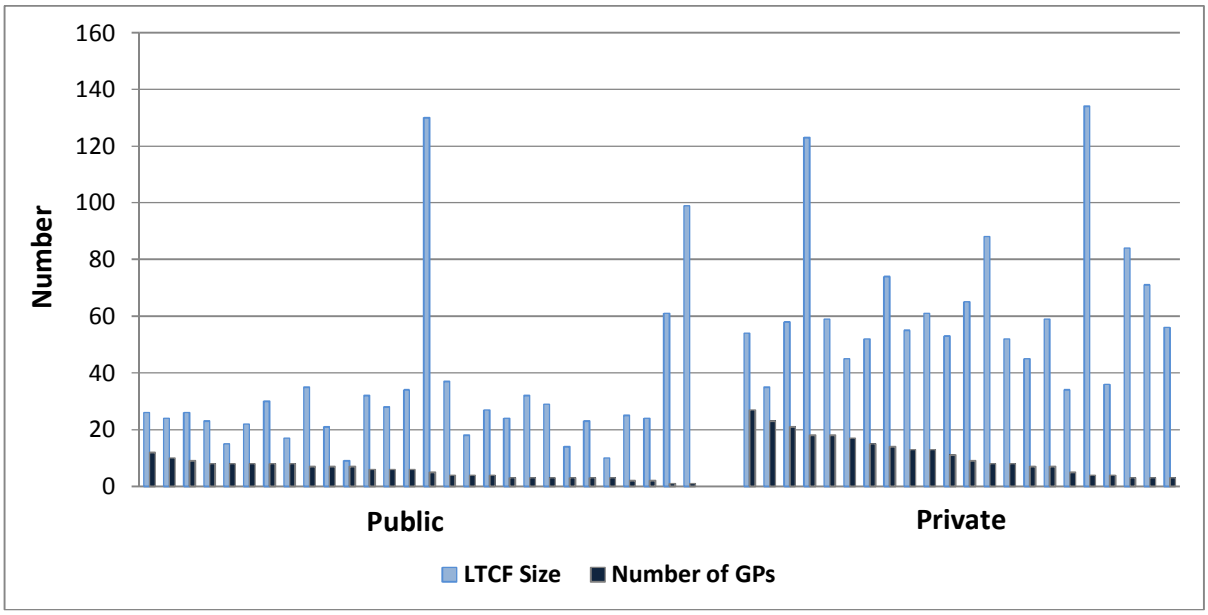


Figure 8: Number of GPs providing medical care in participating LTCFs by LTCF size and by ownership

4.5.2 Medical Coordination

In 39% (42) of LTCFs, a designated medical doctor was responsible for standardisation of practices and policies and coordination of medical activities (Figure 9). This included staff education, development of infection control and antibiotic stewardship policies and coordination of medical rotas and staff vaccination. This was provided by either a designated GP (8%, 9 LTCFs), a designated medical doctor employed by the LTCF (28%, 30 LTCFs) or an external doctor (3%, 3 LTCFs). There was no coordination of medical activity in 56% (61) of the LTCFs surveyed and in 4% it was unknown. A similar national breakdown was observed in the 2010 survey. On average, 49 hours a month was devoted to medical coordination but this varied considerably by LTCF (range 2 – 180 hours).

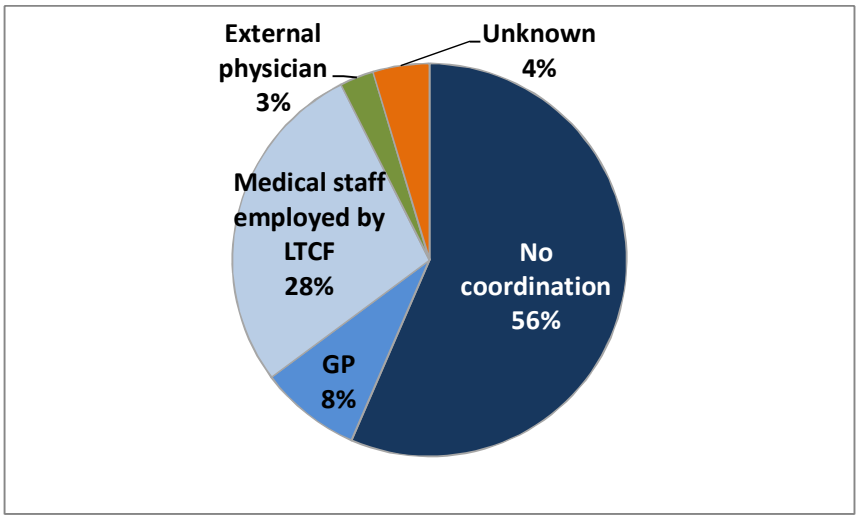


Figure 9: Breakdown of coordination of medical care in LTCFs

Tasks performed by coordinating doctors are summarised in Figure 10. As in 2010, few coordinating doctors had roles in staff education and development of antibiotic stewardship or infection prevention and control policy for the facility.

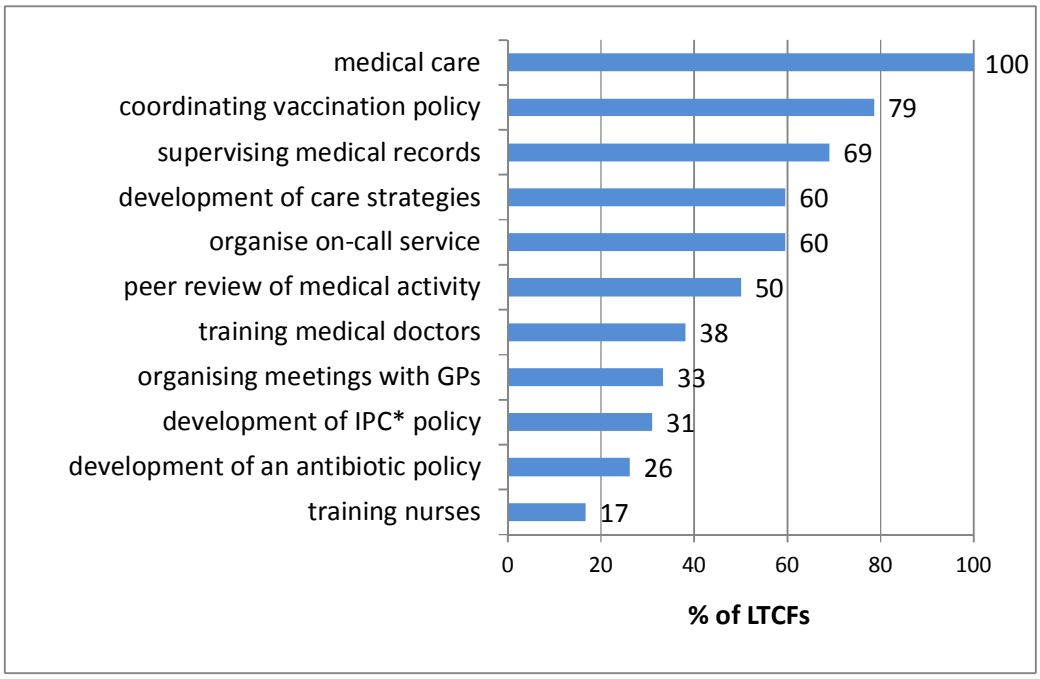


Figure 10: Tasks performed by doctor coordinating medical activities in 43 LTCFs

** IPC: Infection prevention and control*

The availability of medical coordination differed between public and private facilities (Figure 11). Only 17% of surveyed private LTCFs had a designated medical doctor to coordinate medical activities in comparison with 45% of public LTCFs.

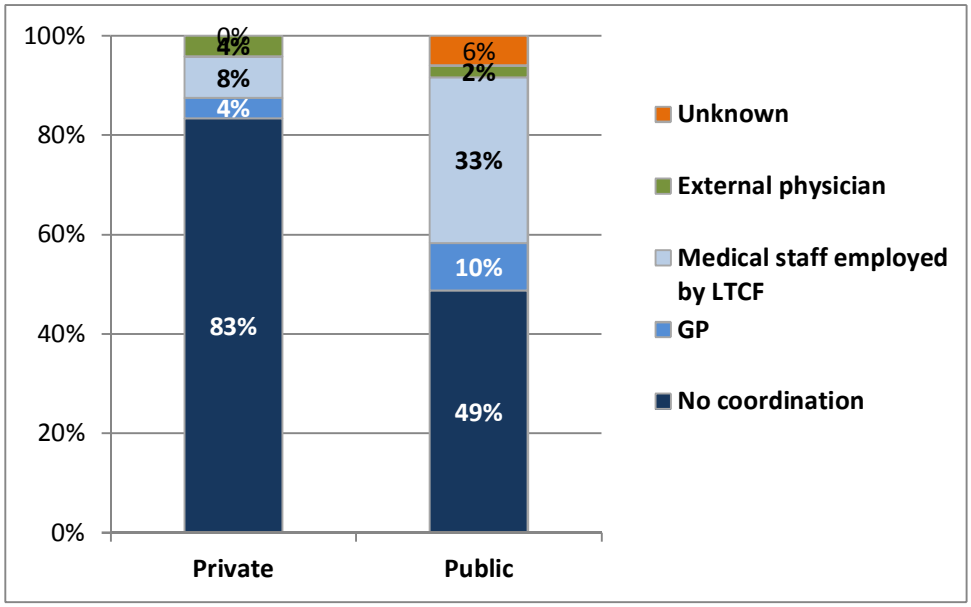


Figure 11: Breakdown of coordination of medical care in LTCFs by ownership type

4.6 Infection Prevention and Control Practice

An infection prevention and control practitioner was defined as a registered nurse, physician, epidemiologist or medical technologist who helps to prevent healthcare-acquired infections by isolating sources of infections and limiting their spread; systematically collects, analyses and interprets health data in order to plan, implement, evaluate and disseminate appropriate public health practices; and trains healthcare staff through instruction and dissemination of information on infection control practices. *(Definition source: Association for Professionals in Infection Control and Epidemiology).*

In 37% (40) of LTCFs there was no infection prevention and control practitioner in place whereas 63% (68) had (Figure 12). Presence of an infection prevention and control practitioner was more prevalent in public (74%, 62 LTCFs) compared to private (25%, 6 LTCFs) LTCFs. In 2010, only 17% of surveyed LTCFs had no infection prevention and control practitioner in place, however, with the increased number of participating LTCFs in 2011, it is likely that the 2011 results are a more accurate reflection of infection prevention and control resources in Irish LTCFS.

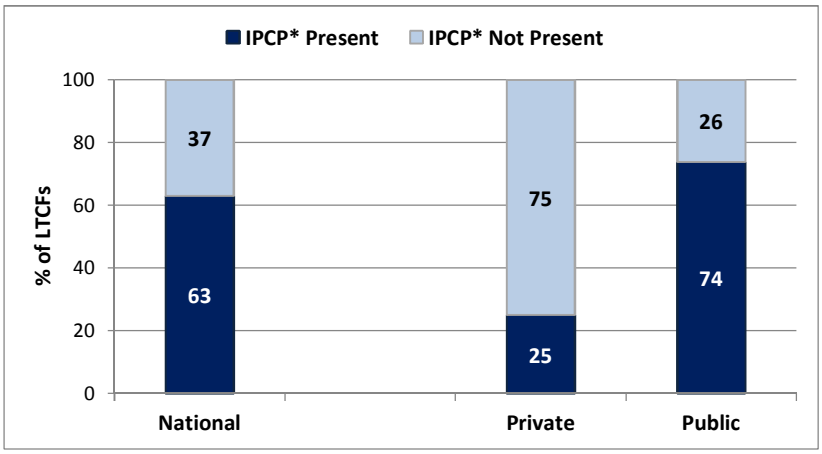


Figure 12: Presence of infection prevention and control practitioners in LTCFs by ownership type

** IPCP: Infection prevention and control practitioner*

The availability of infection prevention and control practitioners in public LTCF did not vary considerably across HSE Dublin Mid-Leinster, HSE-South and HSE-West (Figure 13). Too few LTCFs (10) participated from HSE Dublin North East to make accurate cross regional comparisons.

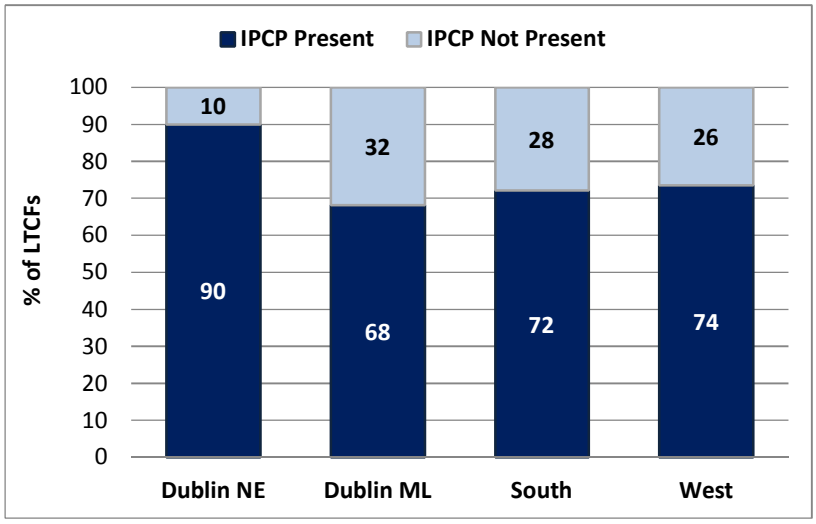


Figure 13: Presence of infection prevention and control practitioners in LTCFs by HSE Region

** IPCP: Infection prevention and control practitioner*

Infection prevention and control practitioners were predominantly nurses (90%), (Table 12). In 62% (42) of LTCFs with an infection prevention and control practitioner, this person was not working in the facility.

Table 12: Description and location of Infection Prevention and Control Practitioner

Breakdown of type of infection prevention and control **practitioner present**	**Number of LTCFs (%)**
Nurse	61 (90%)
Doctor	2 (3%)
Both	1 (1%)
Unknown	4 (6%)
Location of infection prevention and control **practitioner**	
Working in the facility	25 (37%)
Working Externally	42 (62%)
Unknown	1 (1%)

59% (64) of LTCFs had an infection control committee which met a median of four times (range 1 - 11) in the previous year. This was more likely to occur in public rather than private LTCF ($p < 0.001$), (Table 13). 78% of all facilities had access to infection prevention and control advice with public facilities having significantly more access (67%) compared to private facilities (11%) ($p = 0.006$), (Table 13). Details of infection control activities are summarised in Table 14 and 15.

Table 13: Presence of an Infection Control Committee and access to infection prevention and control **advice**

Presence of an Infection Control Committee	**Number of LTCFs (%)**
National	64 (59%)
by Ownership	
Public	59 (70%)
Private	5 (21%)
Access to Infection Control Advice	
National	84 (78%)
by Ownership	
Public	72 (67%)
Private	12 (11%)

Table 14: Description of infection prevention and control activities in participating LTCFs

Infection Prevention & Control Activities	Number (%)
Infection prevention and control training of nursing/paramedical staff	85 (79%)
Hand hygiene activities	81 (75%)
Management of outbreaks	83 (77%)
Decisions on transmission-based precautions for residents	82 (76%)
Development of care protocols	81 (75%)
Offering influenza immunisation to residents	81 (75%)
Supervision of disinfection/sterilisation	59 (55%)
Monitoring incidence of multidrug-resistant organisms	61 (56%)
Performing audits on infection control policies and procedures	58 (54%)
Feedback of surveillance results to staff	65 (60%)
Infection prevention and control training of GPs/medical staff	20 (19%)

Table 15: Description of protocols, surveillance and hand hygiene in participating LTCFs

Presence of written protocols	
Hand hygiene	105 (97%)
Management of MRSA	107 (99%)
Management of urinary catheter care	95 (88%)
Enteral feeding	96 (89%)
Venous catheter care	45 (42%)
Programme of HCAI surveillance	
Yes	28 (26%)
No	78 (72%)
Unknown	2 (2%)
Hand hygiene training organised previous year	
Yes	85 (79%)
No	21 (19%)
Unknown	2 (2%)
Hand hygiene products used in the LTCF	
Alcohol hand rub	104 (96%)
Wipes (alcoholic)	14 (13%)
Liquid soap (antiseptic/other)	101 (94%)
Bar soap	1 (1%)

4.7 Antimicrobial Stewardship

Antimicrobial stewardship is a term used to describe an overarching programme to direct appropriate antimicrobial use in a healthcare facility. A number of different strategies can be used in an antimicrobial stewardship programme including having appropriate governance structures in place (i.e., an antibiotic committee to direct antibiotic prescribing policies, regular review of antibiotic resistance and antibiotic use data), regular prescriber training and availability of written guidelines on appropriate antibiotic use.

Table 16: Presence of antibiotic committee, prescriber education and availability of written antibiotic guidelines in participating LTCFs

Antibiotic Stewardship			
	Antibiotic committee	**Training on antibiotic prescribing**	**Written guidelines on appropriate antibiotic use**
National	13 (12%)	9 (8%)	21 (19%)
by Ownership			
Public	**13 (15%)**	9 (11%)	19 (23%)
Private	0 (0%)	0 (0%)	2 (8%)
by Presence of a Coordinating physician			
Coordinating physician	6 (14%)	5 (12%)	14 (33%)
None	6 (10%)	3 (5%)	6 (10%)

Only 12% of LTCFs surveyed had an antibiotic committee, 8% ran annual regular training on appropriate antibiotic prescribing and 19% had written guidelines (Table 16). In 2011, there was a decrease in the number of LTCFs with an antimicrobial stewardship committee in place and with written antibiotic guidelines available when compared with 2010. This is most likely due to the increase in participating LTCFs rather than a true decrease in stewardship activities. Antimicrobial stewardship activities were more prevalent in public LTCFs and if a coordinating doctor was present in the facility (Table 16). Presence of a coordinating doctor was significantly associated with the availability of written antibiotic guidelines (33% vs. 10%, p = 0.004) and presence of an antibiotic committee was more likely to occur in public rather than private LTCFs (15% vs. 0%, p= 0.03). Antimicrobial stewardship activities are summarised in Figure 14.

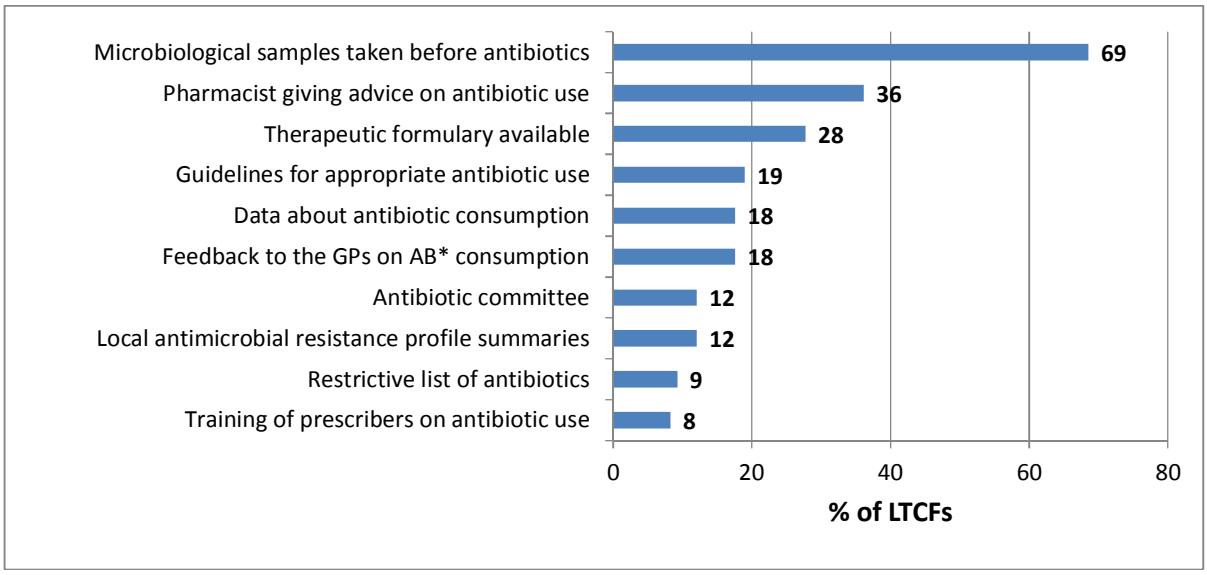


Figure 14: Summary of antibiotic stewardship activities in all facilities

**AB: Antibiotic*

5. Conclusions and Recommendations

5.1 Feedback of results to LTCF staff

HCAI surveillance outside the acute hospital setting is challenging for a number of reasons; LTCFs are not a homogenous group in terms of resident case mix /HCAI risk factors, traditionally there is less infection control and surveillance expertise in this setting and the diagnosis of infection in older people (who may present with non specific signs and symptoms of infection) can be challenging. LTCFs can vary considerably – they can represent a person's home (where care is predominantly social) or can represent a hospital 'step-down' facility (where care is predominantly medical and nursing). As in 2010, a wide range of LTCFs with varying lengths of stay and case mix participated in 2011.

LTCFs should share their individual results with all staff; discuss areas that may require improvement and where preventative programmes can be commenced. LTCFs that participated in 2010 can make comparisons with their 2011 results. However, as participating Irish LTCFs are not a homogenous group; the conclusions drawn from combining results as outlined in this report are most likely reflective of LTCFs caring for elderly patients with a definitive length of stay rather than the other resident groups.

Recommendation:

- **Participating LTCTs should feedback the results of this study to medical, nursing, allied health and management staff. Results should be used to plan preventative programmes. Participants from 2010 can compare their results with 2011; however, because of the heterogeneity of LTCFs as outlined in section 5, comparisons with other LTCF may not be valid.**

5.2 HCAI: Vaccination to Prevent Respiratory Infection

LTCF staff recorded patient signs and symptoms on the survey form and LTCF database. Standardised definitions were then used by HPSC to designate residents with a HCAI as outlined in Appendix 2 (i.e., residents required a particular number of signs and symptoms of infection to be categorised as having a HCAI). Hence, more residents were recorded with signs and symptoms of infection (6.5%) than those with a HCAI. HCAI prevalence increased from 3.6% in 2010 (69 LTCFs) to 4.1% (108 LTCFs) in 2011, which may be due to improved case finding and the increased number of participating LTCFs. As in 2010, a wide range of HCAI was observed 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) as discussed above.

The most common HCAI were respiratory (1.4% residents), urinary (1.3% residents), and skin/soft tissue infection (1% residents). RTI due to influenza virus and pneumococcal infection can result in significant morbidity and mortality, especially in older residents and in the case of influenza virus infection, a potential cause of outbreaks and staff absenteeism. Vaccination of residents and staff should be an important component of LTCF infection prevention and control policy. Staff are particularly at risk of influenza infection, as they are exposed in both the general community (e.g. household contacts, etc.) and the workplace. Close proximity to residents, and a constant flow of visitors and co-workers may increase the infection risk. Up to 25% of non-immunized staff develop influenza during the winter; however, attack rates may be even higher as infected staff may also be asymptomatic. Annual influenza vaccination is recommended for all individuals aged 50 years and older.[4] However, the elderly may develop suboptimal protective antibody responses following vaccination. Staff are therefore recommended as specific targets for influenza vaccination to protect their patients because of their close interactions with persons at high risk for influenza-related complications (which include elderly people).[4] Staff can serve as vectors for healthcare-associated influenza, may shed the influenza virus before the onset of symptoms, and may not present with classic influenza- like illness. Hence, promoting annual staff influenza vaccination is essential.

Recommendation:

- **One of the most common infections recorded was respiratory tract infection. LTCFs should review their vaccination policies and ensure that influenza and pneumococcal vaccination protocols are in line with national guidance[4] and part of the infection prevention and control plan. This vaccination policy must include annual influenza vaccination of all LTCF staff.**

5.3 Antibiotic prescriptions in Irish LTCF: prophylactic antibiotic use for UTI

The antibiotic use reported in both years of this survey (10.1%), 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 is of concern, of 5922 residents surveyed, 4% (244 residents) were on prophylactic antibiotics, a figure unchanged from 2010. The majority of prophylactic antibiotics prescribed (81% of all prophylactic antibiotics prescribed) were for the prevention of UTI. The majority, 61.7%, of all urinary tract related antibiotic prescriptions were for prophylactic use. This is similar to what was reported in 2010 (65.9%). Likewise, only 45% (55) of residents that were prescribed antibiotics to treat a UTI had a specimen taken for culture before antibiotic therapy

commenced and 81% had a dipstick performed. This again highlights the need for national antimicrobial stewardship guidelines for LCTFs and prescriber education.

Recommendation:

- **There is no evidence that prophylactic antibiotics prevent the onset of UTI in residents. The use of prophylactic antibiotics needs to be assessed on a case by case basis. Inappropriate antibiotic use increases the risk of *C. difficile* infection and the emergence of antibiotic resistant organisms[5, 6].**
- **Urinary dipsticks should be used to exclude UTI. Residents with suspected UTI should have a specimen sent for culture before antibiotic therapy is commenced and antibiotic therapy altered appropriately on the basis of culture and susceptibility results.**

5.4 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 and urinary catheter use despite a high proportion of incontinent and/or immobile residents reflects high quality nursing and medical care provided within in the facilities. In terms of association of HCAI risk factors with HCAI, our results are similar to what has been described in previous studies. Residents with a urinary catheter had an increased prevalence of UTI (10.2%) when compared to residents without (3.7%). Skin infections were associated with the presence of pressure sores. Because vulnerable highly dependent LTCF population are at risk of HCAI, wound management and device use (e.g., urinary catheters) should be accompanied with preventative strategies such as care bundles etc.[5-9]

Recommendation:

- **LTCFs should ensure that procedures are in place (e.g., care bundles, checklists etc) as recommended by national guidelines, to prevent HCAI associated with risk factors including medical devices such as urinary catheters, wounds and inappropriate antibiotic use (which can cause *C. difficile* infection).[6-9] As relevant national guidelines are published, they should be implemented accordingly.**

5.5 Provision of medical care, antibiotic prescribers and the importance of medical coordination

There was a wide variation in the delivery of medical care in LTCFs. Antibiotic prescribers were predominantly medical (relatively little nurse prescribing) and the speciality (GP or specialist) varied geographically and with LTCF ownership. Therefore, national LTCF antibiotic stewardship strategies need to take account of this, and target different groups in different geographical areas. There was no coordination of medical activities in over 50% of the facilities surveyed. Not having a coordinating doctor had a negative impact on a LTCF antibiotic stewardship (e.g., less likely to have prescribing guidelines in place which are an essential first step to direct appropriate prescribing, especially if multiple prescribers care for residents in the facility). Private facilities were less likely to have a coordinating doctor which may reflect that resident care is predominantly delivered by individual GPs rather than medical staff employed directly by the facility. However, there was a wide variance in responsibilities and time commitment of coordinating doctors within LTCFs. At a national level there is a clear need for a national HCAI and antibiotic stewardship strategy specifically for LTCF. This should be coordinated by the relevant HSE clinical care programmes (including HCAI, elderly care, primary care, nursing) and offices (HSE-Older person's services) in conjunction with principle prescribers (GPs, LTCF staff, specialists in medicine for the elderly etc) and other LTCF staff. LTCF appear to benefit from the presence of a coordinating doctor, therefore this should be explored by LTCF further, including pursuing local area and/or regional options.

Recommendation:

- **A national strategy for the prevention and control of HCAI in LTCF to include antibiotic stewardship should be developed and implemented in conjunction with relevant HSE clinical care and quality and patient safety programmes, LTCF prescribers and LTCF staff.**

5.6 Increased participation in 2011 from the private sector

Twenty-four private facilities participated in 2011 in contrast to eight in 2010. With the increasing use of the private sector by publicly funded healthcare, it is essential that common policies and protocols are used in both sectors to prevent HCAI and improve antibiotic prescribing. Despite the variability of dependency levels of patients between facilities, there exists a significant possibility for organisations to share best practice between themselves regardless of funding methodologies. Greater participation by private facilities is to be welcomed.

6. References

1. HSE-Health Protection Surveillance Centre. HALT National Report, November 2010. Available at: http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Surveillance/HCAIinlongtermcarefacilities/HALTproject2010/Results/

2. 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

3. Second National Prevalance Study. Protocol and data collection forms. Available at: http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Surveillance/HCAIinlongtermcarefacilities/HALTproject2011/ProtocolForms/

4. Royal College of Physicians of Ireland. Immunisation Guidelines for Ireland, 2008 EDITION, updated August 2010. National Immunisation Advisory Committee. ISBN 978-0-9559351-0-7. Available at: http://www.hpsc.ie/hpsc/A-Z/VaccinePreventable/Vaccination/Guidance/File,3066,en.pdfhttp://www.hpsc.ie/hpsc/A-Z/VaccinePreventable/Vaccination/Guidance/

5. Tamma PD, Cosgrove SE. Antimicrobial stewardship. Infect Dis Clin North Am. 2011 Mar; 25(1):245-60.

6. HSE-Health Protection Surveillance Centre. Surveillance, Diagnosis and Management of *C. difficile* – associated Disease in Ireland. Clostridium difficile Sub-Committee Health Protection Surveillance Centre, 2008. ISBN 978-0-9551236-3-4. Available at: http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Guidelines/

7. HSE-Health Protection Surveillance Centre. Prevention of Intravascular Catheter-related Infections in Ireland. SARI Prevention of Intravascular Catheter-related Infection Sub-Committee. December 2009, updated February 2010. ISBN 978-0-9551236-6-5. Available at: http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Guidelines/

8. HSE-Health Protection Surveillance Centre. Prevention of Urinary Catheter-related infections in Ireland. SARI Prevention of Urinary Catheter-related Infection Sub-Committee. In press (August 2011). Available at: http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Guidelines/

9. Care bundles & checklists. Available at: http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/CareBundles/

10. HSE. National best practice and evidence based guidelines for wound management, October 2009. Available at: http://www.hse.ie/eng/services/Publications/services/Primary/woundguidelines.pdf

11. HSE-Health Protection Surveillance Centre. Guidelines for Antimicrobial Prescribing in Primary Care in Ireland. SARI antimicrobial stewardship subcommittee. April 2011. Available at: http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Guidelines/

Appendix 1: HALT 2011 Steering group

- Dr. Fidelma Fitzpatrick, Consultant Microbiologist, HSE-Health Protection Surveillance Centre and Beaumont Hospital, Dublin. RCPI/HSE Clinical Lead in Healthcare-associated Infection (Chair)
- Ms. Sheila Donlon, Infection Control Nurse Manager, HSE-Health Protection Surveillance Centre.
- Dr. Fiona Roche, Surveillance Scientist, HSE- Health Protection Surveillance Centre.
- Dr. Diarmuid O'Shea, Consultant Geriatrician, St. Vincents University Hospital, Dublin. RCPI/HSE Clinical Lead in Elderly Care
- Dr. Joe Clarke. General Practitioner, HSE Primary Care Clinical Lead.
- Mr. Ian Callaghan, Clinical Audit Facilitator, National lead, Clinical Audit, HSE, St. Vincent's Healthcare Group.
- Ms. Samantha Rayner, National Specialist, Older Person Services. HSE-Integrated Services Directorate.
- Ms. Fiona McMahon, Senior Executive Manager, Office of the Nursing & Midwifery Services Director. Clinical Strategy & Programmes Directorate, HSE
- Ms. Margaret Nadin. Project Manager - Chronic Illness, NMPD, HSE- Dublin, NE
- Dr. Meaghan Cotter, Locum Consultant Microbiologist, Mater Misericordiae University Hospital, Dublin.
- Dr. Joanne O'Gorman, SpR in Clinical Microbiology, Beaumont Hospital, Dublin.

Appendix 2: Adapted McGeer[2] definitions of infection for surveillance in long-term care facilities

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 <u>at least three</u> 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.

<u>Urinary infection</u>

Symptomatic urinary infection

One of the following criteria must be met:

1. The resident <u>does not have an indwelling urinary catheter</u> and has <u>at least three</u> 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 <u>has an indwelling catheter</u> and has <u>at least two</u> 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 $^{\circ}$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.

Appendix 3: Glossary

Further definitions used in this survey are outlined in the study protocol.[3]

Antibiotic policy	Recommendations for good antimicrobial practice based on current knowledge and evidence, taking into account a prudent use and avoiding unnecessary or ineffective treatments.
Coordinating physician	A medical doctor in charge of the co-ordination of medical activities and the standardisation of practices/policies in the LTCF.
ECDC	European Centre for Disease Prevention and Control
ESBL	Extended spectrum B-lactamase
GP	General Practitioner
HALT	Healthcare-associated infection and antibiotic use in European long term care facilities
HCAI	Healthcare-associated Infection
HSE	Health Services Executive
HPSC	HSE-Health Protection Surveillance Centre
Infection prevention and control practitioner	A registered nurse, physician, epidemiologist or medical technologist who helps to prevent healthcare-acquired infections by isolating sources of infections and limiting their spread; systematically collects, analyses and interprets health data in order to plan, implement, evaluate and disseminate appropriate public health practices; and trains healthcare staff through instruction and dissemination of information on infection control practices. *(Definition source: Association for Professionals in Infection Control and Epidemiology)*
Infection prevention policy	A coherent whole of precautions taken to prevent infections and transmission of pathogens among a population.
IT	Information technology
LTCF	Long term care facility
MSSA	Meticillin susceptible *S. aureus*
MRSA	Meticillin resistant *S. aureus*
RTI	Respiratory tract infection
UTI	Urinary tract infection
VRE	Vancomycin resistant Enterococci