Point Prevalence Survey of Healthcare-Associated Infections & Antimicrobial Use in Long-Term Care Facilities (HALT): May 2013

REPUBLIC OF IRELAND: NATIONAL REPORT – MARCH 2014

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Executive Summary

In May 2013, 9,318 residents in 190 Irish long-term care facilities (LTCF) were included in a European point prevalence survey (PPS) of healthcare-associated infections (HCAI) and antimicrobial use. The survey is also known as the HALT survey. This is the national report for Ireland.

Aims of the HALT survey

1. To calculate the prevalence of healthcare-associated infections (HCAI) in residents of Irish LTCF
2. To calculate the prevalence of and indications for antimicrobial use in Irish LTCF
3. To provide the Irish Government, Department of Health, Health Service Executive, the managers, doctors and nurses caring for residents in all of the LTCF that took part, with information for action: to reduce the numbers of residents who develop HCAI and to influence positive antimicrobial stewardship practices in LTCF
4. To provide residents, their families and members of the public with more information about HCAI in Ireland and which types of infections are most commonly seen in Irish LTCF

Participating LTCF

- Of the 190 LTCF, the majority were owned by the Health Service Executive (HSE) [n=128; 67%], followed by private [n=39; 21%] and voluntary services [n=23; 12%]
- The median capacity of participating LTCF was 46 beds (range = 5 – 203) and the median bed occupancy on the HALT survey date was 94%
- Overall, single room accommodation accounted for a median of 34% of available beds. The proportion of single room accommodation was much lower in HSE-owned than privately-owned LTCF (21% versus 76%)
- For the purposes of data analysis and reporting, the HALT steering group stratified the 190 LTCF into the following care type categories, based on the characteristics and estimated length-of-stay (LOS) for the majority of the residents:
    i. **General nursing homes >12 months (GN>12m):** 103 long-stay facilities with 5,807 residents
    ii. **Mixed care type facilities >12 months (Mixed>12m):** 26 long-stay facilities with 1,409 residents

iii. **LTCF caring for residents with intellectual disabilities (Intellectually disabled):** 24 facilities with 1,060 residents

iv. **LTCF (either general nursing homes or mixed care type facilities) <12 months (LTCF<12m):** 15 short-stay facilities with 374 residents

v. **LTCF caring for residents with psychiatric conditions (Psychiatric):** 11 facilities with 345 residents

vi. **Other care types:** Facilities caring for residents with palliative care needs (4 facilities with 89 residents) rehabilitation needs (3 facilities with 139 residents), physical disabilities (2 facilities with 46 residents) and 'other' care types (2 facilities with 49 residents)

Coordination of medical care, infection prevention & control & antimicrobial stewardship

- Overall, resident medical care was provided by the resident's own general practitioner (GP) in 35%, by a directly-employed doctor in 41% and by a mix of GP plus directly-employed doctor care in 24% of LTCF. However, when LTCF were stratified by ownership, GP-led medical care predominated in privately-owned LTCF (82%) versus HSE-owned (35%) LTCF
- A designated coordinating physician, with responsibility for coordination and standardisation of policies/practices for resident medical care within the LTCF was available for only 45% of LTCF overall and for only 26% of privately-owned LTCF. Where a coordinating physician was in post, the reported roles undertaken infrequently included development of local infection prevention and control (IPC) (16%) or antimicrobial prescribing policies (14%)
- One third of LTCF reported having no active local infection prevention and control committee (IPCC)
- Access to a staff member with training in IPC was reported by 62% of LTCF overall and by only 10% of privately-owned LTCF. For the vast majority of LTCF with a trained IPC staff member, that person was an infection prevention and control nurse (IPCN) (93%). For the majority of LTCF, the IPCN was not based in the LTCF on a day-to-day basis (71%)
- Following the HALT survey, additional information was sought to estimate the national number of whole time equivalent (WTE) IPCNs for LTCF: In 2013, it is estimated that there was one WTE IPCN for every 496 LTCF beds in Ireland
- Although the vast majority of LTCF reported the presence of a written local hand hygiene policy (97%), the provision of regular staff hand hygiene training sessions was not universal, with only 88% of LTCF reporting that such a session had been arranged in the past 12

months. Medical and allied health professional staff were less likely to be invited to attend such training sessions than nursing and hygiene services staff. In addition, 19% of LTCF reported having no system in place for the organisation, control and feedback on hand hygiene

- The provision of seasonal influenza vaccination for residents was not universal, with 6% of LTCF overall reporting this was not routine local practice
- The vast majority (95%) reported having no active local antimicrobial stewardship committee (ASC), training on antimicrobial prescribing was not provided by 95% and just over two thirds (68%) of LTCF reported having no local antimicrobial prescribing guidelines
- Prescriber feedback regarding local antimicrobial use and local microbiology laboratory antimicrobial susceptibility data for common pathogens causing infection was available in only a minority of LTCF (13% and 7%, respectively)
- LTCF with a designated coordinating physician were significantly more likely to demonstrate positive local antimicrobial stewardship practices such as; an active ASC, prescribing guidelines, restrictive prescribing policy and provision of antimicrobial consumption data

Resident demographics, nursing care requirements and HCAI risk factors

- Female residents predominated across all care types and the proportion aged ≥85 years was highest in GN>12m (47%), Mixed>12m (41%) and LTCF<12m (38%). In contrast, only 1% of intellectually disabled LTCF residents were aged ≥ 85 years
- Indicators of resident nursing care requirements (incontinence, disorientation and impaired mobility) were evident in all care types, but most prevalent in GN>12m, Mixed>12m and LTCF<12m
- HCAI risk factors (presence of urinary or vascular catheter, pressure sores or other wounds) were most prevalent in residents of palliative care LTCF
- It was largely uncommon for residents to have a history of recent surgery, other than in rehabilitation facilities (5%) and LTCF<12m (4%)

HCAI

- The national crude HCAI prevalence was 5.3% and the national median HCAI prevalence was 4.2%. The median prevalence was higher in rehabilitation (7.8%), LTCF<12m (8.3%), Mixed>12m (6.1%) and the highest prevalence was reported in palliative care (18%), which

may reflect the HCAI risk factors encountered in that unique resident cohort. The lowest median HCAI prevalence was reported from GN>12m (4.2%) psychiatric (4.3%) and physically disabled LTCF (no HCAI detected in 46 residents)

- The most prevalent HCAI types were: respiratory tract infections (RTI), urinary tract infections (UTI) and skin infections; affecting 1.9%, 1.7% and 1.3% of all residents, respectively

Antimicrobial use and antimicrobial resistance

- The national crude antimicrobial use prevalence was 9.8% and the national median antimicrobial use prevalence was 9.7%. The median prevalence was higher in LTCF<12m (11.2%). At 24.5%, the prevalence in palliative care was more similar to antimicrobial use prevalence reported from acute hospital settings
- The majority of antimicrobials were prescribed within the LTCF (81%), mainly by GPs and directly-employed doctors
- Whilst the majority of antimicrobials were prescribed to treat infection, the proportion that were prescribed for infection prevention/prophylaxis was particularly high in intellectually disabled LTCF (49%), GN>12m (39%) and Mixed>12m (35%)
- During HALT 2013, 3.2% of GN>12m, 2.9% of Mixed>12m and 2% of intellectually disabled LTCF residents were prescribed antimicrobials for UTI prophylaxis. Prophylaxis against RTI (1.9%) and skin infection (1.4%) was most prevalent in intellectually disabled LTCF
- A relevant microbiological specimen had been obtained for just over one quarter of antimicrobial prescriptions (27%), with *Escherichia coli* (33%) and *Staphylococcus aureus* (22%) the two most frequently reported pathogens. Of those with available antimicrobial susceptibility results, 29% of *E. coli* were resistant to 3rd generation cephalosporins and 44% of *S. aureus* were meticillin/flucloxacillin resistant (i.e., MRSA). There were no carbapenem resistant *Enterobacteriaceae* reported during the HALT survey

Future Priorities

Standards & Guidelines

- HCAI and antimicrobial resistance are a prevalent issue in Irish LTCF, regardless of the resident care type. The requirement for every LTCF to implement and demonstrate ongoing evidence of local HCAI prevention programmes and antimicrobial stewardship practices should be clearly stated within the regulatory standards for registration and inspection of all types of LTCF. The 2009 HIQA National Standards for the Prevention and Control of HCAI could be used as a template and added as an update to the existing regulatory standards for residential care and psychiatric LTCF
- The existing national guidelines for antimicrobial prescribing in primary care, diagnosis and management of UTI in long-term care residents aged over 65 years, prevention of catheter-associated UTI, surveillance, diagnosis and management of *C. difficile* infection and the prevention and management of influenza outbreaks in residential care facilities should be formally implemented in every LTCF and evidence of implementation of each guideline sought as part of routine monitoring inspections for registration

Staffing

- There is a severe shortage of specialist community IPCNs to provide expert advice, education, training and to support HCAI surveillance activities in Irish LTCF. It is recommended that the appointment of a minimum of one whole-time equivalent (WTE) specialist community IPCN per 250 LTCF beds is progressed as a matter of urgency by the HSE. Priority should be given to areas without any existing specialist community IPCN resource
- The development of the IPC link practitioner/nurse role within the existing staff complement of each LTCF should also be encouraged and facilitated. This is an important role for the local coordination of IPC, HCAI surveillance and antimicrobial stewardship activities within each LTCF, functioning as a key communication link with and supporting the role of the specialist community IPCN
- There should be an overarching mechanism within each LTCF to ensure the coordination of resident medical care and to ensure that local policies, procedures and guidelines are developed, communicated to and folllowed by all clinicians and staff involved in resident medical care. However, it is important that every effort is made to accommodate a

resident's own preference for his/her medical care and to ensure that GP-led and coordinating physician-led models of care do not become mutually exclusive. Coordination is particularly important to optimise antimicrobial stewardship practices in LTCF. The coordination of medical care could be further enhanced by the adequate resourcing of external expert advice at a regional level, such as formal access to the input of a geriatrician and clinical microbiologist with community remit. It is recommended that such roles are developed by the HSE

- Future HALT surveys should capture information regarding nursing and healthcare assistant staffing levels and skill mix within participating LTCF

Surveillance

- Participation in future HALT surveys should be actively encouraged by the HSE Social Care Directorate and by the licensing and regulatory bodies for LTCF in Ireland. Evidence of each LTCF's participation in prevalence surveys should be sought as part of monitoring inspections
- The development of national protocols and guidance to support the LTCF that plan to commence prospective local programmes of HCAI incidence surveillance and antimicrobial stewardship should be progressed
- The provision of periodic antimicrobial consumption summary reports to individual LTCF by the local dispensing pharmacy should be developed
- The capacity of local IT systems to provide prescriber-level feedback to individual GPs, regarding antimicrobial prescribing should be developed and progressed
- Regional HCAI and antimicrobial resistance committees should be further developed, with a remit to provide periodic reports of regional microbiology laboratory antimicrobial resistance data on key pathogens isolated in specimens submitted from LTCF residents. Potential for collaboration with the Irish Primary Care Research Network, with antimicrobial prescriber feedback and urinary pathogen antimicrobial resistance surveillance should be explored at a national level
- Regional HCAI and antimicrobial resistance committees should be further developed, with a remit to also provide education, training and support for analysis and feedback of HCAI surveillance data to individual LTCF

HCAI prevention

- The requirement for excellent communication between acute hospitals and LTCF cannot be over-emphasised. Due to the frequent transfer of residents between these settings, the appropriate placement of patients/residents is vitally important for their own safety and to prevent onward transmission of multi-drug resistant organisms or transmissible pathogens (e.g., influenza, norovirus, *C. difficile*). The development of a national inter-healthcare facility transfer communication template should be progressed and implemented in every acute hospital and LTCF
- Seasonal influenza vaccination should be offered to all residents of LTCF and the percentage of LTCF residents immunised against influenza should be a key performance indicator, subject to regular review by each LTCF's management team. Residents should also receive other vaccines as indicated by national immunisation guidelines (e.g., pneumococcal and hepatitis B virus)
- Seasonal influenza vaccination should be offered to all staff of LTCF and the percentage of LTCF staff immunised against influenza should be a key performance indicator, subject to regular review by each LTCF's management team. Easy access to vaccination, accompanied by clear and accurate educational materials must be available within the workplace
- UTI prophylaxis should not be prescribed to residents with indwelling urinary catheters
- Where UTI prophylaxis is deemed to be indicated, the resident should be counselled regarding the potential risks and this should be documented. The duration of prophylaxis should never exceed six months without a formal review by the prescriber

Education

- Every LTCF must have a formal programme for ongoing staff education and training on HCAI prevention practices (standard precautions, equipment decontamination, hand hygiene technique and opportunities, use of personal protective equipment etc.), transmission-based precautions, management of indwelling medical devices and antimicrobial stewardship practices (compliance with local prescribing guidelines, review of indication and duation, review of consumption data and antimicrobial resistance data). Evidence of each LTCF's local educational programme should be sought as part of monitoring inspections, along with up-to-date staff training records
- There is an urgent need to provide resources to improve the levels of specialist community IPCNs and to develop the role of a clinical microbiologist with community remit, to provide

the necessary support to LTCF in developing local HCAI prevention and antimicrobial stewardship programmes

- Educational and training materials on HCAI prevention and management, antimicrobial stewardship and antimicrobial resistance should be developed specifically for use by GPs in training and in practice. Completion of such educational activities should be linked to continuing professional development credits
- Educational materials (e.g., information leaflets, on-line resources) of relevance to HCAI prevention and antimicrobial stewardship should be developed specifically for and accessible by both LTCF residents and their families/carers

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Plain Language Summary

Background

During May 2013, 190 Irish long-term care facilities (LTCF) took part in a European survey known as the HALT survey. It was coordinated in Ireland by the Health Protection Surveillance Centre (HPSC). The HPSC is the national centre for the surveillance of infections in Ireland. The HALT survey was carried out in all of the European Union countries.

During April 2013, staff members from the 190 LTCF went to a training day, where they were taught how to perform the survey. The survey was then carried out in each LTCF, using the same set of instructions. Once the survey was completed, the results from each LTCF were collected and checked at the HPSC. The results have been put together to produce this national report for Ireland. The results for every LTCF that took part have also been returned to each individual LTCF, so they can be used to help the staff to make future plans to further improve resident care.

The HALT survey does not capture information on infection acquired in hospitals. A national survey was conducted in May 2012 to capture that information and that report is available on the HPSC website at the following link:

http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Surveillance/HospitalPointPrevalenceSurveys/2012/PPS2012ReportsforIreland/

The HALT survey was done for the following reasons:

1. To count the number of residents with an infection, which may have occurred as a result of being admitted to the LTCF. A so-called ‘healthcare associated infection’ or HCAI for short
2. To count the number of residents in the LTCF who were prescribed antibiotics
3. To provide the Irish Government, Department of Health, Health Service Executive, the managers, doctors and nurses in all of the LTCF that took part, with information about HCAI and antibiotic prescribing in Irish LTCF in 2013. This information is important to plan future ways to reduce the numbers of residents who get HCAI and to reduce the chance that antibiotics may be prescribed unnecessarily
4. To provide residents, their families and members of the public with more information about HCAI in Ireland and which types of infections are most commonly seen in Irish LTCF

The count of the residents with a HCAI and the residents prescribed antibiotics is called ‘prevalence’. These results provide us with a picture or a snapshot of the number of residents with a HCAI and the

number of residents prescribed antimicrobials in the Irish LTCF that took part in the HALT survey in May 2013.

In this report, each of the 190 LTCF has been categorised into commonly encountered care types, based on the typical characteristics and length-of-stay for the majority of residents in the LTCF: The most common LTCF care types in Ireland are: general nursing homes (long-stay), mixed care type LTCF (long-stay), LTCF where the majority of residents stay for less than 12 months (short-stay), intellectually disabled LTCF, psychiatric LTCF, rehabilitation LTCF and palliative care LTCF.

Healthcare Associated Infections (HCAI)

During this survey, a HCAI was defined as an infection that developed more than two days after a resident was admitted to the LTCF. HCAI are very important because they can cause harm to residents. Not every HCAI can be prevented from happening, but every chance should be taken to prevent HCAI, whenever possible.

There were 9,318 residents counted during the survey across 190 Irish LTCF. Of those, 497 had a HCAI at the time of the survey. This means that the median prevalence of HCAI across all of the LTCF was 4.2%. Some LTCF had a HCAI prevalence that was higher and others had a HCAI prevalence that was lower than the overall figure of 4.2%. This means that just under one-in-twenty residents present in Irish LTCF in May 2013 had a HCAI. However, because different LTCF may care for different types of residents, it is not possible to directly compare the results of one LTCF with those of another LTCF.

The most common types of infections reported in the survey were as follows:

1. Respiratory tract infections
2. Urinary tract infections, which may include infections of the bladder or kidneys
3. Skin or wound infections

In this survey, it was found that residents who had a HCAI were more likely to have some of the common ‘risk factors’ for developing HCAI. Well-known risk factors for developing HCAI can include: having had a recent operation, having a drip or a bladder catheter and being older. Two LTCF residents were reported to have *Clostridium difficile* infection during the HALT survey.

Antibiotic Use

Antibiotics are an extremely important resource for treatment of infection caused by bacteria. There is concern around the world that bacteria are becoming more and more resistant to antibiotics, so

they no longer work to treat common infections. This problem is made worse by the fact that there have been very few new types of antibiotics developed to overcome this problem of resistance. It is very important that antibiotics are only used when they are absolutely necessary and that they are not used in the incorrect circumstances, such as to try and treat infections caused by viruses. It is also very important that antibiotics are not used for too long and that the course of treatment is kept as short as possible.

This survey found that of the 9,318 residents who were counted, 913 were prescribed antibiotics. The median prevalence of antibiotic use across all of the Irish LTCF was 9.7%. However, because different LTCF may care for different types of residents, it is not possible to directly compare the results of one LTCF with those of another LTCF.

Almost one-in-ten residents who were admitted to Irish LTCF in May 2013 were prescribed an antibiotic. This survey showed that antibiotic prescribing is common in Irish LTCF. Most residents were prescribed antibiotics to treat infection. However, a proportion of residents were prescribed antibiotics to prevent infection, which is also known as prophylaxis. Most antibiotic prophylaxis was prescribed to prevent urinary tract infection. The results of the survey show that it is very important to make sure that antibiotic prescribing in LTCF is done properly and that antibiotics are prescribed appropriately. This in turn, will reduce the chances of antibiotic resistant bacteria emerging in Irish LTCF, reduce the risk of residents picking up *Clostridium difficile* infection and preserve the use of antibiotics for treatment of infection in residents in the future.

1. Introduction

This report outlines the findings of a survey conducted in May 2013 to assess the prevalence of HCAI and antimicrobial prescribing practices in Irish LTCF. Irish LTCF first participated in a European wide PPS of HCAI in long-term care facilites (HALT) in 2010.[1-3] In 2011, Ireland repeated a national HALT survey.[4] The third HALT survey in Ireland and the second European HALT survey took place during May 2013.

2. Methods

The HALT survey in Europe is coordinated by the European Centre for Disease Prevention & Control (ECDC) and the Scientific Institute of Public Health (WIV-ISP), Brussels, Belgium. The HALT survey in Ireland is coordinated by the Health Protection Surveillance Centre (HPSC) and was overseen by a multi-disciplinary steering group convened in January 2013, under the auspices of the Royal College of Physicians of Ireland (RCPI) Clinical Advisory Group on HCAI & Antimicrobial Resistance **(Appendix B)**. The steering group met on seven occasions between January 2013 and February 2014 to plan for the HALT survey and report on its findings.

In January 2013, an invitation to participate in HALT was extended to LTCF by HPSC. Participation was voluntary. However, at least one person from each participating LTCF was required to attend a training day. During April 2013, 205 healthcare workers attended one of eight regional training days to learn about the survey protocol and methodology. The schedule of presentations for each training day included; an introduction to HALT survey methodology, presentations and practical case studies to enable trainees to practice completion of the HALT data collection forms (**Appendix C**). All training materials were posted on a dedicated HALT section of the HPSC website.

A dedicated HALT e-mail address was established to address any queries from participants. A frequently-asked questions section was also maintained on the HPSC website. Information leaflets were prepared for residents and their families, for LTCF staff and General Practitioners (GPs).

The HALT survey took place in Ireland during May 2013, with 190 units on 174 sites participating. The survey was conducted using a standard protocol devised by the European HALT Coordinating Team. The European HALT protocol was adapted for use in Ireland. All study documentation related to HALT 2013, including protocol and data collection forms were posted on a dedicated HALT section of the HPSC website:

http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Surveillance/HCAIinlongtermcarefacilities/

During the HALT survey, all eligible residents in each LTCF were surveyed by a local HALT team for anonymous demographic details, risk factors, antimicrobial use and the presence of an active HCAI.

HCAI were defined using standardised infection definitions. The McGeer criteria for defining HCAI in LTCF were published in 1991.[5] They have not been formally validated. In 2009, the Society for Healthcare Epidemiology of America (SHEA) and the US Centers for Disease Control & Prevention (CDC) convened a multi-disciplinary group to update the McGeer criteria by systematic review of literature.[6] Most studies evaluated were small observational or uncontrolled case series and evidence was generally judged to be of low quality. Therefore, grading of evidence was not done and the updated criteria require validation in different types of LTCF. The revised criteria incorporate changes to surveillance definitions of UTI and RTI and added new categories for norovirus gastroenteritis and *Clostridium difficile* infection (CDI).[6]

Similar to previous HALT surveys performed in 2010 and 2011, participants in HALT 2013 were required to record all relevant signs and symptoms on a resident questionnaire. For HALT 2010 and 2011, the McGeer criteria were adapted to include the criterion 'physician diagnosis'. In earlier HALT surveys, the HALT software analysed recorded signs and symptoms and reported the presence or absence of a HCAI according to the McGeer criteria. However, in 2013, participants were required to follow algorithms on the resident questionnaire and decide for themselves whether a HCAI was present or absent using the revised CDC/SHEA definitions. Signs and symptoms data was not entered into the software in 2013 (**Appendix C** – Resident Questionnaire).

Information on availability of IPC and antimicrobial stewardship resources, including availability of an IPCN was collected. Where a LTCF reported having access to an IPCN, contact details for that person were obtained. At a later date, each IPCN was contacted by the HALT national coordinating team to calculate the estimated WTE IPCN for LTCF in Ireland.

Information on the availability of a coordinating physician was also collected. Where a LTCF reported having a coordinating physicican, further information regarding that person's job title was sought at a later date by the coordinating team.

A local HALT report was issued to each of the 190 participating LTCF in November 2013.

Data Management & Analysis

Data were collected on paper forms (**Appendix C**) and subsequently entered electronically to a downloadable software application. The completed data file was returned electronically from each participating LTCF to HPSC.

Once submitted, data were cleaned and quality checks were performed. All participants received a summary of submitted data with any inconsistent, missing or potentially inaccurate data highlighted for review and correction.

The complete dataset from Ireland was also returned to the HALT European Coordinating Team for inclusion in the European HALT analysis and report to be published in 2014.

Data was analysed using Microsoft Access and Excel. Statistical analysis were carried out using STATA/SE v11.2 and OpenEpi v3.01. ArcView GIS v3.2 was used for data mapping.

Data Validation

Ireland also contributed HALT data to a European validation study. This was designed to validate the HALT data collection across Europe and assess concordance between the original McGeer and revised CDC/SHEA HCAI definitions. During May 2013, two HALT members of the HALT national coordinating team visited two LTCF and conducted a parallel HALT survey. The anonymous data collected simultaneously by the local HALT team and the validation team were returned to the European Validation Study Coordinating Team in Bologna, Italy for inclusion in the European HALT validation analysis and report.

In addition, of the 190 LTCF, 30 (16%) reported that a local physician had been involved in validating the data collected on residents who were prescribed antimicrobials and/or who had signs or symptoms suggestive of an active HCAI.

3. Results

3.1 National Overview

3.1.1 Description of Participating LTCF

There was an excellent response to participate in the voluntary 2013 HALT survey, with a continued increase in participating LTCF; from 69 (2010) to 108 (2011) to 190 (2013), as displayed in Table 3.1.1. Fifty LTCF have participated in all three HALT surveys to date, 33 participated in 2011 and again in 2013, with 100 (53%) participating in HALT for the first time in 2013. In 2013, a designation for voluntary ownership was included for the first time.

There has also been an annual increase in participating LTCF across all care types. LTCF delivering care to eight major resident care types participated in HALT 2013, with four care types having more than one participant for the first time in 2013 [palliative care, physically disabled, and rehabilitation LTCF] (Table 3.1.1).

Table 3.1.1 Annual increases in HALT participation, by ownership, HSE region and care type.

Category	**2010**	**2011**	**2013**
by Ownership			
HSE	61	84	128
South	8	18	38
West	32	34	42
Dublin Mid Leinster	14	22	23
Dublin North East	7	10	25
Private	8	24	39
Voluntary	N/A	N/A	23
by Care Type			
General nursing homes	30	58	112
Mixed care facilities	16	16	32
Intellectually disabled	8	15	24
Psychiatric	3	5	11
Palliative care	1	1	4
Physically disabled	1	1	3
Rehabilitation	1	1	2
Other	3	1	2
National	**69**	**108**	**190**

* Other care types in 2013 included: a young chronically ill unit and a paediatric mixed care unit.

Figure 3.1.1 displays the distribution by county and by percentage of HIQA-registered residential care settings for older people that participated in HALT 2013.

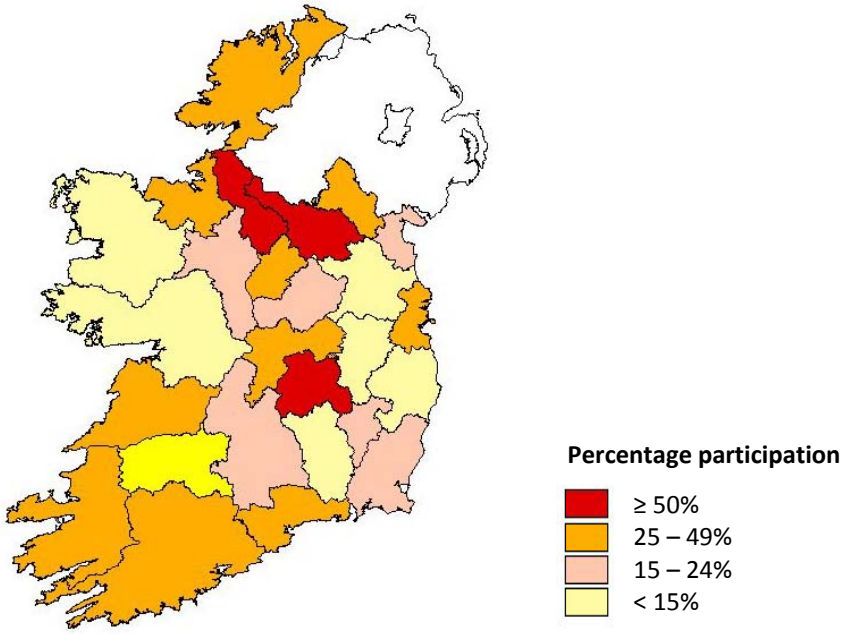

Figure 3.1.1 Distribution, by county and by percentage of HIQA-registered residential care settings for older people that participated in HALT 2013.

Table 3.1.2 displays participating LTCF, by care type and by the estimated LOS for the majority (>75%) of each LTCF's residents. Most (n=166; 87%) estimated that the majority of their residents were expected to remain in the LTCF indefinitely (i.e., for a period between 12 months until end-of-life).

Table 3.1.2 Breakdown of LTCF care type, by estimated LOS *

Care Type	Length of stay of majority of residents					Total
	<3 months	3-12 months	>12 months	until end-of-life	Other	
General nursing care	5	4	6	97	0	**112**
Intellectually disabled	0	0	2	22	0	**24**
Mixed facility	3	3	9	17	0	**32**
Other	0	0	0	2	0	**2**
Palliative care	2	0	0	1	1	**4**
Physically disabled	0	0	1	1	0	**2**
Psychiatric	0	1	3	5	2	**11**
Rehabilitation	3	0	0	0	0	**3**
National	**13**	**8**	**21**	**145**	**3**	**190**

*Estimated LOS of the majority of residents admitted to the LTCF = expected LOS for >75% of residents.

The HALT Steering Goup agreed to further stratify participating LTCF for data analysis, taking into account both care type and LOS. Thus, LTCF were categorised into eight care types, as displayed in Table 3.1.3.

- The two largest LTCF categories, general nursing homes and mixed care type facilities were further divided into three groups based on estimated LOS for majority of residents:
    - General nursing homes with estimated LOS >12 months (long-stay) = GN>12m
    - Mixed care type facilities with estimated LOS >12 months (long-stay) = Mixed >12m
    - LTCF (either general nursing homes or mixed care type facilities) with estimated LOS <12 months (short-stay) = LTCF <12m
- LTCF caring for residents with intellectual disabilities (Intellectually disabled)
- LTCF caring for residents with psychiatric conditions (Psychiatric)
- Other care types: Facilities caring for residents with palliative care needs, rehabilitation needs, physical disability or other care types

GN>12m accounted for the majority of participating LTCF (n=103; 54%), followed by Mixed>12m (n=26; 14%) and intellectually disabled LTCF (n=24; 13%). The remaining 37 LTCF (19%) were distributed among a variety of other care types (Table 3.1.3).

Table 3.1.3 also displays further breakdown of each care type, by ownership, size, overall bed occupancy and availability of single rooms. Overall, there was a median of 46 beds (range = 5 - 203 beds) per LTCF and the median number of beds in privately-owned (n=59) and voluntary (n=53) LTCF was higher than that in HSE-owned LTCF (n=38).

Overall, the median bed occupancy was 94% and the median single room occupancy was 34%. However, there were striking differences in single room availability based on ownership, with much lower proportions of single room availability in HSE-owned (21% of residents) versus LTCF under voluntary (50% of residents) and private (76% of residents) ownership.

Information was also captured on the proportion of LTCF residents who were absent on the survey date due to hospital admission. On average, 2.4% of residents were absent due to hospitalisation.

Table 3.1.3 Breakdown of participating LTCF, by ownership and care type.

Category	Number of LTCFs	Size of the facility			Total residents surveyed	Median proportion of single rooms available	Median percentage of beds occupied	Percentage of residents hospitalised
	n	median	min	max	n	%	%	%
by Ownership								
HSE	128	38	5	186	5,622	21	93	0.9
by HSE Region								
South	38	44	16	137	1,872	18	100	0.6
West	42	30	9	142	1,512	21	100	1.3
Dublin Mid Leinster	23	51	27	166	1,290	21	100	1.1
Dublin North East	25	26	5	186	948	24	100	0.7
Private	39	59	20	203	2,536	76	96	1.5
Voluntary	23	53	10	141	1,160	50	95	0.6
by Care Type								
General nursing > 12 months	103	51	21	203	5,807	35	95	1.2
Mixed > 12 months	26	47	13	142	1,409	32	94	1.1
Intellectually disabled	24	34	5	137	1,060	56	98	0.6
LTCFs < 12 months	15	29	12	78	374	15	89	0.5
Psychiatric	11	25	12	110	345	24	92	0.3
Palliative care	4	24	12	46	89	43	88	0.0
Physically disabled	2	28	22	34	46	14	82	0.0
Rehabilitation	3	64	35	72	139	14	93	0.0
Other	2	31	29	32	49	34	88	2.0
National	**190**	**46**	**5**	**203**	**9,318**	**34**	**94**	**2.4**

3.1.2 Governance Structures

3.1.2.1 Provision of Nursing & Medical Care

Availability of 24-hour qualified nursing care is a prerequisite for participation in the HALT survey. In the majority of units (n= 181, 95%), nursing staff had direct access to residents' healthcare records. For the remaining 5%, this information was not provided.

A variety of models of medical care exist in Irish LTCF, as displayed in Figure 3.1.2. Care was provided by the resident's own GP in 35%, a directly-employed doctor in 41% and in the remaining 24%, a mixed care model was observed, with both GPs and directly-employed doctors providing medical care.

Regional differences were also observed within HSE-owned LTCF, with GP-led care predominant in the West (64%) and much less common in the South (13%) and Dublin-North-East (20%). Notably, the distribution of care types was similar across the regions.

Differences were also observed based on LTCF ownership (GP-led care predominating in 82% of privately-owned versus 22% in those under voluntary ownership) and by care type (GN>12m were more likely to have directly employed doctors than Mixed>12m; 40% versus 23%) as displayed in Figure 3.1.3.

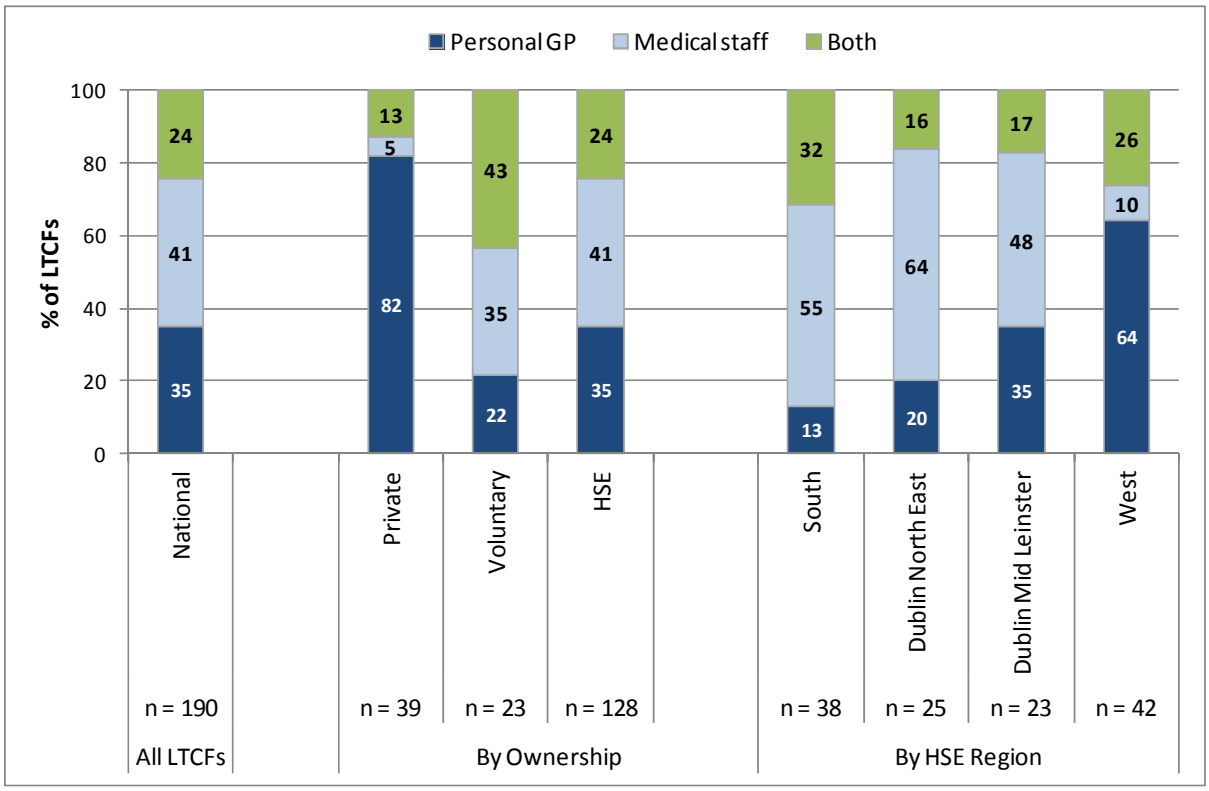

Figure 3.1.2 Models of medical care provision in LTCF, by ownership type and HSE region (for HSE-owned facilities)

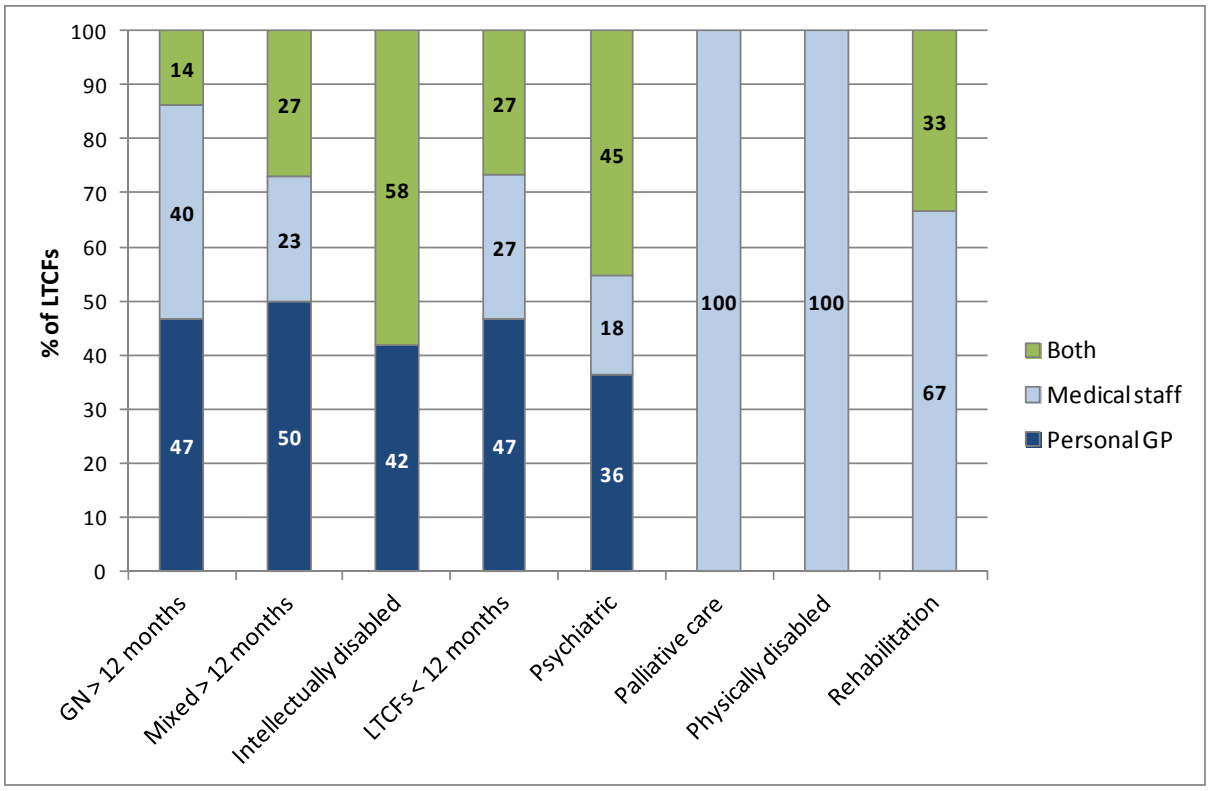

Figure 3.1.3 Models of medical care provision in LTCF, by care type

3.1.2.2 Coordination of Medical Care

Participants were asked to provide information regarding the coordination of medical care within the facility. This was defined as having a designated 'coordinating physician' to arrange medical activities and take responsibility for standardisation of practices/policies for resident care. Figure 3.1.4 displays the coordination of medical care.

Overall, 55% reported having no coordinating physician and this was higher in privately-owned LTCF (74%). For the 45% with a coordinating physician, a variety of models of care were delivered [internal (20%), external (18%) or a mixture of both (2%)].

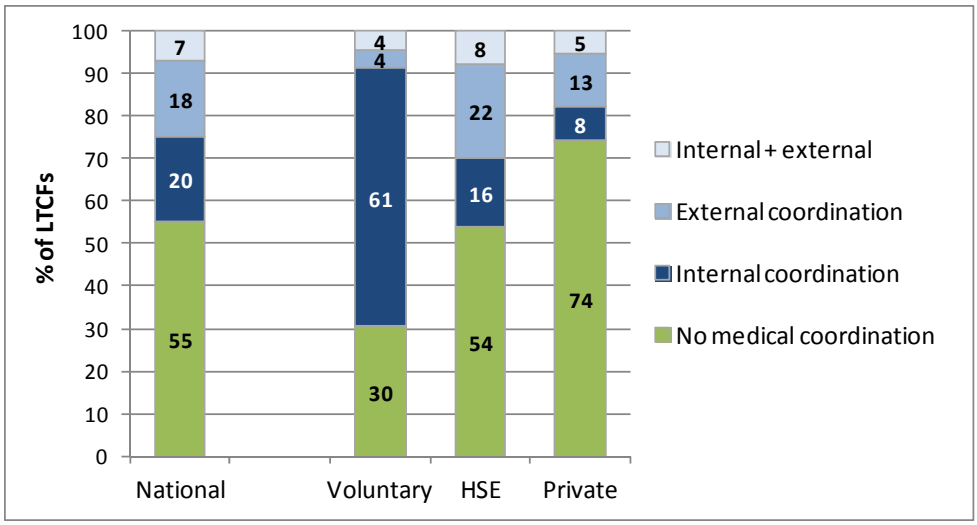

Figure 3.1.4 Coordination of medical care, by LTCF ownership.

Differences in coordination of medical care were also observed when facilities were stratified by care type (Figure 3.1.5). Absence of a nominated coordinating physician was more common in both GN>12m and Mixed>12m categories (>60%), whereas a coordinating physician was present in all of the palliative care, rehabilitation and physically disabled LTCF.

As the largest care type, availability of a coordinating physician in GN>12m was analysed, based on ownership. Absence of a coordinating physician was significantly more common in private (78%) than HSE (53%) GN>12m [p=0.02].

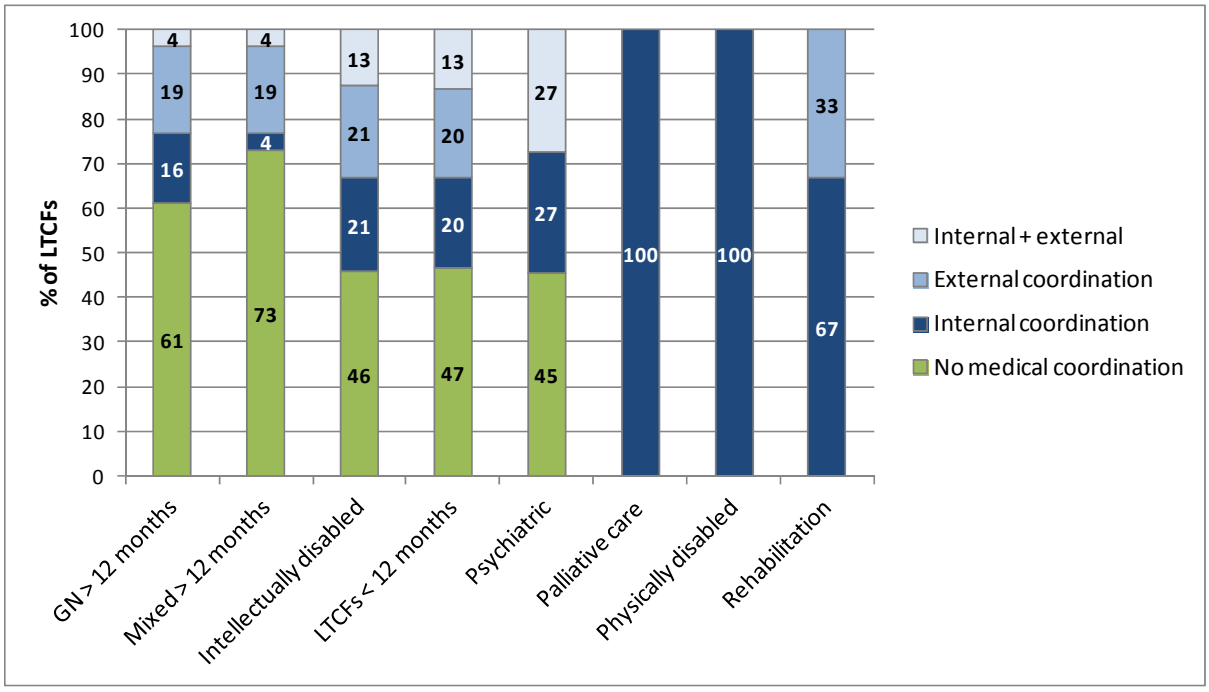

Figure 3.1.5 Coordination of medical care, by care type.

For the 85 (45%) LTCF with a designated coordinating physician (whether internal, external or a combination of both), retrospective additional information was sought on the job title of the coordinating physician. Of the facilities that responded (n = 60), the majority of coordinating physicians were either a directly-employed doctor (n = 24, 28%) or a designated GP (n = 20, 24%). Other titles included a hospital specialist [e.g., geriatrician] (n = 12, 14%), a medical doctor who owned the facility (n = 1, 1%) or another type of medical doctor (n = 3, 4%). For the remaining 25 LTCF, the job title of the coordinating physician was not provided. Figure 3.1.6 displays a breakdown of the coordinating physician job title, by care type.

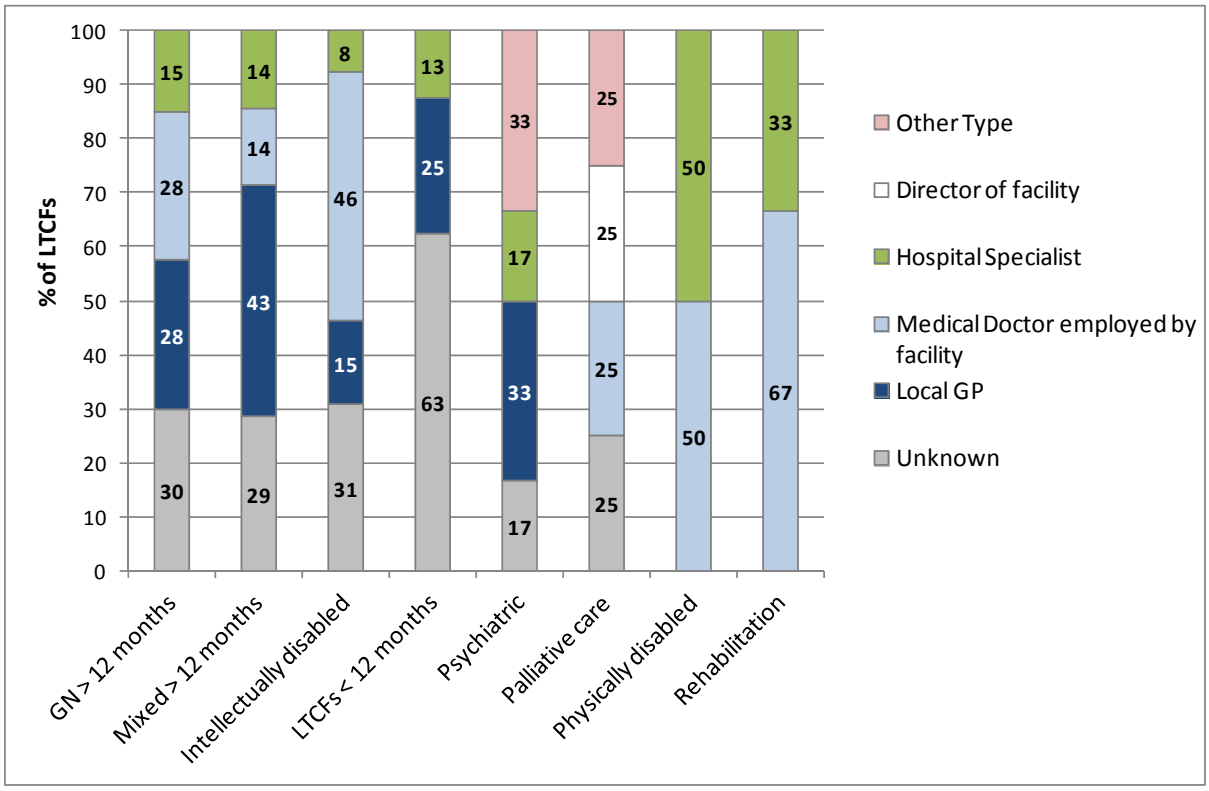

Figure 3.1.6 Type of coordinating physican, by LTCF type.

In 98% (n = 83) of LTCF with a coordinating physician, that person also delivered medical care to the residents and in the majority (96%), the coordinating physician had direct access to residents' healthcare records. In one LTCF direct access to records was not available and for two LTCF this was not reported.

Further information was sought on the duties performed by the coordinating physician. Figure 3.1.7 displays the frequency and variety of tasks undertaken. Frequently-reported duties were; organisation of an on-call service, coordination of resident vaccination, supervision of medical

records and care strategy development. The coordinating physician was less frequently reported to undertake roles specific to prevention of HCAI and antimicrobial resistance, such as development of IPC (16%) or antimicrobial prescribing (14%) policies.

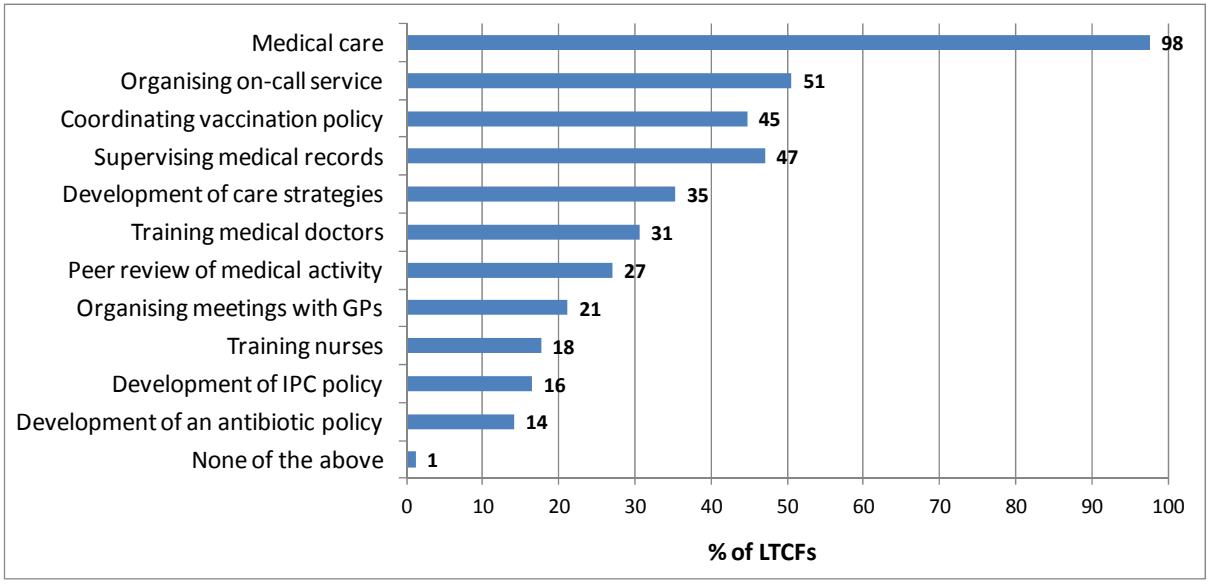

Figure 3.1.7 Duties performed by the coordinating physician.

3.1.2.3 Infection Prevention & Control (IPC) Practices

Tables 3.1.4 & 3.1.5 display the IPC structures, educational practices, protocols, surveillance and additional activities. Further description of these categories is provided subsequently.

Table 3.1.4 Overview of IPC structures, education and protocols, by ownership and care type.

	IPC Structure			IPC Education			IPC Protocols				
	Staff with IPC training	Expert IPC advice	IPC committee	Hand hygiene training	IPC training of nursing/paramedical staff	IPC training of GPs/medical staff	MRSA	Hand hygiene	Management of urinary catheters	Mangement of vascular catheters	Mangement of enteral feeding
	%			%			%				
by Ownership type											
Private (n = 39)	10	51	46	90	95	10	100	97	92	23	87
Voluntary (n = 23)	61	61	61	70	87	30	87	96	57	48	78
HSE (n = 128)	77	65	75	91	84	13	99	98	91	56	87
by Care Type											
GN > 12 months (n = 103)	52	66	67	92	88	14	100	98	90	41	88
Private only (n = 32)	9	50	44	91	94	9	100	97	91	25	84
Voluntary only (n = 7)	57	86	71	86	100	57	100	100	86	43	71
HSE only (n = 64)	73	72	78	94	84	11	100	98	91	48	92
Mixed > 12 months (n = 26)	58	46	73	88	92	8	96	96	88	50	92
Intellectually disabled (n = 24)	71	54	75	71	79	4	92	100	79	50	83
LTCFs < 12 months (n = 15)	87	73	67	93	80	20	100	100	100	73	93
Psychiatric (n = 11)	73	64	36	73	64	9	91	82	73	27	36
Palliative care (n = 4)	100	75	50	100	100	50	100	100	75	100	75
Physically Disabled (n = 2)	100	0	100	100	100	50	100	100	100	100	100
Rehabilitation (n = 3)	100	67	67	100	100	67	100	100	67	100	100
National	**62**	**62**	**67**	**88**	**86**	**14**	**98**	**97**	**87**	**48**	**86**

Table 3.1.5 Overview of IPC surveillance and general activities, by ownership and care type.

	Surveillance				General IPC activities					
	HCAI surveillance	Performing audits on IPC policies and procedures	Feedback of surveillance results to staff	Monitoring incidence of MDROs	Offering influenza immunisation to residents	Management of outbreaks	Organisation, control and feedback on hand hygiene	Decisions on transmission-based precautions for residents	Development of care protocols	Supervision of disinfection/sterilisation
	%				%					
by Ownership type										
Private (n = 39)	36	62	49	54	97	92	72	82	82	62
Voluntary (n = 23)	39	65	61	30	78	87	70	70	78	48
HSE (n = 128)	35	55	56	57	95	83	85	80	77	59
by Care Type										
GN > 12 months (n = 103)	37	53	55	53	97	87	79	83	80	61
Private only (n = 32)	41	59	53	56	97	94	69	84	78	63
Voluntary only (n = 7)	57	57	57	43	100	100	43	86	57	71
HSE only (n = 64)	33	50	56	53	97	83	88	83	83	59
Mixed > 12 months (n = 26)	42	69	54	62	96	88	92	81	88	65
Intellectually disabled (n = 24)	21	71	50	46	92	79	75	58	75	42
LTCFs < 12 months (n = 15)	40	60	53	60	100	80	87	73	73	53
Psychiatric (n = 11)	18	9	27	45	82	73	55	64	45	45
Palliative care (n = 4)	50	75	100	25	25	75	100	100	100	75
Physically Disabled (n = 2)	100	100	100	100	100	100	100	100	100	50
Rehabilitation (n = 3)	33	67	100	33	67	100	100	100	67	67
National	**36**	**57**	**55**	**53**	**94**	**85**	**81**	**79**	**78**	**58**

MDROs: Multi-drug resistant organisms

3.1.2.3.1 Staff with Training in IPC & Access to Advice from External IPC Experts

Overall, 117 (62%) LTCF reported access to a staff member with IPC training. However, LTCF under HSE or voluntary services ownership were more likely to have access to staff with IPC training (77% and 61%, respectively) than LTCF under private ownership (10%).

Of the 117 LTCF reporting a staff member with IPC training, for 83 (71%), that person was not based within the LTCF on a day-to-day basis, for 27 (23%) that person was based within the LTCF on an ongoing basis and for seven (6%) that person attended the LTCF on a sessional basis. Where a staff member with IPC training was available, for the majority of LTCF, that person was a nurse (n=109; 93%). Seven LTCF (6%) reported having both a nurse and a doctor with IPC training and one LTCF (1%) reported having a doctor with IPC training. Four LTCF were governed by an acute hospital. Thus, for those LTCF, the IPC service was provided by the acute hospital's IPC team.

There was considerable geographic variability in the proportion of LTCF beds with access to an IPCN when distributed by county (range: 0 – 100%), as displayed in Figure 3.1.8.

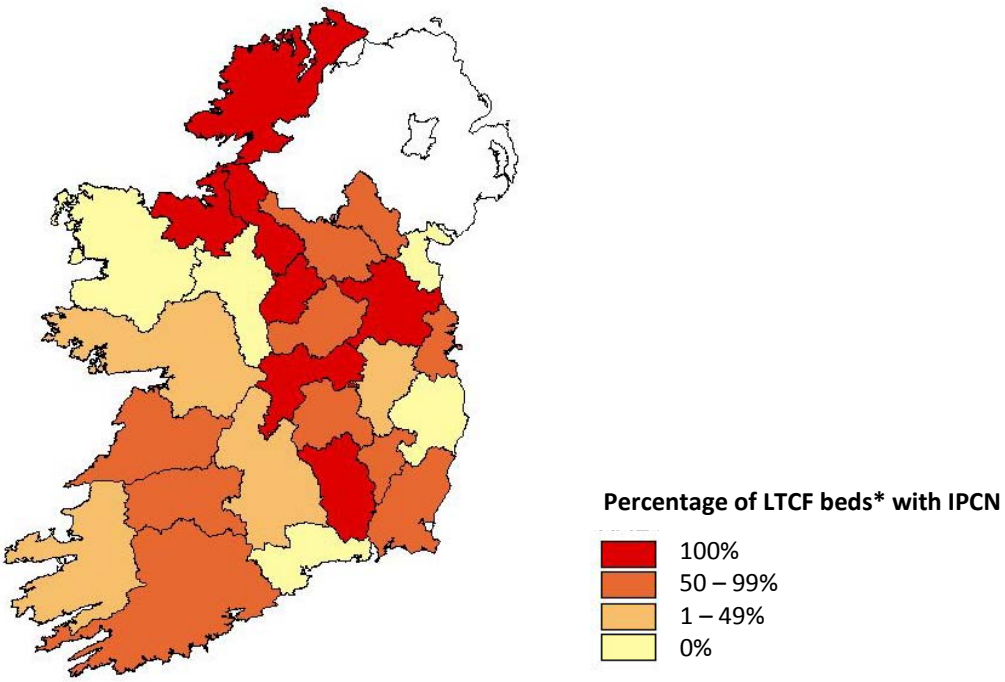

Figure 3.1.8 Geographical distribution of the proportion of participating LTCF beds covered by IPCNs.

* Includes LTCF beds that participated in HALT only

A total of 36 IPCNs were available to participating LTCF. Excluding the four IPCNs attached to LTCF governed by acute hospitals, the estimated overall WTE ratio of IPCNs to LTCF beds in Ireland was 1:496. This ratio was calculated by including all LTCF beds that the IPCN was responsible for, which included both participating and non-participating HALT LTCF.

In HSE-owned LTCF, the estimated ratio of WTE IPCNs to LTCF beds was highest in HSE South and West (1:673 and 1:659) when compared to Dublin-mid-Leinster and Dublin-North-East (1:387 and 1:354) (Table 3.1.6).

Table 3.1.6 Ratio of WTE IPCN per HSE-owned LTCF, by HSE region.

HSE Region	Number of HSE LTCFs that participated	Number of facilities with an IPCN	WTE ratio[a]
Dublin Mid Leinster	22	14	1:387
Dublin North East	24	20	1:354
South	36	24	1:673
West	42	37	1:659

[a] The whole time equivalent (WTE) ratio per HSE region was calculated by dividing the total number of HSE beds that IPCNs* within that region are responsible for by the total WTE associated with those IPCNs.

In addition to having access to staff with IPC training, information was sought on access to external expert IPC advice. Overall, 117 LTCF (62%) reported having access to such advice, no access was reported by two LTCF caring for residents with physical disability, and less access for LTCF caring for intellectually disabled (54%) and Mixed>12m (46%).

3.1.2.3.2 Infection Prevention and Control Committee (IPCC)

Just over two-thirds reported having an active local IPCC, with a median number of three meetings per year (range = 0 – 15). Psychiatric (36%) and palliative care facilities (50%) were less likely to have an IPCC.

3.1.2.3.3 Hand Hygiene and Access to Personal Protective Equipment (PPE)

Hand Hygiene Training

Overall, 88% reported that a staff hand hygiene training session had been organised during the previous year. This figure was higher in GN>12m (92%) and LTCF<12m (93%) and lower in intellectually disabled (71%) and psychiatric (73%) LTCF.

Overall, there was variation in the staff categories invited to avail of annual hand hygiene training as displayed in Table 3.1.7. Nursing (100%) and hygiene services staff (92%) were most likely to be invited and medical (27%) and allied health professional (28%) staff were less likely to be invited. By category of ownership, medical and allied health staff were less likely to be invited to attend hand hygiene training in privately-owned LTCF (11% and 14%, respectively) and more likely to be invited in facilities under voluntary ownership (both 53%).

Table 3.1.7 Staff categories invited to avail of annual hand hygiene education.

Ownership	Medical staff	Nurses and care assistants	Allied health staff*	Hygiene services staff
	%	%	%	%
Private	11	100	14	92
HSE	28	100	28	93
Voluntary	53	100	53	80
National	**27**	**100**	**28**	**92**

* physiotherapist, occupational therapist, speech therapist etc

Access to hand hygiene products

The vast majority of LTCF reported having both alcohol-based hand rub (ABHR) and liquid soap (both 97%) as hand hygiene products (Table 3.1.8). Alcohol-based wipes were reported to be available in 41% of LTCF. ABHR was reported as the preferred hand hygiene method in 53% and the average estimated volume of ABHR consumed during the previous year (2012) was 118 litres. For 36% of LTCF, hand washing with a non-antiseptic soap was the preferred method and for 10% antiseptic soap was the preferred method.

Table 3.1.8 Availability of hand hygiene products and preferred hand hygiene methods.

Hand hygiene products/methods	% of LTCFs
Product	
Alcohol rub	97
Liquid soap	97
Wipes	41
Bar soap	0
Method	
Hand disinfection with an alcohol solution	53
Hand washing with water and a non antiseptic soap	36
Hand washing with water and an antiseptic soap	10

Access to personal protective equipment (PPE)

All reported having both gloves and aprons available for healthcare worker PPE. Gowns were available in 99%, surgical masks in 88% and goggles in 66% of LTCF.

3.1.2.3.4 Availability of Written Protocols

Information regarding the availability of written protocols for staff on the following topics was sought (Table 3.1.4):

- *Management of MRSA and other multi-drug resistant organisms (MDRO):* Available in 98% overall, with lower rates reported from psychiatric (91%) and intellectually disabled LTCF (92%)
- *Hand hygiene*: Available in 97% overall, with lower rates reported from psychiatric LTCF (82%)
- *Management of urinary catheters:* Available in 87% overall, with lower rates reported from rehabilitation (67%), psychiatric (73%) and palliative care facilities (75%)
- *Management of vascular catheters:* Available in 48% overall, with higher rates from palliative care (100%) and rehabilitation (100%) and lower rates reported from Mixed>12m and intellectually disabled LTCF (both 50%)
- *Management of enteral feeding:* Available in 86% overall, with higher rates from LTCF<12m (93%), Mixed>12m (92%) and lower rates reported from psychiatric LTCF (36%)

3.1.2.3.5 HCAI Surveillance Programme

- Some form of a HCAI surveillance programme was reported by 36% (n=68) of LTCF (Table 3.1.5). Ongoing participation in repeated HALT surveys could be regarded as an annual HCAI surveillance programme. Some care types were more likely to report having HCAI surveillance activities; palliative care (50%) and Mixed>12m (42%). Lower levels were reported from rehabilitation (33%), intellectually disabled (21%) and psychiatric (18%) LTCF
- Overall, just over half reported that audits of IPC policies and procedures are conducted (57%), that surveillance results are fed back to staff (55%) and that the incidence of MRDO is monitored (53%)
- Notably, facilities with an active IPCC were much more likely to report having MDRO surveillance programmes than those without
- A designated staff member for reporting and management of infection outbreaks was available in 85% overall, with lower levels reported from psychiatric (73%) and palliative care (75%) LTCF
- A system in place for the organisation, control and feedback on hand hygiene was available in 81% overall, with lower levels reported from psychiatric (55%) and intellectually disabled (75%) LTCF
- A system for management of patients with resistant organisms (e.g., patient isolation, additional IPC precautions) was available in 79% overall, with less availability in intellectually disabled (58%), psychiatric (64%) and LTCF<12m (73%)
- Overall, a system for development of resident care protocols available in 78% and a system for supervision of disinfection/sterilisation of medical equipment in only 58% of LTCF
- Overall, the majority (94%) reported that seasonal influenza vaccine is offered to residents. However, lower figures were reported from rehabilitation (67%) and psychiatric (82%) LTCF

3.1.2.4 Antimicrobial Stewardship Practices

Antimicrobial stewardship practices, stratified by LTCF ownership, care type and presence of a designated coordinating physician are displayed in Table 3.1.9.

Table 3.1.9 Antimicrobial stewardship practices, by LTCF ownership, care type and presence of a coordinating physician.

	Antimicrobial stewardship committee	Training of prescribers on antimicrobial use	Guidelines for appropriate antimicrobial use	Data about antimicrobial consumption	Microbiological samples taken before antimicrobials	Local antimicrobial resistance profile summaries	Permission for prescribing restrictived antimicrobials	Pharmacist giving advice on antimicrobial use	Therapeutic formulary available	Feedback to GPs on antimicrobial consumption
	%									
by Ownership type										
Private (n = 39)	0	5	28	13	21	13	0	44	21	10
Voluntary (n = 23)	13	22	43	22	22	13	0	43	39	9
HSE (n = 128)	5	2	31	11	17	4	6	27	37	10
by Care Type										
GN > 12 months (n = 103)	6	4	28	16	19	8	5	39	33	13
Private only (n = 32)	0	6	22	16	25	16	0	44	25	13
Voluntary only (n = 7)	14	14	43	29	29	14	0	29	14	14
HSE only (n = 64)	8	2	30	14	16	3	8	38	39	13
Mixed > 12 months (n = 26)	0	0	54	8	19	8	0	27	35	12
Intellectually disabled (n = 24)	8	13	17	8	21	4	0	17	38	8
LTCFs < 12 months (n = 15)	0	0	40	13	27	0	13	20	27	7
Psychiatric (n = 11)	0	0	9	0	0	0	0	18	9	0
Palliative care (n = 4)	0	25	100	25	0	25	0	100	75	0
Physically disabled (n = 2)	0	0	0	0	0	0	0	0	100	0
Rehabilitation (n = 3)	0	0	67	0	0	0	0	33	0	0
by Presence of a Coordinating Physician										
With a CP	**9**	8	**41**	**20**	19	9	**8**	40	41	13
Without a CP	**1**	2	**25**	**7**	18	5	**1**	27	28	8
Chi-test (p-value)	**0.02**	0.052	**0.02**	**0.01**	0.9	0.2	**0.02**	0.54	0.052	0.24
National	**5**	**5**	**32**	**13**	**18**	**7**	**4**	**33**	**34**	**10**

* Chi-test p-values that reached significance are highlighted in bold

3.1.2.4.1 Overview of Antimicrobial Stewardship Practices & Guidelines

- The vast majority (95%) reported having no antimicrobial stewardship committee (ASC). Of the nine LTCF with an ASC (5%), none were privately-owned
- Additionally, the vast majority (95%) reported that annual training on antimicrobial prescribing was not provided
- Just under one third (32%) reported having a local antimicrobial prescribing guideline, with less availability reported by psychiatric (9%), intellectually disabled (17%) and GN>12m (28%). Prescribing guidelines were more likely to be available in palliative care (100%), rehabilitation (67%) and Mixed>12m (54%) facilities
- The vast majority (88%) reported having no restrictions on the types of antimicrobials that could be prescribed for residents. Of the 22 that reported having a restricted antimicrobial list, the types of restricted antimicrobials are displayed in Table 3.1.10

Table 3.1.10 Types of restricted antimicrobials.

Restricted antimicrobials	Number of LTCFs (%)
3rd generation cephalosporins	15 (68)
carbapenems	14 (64)
vancomycin	13 (59)
fluoroquinolones	8 (36)
intravenous antimicrobials	8 (36)
broad-spectrum antibiotics	6 (27)
glycopeptides	5 (23)
mupirocin	3 (14)
Total	**22 (100)**

- One-third reported having access to the advice of a pharmacist as required, if residents were prescribed unusual antimicrobials, with more access reported by LTCF under private (44%) or voluntary (43%) ownership
- Local antimicrobial consumption data was collected by the minority (13%), such data was reported back to GPs by a minority (10%) and a minority (7%) reported having access to summary reports of antimicrobial resistance in key pathogens from their local microbiology laboratory
- A minority (18%) reported having a system in place to remind staff of the importance of obtaining relevant clinical specimens from the resident prior to commencing antimicrobial

therapy (e.g., the importance of taking a urine specimen before starting treatment for a suspected UTI)

- Information was sought regarding the frequency with which a urine dipstick test was used for UTI diagnosis. Of the 186 (98%) who answered, urine dipstick was performed routinely in 146 (78%), on occasion in 39 (21%) and never in one LTCF (1%)
- Specific information was also sought on the availability of local antimicrobial prescribing guidelines for three common infection types, as displayed in Table 3.1.11:
    - RTI (35%)
    - UTI (43%)
    - Wound/skin or soft tissue infection (43%)

Table 3.1.11 Written antimicrobial treatment guidelines.

	Antimicrobial treatment guidelines		
	Respiratory tract infections	Urinary tract infections	Wound and soft tissue infections
by Ownership			
Private	26	42	39
HSE	36	41	42
Voluntary	45	55	55
by Presence of a Coordinating Physician			
With a CP	46	50	51
Without a CP	27	37	37
National	**35**	**43**	**43**

- When LTCF were stratified by the presence or absence of a coordinating physician, the presence of a coordinating physician was significantly associated with a higher prevalence of positive antimicrobial stewardship practices, in particular the existence of an ASC, antimicrobial prescribing guidelines, restrictive prescribing policies and antimicrobial consumption data

3.1.3 HCAI and Antimicrobial Use

3.1.3.1 Description of Residents

Table 3.1.12 displays an overview of the resident demographics, care load indicators and HCAI risk factors, by care type. Female residents predominated across all care types. There was a much higher proportion of residents aged ≥85 years in; GN>12m, Mixed>12m, LTCF<12m and rehabilitation LTCF.

Care load indicators (incontinence, disorientation and impaired mobility) were evident but varied across all care types. Overall, there was a heavy burden of all care load indicators in GN>12m, Mixed>12m and LTCF<12m.

HCAI risk factors were most prevalent in palliative care, where urinary and vascular catheters and 'other wounds' were much more common than for other care types. Overall, recent surgery within the past 30 days was uncommon in residents, with rehabilitation (5%) and LTCF<12m (4%) more likely to accommodate those resident types. Residents of psychiatric LTCF were less likely to have HCAI risk factors.

Table 3.1.12 Resident demographics, care load indicators and HCAI risk factors, by care type.

Facility Type	Gender	Age	Care load indicators			HCAI Risk factors				
	male residents	resident >85 years	incontinence	disorientation	impaired mobility	urinary catheter	vascular catheter	pressure sores	other wounds	surgery (<30 days)
	%									
GN > 12 months	35	47	62	57	48	5	0	4	10	1
Mixed > 12 months	39	41	65	54	54	8	1	4	11	3
LTCFs < 12 months	36	38	45	33	40	14	1	8	11	4
Intellectually disabled	45	1	52	54	33	3	0	1	9	0
Psychiatric	48	10	43	29	23	2	1	2	2	1
Palliative care	44	9	27	26	60	31	10	9	36	1
Physically Disabled	48	9	78	59	74	7	0	0	2	0
Rehabilitation	40	29	22	17	21	8	2	1	15	5
Other	71	0	78	53	84	2	0	6	39	0
National	**37**	**38**	**59**	**53**	**46**	**6**	**0.5**	**4**	**11**	**1**

3.1.3.2 HCAI

The national median HCAI prevalence was 4.2%. Table 3.1.13 displays the HCAI prevalence, by care type. Similar to the distribution of HCAI risk factors, as displayed in Table 3.1.12 above, the median prevalence of HCAI was highest in palliative care (18%) and lowest in intellectually disabled (2.2%) and physically disabled LTCF (no reported HCAI in 46 residents). Median HCAI prevalence was higher in rehabilitation (7.8%) and LTCF<12m (8.3%) than Mixed>12m (6.1%) and GN>12m (4.2%). The median HCAI prevalence in GN>12m and psychiatric LTCF was quite similar (4.2% and 4.3%).

Table 3.1.13 HCAI prevalence, by care type.

Facility Type	Total eligible residents	Number of residents with an infection	HCAI prevalence (%)	
			Crude[a]	Median (IQR[b])
GN > 12 months	5,807	294	5.1	4.2 (2 - 7)
Mixed > 12 months	1,409	86	6.1	6.1 (2.6 - 8.5)
Intellectually disabled	1,060	46	4.3	2.2 (0 - 6.8)
LTCFs < 12 months	374	28	7.5	8.3 (0.7 - 10.9)
Psychiatric	345	11	3.2	4.3 (0 - 6.5)
Rehabilitation	139	11	7.9	7.8 (6 - 11.3)
Palliative care	89	18	20.2	18.0 (14.1 - 21.8)
Physically disabled	46	0	0.0	0.0 (0 - 0)

[a] The crude prevalence of residents with a HCAI is the total number of residents with an infection divided by the total number of eligible residents.

[b] The interquartile range is the difference between the first quartile (25th percentile) and the third quartile (75th percentile) of an ordered range of data. It represents the middle fifty percent of the data.

HCAI Types

Figure 3.1.9 displays the prevalence of HCAI, by care type.

RTI

- Overall, RTI was the most prevalent HCAI, affecting 1.9% of all residents. RTI were further categorised into; lower RTI (68%), common cold (23%), pneumonia (8%) and flu (2%)
- RTI was the most prevalent (or one of the most prevalent) HCAI reported by Mixed>12m (2.3%), intellectually disabled (1.6%) and rehabilitation (2.9%) LTCF. RTI was less prevalent in psychiatric LTCF (0.9%)

UTI

- Overall, UTI was the second most prevalent HCAI, affecting 1.7% of all residents. In total, 33% were reported as microbiologically-confirmed UTI
- UTI was the most prevalent (or one of the most prevalent) HCAI, reported by LTCF<12m (3.2%), GN>12m (1.7%) and rehabilitation LTCF (2.9%). UTI was less prevalent in intellectually disabled (0.6%) and psychiatric LTCF (0.6%)

Skin infections

- Skin infections were the third most prevalent HCAI, affecting 1.3% of all residents. The vast majority were further categorised as cellulitis (94%)
- Skin infections were the most prevalent (or one of the most prevalent) HCAI reported by intellectually disabled (1.6%) and psychiatric LTCF (1.4%)

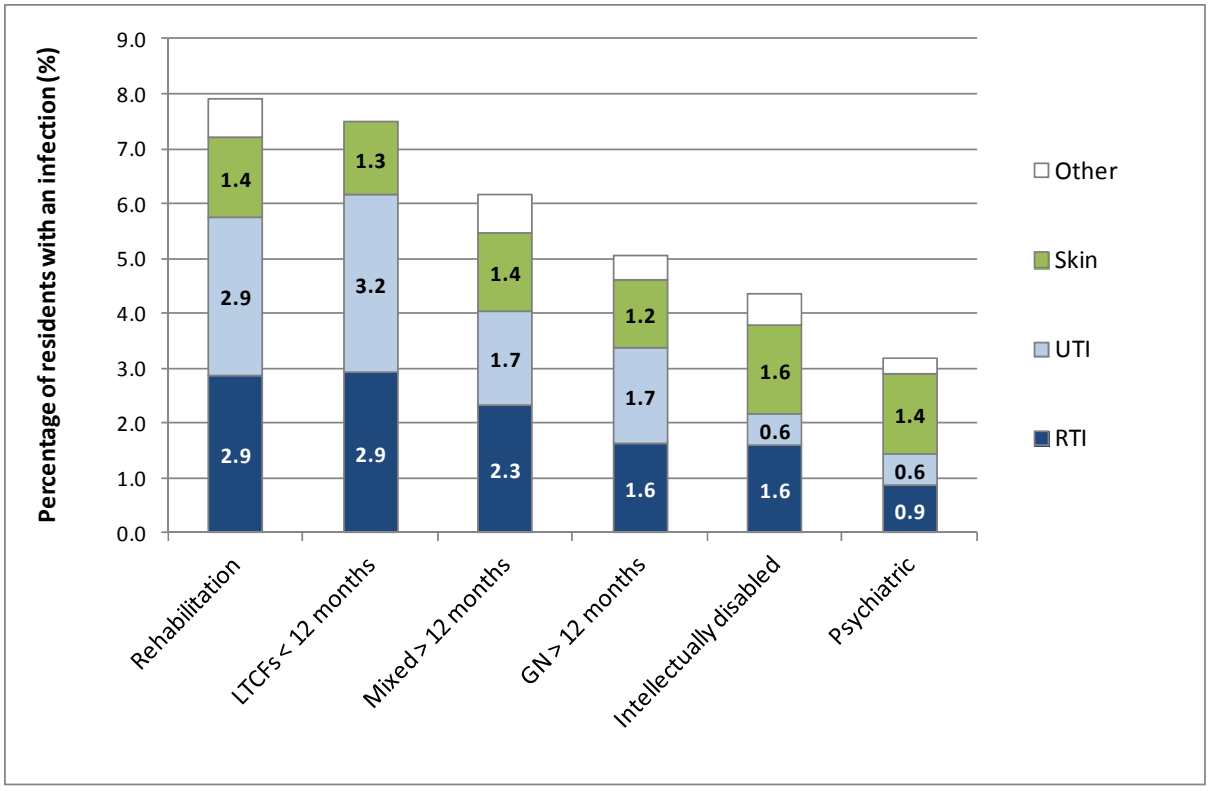

Figure 3.1.9 Prevalence of HCAI, by care type.

Only LTCF care types including > 100 eligible residents were included for this analysis

3.1.3.3 Antimicrobial Use

The national median antimicrobial use prevalence was 9.8%. Table 3.1.14 displays antimicrobial use prevalence, by care type. The median prevalence was highest in palliative care (24.5%) and Mixed>12m (11.2%) and lowest in psychiatric (4.7%) and physically disabled (no antimicrobials prescribed) LTCF.

Table 3.1.14 Antimicrobial use prevalence, by care type.

Facility Type	Total eligible residents	Number of residents on antimicrobials	Antimicrobial prevalence (%)	
			Crude	median (IQR)
GN > 12 months	5807	541	9.3	9.1 (5.7 - 13.3)
Mixed > 12 months	1409	149	10.6	11.2 (8.2 - 15.3)
Intellectually disabled	1060	106	10.0	7.5 (3.2 - 13.9)
LTCFs < 12 months	374	42	11.2	9.5 (5.5 - 16.7)
Psychiatric	345	23	6.7	4.7 (4.3 - 11.7)
Rehabilitation	139	14	10.1	9.4 (8.9 - 12.1)
Palliative care	89	31	34.8	24.5 (19.7 - 33)
Physically Disabled	46	0	0.0	0.0 (0 - 0)

Antimicrobial Prescribers and Prescribing Location

Across all care types, the vast majority of antimicrobials were prescribed within the LTCF (81%), as displayed in Figure 3.1.10. A higher proportion of antimicrobials were prescribed in the hospital setting in Mixed>12m (15%), intellectually disabled (14%), and palliative (18%) LTCF.

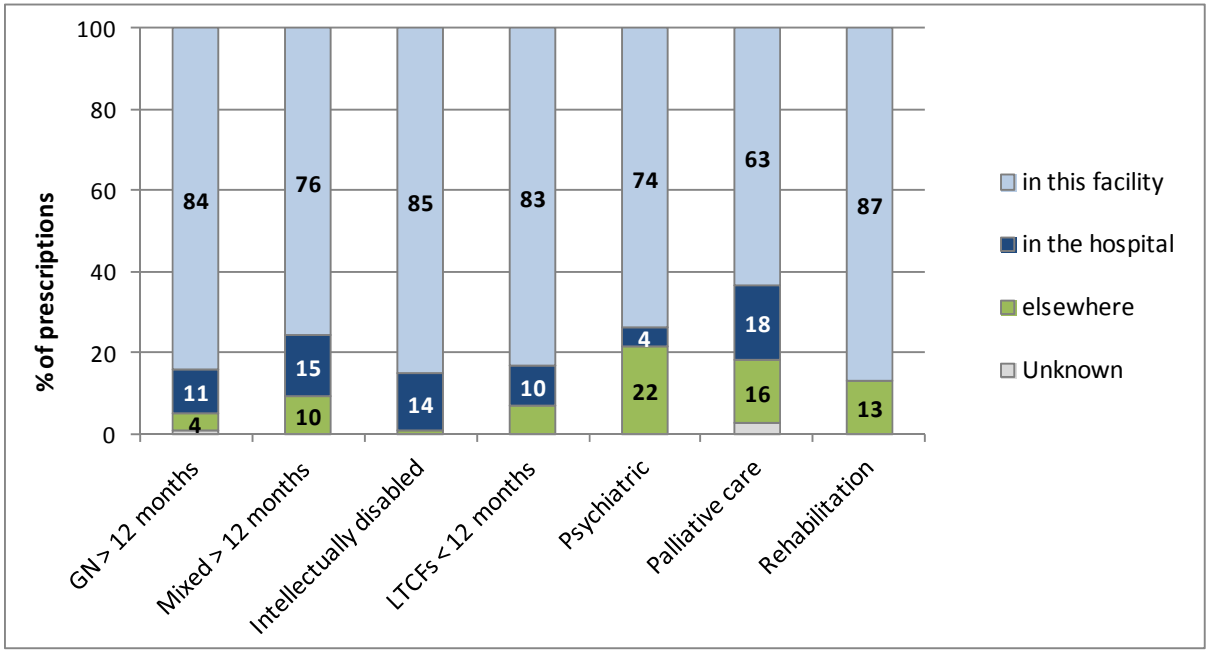

Figure 3.1.10 Antimicrobials, by prescribing location and care type.

Combined, GPs and directly-employed doctors accounted for the majority of prescribers across the care types, as displayed in Figure 3.1.11. Hospital-based specialists accounted for increasing proportions of antimicrobials in rehabilitation (33%) and palliative care (45%) LTCF.

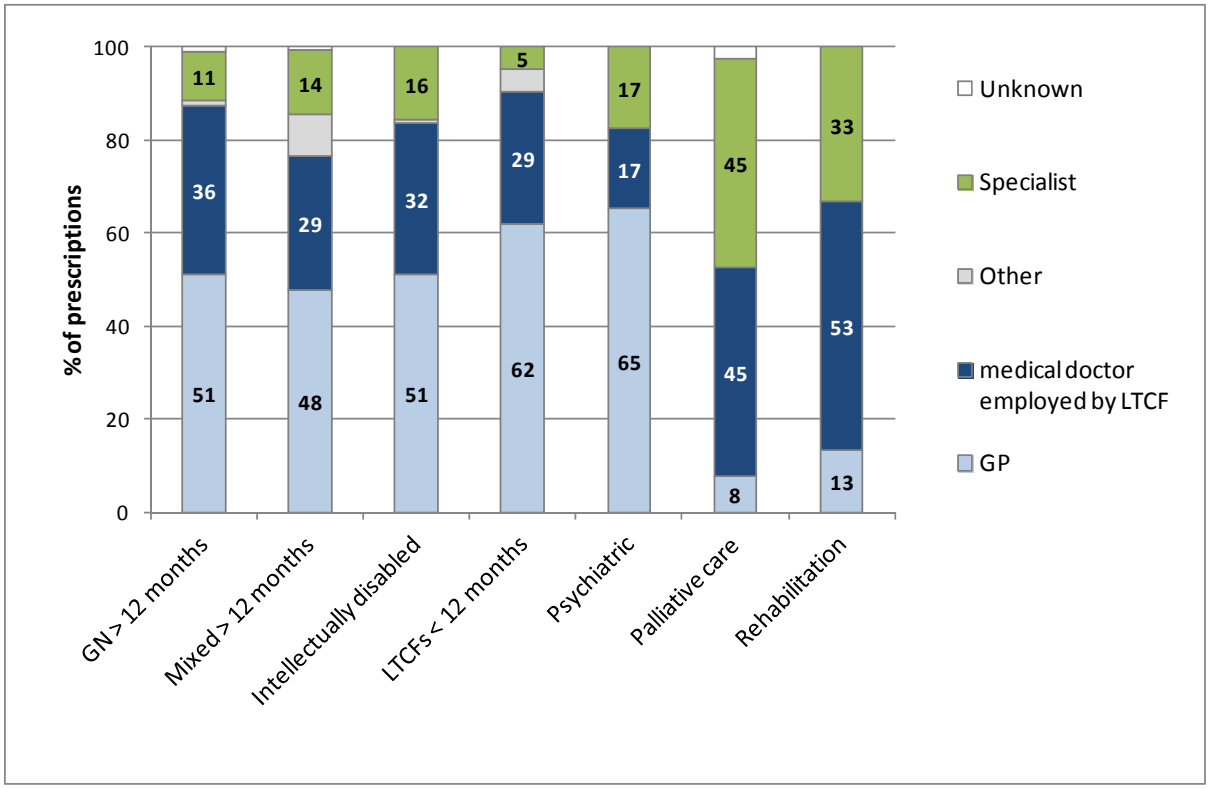

Figure 3.1.11 Antimicrobials, by prescriber and care type.

Reasons & Sites for which Antimicrobials were Prescribed

The reason for antimicrobials varied across care types, as displayed in Figure 3.1.12. Whilst the majority were for treatment of infection, the proportion prescribed for prophylaxis was highest in intellectually disabled (49%), GN>12m (39%) and Mixed>12m (35%) and lowest in LTCF<12m (17%) and rehabilitation (13%) LTCF.

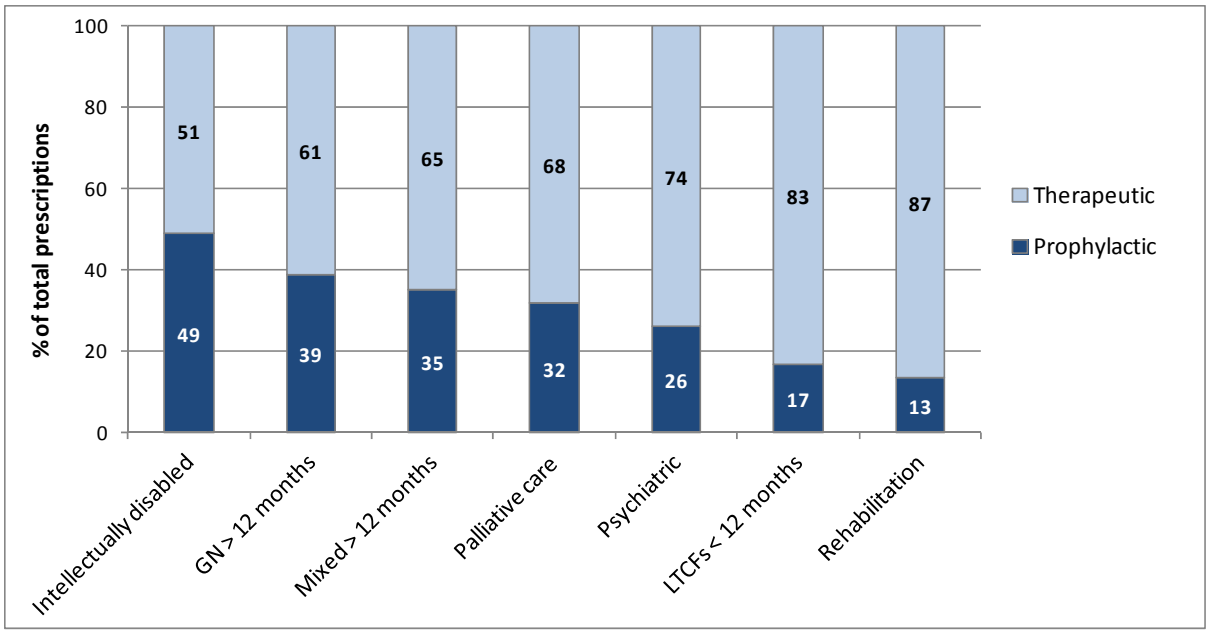

Figure 3.1.12 Reason for antimicrobials, by care type.

Figure 3.1.13 displays the antimicrobial use prevalence, by body site across the care types.

- The urinary tract was the most prevalent site, accounting for antimicrobials prescribed to 4.6% of all residents. GN>12m (5.1%), Mixed>12m and LTCF<12m (4.8% each) had a slightly higher prevalence, whilst intellectually disabled (2.6%) and psychiatric (2.3%) LTCF had a lower prevalence
- The respiratory tract was the second most prevalent site, accounting for antimicrobials prescribed to 2.9% of all residents. Intellectually disabled (3.9%), Mixed>12m (3.6%) and LTCF<12m (3.2%) had a higher prevalence, whilst psychiatric (2.3%) and GN>12m (2.4%) had a lower prevalence
- Skin or wounds were the third most prevalent site, accounting for antimicrobials prescribed to 1.6% of all residents. Intellectually disabled LTCF had a higher prevalence (3.1%) and GN>12m, Mixed>12m and rehabilitation LTCF had a lower prevalence (1.4% each)

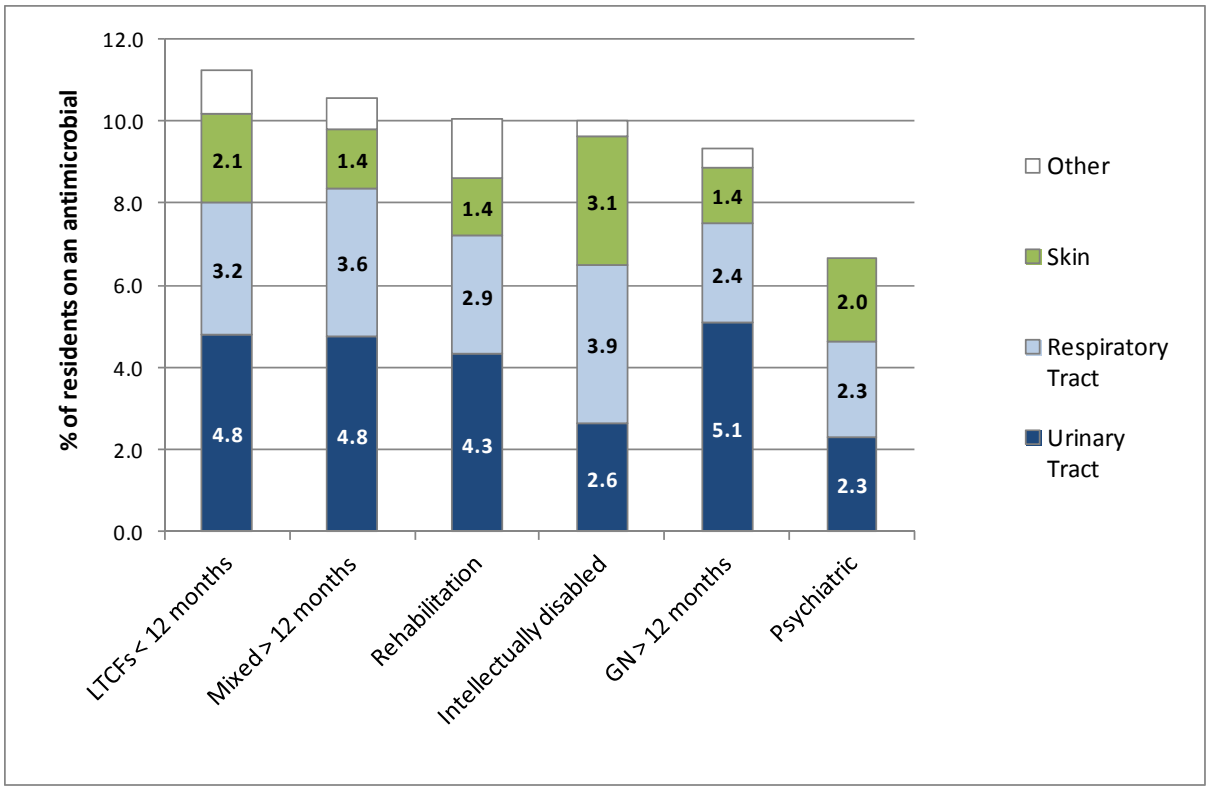

Figure 3.1.13 Prevalence of antimicrobial use, by body site and care type.

Only LTCF care types including > 100 eligible residents were included in this breakdown.

Figures 3.1.14 and 3.1.15 display the breakdown of antimicrobials for treatment and prophylaxis, by care type.

- Treatment of RTI and UTI were jointly the two most prevalent indications: LTCF<12m (3.2% each) and rehabilitation LTCF (2.9% each). UTI treatment was less prevalent in intellectually disabled (0.7%) and psychiatric LTCF (1.2%). Treatment of skin/wound infections was most prevalent in LTCF<12m (1.9%) and intellectually disabled LTCF (1.7%)
- UTI prevention was the most prevalent indication for antimicrobial prophylaxis (3.2% of GN>12m and 2.9% of Mixed>12m residents)
- Intellectually disabled LTCF had the highest prevalence of prophylaxis (5.3%), divided into urinary tract (2.0%), respiratory tract (1.9%) and skin/wound (1.4%) prophylaxis. Indeed, almost half of antimicrobials prescribed in intellectually disabled LTCF were for prevention of skin infection

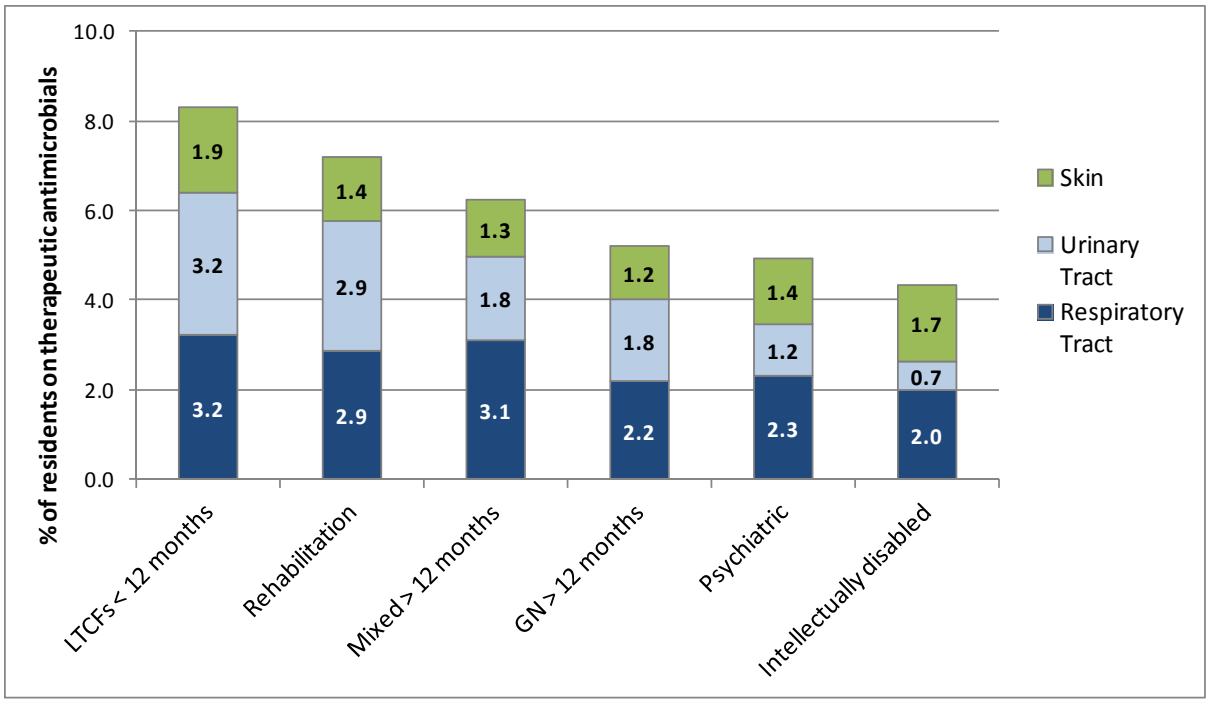

Figure 3.1.14 Body sites for treatment of infection, by care type.

Only LTCF care types including > 100 eligible residents were included in this breakdown.

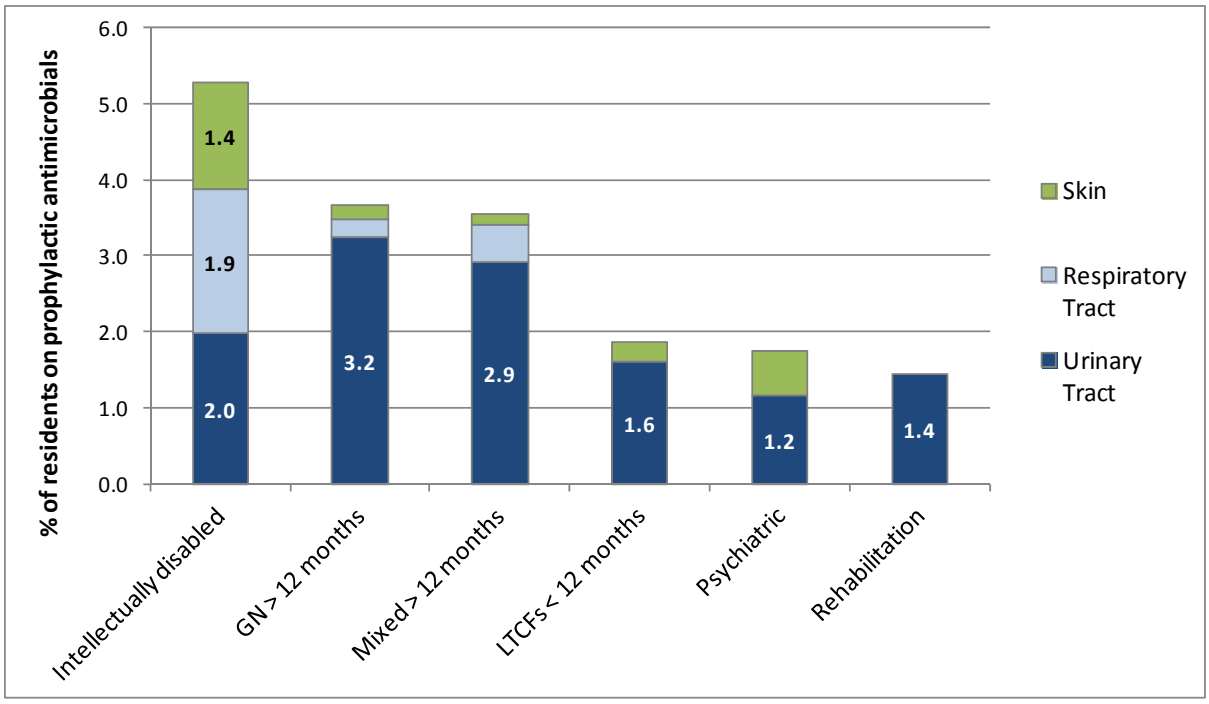

Figure 3.1.15 Body sites for prevention of infection (prophylaxis), by care type.

Only LTCF care types including > 100 eligible residents were included in this breakdown.

Prescribed Antimicrobials

Figure 3.1.16 displays the breakdown of prescribed antimicrobials, by care type. Co-amoxiclav was the most commonly prescribed antimicrobial. Nitrofurantoin, trimethoprim, flucloxacillin, ciprofloxacin, amoxicillin, clarithromycin and cefalexin were also frequently prescribed. See the separate reports of each care type for a more detailed description of antimicrobials.

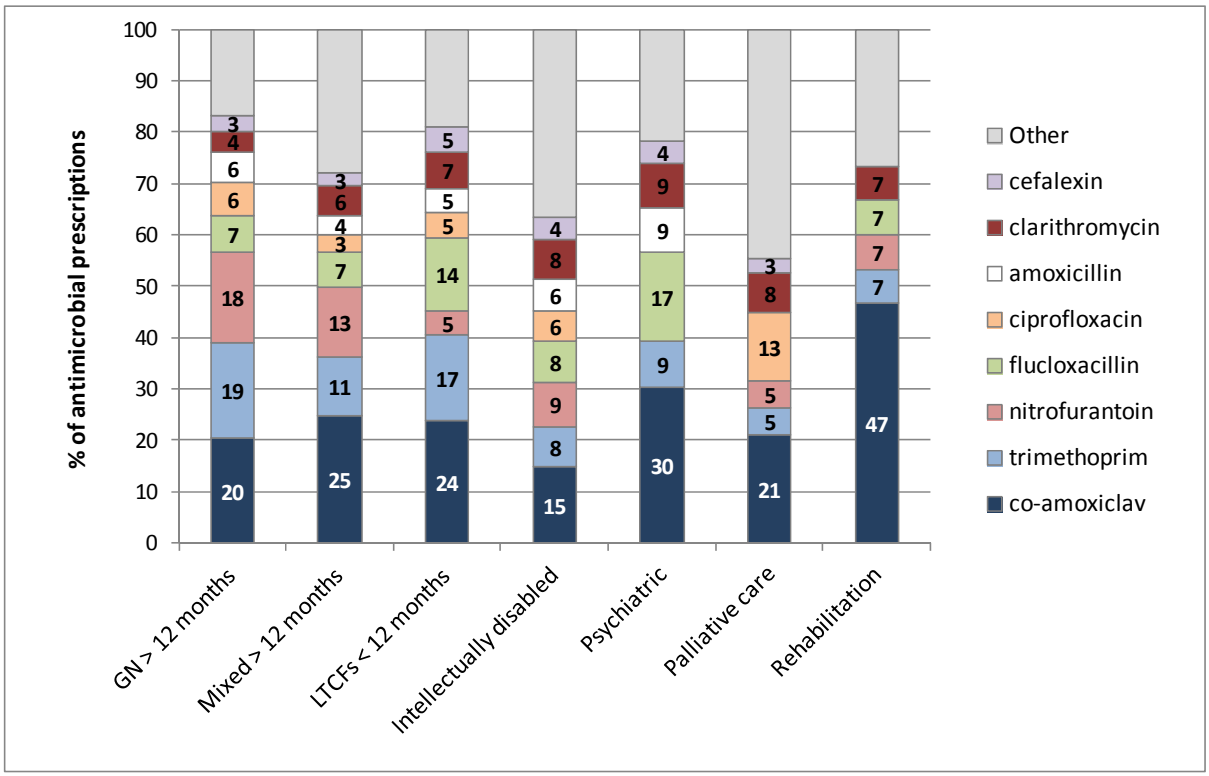

Figure 3.1.16 Prescribed antimicrobials, by care type.

3.2 General Nursing Homes with a LOS greater than 12 months (GN >12m)

3.2.1 Description of Care Type

There were 103 LTCF in this category, with an estimated LOS for the majority of residents greater than 12 months (GN>12m). The majority were HSE-owned (64; 62%), followed by private (32; 31%) and voluntary ownership (7; 7%). GN>12m were distributed around Ireland: Leinster (47), Munster (38), Connacht (9) and Ulster (9), with each accommodating a median of 51 residents (range: 21 – 203).

3.2.2 Description of Residents in GN >12m

Of the 5,807 residents, females predominated (65%) and 47% were ≥85 years. Figure 3.2.1 displays resident demographics, care load indicators and risk factors for HCAI.

Care Load

Sixty-two percent of residents were incontinent of faeces and/or urine. Residents with an indwelling urinary catheter were not counted as incontinent, as per the HALT protocol. Over half were disoriented in time and/or space (57%) and 48% were suffering from impaired mobility (wheelchair-bound or bed-ridden).

HCAI Risk Factors

Of 5,807 GN>12m residents; 5% had a urinary catheter *in situ*. Vascular catheters were uncommon, with only 0.4% having this device. Pressure sores were present in 4% and 10% were reported to have an 'other wound' (e.g., leg ulcer, insertion site of a suprapubic catheter or gastrostomy tube, colostomy, ileostomy, tracheostomy, traumatic or surgical wound). Just 1% had a history of surgery in the past 30 days.

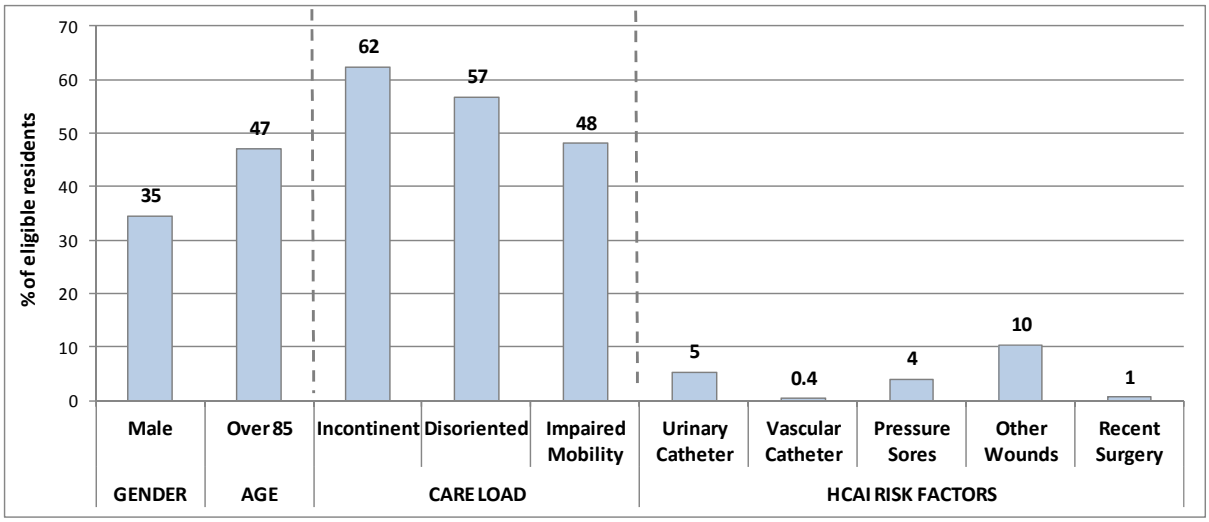

Figure 3.2.1 Resident demographics, care load indicators and HCAI risk factors in GN>12m.

3.2.3 HCAI in GN >12m

Of the 5,807 residents, 337 (5.8%) were reported to have signs or symptoms of infection. Of those, 294 ultimately met a HCAI definition. Therefore, the crude HCAI prevalence was 5.1% (median = 4.2%). Four residents had more than one HCAI. In total, there were 298 HCAI. (Table 3.2.1). There was wide variation in the HCAI prevalence by individual LTCF (0 - 25%), with 15 GN>12m (15%) reporting no residents with HCAI. There was very little difference in median HCAI prevalence by ownership; HSE (4.3%, range: 0-16.7%) and private (3.9%, range: 0–25%), whilst voluntary GN>12m reported a lower median HCAI prevalence (3.2%, range: 0–8.9%).

Table 3.2.1 HCAI prevalence in GN>12m.

HCAI prevalence data	
Number of LTCFs that participated in survey	103
Number of residents surveyed	5807
Number of residents with signs/symptoms of an infection	337
Number of residents with infections[a]	294
Number of infections	298
Residents with more than one infection	4
Crude prevalence of residents with a HCAI infection[b]	**5.1%**
National median prevalence	4.2%
National range (min - max)	0 - 25%
National interquartile range[c]	2 - 7%

[a] As defined by Stone *et al* 2012. [6]

[b] The crude prevalence of residents with a HCAI is the total number of residents with an infection divided by the total number of eligible residents.

[c] The interquartile range is the difference between the first quartile (25th percentile) and the third quartile (75th percentile) of an ordered range of data. It represents the middle fifty percent of the data.

Residents with HCAI: Demographics and HCAI Risk Factors

Of 294 residents with HCAI, the mean age was 81 years (range = 54 – 98) and the majority (68%) had been living in the LTCF for one year or longer. Recent hospital admission (within past three months) was reported for 21% of GN>12m residents with HCAI.

Table 3.2.2 displays a comparison of GN>12m residents with HCAI and the overall GN>12m population with regard to demographics, care load indicators and HCAI risk factors.

Residents with HCAI were significantly more likely to be disoriented (67% vs 57%) and immobile (54% vs 48%) when compared with the overall GN>12m population. The following HCAI risk factors were also significantly more prevalent in residents with HCAI; indwelling urinary catheters (9% vs 5%), 'other wound' types (24% vs 10%) and indwelling vascular catheters (3% vs 0%). However, a resident may have required a vascular catheter for administration of intravenous antimicrobials for HCAI treatment.

Table 3.2.2 Comparison of GN>12m resident demographics, care load indicators and risk factors for residents with HCAI compared to the total GN>12m population.

Resident Characteristic	Total resident population (%)	Residents with an infection (%)	p value	Odd's ratio
Gender/Age				
% male	35	36	0.6791	
% > 85	47	44	0.2613	
Care Load				
Incontinent	62	66	0.1563	
Disoriented	**57**	**67**	**0.0002**	**1.6**
Immobile	**48**	**54**	**0.035**	**1.3**
HCAI Risk Factors				
Urinary Catheter	**5**	**9**	**0.0079**	**1.8**
Vascular Catheter	**0**	**3**	**0.0000**	**10.3**
Pressure Sores	4	6	0.1257	
Other Wounds	**10**	**24**	**0.0000**	**3.0**
Recent Surgery	1	1	0.1233	

*An odd's ratio was only provided where the p-value reached significance (< 0.05).

HCAI Types

Three HCAI categories accounted for 92% of reported infections: UTI (101; 34%), RTI (95; 32%) and skin infections (72; 24%). Figure 3.2.2 displays the distribution of the 298 HCAI, by infection category and Table 3.2.3 provides further breakdown of the HCAI types within each category.

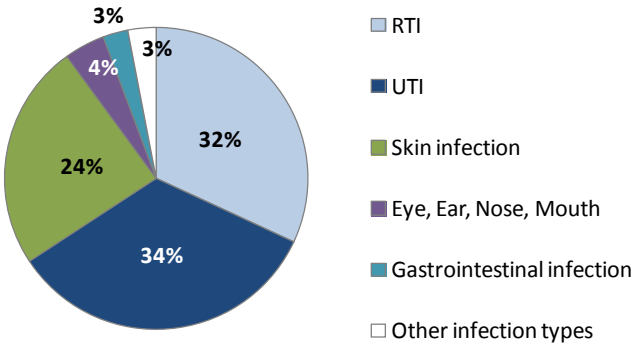

Figure 3.2.2 Distribution of HCAI in GN>12m, by infection category.

Table 3.2.3 HCAI breakdown in GN>12m, by HCAI type and prevalence (**Appendix C***).*

Infection Type		Number of residents with infections		% of residents with infection	
Urinary Tract Infection		101		1.7%	
	Confirmed		*35*		*0.6%*
	Probable		*66*		*1.1%*
Respiratory Tract Infection		95		1.6%	
	Cold		*22*		*0.4%*
	Pneumonia		*4*		*0.1%*
	Flu		*2*		*0.0%*
	Lower respiratory tract infection		*67*		*1.2%*
Skin		72		1.2%	
	Cellulitis		*68*		*1.2%*
	Herpes		*2*		*0.0%*
	Fungal		*2*		*0.0%*
Eye, Ear, Nose, Mouth		13		0.2%	
	Eye		*10*		*0.2%*
	Ear		*1*		*0.0%*
	Mouth		*1*		*0.0%*
	Sinusitis		*1*		*0.0%*
Gastrointestinal		8		0.1%	
	Gastro		*8*		*0.1%*
	C. difficile		*0*		*0.0%*
Other		9		0.2%	
	Bloodstream infection		*0*		*0.0%*
	Fever		*2*		*0.0%*
	Other		*7*		*0.1%*
Total number of residents with infections		**294**		**5.1%**	

UTI

UTI were the most prevalent HCAI, affecting 1.7% of residents. Of the 101 UTI, most (65%) were further categorised as 'probable UTI', based on absence of a positive urine microbiology culture result.

RTI

RTI were the second most prevalent HCAI, affecting 1.6% of residents. Of the 95 RTI, most (71%) were further categorised as 'lower respiratory tract infections'. 'Common cold or pharyngitis' was the second most prevalent RTI type (23%), followed by 'pneumonia' confirmed by chest x-ray (4%) and 'flu' (2%). It is notable that influenza activity in Ireland during May 2013 was at a low level.[7]

Skin Infections

Skin infections were the third most prevalent HCAI, affecting 1.2% of residents. Of the 72 infections, the vast majority (94%) were categorised as 'cellulitis/soft tissue/wound infections'. There were also two cases of herpes infection (i.e., herpes simplex/cold sore or herpes zoster/shingles) and two cases of fungal skin infection. There were no cases of scabies reported in the HALT survey.

Eye, Ear, Nose & Mouth Infections

This infection category was the fourth most prevalent, affecting 0.2% of eligible residents. Of the 13 infections, conjunctivitis accounted for the majority (77%), followed by one case each of ear infection, oral candidiasis and sinusitis (7.5% each).

Gastrointestinal Infections

There were eight cases in the category gastrointestinal infection, affecting 0.1% of residents. All were categorised as 'gastroenteritis', with no *C. difficile* infections reported.

Other Infection Types

There were nine additional infection types reported: Unexplained fever (2)and 'other' infections not categorised in the HCAI subtypes (7). There were no cases of bloodstream infection reported from GN>12m residents.

3.2.4 Antimicrobial Use in GN > 12m

Of the 5,807 GN>12m residents, 541 were prescribed systemic antimicrobials. Therefore, the crude prevalence of antimicrobial use was 9.3% (median = 9.1%). Thirty-two residents were prescribed more than one antimicrobial. In total, information on 572 antimicrobials was recorded (Table 3.2.4). The majority were administered via the oral route (96%), with only 1% intravenous. For the remainder, another administration route (2%) or unknown administration route (1%) was recorded. There was wide variation in the antimicrobial use prevalence by individual LTCF (0 – 28.6%), with five GN>12m (5%) reporting no residents on antimicrobials. There was very little difference in the median antimicrobial use prevalence by ownership; HSE (9%, range: 0-28.6%) and private (9.6%, range: 2.5–26.2%), whilst voluntary GN>12m reported a lower median antimicrobial use prevalence (7.1%, range: 0–17.7%).

Table 3.2.4 Antimicrobial use prevalence in GN>12m.

Antimicrobial prevalence data	
Number of residents surveyed	5807
Number of residents on antimicrobials	541
Number of antimicrobials prescribed	572
Number of residents on more than one antimicrobial	32
Crude prevalence of residents on antimicrobials[a]	**9.3%**
National mean prevalence	9.9%
National median prevalence	9.1%
National range (min - max)	0 - 28.6%
National interquartile range	5.7 - 13.3%

[a] The crude prevalence of residents on antimicrobials is the total number of residents on one or more antimicrobials divided by the total number of eligible residents.

Residents Prescribed Antimicrobials: Demographics, Care Load Indicators and HCAI Risk Factors

Of 541 residents prescribed antimicrobials, the mean age was 80 years (range = 34 – 103) and 43% were ≥85 years. Table 3.2.5 displays a comparison of GN>12m residents on antimicrobials and the overall GN>12m population, with regard to demographics, care load indicators and risk factors.

GN>12m residents on antimicrobials were significantly more likely to be incontinent (70% vs 62%), disoriented (64% vs 57%) and immobile (58% vs 48%). These residents were also significantly more

likely to have an indwelling urinary catheter (12% vs 5%), 'other wound' types (21% vs 10%) or indwelling vascular catheter (1.5% vs 0.4%). However, a resident may have required a vascular catheter for administration of intravenous antimicrobials.

Table 3.2.5 Comparison of GN>12m resident demographics, care load indicators and risk factors for residents on antimicrobials compared to the total GN>12m population.

	Total resident population (%)	Residents on an antimicrobial (%)	p value	Odd's ratio
Gender/Age				
male	35	33	0.384	
> 85	47	43	0.051	
Care Load				
Incontinent	**62**	**70**	**0.000**	**1.5**
Disoriented	**57**	**64**	**0.001**	**1.4**
Immobile	**48**	**58**	**0.000**	**1.6**
HCAI Risk Factors				
Urinary Catheter	**5**	**12**	**0.000**	**2.7**
Vascular Catheter	**0.4**	**1.5**	**0.000**	**5.3**
Pressure Sores	4	5	0.109	
Other Wounds	**10**	**21**	**0.000**	**2.5**
Recent Surgery	1	1	0.168	

Antimicrobial Prescribers & Prescribing Location

For each antimicrobial, information was sought regarding the prescribing location and the prescriber (Table 3.2.6). The majority of antimicrobials in GN >12m (84%) were prescribed in the LTCF, followed by the hospital (11%).

GPs prescribed the majority of antimicrobials (51%), followed by directly-employed doctors (36%) and hospital-based specialists (11%).

Table 3.2.6 Antimicrobial prescriptions in GN>12m, by prescribing location and prescriber.

Where are antimicrobials prescribed?	%
In this facility	84
In the hospital	11
Elsewhere	4
Unknown	1

Who prescribes the antimicrobials?	%
GP	51
Medical doctor employed by the facility	36
Specialist	11
Other	1
Unknown	1

Reasons & Sites for which Antimicrobials were Prescribed

The reason for each of the 572 antimicrobials prescribed to GN>12m residents was recorded. The majority were for treatment of infection (350; 61%), with the remainder for prevention of infection (hereafter known as prophylaxis) (222; 39%). Figure 3.2.3 displays the breakdown by the body site for which the 572 antimicrobials were prescribed. Combined, three body sites accounted for 93% of prescriptions.

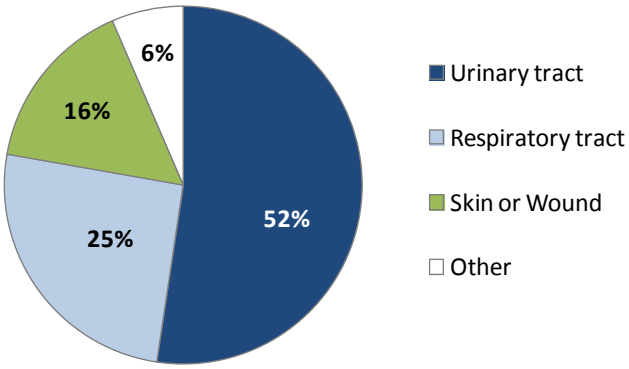

Figure 3.2.3 Prescribed antimicrobials, by body site indication.

The vast majority of prophylaxis was for UTI prevention (86%). Treatment of RTI (37%) and UTI (31%) were the most frequent indications for therapeutic antimicrobials (Figure 3.2.4).

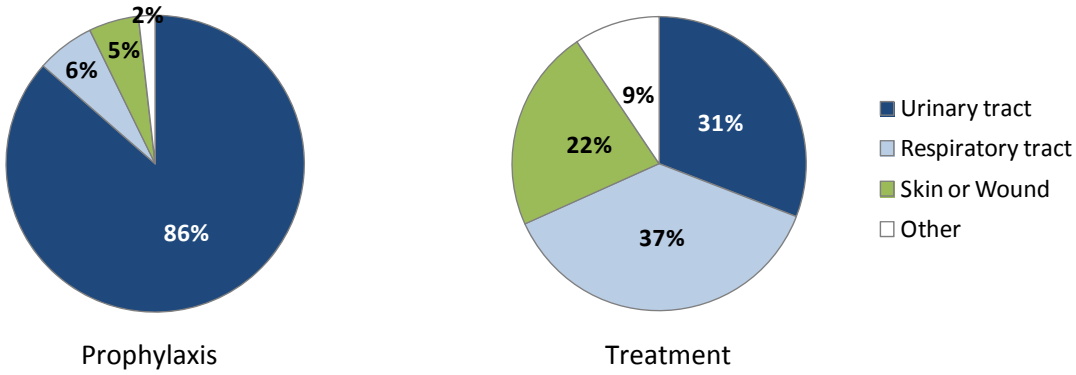

Figure 3.2.4 Breakdown of prophylaxis and treatment, by body site.

Urinary Tract

The urinary tract (UTI treatment or prophylaxis) accounted for the highest proportion of antimicrobials prescribed to GN>12m residents (229; 52%), with the majority of those prescribed for UTI prophylaxis (191; 64%). The prevalence of antimicrobial use for the urinary tract in GN>12m residents was 5.1% (prophylaxis 3.2% and treatment 1.8%). The majority who were prescribed UTI prophylaxis were resident in the LTCF for more than one year (83%) and were significantly more likely to be female (78% vs 65%), incontinent (79% vs 62%), disoriented (68% vs 57%), immobile (64% vs 48%) and to have an indwelling urinary catheter (16% vs 5%) as displayed in Table 3.2.7.

UTI prophylaxis was predominantly prescribed by GPs (55%) or directly-employed doctors (32%), with hospital-based specialists accounting for 11% of UTI prophylaxis prescriptions.

Table 3.2.7 Comparison of resident demographics, care load indicators and risk factors for residents on prophylactic antimicrobials for the urinary tract compared to the total eligible population.

	Total resident population (%)	Residents on a prophylactic antimicrobial for a UTI (%)	p value	Odd's ratio
Gender/Age				
male	**35**	**22**	**0.000**	**0.5**
> 85	47	51	0.299	
Care Load				
Incontinent	**62**	**79**	**0.000**	**2.3**
Disoriented	**57**	**68**	**0.002**	**1.6**
Immobile	**48**	**64**	**0.000**	**1.9**
HCAI Risk Factors				
Urinary Catheter	**5**	**16**	**0.000**	**3.5**
Vascular Catheter	0	0	0.383	
Pressure Sores	4	4	0.844	
Other Wounds	10	10	0.755	
Recent Surgery	1	0	0.262	

For the 107 residents prescribed antimicrobial therapy for suspected UTI, prior to commencing treatment a urine dipstick was performed for 88 (82%) and for 55 (51%), a urine specimen was sent to the microbiology laboratory for culture and susceptibility testing.

Respiratory Tract

The respiratory tract (RTI treatment or prophylaxis) accounted for 25% (n=145) of antimicrobials prescribed to GN>12m residents. The prevalence of antimicrobial use for the respiratory tract was 2.4% (prophylaxis 0.2% and treatment 2.2%).

Skin or Wound

The skin or wound (treatment or prophylaxis for skin/wound infection) accounted for 16% (n=90) of antimicrobials prescribed to GN>12m residents. The prevalence of antimicrobial use for skin/wound was 1.4% (prophylaxis 0.2% and treatment 1.2%).

Prescribed Antimicrobials

Table 3.2.8 displays the most frequently prescribed antimicrobials in GN>12m:

i. Co-amoxiclav was the most common antimicrobial (20.3%). It was mostly prescribed to treat RTI (49%), UTI (25%) and skin/wound infections (9%)
ii. Trimethoprim was the second most common antimicrobial (18.7%). It was only prescribed for urinary tract indications, in particular for UTI prophylaxis (86% of prescriptions)
iii. Nitrofurantoin was the third most common antimicrobial (17.5%). It was only prescribed for urinary tract indications, in particular for UTI prophylaxis (71% of prescriptions)

See **Appendix E** for a more detailed description of prescribed antimicrobials, by the top body sites and indications in GN>12m.

Table 3.2.8 Most frequently prescribed antimicrobials in GN > 12m.

Antimicrobial name	Number of prescriptions (%)
co-amoxiclav	116 (20.3)
trimethoprim	107 (18.7)
nitrofurantoin	100 (17.5)
flucloxacillin	41 (7.2)
ciprofloxacin	36 (6.3)
amoxicillin	34 (6)
clarithromycin	24 (4.2)
cefalexin	17 (3)
phenoxymethylpenicillin	11 (1.9)
other	85 (14.9)
Total	**571 (100)**

3.3 Mixed Care Facilities with a LOS greater than 12 months (Mixed > 12m)

3.3.1 Description of Care Type

There were 26 mixed care type LTCF in this category, with an estimated LOS for the majority of residents greater than 12 months (Mixed>12m). The majority were HSE-owned (20; 77%), with five under private (19%) and one under voluntary ownership (4%). Mixed>12m were distributed around Ireland: Leinster (9), Munster (11), Connacht (3) and Ulster (3), with each accommodating a median of 47 residents (range: 13 – 142).

3.3.2 Description of Residents

Of the 1,409 residents, females predominated (61%) and 41% were ≥85 years. Figure 3.3.1 displays resident demographics, care load indicators and risk factors for HCAI.

Care Load

Sixty-five percent of residents were incontinent of faeces and/or urine. Residents with an indwelling urinary catheter were not counted as incontinent, as per the HALT protocol. Over half were disoriented in time and/or space (54%) and 54% were suffering from impaired mobility (wheelchair-bound or bed-ridden).

HCAI Risk Factors

Of 1,409 Mixed>12m residents, 8% had a urinary catheter *in situ*. Vascular catheters were uncommon, with only 1% having this device. Pressure sores were present in 4% and 11% were reported to have an 'other wound' (e.g., leg ulcer, insertion site of a suprapubic catheter or gastrostomy tube, colostomy, ileostomy, tracheostomy, traumatic or surgical wound). Three percent had a history of surgery in the past 30 days.

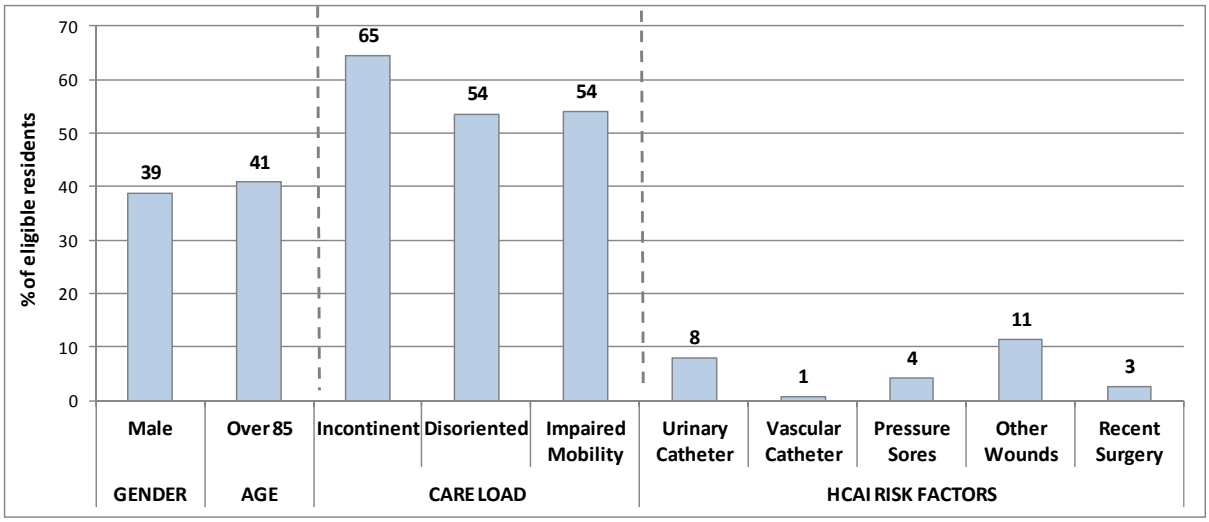

Figure 3.3.1 Resident demographics, care load indicators and HCAI risk factors in Mixed>12m.

3.3.3 HCAI in Mixed > 12m

Of the 1,409 residents, 96 (6.8%) were reported to have signs or symptoms of infection. Of those, 87 ultimately met a HCAI definition. Therefore, the crude HCAI prevalence was 6.2% (median = 6.1%). Five residents had more than one HCAI. In total, there were 92 HCAI. (Table 3.3.1). There was a wide variation in the HCAI prevalence by individual LTCF (0–16.1%), with three Mixed>12m (12%) reporting no residents with HCAI.

Table 3.3.1 HCAI prevalence in Mixed>12m.

HCAI prevalence data	
Number of LTCFs that participated in survey	26
Number of residents surveyed	1409
Number of residents with signs/symptoms of an infection	96
Number of residents with infections[a]	87
Number of infections	92
Residents with more than one infection	5
Crude prevalence of residents with a HCAI infection[b]	**6.2%**
National median prevalence	6.1%
National range (min - max)	0 - 16.1%
National interquartile range[c]	2.8 - 8.5%

[a] As defined by Stone *et al* 2012.[6]

[b] The crude prevalence of residents with a HCAI is the total number of residents with an infection divided by the total number of eligible residents.

[c] The interquartile range is the difference between the first quartile (25th percentile) and the third quartile (75th percentile) of an ordered range of data. It represents the middle fifty percent of the data.

Residents with HCAI: Demographics and HCAI Risk Factors

Of 87 residents with HCAI, the mean age was 81 years (range: 48 – 98) and the majority (70%) had been living in the LTCF for one year or longer. Recent hospitalisation (within past three months) was reported for 31% of Mixed>12m residents with HCAI.

Table 3.3.2 displays a comparison of Mixed>12m residents with HCAI and the overall Mixed>12m population, with regard to demographics, care load indicators and HCAI risk factors.

Residents with HCAI were significantly less likely to be aged >85 years (30% vs 41%), significantly more likely to have pressure sores (9% vs 4%) and 'other wound' types (28% vs 11%) when compared to the overall Mixed>12m population.

Table 3.3.2 Comparison of Mixed>12m resident demographics, care load indicators and risk factors for residents with HCAI compared to the total Mixed>12m population.

Resident Characteristic	Total resident population (%)	Residents with an infection (%)	p value	Odd's ratio
Gender/Age				
male	39	41	0.6133	
> 85	**41**	**30**	**0.0323**	**0.6**
Care Load				
Incontinent	65	62	0.6227	
Disoriented	54	56	0.5971	
Immobile	54	62	0.1227	
HCAI Risk Factors				
Urinary Catheter	8	10	0.4261	
Vascular Catheter	1	1	0.6866	
Pressure Sores	**4**	**9**	**0.0161**	**2.5**
Other Wounds	**11**	**28**	**0.0000**	**3.3**
Recent Surgery	3	3	0.6205	

*An odd's ratio was only provided where the p-value reached significance (< 0.05).

HCAI Types

Three HCAI categories accounted for 84% of reported infections: RTI (33; 36%), UTI (24; 26%) and skin infections (19; 21%). Figure 3.3.2 displays the distribution of the 92 HCAI, by infection category and Table 3.3.3 provides a further breakdown of the HCAI types within each category.

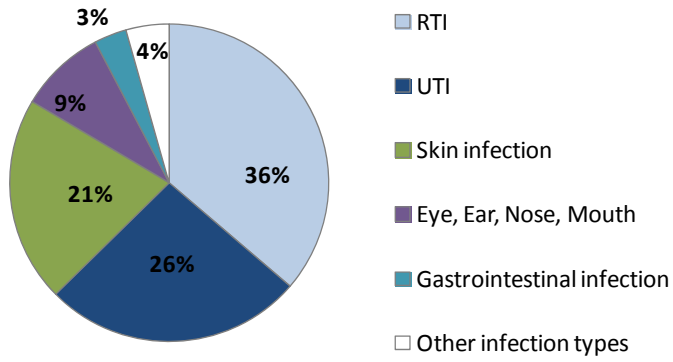

Figure 3.3.2 Distribution of HCAI in Mixed>12m, by infection category.

Table 3.3.3 HCAI breakdown in Mixed>12m, by HCAI type and prevalence (**Appendix C**).

Infection Type	Number of residents with infections	% of residents with infection
Respiratory Tract Infection	33	2.3%
Cold	*4*	*0.3%*
Pneumonia	*5*	*0.4%*
Flu	*1*	*0.1%*
Lower respiratory tract infection	*23*	*1.6%*
Urinary Tract Infection	24	1.7%
Confirmed	*7*	*0.5%*
Probable	*17*	*1.2%*
Skin	19	1.3%
Cellulitis	*18*	*1.3%*
Herpes	*1*	*0.1%*
Fungal	*0*	*0.0%*
Eye, Ear, Nose, Mouth	8	0.6%
Eye	*7*	*0.5%*
Ear	*1*	*0.1%*
Mouth	*0*	*0.0%*
Sinusitis	*0*	*0.0%*
Gastrointestinal	3	0.2%
Gastro	*1*	*0.1%*
C. difficile	*2*	*0.1%*
Other	4	0.3%
Bloodstream infection	*0*	*0.0%*
Fever	*1*	*0.1%*
Other	*3*	*0.2%*
Total number of residents with infections	**86**	**6.1%**

RTI

RTI were the most prevalent HCAI, affecting 2.3% of residents. Of the 33 RTI, most (70%) were further categorised as 'lower respiratory tract infections'. 'Pneumonia' confirmed by chest X-ray was the second most prevalent RTI type (15%), followed by 'common cold or pharyngitis' (12%). One case meeting the 'flu' surveillance definition was reported (3%). It is notable that influenza activity in Ireland during May 2013 was at a low level.[7]

UTI

UTI were the second most prevalent HCAI, affecting 1.7% of residents. Of the 24 UTI, most (71%) were further categorised as 'probable UTI', based on absence of a positive urine microbiology culture result.

Skin Infections

Skin infections were the third most prevalent HCAI, affecting 1.3% of residents. Of the 19 infections, the vast majority (95%) were categorised as 'cellulitis/soft tissue/wound infections'. There was also one case of herpes infection (i.e., herpes simplex/cold sore or herpes zoster/shingles).

Eye, Ear, Nose & Mouth Infections

This infection category was the fourth most prevalent, affecting 0.6% of residents. Of the eight infections, conjunctivitis accounted for the majority (88%) and one case of ear infection was reported.

Gastrointestinal Infections

There were three cases in the category gastrointestinal infection, affecting 0.2% of residents. *C. difficile* infection (2) and gastroenteritis (1).

Other Infection Types

There were four additional infection types reported. Unexplained fever (1) and 'other' infections not categorised in the HCAI subtypes (3) above. There were no cases of bloodstream infection reported from Mixed>12m residents.

3.3.4 Antimicrobial Use in Mixed > 12m

Of the 1,409 Mixed>12m residents, 149 were prescribed systemic antimicrobials. Therefore, the crude prevalence of antimicrobial use was 10.6% (median = 11.2%). Seven residents were prescribed more than one antimicrobial. In total, information on 157 antimicrobials was recorded (Table 3.3.4). The majority were administered via the oral route (92%), with 6% intravenous. There was a wide variation in antimicrobial use prevalence by individual LTCF (0 – 20.8%), with one Mixed>12m facility (4%) reporting no residents on antimicrobials.

Table 3.3.4 Antimicrobial use prevalence in Mixed>12m.

Antimicrobial prevalence data	
Number of residents surveyed	1409
Number of residents on antimicrobials	149
Number of antimicrobials prescribed	157
Number of residents on more than one antimicrobial	7
Crude prevalence of residents on antimicrobials[a]	**10.6%**
National mean prevalence	11.3%
National median prevalence	11.2%
National range (min - max)	0 - 20.8%
National interquartile range	8.2 - 15.3%

Residents Prescribed Antimicrobials: Demographics, Care Load Indicators and HCAI Risk Factors

Of 149 residents prescribed antimicrobials, the mean age was 80 years (range: 40 – 98) and 34% were ≥85 years. Table 3.3.5 displays a comparison of Mixed>12m residents on antimicrobials and the overall Mixed>12m population, with regard to demographics, care load indicators and risk factors.

Mixed>12m residents on antimicrobials were significantly more likely to have a urinary catheter *in situ* (15% vs 8%) and to have 'other' wound types (21% vs 11%).

Table 3.3.5 Comparison of Mixed>12m resident demographics, care load indicators and risk factors for residents on antimicrobials compared to the total Mixed>12m population.

	Total resident population (%)	Residents on an antimicrobial (%)	p value	Odd's ratio
Gender/Age				
male	39	44	0.147	
> 85	41	34	0.084	
Care Load				
Incontinent	65	60	0.267	
Disoriented	54	54	0.978	
Immobile	54	61	0.070	
HCAI Risk Factors				
Urinary Catheter	**8**	**15**	**0.002**	**2.2**
Vascular Catheter	0.8	2.0	0.071	
Pressure Sores	4	6	0.232	
Other Wounds	**11**	**21**	**0.000**	**2.3**
Recent Surgery	3	5	0.094	

Antimicrobial Prescribers & Prescribing Location

For each prescribed antimicrobial, information was sought regarding the prescribing location and the prescriber (Table 3.3.6). The majority of antimicrobials in Mixed>12m (76%) were prescribed in the LTCF, followed by the hospital (15%).

GPs prescribed the majority of antimicrobials (48%), followed by directly-employed doctors (29%), hospital-based specialists (14%) and other healthcare professionals [e.g., nurse prescribers] (9%).

Table 3.3.6 Antimicrobial prescriptions in Mixed>12m, by prescribing location and prescriber.

Where are antimicrobials prescribed?	%
In this facility	76
In the hospital	15
Elsewhere	10
Unknown	0

Who prescribes the antimicrobials?	%
GP	48
Medical doctor employed by the facility	29
Specialist	14
Other	9
Unknown	1

Reasons & Sites for which Antimicrobials were Prescribed

The reason for each of the 157 antimicrobials prescribed to Mixed>12m residents was recorded. The majority were for treatment of infection (102; 65%), with the remainder for prevention of infection (herafter known as prophylaxis) (55; 35%). Figure 3.3.3 displays the breakdown by the body site for which the 157 antimicrobials were prescribed. Combined, three body sites accounted for 91% of prescriptions.

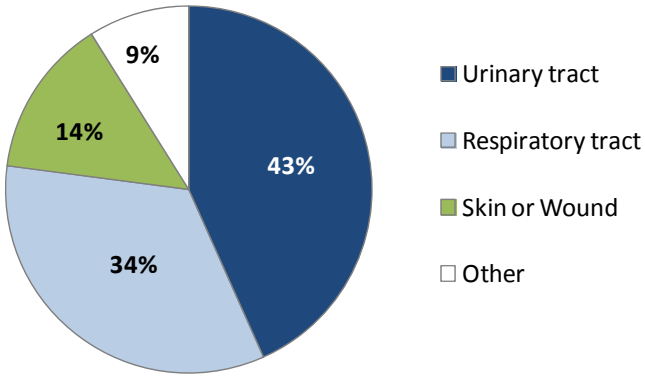

Figure 3.3.3 Prescribed antimicrobials, by body site indication.

The vast majority of prophylaxis was for UTI prevention (76%). Treatment of RTI (45%) and UTI (25%) were the most frequent indications for therapeutic antimicrobials (Figure 3.3.4).

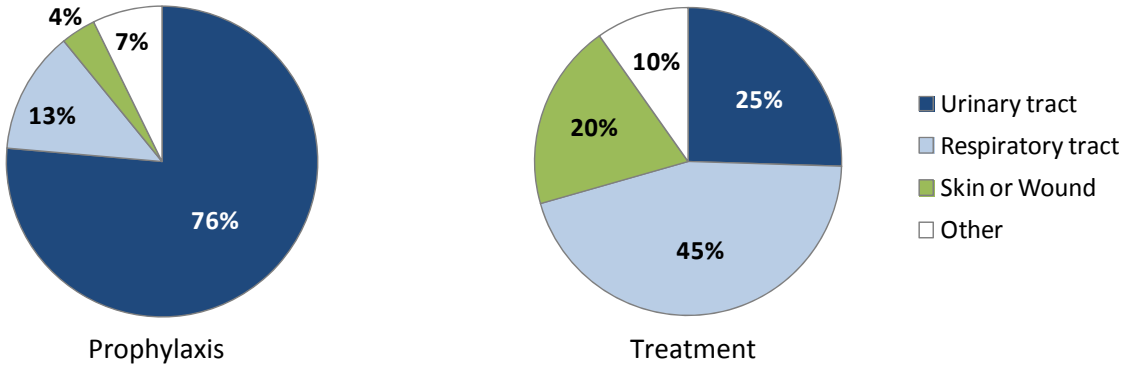

Figure 3.3.4 Breakdown of prophylaxis and treatment, by body site.

Urinary Tract

The urinary tract (UTI treatment or prophylaxis) accounted for the highest proportion of antimicrobials prescribed to Mixed>12m residents (68; 43%), with the majority of those prescribed for UTI prophylaxis (42; 62%). The prevalence of antimicrobial use for the urinary tract in Mixed>12m was 4.8% (prophylaxis 2.9% and treatment 1.8%). Residents prescribed UTI prophylaxis were significantly more likely to have an indwelling urinary catheter (20% vs 8%: p-value: 0.007, OR 2.9). Of the 26 residents prescribed antimicrobial therapy for suspected UTI, prior to commencing treatment a urine dipstick was performed for 22 (85%) and for 16 (62%), a urine specimen was sent to the microbiology laboratory for culture and susceptibility testing.

Respiratory Tract

The respiratory tract (RTI treatment or prophylaxis) accounted for 34% (n=53) of antimicrobials prescribed to Mixed>12m residents. The prevalence of antimicrobial use for the respiratory tract was 3.6% (prophylaxis 0.5% and treatment 3.1%).

Skin or Wound

The skin or wound (treatment or prophylaxis for skin/wound infection) accounted for 14% (n=22) of antimicrobials prescribed to Mixed>12m residents. The prevalence of antimicrobial use for skin/wound was 1.4% (prophylaxis 0.1% and treatment 1.3%).

Prescribed Antimicrobials

Table 3.3.7 displays the most frequently prescribed antimicrobials in Mixed>12m:

i. Co-amoxiclav was the most common antimicrobial (24.8%). It was mostly prescribed to treat RTI (62%) and UTI (21%)

ii. Nitrofurantoin was the second most common antimicrobial (13.4%). It was only prescribed for urinary tract indications, in particular for UTI prophylaxis (71% of prescriptions)

iii. Trimethoprim was the third most common antimicrobial (11.5%). It was only prescribed for urinary tract indications, in particular for UTI prophylaxis (67% of prescriptions)

Table 3.3.7 Most frequently prescribed antimicrobials in Mixed>12m.

Antimicrobial name	Number of prescriptions (%)
co-amoxiclav	39 (24.8)
nitrofurantoin	21 (13.4)
trimethoprim	18 (11.5)
flucloxacillin	11 (7)
clarithromycin	9 (5.7)
doxycycline	7 (4.5)
amoxicillin	6 (3.8)
methenamine	6 (3.8)
ciprofloxacin	5 (3.2)
cefalexin	4 (2.5)
other	31 (19.7)
Total	**157 (100)**

3.4 LTCF with LOS < 12 months (LTCF<12m)

3.4.1 Description of Facility Type

There were 15 LTCF in this category, with an estimated LOS for the majority of residents less than 12 months (LTCF<12m). Within this category, the LTCF cared for either general nursing home or mixed care type residents. The vast majority were HSE-owned (14; 93%) with one privately-owned. LTCF<12m were distributed in Ulster (8), Leinster (4), Munster (3) and the majority had a rural location (13; 87%). LTCF<12m accommodated a median of 29 residents (range 12 – 78).

3.4.2 Description of Residents in LTCF<12m

Of the 374 residents, females predominated (64%) and 38% were ≥85 years. Figure 3.4.1 displays resident demographics, care load indicators and risk factors for HCAI.

Care Load

Forty-five percent of residents were incontinent of faeces and/or urine. Residents with an indwelling urinary catheter were not counted as incontinent, as per the HALT protocol. One third were disoriented in time and/or space and 40% were suffering from impaired mobility (wheelchair-bound or bed-ridden).

HCAI Risk Factors

Of 374 LTCF<12m residents, 14% had a urinary catheter *in situ*. Vascular catheters were uncommon, with only 1% having this device. Pressure sores were present in 8% and 11% were reported to have an 'other wound' (e.g., leg ulcer, insertion site of a suprapubic catheter or gastrostomy tube, colostomy, ileostomy, tracheostomy, traumatic or surgical wound). Four percent had a history of surgery in the past 30 days.

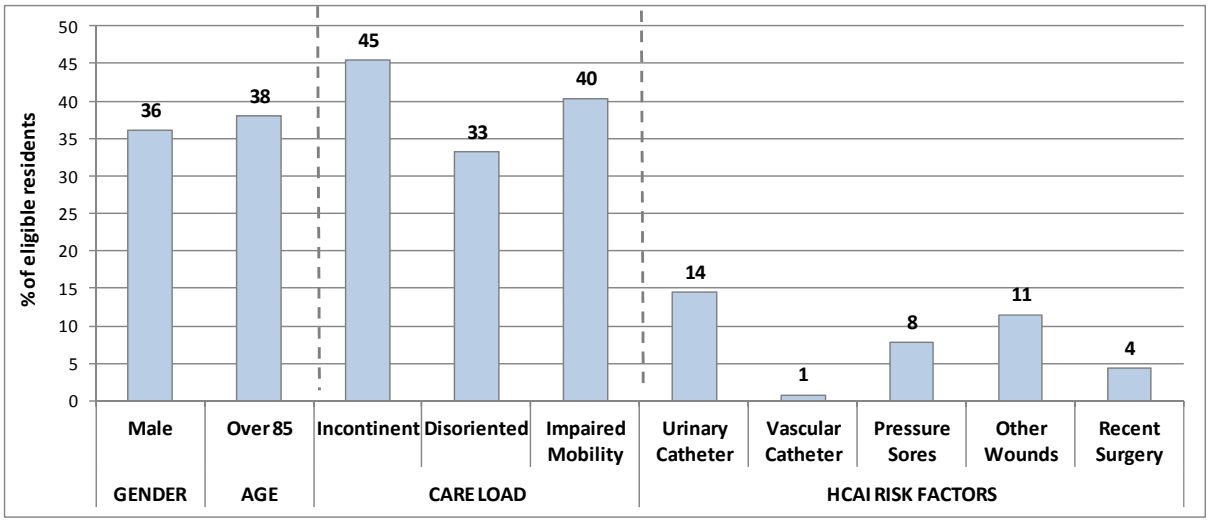

Figure 3.4.1 Resident demographics, care load indicators and HCAI risk factors in LTCF<12m.

3.4.3 HCAI in LTCF < 12m

Of the 374 residents, 28 (7.5%) were reported to have signs or symptoms of infection and all ultimately met a HCAI definition. Therefore, the crude HCAI prevalence was 7.5% (median = 8.3%). One resident had more than one HCAI. In total, there were 29 HCAI (Table 3.4.1). There was wide variation in the HCAI prevalence by individual facility (0 – 25%), with four LTCF<12m (27%) reporting no residents with a HCAI.

Table 3.4.1 HCAI prevalence in LTCF<12m.

HCAI prevalence data	
Number of LTCFs that participated in survey	15
Number of residents surveyed	374
Number of residents with signs/symptoms of an infection	28
Number of residents with infections[a]	28
Number of infections	29
Residents with more than one infection	1
Crude prevalence of residents with a HCAI infection[b]	**7.5%**
National median prevalence	8.3%
National range (min - max)	0 - 23.1%
National interquartile range[c]	0.7 - 10.9%

[a] As defined by Stone *et al* 2012. [6]

[b] The crude prevalence of residents with a HCAI is the total number of residents with an infection divided by the total number of eligible residents. [c] The interquartile range is the difference between the first quartile (25th percentile) and the third quartile (75th percentile) of an ordered range of data. It represents the middle fifty percent of the data.

Residents with HCAI: Demographics and HCAI Risk Factors

Of the 28 residents with HCAI, the mean age was 83 years (range: 62 – 101) and the majority (86%) had been living in the LTCF for less than a year. Over half had a history of hospital admission within the past three months (57%).

Table 3.4.2 displays a comparison of LTCF<12m residents with HCAI and the overall LTCF<12m population, with regard to demographics, care load indicators and HCAI risk factors. Residents with a HCAI were significantly more likely to have pressure sores (18% vs 8%) and 'other wounds' (29% vs 11%) when compared to the overall LTCF<12m population.

Table 3.4.2 Comparison of LTCF<12m resident demographics, care load indicators and risk factors for residents with HCAI compared to the total LTCF<12m population.

Resident Characteristic	Total resident population (%)	Residents with an infection (%)	p value	Odd's ratio
Gender/Age				
male	36	21	0.0929	
> 85	38	36	0.7984	
Care Load				
Incontinent	45	54	0.3698	
Disoriented	33	46	0.1209	
Immobile	40	36	0.6013	
HCAI Risk Factors				
Urinary Catheter	14	18	0.5926	
Vascular Catheter	1	4	0.0876	
Pressure Sores	**8**	**18**	**0.0377**	**2.9**
Other Wounds	**11**	**29**	**0.0032**	**3.6**
Recent Surgery	4	7	0.4361	

*An odd's ratio was only provided where the p-value reached significance (< 0.05).

HCAI Types

Three HCAI categories accounted for 96% of reported infections: UTI (12; 41%), RTI (11; 38%) and skin infections (4; 17%). Figure 3.4.2 displays the distribution of the 29 HCAI, by infection category. Table 3.4.3 provides a further breakdown of the HCAI types within each category.

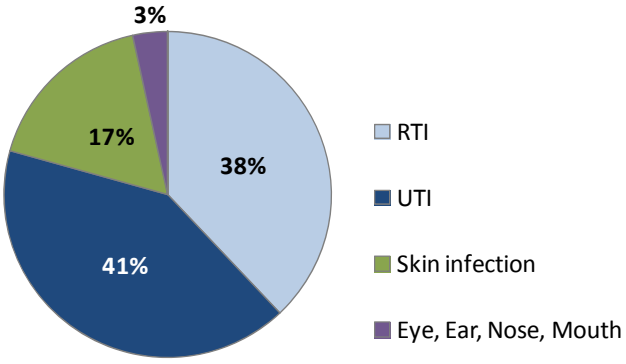

Figure 3.4.2 Distribution of HCAI in LTCF<12m, by infection category.

Table 3.4.3 HCAI breakdown in LTCF<12m, by HCAI type and prevalence (**Appendix C**).

Infection Type		Number of residents with infections		% of residents with infection	
Urinary Tract Infection		12		3.2%	
	Confirmed		*3*		*0.8%*
	Probable		*9*		*2.4%*
Respiratory Tract Infection		11		2.9%	
	Cold		*3*		*0.8%*
	Pneumonia		*0*		*0.0%*
	Flu		*0*		*0.0%*
	Lower respiratory tract infection		*8*		*2.1%*
Skin		5		1.3%	
	Cellulitis		*4*		*1.1%*
	Herpes		*0*		*0.0%*
	Fungal		*1*		*0.3%*
Eye, Ear, Nose, Mouth		1		0.3%	
	Eye		*0*		*0.0%*
	Ear		*0*		*0.0%*
	Mouth		*1*		*0.3%*
	Sinusitis		*0*		*0.0%*
Gastrointestinal		0		0.0%	
	Gastro		*0*		*0.0%*
	C. difficile		*0*		*0.0%*
Other		0		0.0%	
	Bloodstream infection		*0*		*0.0%*
	Fever		*0*		*0.0%*
	Other		*0*		*0.0%*
Total number of residents with infections		**28**		**7.5%**	

UTI

UTI were the most prevalent HCAI, affecting 3.2% of residents. Of the 12 UTI, most (75%) were further categorised as 'probable UTI' based on absence of a positive urine microbiology culture result.

RTI

RTI were the second most prevalent HCAI, affecting 2.9% of residents. Of the 11 RTI, most (73%) were further categorised as 'lower respiratory tract infections', followed by 'common cold or pharyngitis' (27%). No LTCF<12m resident met the definition for 'flu' and it is notable that influenza activity in Ireland during May 2013 was at a low level.[7]

Skin Infections

Skin infections were the third most prevalent HCAI, affecting 1.3% of residents. Of the five infections, most were categorised as 'cellulitis/soft tissue/wound infections' (80%) with one case of fungal skin infection reported.

Other infection categories

One case of oral candidiasis/thrush was reported (0.3%) and there were no residents in LTCF<12m with gastrointestinal infections or 'other' infection types.

3.4.4 Antimicrobial Use in LTCF < 12m

Of the 374 LTCF<12m residents, 42 were prescribed systemic antimicrobials. Therefore, the crude prevalence of antimicrobial use was 11.2% (median=9.5%). In total, information on 42 antimicrobials was recorded (Table 3.4.4). The majority were adminstered via the oral route (98%), with only 2% intravenous. There was a wide variation in antimicrobial use prevalence by individual facility (0 - 23.5%), with three LTCF<12m (20%) recording no residents on antimicrobials.

Table 3.4.4 Antimicrobial use prevalence in LTCF<12m.

Antimicrobial prevalence data	
Number of residents surveyed	374
Number of residents on antimicrobials	42
Number of antimicrobials prescribed	42
Number of residents on more than one antimicrobial	0
Crude prevalence of residents on antimicrobials[a]	**11.2%**
National mean prevalence	10.7%
National median prevalence	9.5%
National range (min - max)	0 - 23.5%
National interquartile range	5.5 - 16.7%

Residents Prescribed Antimicrobials: Demographics, Care Load Indicators and HCAI Risk Factors

Of 42 residents prescribed antimicrobials, the mean age was 83 years (range: 47 – 101) and 43% were ≥85 years. Table 3.4.5 displays a comparison of LTCF<12m residents on antimicrobials and the overall LTCF<12m population, with regard to demographics, care load indicators and risk factors.

LTCF<12m residents on antimicrobials were significantly more likely to be disoriented (52% vs 33%), to have a vascular catheter *in situ* (5% vs 1%) and to have 'pressure sores' (19% vs 8%) or 'other wounds' (33% vs 11%).

Table 3.4.5 Comparison of LTCF<12m resident demographics, care load indicators and risk factors for residents on antimicrobials compared to the total LTCF<12m population.

	Total resident population (%)	Residents on an antimicrobial (%)	p value	Odd's ratio
Gender/Age				
male	36	29	0.281	
> 85	38	43	0.488	
Care Load				
Incontinent	45	57	0.106	
Disoriented	**33**	**52**	**0.005**	**2.5**
Immobile	40	45	0.495	
HCAI Risk Factors				
Urinary Catheter	14	17	0.663	
Vascular Catheter	**1**	**5**	**0.035**	**16.3**
Pressure Sores	**8**	**19**	**0.004**	**3.5**
Other Wounds	**11**	**33**	**0.000**	**5.2**
Recent Surgery	4	2	0.519	

Antimicrobial Prescribers & Prescribing Location

For each prescribed antimicrobial, information was sought regarding the prescribing location and the prescriber (Table 3.4.6). The majority of antimicrobials in LTCF<12m (83%) were prescribed in the LTCF, followed by the hospital (10%).

GPs prescribed the majority of antimicrobials (62%), followed by directly-employed doctors (29%), hospital-based specialists (5%) and other healthcare professionals [e.g., nurse prescriber] (5%).

Table 3.4.6 Antimicrobial prescriptions in LTCF<12m, by prescribing location and prescriber.

Where are antimicrobials prescribed?	%
In this facility	83
In the hospital	10
Elsewhere	7
Unknown	0

Who prescribes the antimicrobials?	%
GP	62
Medical doctor employed by the facility	29
Specialist	5
Other	5
Unknown	0

Reasons & Sites for which Antimicrobials were Prescribed

The reason for each of the 42 antimicrobials prescribed to LTCF<12m residents was recorded. The majority were prescribed for treatment of infection (35; 83%), with the remainder prescribed for prevention of infection (hereafter known as prophylaxis) (7; 17%). Figure 3.4.3 displays the breakdown by the body site for which the 42 antimicrobials were prescribed. Combined, three body sites accounted for 91% of prescriptions.

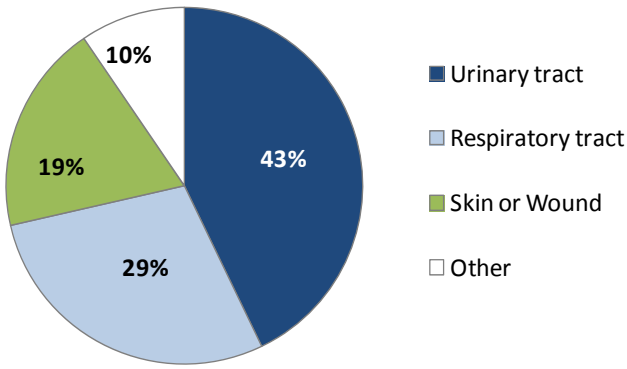

Figure 3.4.3 Prescribed antimicrobials, by body site indication.

The vast majority of prophylaxis was for UTI prevention (86%). Treatment of UTI and RTI (both at 34%) were the most frequent indications for therapeutic antimicrobials (Figure 3.4.4).

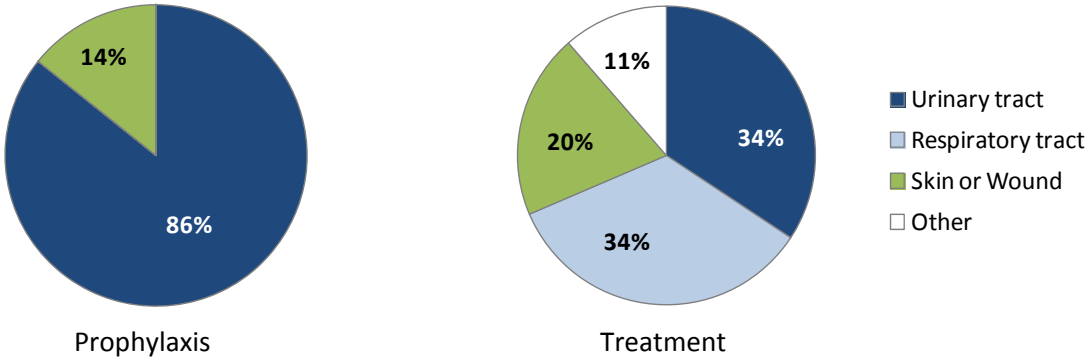

Figure 3.4.4 Breakdown of prophylaxis and treatment, by body site.

<u>Urinary Tract</u>

The urinary tract (UTI treatment or prophylaxis) accounted for the highest proportion of antimicrobials prescribed to LTCF<12m residents. (18; 43%), with the majority of those prescribed

for UTI treatment (12; 67%). The prevalence of antimicrobial use for the urinary tract in LTCF<12m residents was 4.8% (prophylaxis 1.6% and treatment 3.2%). For the 12 residents prescribed antimicrobial therapy for suspected UTI, prior to commencing treatment a urine dipstick was performed for nine (75%) and for four (33%), a urine specimen was sent to the microbiology laboratory for culture and susceptibility testing.

Respiratory tract

The respiratory tract accounted for 29% (n=12) of antimicrobials prescribed to LTCF<12m residents and all were to treat RTI (prevalence = 3.2%).

Skin or Wound

The skin or wound (treatment or prophylaxis for skin/wound infection) accounted for 19% (n=8) of antimicrobials prescribed to LTCF<12m residents, with the majority for treatment (6; 75%). The prevalence of antimicrobial use for skin/wound was 2.1% (prophylaxis 0.3% and treatment 1.9%).

Prescribed Antimicrobials

Table 3.4.7 displays the most frequently prescribed antimicrobials in LTCF<12m.

i. Co-amoxiclav was the most common antimicrobial (23.8%). It was mostly prescribed to treat RTI (50%) and UTI (30%)

ii. Trimethoprim was the second most common antimicrobial (16.7%). It was only prescribed for urinary tract indications; treatment (57%) and prophylaxis (43%)

Table 3.4.7 Mostly frequently prescribed antimicrobials in LTCF<12m.

Antimicrobial name	Number of prescriptions (%)
co-amoxiclav	10 (23.8)
trimethoprim	7 (16.7)
flucloxacillin	6 (14.3)
clarithromycin	3 (7.1)
cefuroxime	3 (7.1)
nitrofurantoin	2 (4.8)
amoxicillin	2 (4.8)
ciprofloxacin	2 (4.8)
cefalexin	2 (4.8)
other	5 (11.9)

3.5 Intellectually Disabled LTCF

3.5.1 Description of Care Type

There were 24 LTCF in this category, which was not further stratified by estimated resident LOS. Fifteen were HSE-owned (63%), with the remainder (37%) owned by voluntary services. Intellectually disabled LTCF were distributed around Ireland: Leinster; all in Dublin (10), Munster (5) Connacht (2) and Ulster (7), with each accommodating a median of 34 residents (range: 5 – 137).

3.5.2 Description of Residents in Intellectually Disabled LTCF

Of the 1,060 residents, there was a slight female predominance (55%), with the vast majority aged less than 85 years (99%). Figure 3.5.1 displays resident demographics, care load indicators and risk factors for HCAI.

Care Load

Fifty-two percent of residents were incontinent of faeces and/or urine. Residents with an indwelling urinary catheter were not counted as incontinent, as per the HALT protocol. Over half were disoriented in time and/or space (54%) and 33% were suffering from impaired mobility (wheelchair-bound or bed-ridden).

HCAI Risk Factors

Of 1,060 intellectually disabled residents, 3% had a urinary catheter *in situ* and none had a vascular catheter. Pressure sores were present in 1% and 9% were reported to have an 'other wound' (e.g., leg ulcer, insertion site of a suprapubic catheter or gastrostomy tube, colostomy, ileostomy, tracheostomy, traumatic or surgical wound). Just 0.2% had a history of surgery in the past 30 days.

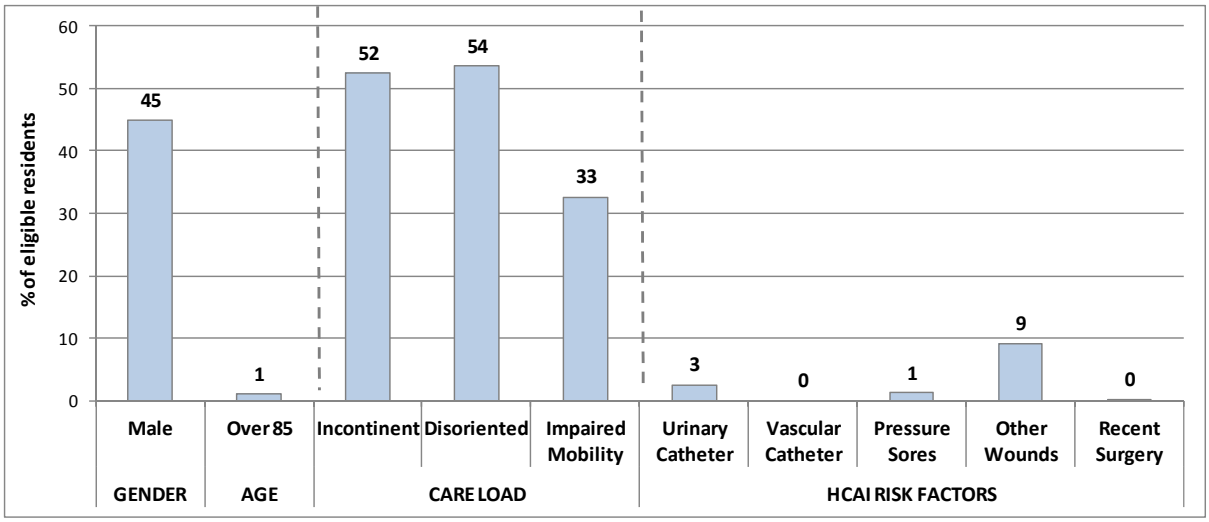

Figure 3.5.1 Resident demographics, care load indicators and HCAI risk factors in intellectually disabled LTCF.

3.5.3 HCAI in Intellectually Disabled LTCF

Of the 1,060 residents, 55 (5.1%) were reported to have signs or symptoms of infection. Of those, 46 ultimately met a HCAI definition. Therefore, the crude HCAI prevalence was 4.3% (median = 2.2%). Three residents had more than one HCAI. In total, there were 49 HCAI. (Table 3.5.1). There was wide variation in the HCAI prevalence by individual LTCF (0-46%), with eight (33%) reporting no residents with HCAI. However, one third of intellectually disabled LTCF surveyed fewer than 20 residents. Whilst the median HCAI prevalence was higher in HSE-owned than in voluntary intellectually disabled LTCF (4.1% vs 1.1%), this different was not significant due to small numbers of participants.

Table 3.5.1 HCAI prevalence in intellectually disabled LTCF.

HCAI prevalence data	
Number of LTCFs that participated in survey	24
Number of residents surveyed	1060
Number of residents with signs/symptoms of an infection	55
Number of residents with infections[a]	46
Number of infections	49
Residents with more than one infection	3
Crude prevalence of residents with a HCAI infection[b]	**4.3%**
National median prevalence	2.2%
National range (min - max)	0 - 46.7%
National interquartile range[c]	0 - 6.8%

[a] As defined by Stone *et al* 2012.[6]

[b] The crude prevalence of residents with a HCAI is the total number of residents with an infection divided by the total number of eligible residents.

[c] The interquartile range is the difference between the first quartile (25th percentile) and the third quartile (75th percentile) of an ordered range of data. It represents the middle fifty percent of the data.

Residents with HCAI: Demographics and HCAI Risk Factors

Of 46 residents with HCAI, the mean age was 56 years (range: 15 – 79) and the majority (91%) had been living in the LTCF for one year or longer. Recent hospital admission (within past three months) was reported for 4% of intellectually disabled LTCF residents with HCAI.

Table 3.5.2 displays a comparison of intellectually disabled residents with HCAI and the overall intellectually disabled population, with regard to demographics, care load indicators and HCAI risk factors. Residents with a HCAI were significantly more likely to be immobile (50% vs 33%) and to have 'other wound' types (35% vs 9%).

Table 3.5.2 Comparison of intellectually disabled resident demographics, care load indicators and risk factors for residents with a HCAI compared to the total intellectually disabled population.

Resident Characteristic	Total resident population (%)	Residents with an infection (%)	p value	Odd's ratio
Gender/Age				
male	45	52	0.3109	
> 85	1	0	0.4776	
Care Load				
Incontinent	52	59	0.3860	
Disoriented	54	46	0.2700	
Immobile	**33**	**50**	**0.0103**	**2.1**
HCAI Risk Factors				
Urinary Catheter	3	4	0.4280	
Vascular Catheter	0	0	-	
Pressure Sores	1	0	0.4397	
Other Wounds	**9**	**35**	**0.0000**	**6.1**
Recent Surgery	0	0	0.7630	

*An odd's ratio was only provided where the p-value reached significance (< 0.05).

HCAI Types

Four HCAI categories accounted for 92% of reported infections: RTI (17; 35%), skin infections (17; 35%), UTI (6; 12%) and eye/ear/nose/mouth infections (5; 10%). Figure 3.5.2 displays the distribution of the 49 HCAI, by infection category and Table 3.5.3 provides a further breakdown of the HCAI types within each category.

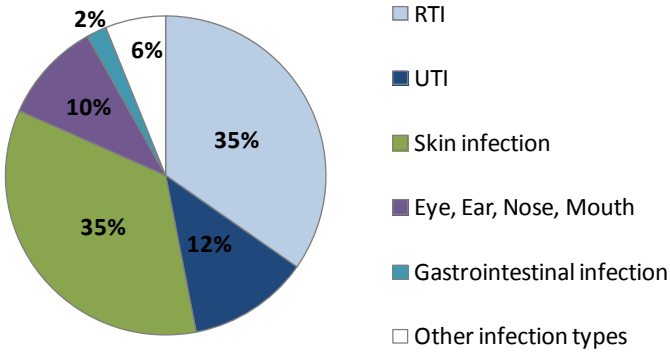

Figure 3.5.2 Distribution of HCAI in intellectually disabled residents, by infection category.

Table 3.5.3 HCAI breakdown in intellectually disabled residents, by HCAI type and prevalence (**Appendix C**).

Infection Type	Number of residents with infections	% of residents with infection
Respiratory Tract Infection	17	1.6%
Cold	*9*	*0.8%*
Pneumonia	*1*	*0.1%*
Flu	*0*	*0.0%*
Lower respiratory tract infection	*7*	*0.7%*
Skin	17	1.6%
Cellulitis	*16*	*1.5%*
Herpes	*1*	*0.1%*
Fungal	*0*	*0.0%*
Urinary Tract Infection	6	0.6%
Confirmed	*2*	*0.2%*
Probable	*4*	*0.4%*
Eye, Ear, Nose, Mouth	5	0.5%
Eye	*3*	*0.3%*
Ear	*2*	*0.2%*
Mouth	*0*	*0.0%*
Sinusitis	*0*	*0.0%*
Gastrointestinal	1	0.1%
Gastro	*1*	*0.1%*
C. difficile	*0*	*0.0%*
Other	3	0.3%
Bloodstream infection	*0*	*0.0%*
Fever	*1*	*0.1%*
Other	*2*	*0.2%*
Total number of residents with infections	**46**	**4.3%**

RTI

RTI along with skin infections were the most prevalent HCAI, affecting 1.6% of residents. Of the 17 RTI, most (53%) were further categorised as 'common cold/pharyngitis', followed by 'other lower respiratory tract infections' (41%) and 'pneumonia' confirmed by chest x-ray (6%). There were no cases of flu reported from intellectually disabled residents and it is notable that influenza activity in Ireland during May 2013 was at a low level.[7]

Skin Infections

Skin infections along with RTI were the most prevalent HCAI, affecting 1.6% of residents. Of the 17 skin infections, the vast majority (94%) were categorised as 'cellulitis/soft tissue/wound infections'. There were one case of herpes infection (i.e., herpes simplex/cold sore or herpes zoster/shingles).

UTI

UTI were the third most prevalent HCAI, affecting 0.6% of residents. Of the six UTI, most (66%) were further categorised as 'probable UTI', based on absence of a positive urine microbiology culture result.

Eye, Ear, Nose & Mouth Infections

This infection category was the fourth most prevalent, affecting 0.5% of residents. Of the five infections, conjunctivitis accounted for the majority (60%), followed by ear infection (40%).

Gastrointestinal Infections

There was one case of gastroenteritis in this category, affecting 0.1% of residents. No *C. difficile* infections were reported.

Other Infection Types

There were three additional infection types reported; 'unexplained fever' (1) and two residents with 'other' infections not categorised in the HCAI subtypes above. There were no cases of bloodstream infections reported from intellectually disabled residents.

3.5.4 Antimicrobial Use in Intellectually Disabled LTCF

Of the 1,060 intellectually disabled residents, 106 were prescribed systemic antimicrobials. Therefore, the crude prevalence of antimicrobial use was 10% (median = 11.1%). Six residents were prescribed more than one antimicrobial. In total, information on 115 antimicrobials was recorded (Table 3.5.4). The majority were administered via the oral route (96%), with only 1% intravenous. For the remaining 3%, another administration route was recorded. There was a wide variation in antimicrobial use prevalence by individual LTCF (0 – 42.6%), with four (17%) reporting no residents on antimicrobials. There was very little difference in the median antimicrobial use prevalence by ownership: HSE (7.4%, range: 0–42.9%) and voluntary (7.5%, range: 0–30%).

Table 3.5.4 Antimicrobial use prevalence in intellectually disabled LTCF.

Antimicrobial prevalence data	
Number of residents surveyed	1060
Number of residents on antimicrobials	106
Number of antimicrobials prescribed	115
Number of residents on more than one antimicrobial	6
Crude prevalence of residents on antimicrobials[a]	**10.0%**
National mean prevalence	11.1%
National median prevalence	7.5%
National range (min - max)	0 - 42.9%
National interquartile range	3.2 - 13.9%

Residents Prescribed Antimicrobials: Demographics, Care Load Indicators and HCAI Risk Factors

Of 106 residents prescribed antimicrobials, the mean age was 54 years (range: 15 – 90). The vast majority 92% had been living in the facility for one year or longer and 6% had a history of recent hospital admission (within past three months). Table 3.5.5 displays a comparison of intellectually disabled residents on antimicrobials and the overall intellectually disabled population, with regard to demographics, care load indicators and risk factors.

Intellectually disabled residents on antimicrobials were significantly more likely to be incontinent (65% vs 52%), immobile (50% vs 33%), to have a urinary catheter *in situ* (7% vs 3%) and 'other wound' types (25% vs 9%) when compared to the overall intellectually disabled population.

Table 3.5.5 Comparison of resident demographics, care load indicators and risk factors for residents on antimicrobials compared to the total eligible population.

	Total resident population (%)	Residents on an antimicrobial (%)	p value	Odd's ratio
Gender/Age				
male	45	52	0.128	
> 85	1	1	0.920	
Care Load				
Incontinent	**52**	**65**	**0.006**	**1.8**
Disoriented	54	61	0.092	
Immobile	**33**	**50**	**0.000**	**2.3**
HCAI Risk Factors				
Urinary Catheter	**3**	**7**	**0.005**	**3.3**
Vascular Catheter	0	0	-	
Pressure Sores	1	2	0.515	
Other Wounds	**9**	**25**	**0.000**	**4.3**
Recent Surgery	0	0	0.637	

Antimicrobial Prescribers & Prescribing Location

For each prescribed antimicrobial, information was sought regarding the prescribing location and the prescriber (Table 3.5.6). The majority of antimicrobials in intellectually disabled facilities (85%) were prescribed in the LTCF, followed by the hospital (14%).

GPs prescribed the majority of antimicrobials (51%), followed by directly-employed doctors (32%) and hospital-based specialists (16%).

Table 3.5.6 Antimicrobial prescriptions in intellectually disabled LTCF, by prescribing location and prescriber.

Where are antimicrobials prescribed?	%
In this facility	85
In the hospital	14
Elsewhere	1
Unknown	0

Who prescribes the antimicrobials?	%
GP	51
Medical doctor employed by the facility	32
Specialist	16
Other	1
Unknown	0

Reasons & Sites for which Antimicrobials were Prescribed

The reason for each of the 115 antimicrobials prescribed to intellectually disabled residents was recorded. Just over half were for treatment of infection (59; 51%), with the remainder for prevention of infection (hereafter known as prophylaxis) (56; 49%). Figure 3.5.3 displays the breakdown by the body site for which the 115 antimicrobials were prescribed. Combined, three body sites accounted for 90% of prescriptions.

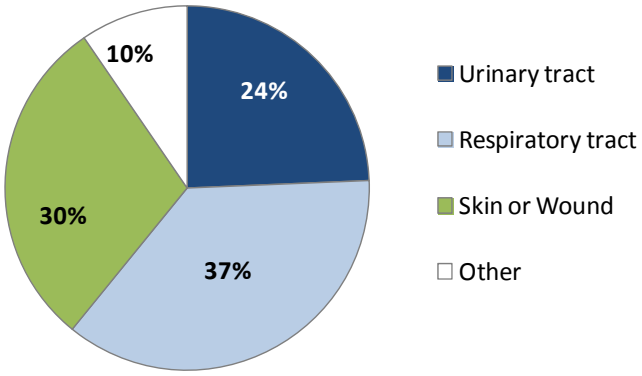

Figure 3.5.3 Prescribed antimicrobials, by body site indication.

Just over one third of prophylaxis was for UTI prevention (38%) followed by RTI prevention (36%) and skin/wound infection prevention (27%). Treatment of RTI (37%) and skin/wound infection (32%) were the most frequent indications for therapeutic antimicrobials (Figure 3.5.4).

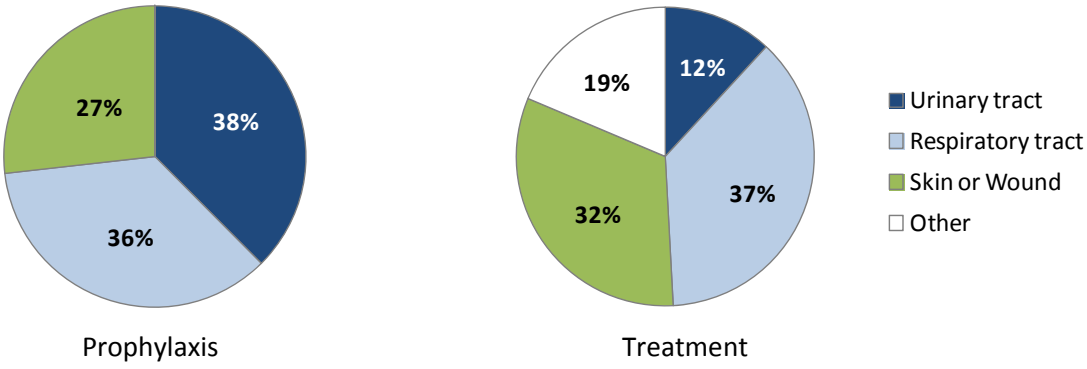

Figure 3.5.4 Breakdown of prophylaxis and treatment, by body site.

Respiratory Tract

The respiratory tract (RTI treatment or prophylaxis) accounted for 37% (n=42) of antimicrobials prescribed to intellectually disabled residents. The prevalence of antimicrobial use for the respiratory tract was 3.9% (prophylaxis 1.9% and treatment 2.0%).

Skin or Wound

The skin or wound (treatment or prophylaxis for skin/wound infection) accounted for 30% (n=34) of antimicrobials prescribed to intellectually disabled residents. The prevalence of antimicrobial use for the skin/wound was 3.1% (prophylaxis 1.4% and treatment 1.7%).

Urinary Tract

The urinary tract (UTI treatment or prophylaxis) accounted for 24% (n=28) of antimicrobials prescribed to intellectually disabled residents. The prevalence of antimicrobial use for the urinary tract was 2.6% (prophylaxis 2.0% and treatment 0.6%).

Prescribed Antimicrobials

Table 3.5.7 displays the most frequent antimicrobials prescribed to intellectually disabled residents:

i. Co-amoxiclav was the most common antimicrobial (14.8%). It was mostly prescribed to treat RTI (41%), UTI (12%) and skin/wound infections (12%). However, it was also prescribed for RTI prophylaxis (17%)
ii. Nitrofurantoin was the second most common antimicrobial (8.7%). It was only prescribed for the urinary tract, in particular for UTI prophylaxis (90%)

Table 3.5.7 Most frequently prescribed antimicrobials for intellectually disabled residents.

Antimicrobial name	Number of prescriptions (%)
co-amoxiclav	17 (14.8)
nitrofurantoin	10 (8.7)
trimethoprim	9 (7.8)
flucloxacillin	9 (7.8)
clarithromycin	9 (7.8)
amoxicillin	7 (6.1)
ciprofloxacin	7 (6.1)
tetralysal	6 (5.2)
vancomycin	6 (5.2)
cefalexin	5 (4.3)
azithromycin	4 (3.5)
phenoxymethylpenicillin	3 (2.6)
metronidazole	3 (2.6)
tetracycline	3 (2.6)
minocycline	3 (2.6)
cefixime	3 (2.6)
cefuroxime	2 (1.7)
other	9 (7.8)
Total	**115 (100)**

3.6 Psychiatric LTCF

3.6.1 Description of Care Type

There were 11 facilities in this category. The vast majority were HSE-owned (10; 91%), with one privately-owned. Psychiatric LTCF were distributed around Ireland: Munster (5), Connacht (2), Ulster (2) and Leinster (2), with each accommodating a median of 25 residents (range 12 – 110).

3.6.2 Description of Residents in Psychiatric LTCF

Of the 345 residents, females predominated (52%) and a minority (10%) were ≥85 years. Figure 3.6.1 displays resident demographics, care load indicators and risk factors for HCAI.

Care Load

Forty-three percent of residents were incontinent of faeces and/or urine. Residents with an indwelling urinary catheter were not counted as incontinent, as per the HALT protocol. Twenty-nine percent were disoriented in time and/or space and 23% were suffering from impaired mobility (wheelchair-bound or bed-ridden).

HCAI Risk Factors

Of the 345 psychiatric residents, 2% had a urinary catheter *in situ*. Vascular catheters were uncommon, with only 1% of all residents having his device. Pressure sores were present in 2% and 2% were reported to have an 'other wound' (i.e., leg ulcer, insertion site of a suprapubic catheter or gastrostomy tube, colostomy, ileostomy, tracheostomy, traumatic or surgical wound). Just 1% had a history of surgery in the past 30 days.

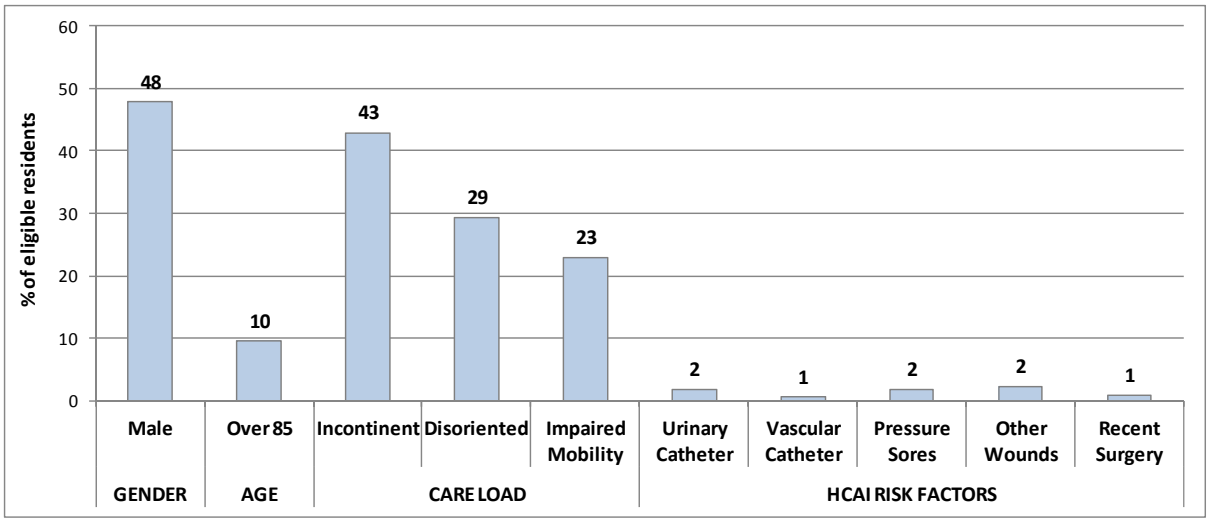

Figure 3.6.1 Resident demographics, care load indicators and HCAI risk factors in psychiatric LTCF.

3.6.3 HCAI in Psychiatric LTCF

Of the 345 residents, all 11 with signs or symptoms of infection ultimately met a HCAI definition (3.2%). Therefore, the crude HCAI prevalence was 3.2% (median = 4.3%). In total, there were 11 HCAI (Table 3.6.1).

Table 3.6.1 HCAI prevalence in psychiatric LTCF.

HCAI prevalence data	
Number of LTCFs that participated in survey	11
Number of residents surveyed	345
Number of residents with signs/symptoms of an infection	11
Number of residents with infections[a]	11
Number of infections	11
Residents with more than one infection	0
Crude prevalence of residents with a HCAI infection[b]	**3.2%**
National median prevalence	4.3%
National range (min - max)	0 - 9.1%
National interquartile range[c]	0 - 6.5%

[a] As defined by Stone *et al* 2012.[6]

[b] The crude prevalence of residents with a HCAI is the total number of residents with an infection divided by the total number of eligible residents.

[c] The interquartile range is the difference between the first quartile (25th percentile) and the third quartile (75th percentile) of an ordered range of data. It represents the middle fifty percent of the data.

Residents with HCAI: Demographics and HCAI Risk Factors

With regard to gender, age ≥85 years, care load indicators and most HCAI risk factors, there were no significant differences between the overall psychiatric population and the 11 residents with HCAI. Psychiatric residents with HCAI were significantly more likely to have 'other wound' types than the overall psychiatric population (18% vs 2%) as displayed in Table 3.6.2.

Table 3.6.2 Comparison of psychiatric resident demographics, care load indicators and risk factors for residents with HCAI compared to the the total psychiatric population.

Resident Characteristic	Total resident population (%)	Residents with an infection (%)	p value	Odd's ratio
Gender/Age				
male	48	36	0.4392	
> 85	10	9	0.9566	
Care Load				
Incontinent	43	45	0.8618	
Disoriented	29	36	0.5995	
Immobile	23	36	0.2801	
HCAI Risk Factors				
Urinary Catheter	2	0	0.6538	
Vascular Catheter	1	9	0.0638	
Pressure Sores	2	0	0.6538	
Other Wounds	**2**	**18**	**0.0246**	**12.1**
Recent Surgery	1	0	0.7522	

HCAI Types

Three HCAI categories accounted for 90% of reported infections: skin infections (5; 45%), RTI (3; 27%) and UTI (2, 18%). Figure 3.6.2 displays the distribution of the 11 HCAI, by infection category and Table 3.6.3 provides further breakdown of the HCAI types within each category. Skin infections (all 'cellulitis/soft tissue/wound infections') were the most prevalent HCAI, affecting 1.4% of residents. RTI were the second most prevalent HCAI, affecting 0.9%, followed by UTI, affecting 0.6%.

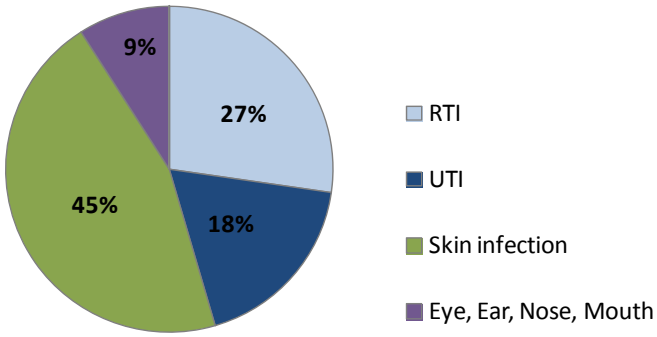

Figure 3.6.2 Distribution of HCAI in psychiatric LTCF, by infection category.

Table 3.6.3 HCAI breakdown in psychiatric LTCF, by HCAI type and prevalence (**Appendix C**).

Infection Type	Number of residents with infections	% of residents with infection
Skin	5	1.4%
Cellulitis	*5*	*1.4%*
Herpes	*0*	*0.0%*
Fungal	*0*	*0.0%*
Respiratory Tract Infection	3	0.9%
Cold	*1*	*0.3%*
Pneumonia	*1*	*0.3%*
Flu	*0*	*0.0%*
Lower respiratory tract infection	*1*	*0.3%*
Urinary Tract Infection	2	0.6%
Confirmed	*0*	*0.0%*
Probable	*2*	*0.6%*
Eye, Ear, Nose, Mouth	1	0.3%
Eye	*1*	*0.3%*
Ear	*0*	*0.0%*
Mouth	*0*	*0.0%*
Sinusitis	*0*	*0.0%*
Total number of residents with infections	**11**	**3.2%**

3.6.4 Antimicrobial Use in Psychiatric LTCF

Of the 345 psychiatric residents, 23 were prescribed systemic antimicrobials. Therefore, the crude prevalence of antimicrobial use was 6.7% (median = 4.7%). In total, information on 23 antimicrobials was recorded (Table 3.6.4). All were administered via the oral route. There was wide variation in the antimicrobial use prevalence by individual facility (0 - 21.4%).

Table 3.6.4 Antimicrobial use prevalence in psychiatric LTCF.

Antimicrobial prevalence data	
Number of residents surveyed	345
Number of residents on antimicrobials	23
Number of antimicrobials prescribed	23
Number of residents on more than one antimicrobial	0
Crude prevalence of residents on antimicrobials[a]	**6.7%**
National mean prevalence	7.7%
National median prevalence	4.7%
National range (min - max)	0 - 21.4%
National interquartile range	4.3 - 11.7%

Residents Prescribed Antimicrobials: Demographics, Care Load Indicators and HCAI Risk Factors

Table 3.6.5 displays a comparison of psychiatric residents on antimicrobials and the overall psychiatric population, with regard to demographics, care load indicators and risk factors. Of the 23 residents prescribed antimicrobials, the mean age was 76 years (range: = 61 – 94), the vast majority (83%) had been living in the facility for one year or longer and 13% had a history of recent hospital admission (within past three months). Of psychiatric residents prescribed antimicrobials, there were significantly fewer males versus the overall psychiatric population (26% vs 48%; p-value 0.031, OR: 0.4) and significantly more with a vascular catheter *in situ* (9% vs 1%) when compared to the overall psychiatric population.

Table 3.6.5 Comparison of resident demographics, care load indicators and risk factors for psychiatric residents on antimicrobials compared to the total psychiatric population.

	Total resident population (%)	Residents on an antimicrobial (%)	p value	Odd's ratio
Gender/Age				
male	**48**	**26**	**0.0307**	**0.4**
> 85	10	17	0.1865	
Care Load				
Incontinent	43	61	0.0715	
Disoriented	29	30	0.8993	
Immobile	23	26	0.7064	
HCAI Risk Factors				
Urinary Catheter	2	0	0.5090	
Vascular Catheter	**1**	**9**	**0.0000**	**NA**
Pressure Sores	2	4	0.3219	
Other Wounds	2	9	0.1049	
Recent Surgery	1	0	0.6420	

NA: An Odd's ratio could not be calculated for vascular catheter as one cell had a zero.

Antimicrobial Prescribers & Prescribing Location

For each prescribed antimicrobial, information was sought regarding the prescribing location and the prescriber (Table 3.6.6). The majority of antimicrobials in psychiatric LTCF (74%) were prescribed in the LTCF, 22% were prescribed elsewhere and 4% were prescribed in the hospital.

GPs prescribed the majority of antimicrobials (66%), jointly followed by directly-employed doctors (17%) and hospital-based specialists (17%).

Table 3.6.6 Antimicrobial prescriptions in psychiatric LTCF, by prescribing location and prescriber.

Where are antimicrobials prescribed?	%
In this facility	74
In the hospital	4
Elsewhere	22
Unknown	0

Who prescribes the antimicrobials?	%
GP	65
Medical doctor employed by the facility	17
Specialist	17
Other	0
Unknown	0

Reasons & Sites for which Antimicrobials were Prescribed

The reason for each of the 23 antimicrobials prescribed to psychiatric residents was recorded. The majority were for treatment of infection (17; 74%), with the remainder for prevention of infection (hereafter known as prophylaxis) (6; 26%). Figure 3.6.3 displays the breakdown by the body site for which the 23 antimicrobials were prescribed, with a relatively even distribution of urinary, respiratory and skin/wound indications.

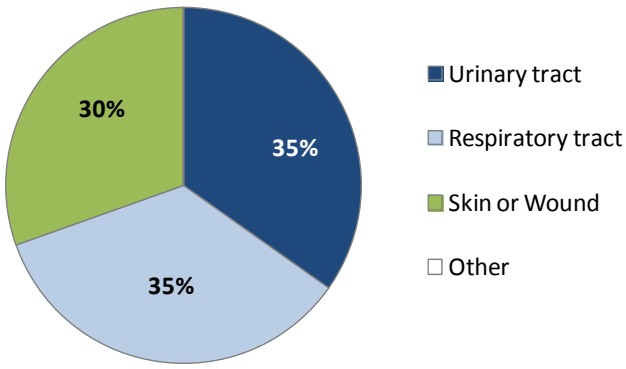

Figure 3.6.3 Prescribed antimicrobials, by body site indication.

Figure 3.6.4 displays the breakdown of prophylaxis and treatment, by body site. The majority of prophylaxis was for UTI prevention (67%), with the remainder for skin/wound infection prevention (33%). RTI accounted for the largest proportion of antimicrobial therapy (47%).

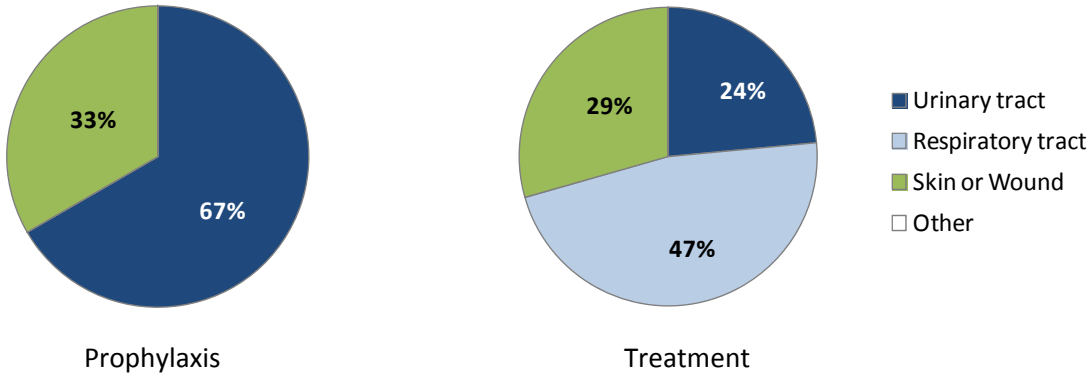

Figure 3.6.4 Breakdown of prophylaxis and treatment, by body site.

Prescribed Antimicrobials

Table 3.6.7 displays the most frequently prescribed antimicrobials in psychiatric LTCF:

i. Co-amoxiclav was the most common antimicrobial (30.4%). It was mostly prescribed to treat RTI (43%) and UTI (43%)
ii. Flucloxacillin was the second most common antimicrobial (17.4%) and was prescribed to treat skin/wound infections

Table 3.6.7 Most frequently prescribed antimicrobials in psychiatric LTCF.

Antimicrobial name	Number of prescriptions (%)
co-amoxiclav	7 (30.4)
flucloxacillin	4 (17.4)
trimethoprim	2 (8.7)
amoxicillin	2 (8.7)
clarithromycin	2 (8.7)
tetracycline	2 (8.7)
other	4 (17.4)
Total	**23 (100)**

3.7 Other LTCF Care Types

3.7.1 Palliative Care

3.7.1.1 Description of Care Type and Residents

There were four LTCF in this category and all were owned by voluntary services, accommodating a median of 24 residents (range: 12 – 46). Of the 89 residents, there was a slight female predominance (56%), with the vast majority <85 years (91%). Figure 3.7.1 displays resident demographics, care load indicators and risk factors for HCAI.

Care Load

Twenty-seven percent of residents were incontinent of faceces and/or urine. Residents with an indwelling urinary catheter were not counted as incontinent, as per the HALT protocol. Twenty-six percent were disoriented in time and/or space and 60% were suffering from impaired mobility (wheelchair-bound or bed-ridden).

HCAI Risk Factors

Of 89 palliative care residents, 31% had a urinary catheter and 10% had a vascular catheter *in situ*. Pressure sores were present in 9% and 36% were reported to have an 'other wound' (i.e., leg ulcer, insertion site of a suprapubic catheter or gastrostomy tube, colostomy, ileostomy, tracheostomy, traumatic or surgical wound). Just 1% had a history of surgery in the past 30 days.

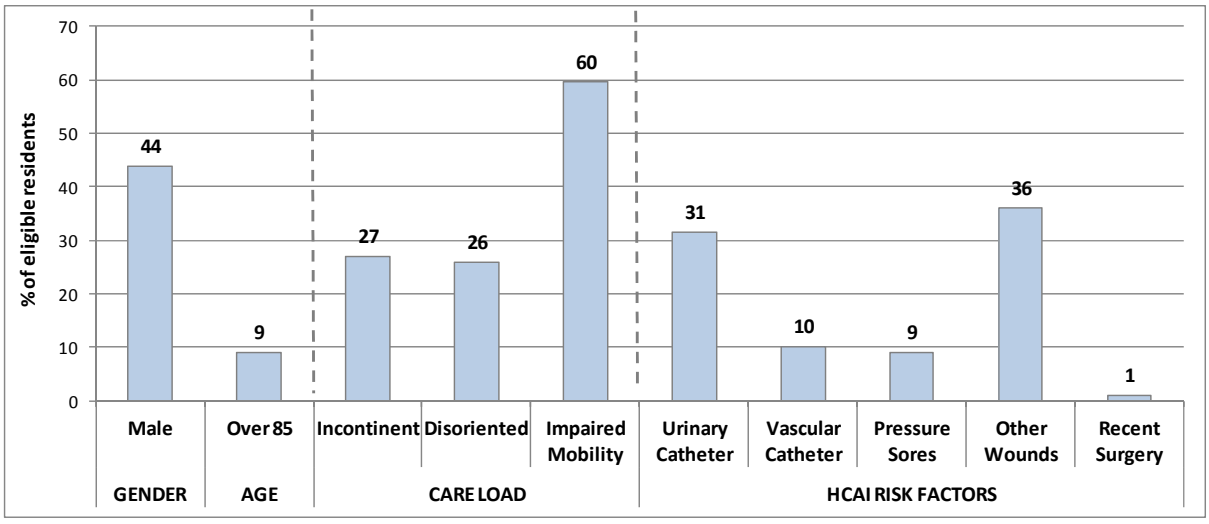

Figure 3.7.1 Resident demographics, care load indicators and HCAI risk factors in palliative care LTCF.

3.7.1.2 HCAI in Palliative Care LTCF

Of the 89 residents, 21 were reported to have signs or symptoms of infection. Of those, 18 ultimately met a HCAI definition. Therefore, the crude HCAI prevalence was 20.2% (median = 18%). In total, there were 19 HCAI (Table 3.7.1).

Table 3.7.1 HCAI prevalence in palliative care LTCF.

HCAI prevalence data	
Number of LTCFs that participated in survey	4
Number of residents surveyed	89
Number of residents with signs/symptoms of an infection	21
Number of residents with infections[a]	18
Number of infections	19
Residents with more than one infection	1
Crude prevalence of residents with a HCAI infection[b]	**20.2%**
National median prevalence	18%
National range (min - max)	8.3 - 27%
National interquartile range[c]	14.1 - 21.8%

[a] As defined by Stone *et al* 2012.[6]

[b] The crude prevalence of residents with a HCAI is the total number of residents with an infection divided by the total number of eligible residents.

[c] The interquartile range is the difference between the first quartile (25th percentile) and the third quartile (75th percentile) of an ordered range of data. It represents the middle fifty percent of the data.

HCAI Types

Four HCAI categories accounted for all reported infections: RTI (7; 37%), UTI (5, 26%), skin infections (4, 21%) and eye, ear, nose and mouth infection (3, 16%). Figure 3.7.2 displays the distribution of the 18 HCAI, by infection category and Table 3.7.2 provides further breakdown of the HCAI types within each category.

RTI were the most prevalent HCAI, affecting 7.9% of residents. UTI were the second most prevalent HCAI (5.6%), followed by skin infections (4.5%) and eye, ear, nose and mouth infections (3.4%).

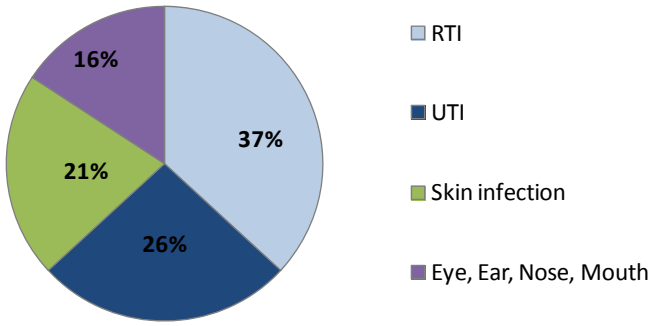

Figure 3.7.2 Distribution of HCAI in palliative care LTCF, by infection category.

Table 3.7.2 HCAI breakdown in palliative care LTCF, by HCAI type and prevalence (**Appendix C**).

Infection Type	Number of residents with infections	% of residents with infection
Respiratory Tract Infection	7	7.9%
Cold	*0*	*0.0%*
Pneumonia	*1*	*1.1%*
Flu	*0*	*0.0%*
Lower respiratory tract infection	*6*	*6.7%*
Urinary Tract Infection	5	5.6%
Confirmed	*2*	*2.2%*
Probable	*3*	*3.4%*
Skin	4	4.5%
Cellulitis	*3*	*3.4%*
Herpes	*1*	*1.1%*
Fungal	*0*	*0.0%*
Eye, Ear, Nose, Mouth	3	3.4%
Eye	*1*	*1.1%*
Ear	*0*	*0.0%*
Mouth	*2*	*2.2%*
Sinusitis	*0*	*0.0%*
Total number of residents with infections	**18**	**20.2%**

3.7.1.3 Antimicrobial Use in Palliative Care LTCF

Of the 89 palliative care residents, 31 were prescribed systemic antimicrobials. Therefore, the crude prevalence of antimicrobial use was 34.8% (median = 24.5%). In total, information on 38 antimicrobials was recorded (Table 3.7.3). The majority (89%) were administered via the oral route.

Table 3.7.3 Antimicrobial use prevalence in palliative care LTCF.

Antimicrobial prevalence data	
Number of residents surveyed	89
Number of residents on antimicrobials	31
Number of antimicrobials prescribed	38
Number of residents on more than one antimicrobial	6
Crude prevalence of residents on antimicrobials[a]	**34.8%**
National mean prevalence	28.1%
National median prevalence	24.5%
National range (min - max)	6.7 - 56.8%
National interquartile range	19.7 - 33%

Antimicrobial Prescribers & Prescribing Location

For each prescribed antimicrobial, information was sought regarding the prescribing location and the prescriber (Table 3.7.4). The majority of antimicrobials in palliative care (63%) were prescribed in the LTCF, 18% were prescribed in the hospital and 16% were prescribed elsewhere.

Hospital-based specialists (45%) and directly-employed doctors (45%) prescribed the majority of antimicrobials, with GPs prescribing 8%.

Table 3.7.4 Antimicrobial prescriptions in palliative care LTCF, by prescribing location and prescriber.

Where are antimicrobials prescribed?	%
In this facility	63
In the hospital	18
Elsewhere	16
Unknown	3

Who prescribes the antimicrobials?	%
GP	8
Medical doctor employed by the facility	45
Specialist	45
Other	0
Unknown	3

Reasons & Sites for which Antimicrobials were Prescribed

The reason for each of the 38 antimicrobials prescribed to palliative care residents was recorded. The majority were for treatment of infection (26; 68%), with the remainder for prevention of infection (hereafter known as prophylaxis) (12; 32%).

Figure 3.7.3 displays the breakdown by the body site for which the 38 antimicrobials were prescribed. The majority were prescribed for the respiratory tract (11; 29%) [predominantly for treatment of RTI (10)].

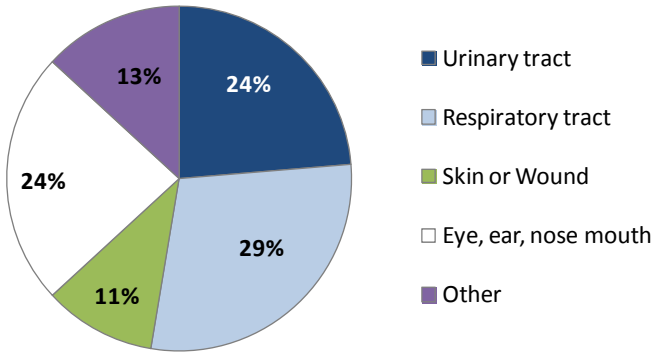

Figure 3.7.3 Body site for prescribed antimicrobials in palliative care LTCF.

Prescribed Antimicrobials

Table 3.7.5 displays the most frequent antimicrobials prescribed to palliative care residents:

i. Co-amoxiclav was the most common antimicrobial (21.1%). It was mostly prescribed to treat RTI (75%)

ii. Nystatin was the second most common antimicrobial (18.4%). It was prescribed to prevent oral candidiasis

Table 3.7.5 Most frequently prescribed antimicrobials for palliative care residents.

Antimicrobial name	Number of prescriptions (%)
co-amoxiclav	8 (21.1)
nystatin	7 (18.4)
ciprofloxacin	5 (13.2)
clarithromycin	3 (7.9)
trimethoprim	2 (5.3)
nitrofurantoin	2 (5.3)
metronidazole	2 (5.3)
other	9 (23.7)
Total	**38 (100)**

3.7.2 Rehabilitation LTCF

There were three LTCF in this category. Of the 139 residents, females predominated (60%) and 29% were ≥85 years. Care load indicators were less prevalent in this category (22% incontinent, 17% disoriented, 21% immobile). However, HCAI risk factors were prevalent (8% with urinary catheter *in situ*, 2% with an indwelling vascular catheter and 15% with 'other wounds' (i.e. leg ulcer, insertion site of a suprapubic catheter or gastrostomy tube, colostomy, ileostomy, tracheostomy, traumatic or surgical wound). Five percent had a history or surgey in the past 30 days.

HCAI

Of the 139 residents, 11 were reported to have a HCAI. Therefore, the crude HCAI prevalence was 7.9% (median = 8%). RTI (n = 4) and UTI (n = 4) were the most prevalent infection types, followed by skin infection (n = 1).

Antimicrobial Use

Of the 139 residents, 14 were prescribed systemic antimicrobials. Therefore the crude prevalence of antimicrobial use was 10.1% (median = 9.4%). Most were prescribed for a urinary tract indication (40%), 33% for the respiratory tract and 13% for skin or wounds. Antimicrobials were predominantly prescribed for therapeutic indications (87%).

3.7.3 Physically Disabled LTCF

There were three LTCF in this category, with a total of 46 residents surveyed. There were no residents reported to have a HCAI and no residents prescribed antimicrobials.

3.8 Microbiology Results – Pathogens & Antimicrobial Resistance

As per the HALT survey protocol, where an antimicrobial was prescribed, information was sought regarding whether or not a relevant microbiological sample had been taken from the resident prior to starting the antimicrobial. Of 971 systemic antimicrobial prescriptions, a relevant sample had been taken for 263 (27%). An associated microbiology result was available for 183 prescriptions and for 139 prescriptions, 158 pathogens were reported.

Figure 3.8.1 displays the breakdown of reported pathogens. *Escherichia coli* (*E. coli*) was the most frequently reported pathogen in microbiological samples taken from LTCF residents who were prescribed antimicrobials (33%). The majority of these were isolated from GN>12m (67%) with 17% isolated from Mixed>12m residents (Figure 3.8.2). *Staphylococcus aureus* was the second most frequently reported pathogen (22%). Similarly, the majority of these isolates were reported from GN>12m (74%) with 21% reported from Mixed>12m residents. Two residents in one LTCF were prescribed tuberculosis treatment.

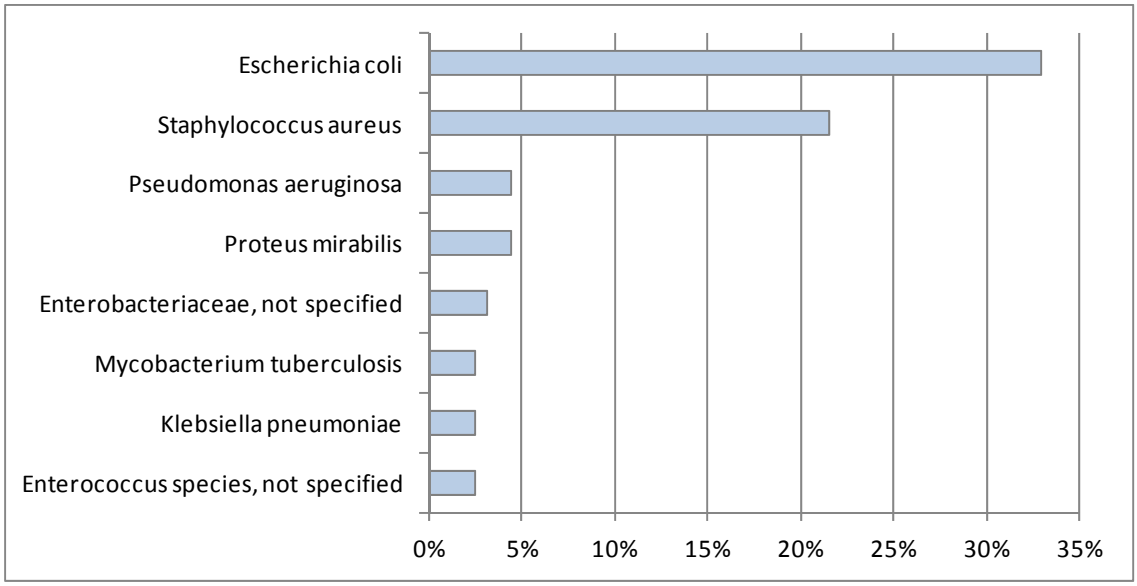

Figure 3.8.1 Breakdown of the most prevalent pathogens isolated from specimens with positive microbiology results.

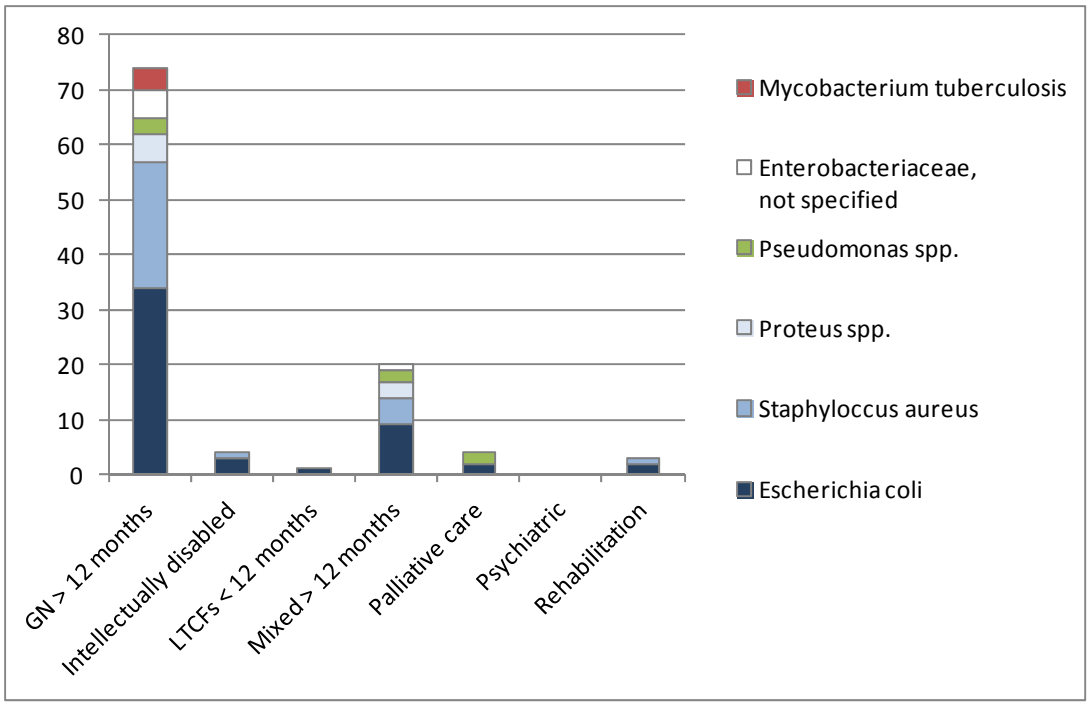

Figure 3.8.2 Breakdown of pathogens isolated, by care type.

Of 52 *E. coli* isolates, 29% were resistant to 3rd generation cephalosporins, 17% were susceptible and for 54%, antimicrobial susceptibility results were unknown. There were no cases of carbapenem resistant *Enterobacteriaceae* (CRE) reported (Figure 3.8.3).

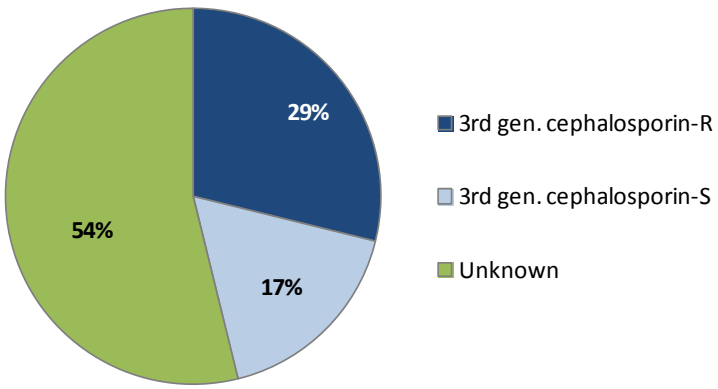

Figure 3.8.3 *E. coli* antimicrobial susceptibility results.

Of 34 *Staphylococcus aureus* isolates , 44% were resistant to meticillin/flucloxacillin (MRSA), 32% were susceptible (MSSA), and for 24%, antimicrobial susceptibility results were unknown (Figure 3.8.4).

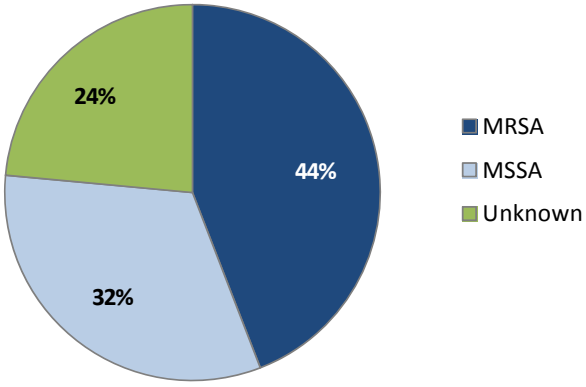

Figure 3.8.4 *Staphylococcus aureus* antimicrobial susceptibility results.

3.9 Previous HALT Surveys

The 2013 HALT survey was the third such PPS performed in Irish LTCF. A review of the key HCAI and antimicrobial use prevalence results across the three HALT surveys (May 2010, 2011 and 2013) is described in this section. Please see the '**Methods**' section for a more detailed description of differences in the methodology between the HALT surveys performed in 2010, 2011 and 2013.

3.9.1 HCAI: 2010 - 2013

Owing to differences in methodology and HCAI surveillance definitions used across the three HALT surveys, caution should be taken when reviewing the annual HCAI prevalence results, as they are not directly comparable. Table 3.9.1 displays an overview of the three HALT surveys. There was an annual increase in the number of participating LTCF and residents surveyed. The proportion of residents with signs and symptoms of infection who ultimately met a HCAI definition increased annually from 56% (2010) to 63% (2011) to 88% (2013).

Table 3.9.1 HCAI: 2010 – 2013.

	Year		
National HCAI prevalence data	**2010[a]**	**2011[a]**	**2013[b]**
Number of LTCFs that participated in survey	69	108	190
Number of residents surveyed	4170	5922	9318
Number of residents with signs/symptoms of an infection	266	384	563
Number of residents with infections[a]	149	242	497
Number of infections	156	253	511
Residents with more than one infection	7	11	14
Crude prevalence of residents with a HCAI infection, %	**3.6**	**4.1**	**5.3**
National median prevalence, %	2.8	4.2	4.2
National interquartile range, %	0 - 5.5	1.9 - 7.2	1.9 - 8.3

[a] Adapted McGeer: McGeer definition using physician diagnosis as a criterion. [4]

[b] As defined by Stone *et al* 2012.[6]

The three commonest care types in all three HALT surveys were; GN>12m, Mixed>12m and intellectually disabled LTCF. Table 3.9.2 displays the annual number of participants, eligible residents

and median HCAI prevalence for each care type. Again, caution should be taken when reviewing the annual HCAI prevalence results, as they are not directly comparable.

Table 3.9.2 HCAI prevalence in the three commonest care types: 2010 – 2013.

Care type	Year	Number of LTCFs	Number of residents	Median HCAI prevalence (%)
GN > 12 months	2010	30	2,487	2.7
	2011	58	3,916	4.0
	2013	103	5,807	4.2
Mixed > 12 months	2010	16	660	1.5
	2011	16	778	2.9
	2013	26	1,409	6.1
Intellectually disabled	2010	8	510	2.4
	2011	15	740	4.8
	2013	24	1,060	2.2

HCAI Types

The annual breakdown of HCAI is displayed in Figure 3.9.1. Caution is required when reviewing the annual results, because substantial revisions were made to the definitions of some HCAI types for the 2013 HALT survey:

- The RTI categories of cold/pharyngitis and influenza no longer included the criterion 'physician diagnosis': The definitions of the HCAI types, pneumonia and other lower RTI were also revised to reflect the revised SHEA/CDC criteria
- The UTI category was revised to reflect the revised SHEA/CDC criteria. Whilst residents with suspected UTI were stratified by presence or absence of a urinary catheter, the criterion 'physician diagnosis' was removed and UTI were ultimately categorised as 'confirmed' or 'probable' based on availability of a urine culture result

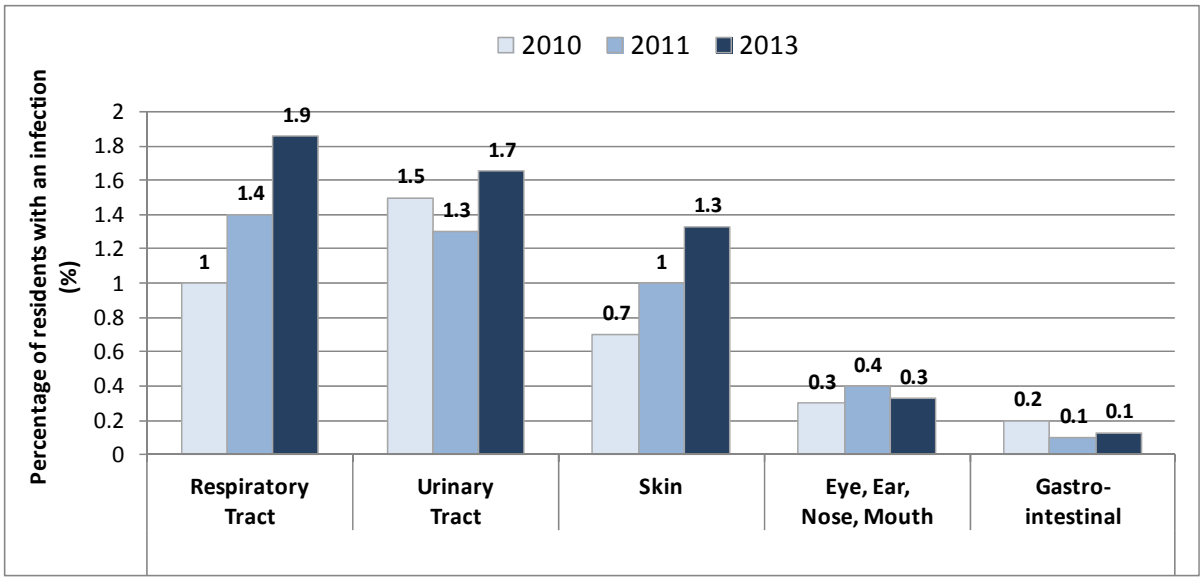

Figure 3.9.1 Prevalence of HCAI types: 2010 – 2013.

3.9.2 Antimicrobial Use: 2010 - 2013

Table 3.9.3 provides an overview of the antimicrobial use prevalence across the three HALT surveys. There was a slight decrease in the median prevalence between 2011 and 2013 (10% versus 9.7%). There has been no increase in the proportion of antimicrobials administered via the intravenous route across the three surveys. The vast majority were administered via the oral route.

Table 3.9.3 Antimicrobial use prevalence: 2010 – 2013.

	Year		
National antimicrobial prevalence data	**2010**	**2011**	**2013**
Number of residents surveyed	4170	5922	9318
Number of residents on antimicrobials	426	601	913
Number of antimicrobials prescribed	453	636	971
Number of residents on more than one antimicrobial, (%)	25 (0.6)	34 (0.6)	55 (0.6)
Crude prevalence of residents on antimicrobials, %	**10.2**	**10.2**	**9.8**
National median prevalence, %	9.5	10	9.7
National interquartile range, %	5.3 - 14.3	7.4 - 14.2	5 - 14.5

Reasons & Sites for which Antimicrobials were Prescribed

Figure 3.9.2 displays the annual breakdown of the antimicrobial use prevalence, by body site. Although the urinary tract remained the most frequent site for which antimicrobials were prescribed, the proportion of residents on antimicrobials for the urinary tract declined between 2010 and 2013 (5.8% to 4.6%). Conversely, there was an increase in the proportion of residents on antimicrobials for the respiratory tract between 2011 and 2013 (2.3% to 2.9%).

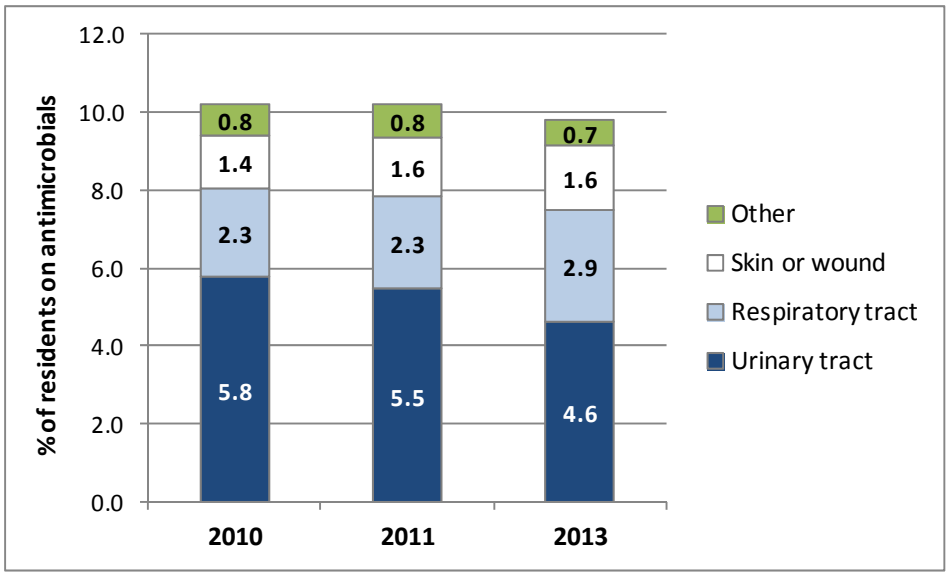

Figure 3.9.2 Breakdown of antimicrobial use prevalence, by body site: 2010 – 2013.

Figure 3.9.3 displays annual trends in the reasons for antimicrobials. Whilst the prevalence of prescribing for treatment of infection remained steady across the three HALT surveys, there was a downward trend in the prevalence of prescribing for prophylaxis.

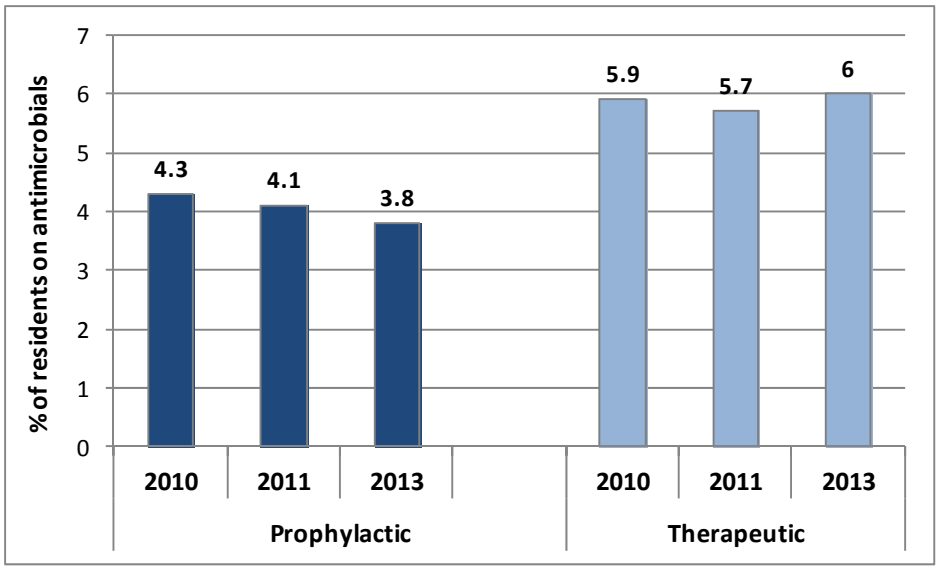

Figure 3.9.3 Reasons for prescribed antimicrobials: 2010 – 2013.

Figure 3.9.4 displays annual trends in the prevalence of prophylaxis and treatment, by body site. There was a decrease in UTI prophylaxis between 2010 and 2013 (3.8% to 2.8%) and an increase in RTI prophylaxis (0.2% to 0.5%). The prevalence of antimicrobial treatment remained stable.

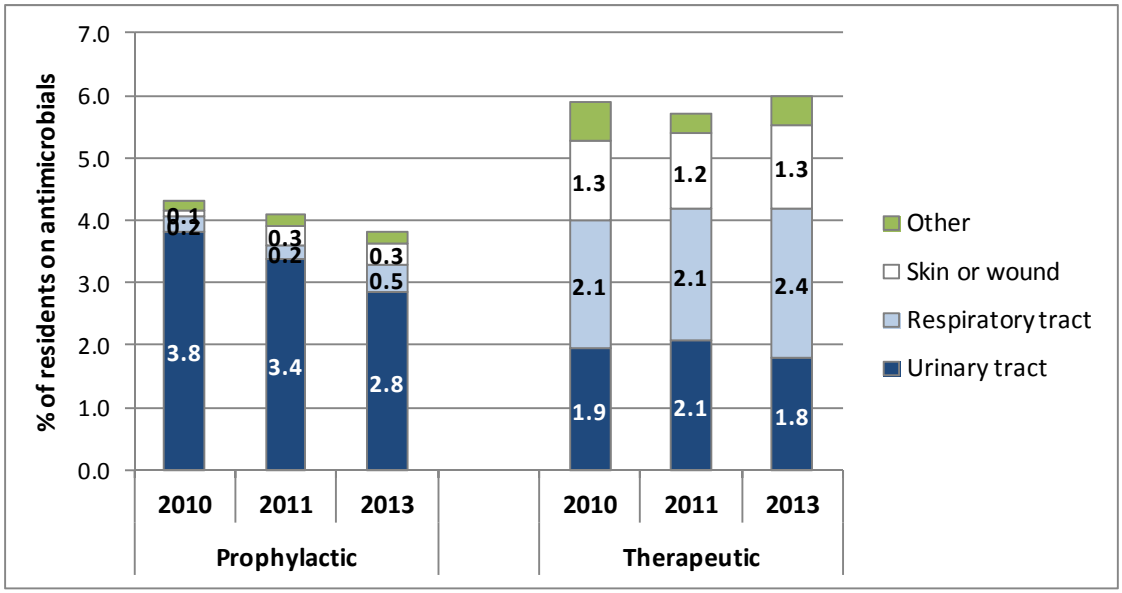

Figure 3.9.4 Reasons for prescribed antimicrobials by body site: 2010 – 2013.

Antimicrobial Use by Care Type

The three commonest care types in all three HALT surveys were GN>12m, Mixed>12m and intellectually disabled LTCF. Table 3.9.4 displays the annual number of participating LTCF, eligible residents and median antimicrobial use prevalence (overall, prophylactic and therapeutic) for each of those three care types. The median overall antimicrobial use prevalence decreased in the GN>12m group between 2010 and 2013 (11.9% to 9.1%). There was a welcome annual decrease in the prevalence of antimicrobial prophylaxis in the GN>12m and Mixed>12m groups. However, prophylaxis remained constant in intellectually disabled LTCF. Between 2011 and 2013, there was a slight decrease in the median therapeutic antimicrobial prevalence in GN>12m and a slight increase in Mixed>12m and intellectually disabled LTCF.

Table 3.9.4 Antimicrobial use prevalence in the three commonest care types: 2010 – 2013.

Care type	Year	Number of LTCFs	Number of residents	Antimicrobial prevalence (%)		
				Overall median	Prophylactic median	Therapeutic median
GN > 12 months	2010	30	2,487	11.9	3.7	5.7
	2011	58	3,916	10.3	2.9	6.0
	2013	103	5,807	9.1	2.8	5.1
Mixed > 12 months	2010	16	660	9.6	4.1	4.6
	2011	16	778	11.6	4.4	5.3
	2013	26	1,409	11.2	3.1	6.8
Intellectually disabled	2010	8	510	4.6	0	4.1
	2011	15	740	5.4	1.9	2.9
	2013	24	1,060	7.5	1.8	4.4

4. Discussion

Standards

In Ireland, facilities providing residential care to older people are legally required to register with the Health Information & Quality Authority (HIQA). In 2009, HIQA published the 32 National Quality Standards for Residential Care Settings for Older People in Ireland and such facilities are inspected by HIQA according to these standards.[8] In June 2013, a total of 570 LTCF, under either HSE, voluntary services or private ownership were registered with HIQA incorporating 34,851 beds. (Source: HIQA). It is estimated that just over one quarter of LTCF beds (26%) registered with HIQA participated in HALT 2013. There were clear differences in the levels of participation when LTCF were mapped by county (Figure 3.1.1 page 21). Effective July 2014, residential care settings for older people registered with HIQA will also be inspected according to the HIQA National Standards for Prevention and Control of HCAI.[9, 10] This is a welcome development as HCAI prevention and antimicrobial stewardship practices will be included as part of HIQA's monitoring inspections.

Inpatient facilities providing care and treatment to people with a mental illness must be listed on the register of approved centres, maintained by the Mental Health Commission (MHC), the responsible body for regulating and monitoring mental health services in Ireland. The MHC has published a Quality Framework for Mental Health Services in Ireland, which comprises 24 standards and mental health services are monitored according to these standards.[11] At 31st December 2012, there were 63 MHC-approved centres, incorporating 2,876 beds. However, a proportion of those centres and beds are designated for acute psychiatric care and not for long-term care (Source: MHC Annual Report 2012). It is estimated that 12% of all psychiatric care beds registered with the MHC (includes acute and long-term beds) participated in HALT 2013. In 2013, a memorandum of understanding was co-signed by the MHC and HIQA. The addition of a requirement for psychiatric LTCF to undertake HCAI prevention and antimicrobial stewardship to the MHC's standards should be progressed as a matter of priority, particularly as the HCAI prevalence in psychiatric LTCF residents was almost identical to that in GN>12m (4.3% and 4.2%, respectively).

Effective November 1st 2013, HIQA became the responsible body for regulation of residential services for children and adults with disabilities. This followed publication of the National Standards for Residential Services for Children and Adults with Disabilities in January 2013.[12]

The voluntary HALT survey provides participants with valuable information regarding infrastructure, models of medical care, IPC and antimicrobial stewardship practices, resident dependency levels, HCAI risk factors, HCAI and antimicrobial prescribing in Irish LTCF. Three HALT surveys have been undertaken in Ireland (May 2010, 2011 and 2013) and there has been a welcomed annual increase in the numbers of participants, including HSE, voluntary and private LTCF. In 2013, over half of participants performed the HALT survey for the first time (53%). In November 2013, each LTCF was provided with a HALT report displaying the local results and enabling comparison with the collective results for LTCF of the same care type. For prior HALT participants, review of the LTCF's performance over time was also provided.

Staffing

The HALT survey results demonstrate differences in the models of resident medical care delivery, by ownership and geographical location. GP-led medical care is the preferred model in privately-owned LTCF and within HSE-owned LTCF, it is much commoner in the West (64%) than the South of Ireland (13%). Regardless of the preferred medical care model, in accordance with HIQA and MHC standards, each facility should have a clearly defined management structure, to incorporate a defined system of clinical governance. The designation of a coordinating physician role, with oversight of all elements of resident medical care is a valuable addition to LTCF governance structures, especially as the median capacity of LTCF participating in HALT 2013 was 46 beds. However, the coordinating physician role is established in less than half of Irish LTCF overall, and just over one quarter of privately-owned LTCF participating in HALT 2013.

The model of primary care delivery in Ireland is unique, with medical care delivered both by group GP practices and individual GPs, with patients having the right to select their own GP. For example, if a resident's medical care in the community has been delivered by his or her local GP, the resident may prefer to remain under their own GP's care after moving into a LTCF. It is important that every effort is made to accommodate a resident's own preference for his/her medical care. Where a LTCF already has or plans to develop a designated coordinating physician post, it is particularly important that the GP-led and coordinating physician-led models of medical care do not become mutually exclusive and that residents benefit from the input of both types of healthcare professional.

There are many potential duties for a coordinating physician, depending upon the needs of each LTCF's resident population. The HALT survey results demonstrate how the presence of a coordinating physician was consistently associated with a higher prevalence of positive antimicrobial

stewardship practices. Access to a coordinating physician would undoubtedly have other potential benefits for resident medical care, beyond antimicrobial stewardship practices.

An alternative or complimentary option might be the resourcing of external healthcare professionals to provide specialist advice to all of the LTCF within a defined geographical area. For example, the resourcing of specialist input from a geriatrician with a community remit to review residents and their prescribed medicines, to identify opportunities to refine chronic medications and minimise polypharmacy issues and the input of a clinical microbiologist with a community remit, to provide guidance and education around the development of antimicrobial stewardship, infection prevention and control and surveillance programmes.

There is undoubtedly a severe shortage of specialist IPC resources for Irish LTCF. Almost four-in-ten of all LTCF participating in HALT 2013 (38%) reported having no access to a staff member with specialist IPC training and this deficit was even more marked in privately-owned LTCF (90% with no IPC-trained staff member). Within HSE-owned LTCF, the estimated ratio of WTE IPCN to LTCF beds displayed marked regional variation, with IPCN resources in Dublin, mid-Leinster and the North-East more plentiful than in the West and South. Additionally, when the map of the 2013 HALT participants (Figure 3.1.1, page 21) is viewed alongside the geographic distribution of IPCN posts (Figure 3.1.8, page 31), it is evident that LTCF without access to an IPCN were less likely to participate in the HALT survey.

Indeed the overall estimated WTE IPCN:LTCF bed ratio for Ireland of 1:496 is much higher than the 1:250, previously recommended by a Canadian expert group.[13] It should be noted that the Canadian recommendation was based on an evaluation of IPCNs working specifically within LTCF and did not take into account the much broader remit of the community-based IPCN role in Ireland. Typically, community IPCNs are involved in provision of IPC advice, education and training, development of policies, procedures and guidelines, audit and surveillance activity across the breadth of community health services, incorporating primary care, dentistry and long-term care. Therefore, it could be anticipated that the adequate community IPCN resource required in Ireland could be even higher than 1:250 LTCF beds.

It is also important to make the distinction between the knowledge and skills of a healthcare professional with specialist IPC training (IPCN) and a healthcare professional (e.g., staff nurse) who has received some introductory IPC training and has an interest in supporting the practice of the IPCN specialist, the so-called IPC link nurse or link practitioner.[14] In addition to enhancing the skills and practice of the IPC link practitioner, such roles support and facilitate the specialist role of the

IPCN. In recent years, courses providing an introduction to HCAI and IPC for healthcare workers, including LTCF staff have been faciliated by the HPSC, the Royal College of Surgeons in Ireland, University College Cork and the University of Limerick. Whilst the development of an IPC link role within each LTCF should be facilitated and encouraged, it cannot replace the urgent need to improve the overall specialist community IPCN staffing levels in Ireland.

To date, the HALT survey has not captured specific data on the staffing levels or staff skill mix (i.e., balance of nurses and healthcare assistants) within LTCF. It is recommended that this data is captured in future HALT surveys conducted in Ireland and these results be reviewed for each LTCF in the context of resident dependency levels, HCAI risk factors, HCAI and antimicrobial use prevalence rates. The requirement for each LTCF to have sufficient staff with necessary skills to deliver safe resident care is enshrined in both HIQA standards for residential care of older people and people with disabilities and in the MHC standards for psychiatric facilities.

The HALT survey clearly demonstrates the diversity within the Irish long-term care population. In an attempt to reflect this and provide a more meaningful interpretation of the data collected, LTCF were subdivided into eight separate care types, which best reflected the typical characteristics and length-of-stay for the majority of residents. The top three care types combined, which were predominantly long-stay facilities (GN>12m, Mixed>12m and intellectually disabled LTCF), accounted for 90% of residents surveyed. The results demonstrate differences between Irish LTCF care types, with regard to resident demographics, nursing care load indicators, HCAI risk factors, HCAI prevalence, HCAI types, antimicrobial use prevalence and antimicrobial prescribing practices. The female gender predominated across LTCF care types. Residents of intellectually disabled, psychiatric and palliative care LTCF tended to have a younger age profile than residents of other care types.

Links between the acute hospital and LTCF

Infection acquired within LTCF is a common issue, with a crude prevalence of 5.3% in all LTCF residents in May 2013. This figure is remarkably similar to the crude prevalence of hospital-acquired infection (HAI) reported from the May 2012 hospital PPS during which 9,030 inpatients in 50 acute hospitals were surveyed and 5.2% were reported to have a HAI.[15]

Whilst the results of the HALT and acute hospital PPS are not directly comparable, owing to different methodologies and different infection definitions that were utilised, they demonstrate similarities and differences in the types of infections commonly encountered in the two settings. For example, UTI was the second most prevalent in LTCF, affecting 1.7% of residents and the third most

prevalent in acute hospitals, affecting 0.8% of inpatients. Bloodstream infections were not reported in LTCF residents, but were the fourth most prevalent in acute hospital inpatients (0.7%).

The findings of the two PPS indicate that HCAI risk factor profiles are quite different between acute hospital and LTCF settings. For example, a history of recent surgery was reported in 18% of hospital inpatients versus 1.1% of LTCF residents. Indwelling vascular catheter use is much less common in LTCF settings (0.5%) versus 41% peripheral and 6% central vascular catheter prevalence in acute hospitals. Overall, urinary catheter prevalence in acute hospitals was 12% versus 6% in LTCF residents. However, urinary catheter use was particularly prevalent in the residents of palliative care facilities (31%).

In the 2012 acute hospital PPS, 2% of inpatients were prescribed antimicrobials to treat long-term care associated infection. During HALT 2013, 2% of LTCF residents were absent from the facility owing to hospitalisation, although the indication for each resident's hospitalisation was not collected. In the HALT survey, a history of hospitalisation within the past three months was sought for residents with a HCAI. Whilst recent hospitalisation was uncommon for intellectually disabled residents with HCAI (4%), it was common in GN>12m (21%), Mixed>12m (31%) and LTCF<12m (57%) residents with HCAI.

These results of the acute hospital and HALT surveys highlight the frequent exchange of patients/residents between acute hospitals and LTCF. They also indicate that infection acquired in LTCF may result in residents requiring hospitalisation for further management. Additionally, in the period following an acute illness for which hospitalisation is required, a LTCF resident may be more vulnerable to acquiring infection.

Therefore, it is critically important to ensure excellent communication between the acute hospital and the LTCF, especially when residents are being transferred between the two settings. For example, where hospital referral becomes indicated for a resident with influenza-like illness or diarrhoea of potentially infectious aetiology or a resident is being transferred from a LTCF with an ongoing infection outbreak, this information must be conveyed to the receiving healthcare facility to ensure safe placement and management of the resident. Likewise, where the resident is transferred back to the LTCF, all relevant information (e.g., colonisation or infection with multi-drug resistant organisms, presence of indwelling devices, ongoing antimicrobial therapy and infection issues) must be provided by the hospital to the LTCF prior to the arrival of the resident, again to faciliate safe placement and management. With this in mind, it is recommended that the development of a

generic inter-facility transfer template should be progressed at a national level and disseminated for local implementation by all acute hospitals and LTCF.

Additionally, the HALT survey has clearly shown how infection is as prevalent an issue in LTCF as in the acute hospital setting. Therefore, the implementation of evidence-based infection prevention practices are just as relevant in LTCF settings and the lack of access to IPCN resources in Irish LTCF needs urgent attention, regardless of ownership.

Surveillance & Antimicrobial Stewardship

The HALT survey has been particularly beneficial in highlighting the importance of HCAI and antimicrobial use in LTCF and in helping participants to identify potential areas for quality improvement. Ireland contributed approximately 10% of the total resident population in the European HALT survey conducted in 2010. This, combined with the annual increase in participating LTCF, highlights the ongoing dedication of healthcare professionals in Irish LTCF to improving the quality and safety of resident care. In spite of this, the majority of residential care facilities registered with HIQA did not participate in HALT 2013. It is recommended that evidence of each LTCF's participation in HALT surveys be actively sought during future monitoring inspections conducted by HIQA and the MHC and that all LTCF are encouraged to and facilitated in participating in future HALT surveys.

Repeating a PPS every one-to-two years does not provide the same level of comparative data as undertaking prospective incidence surveillance. It is recommended that HALT participants build on HCAI and antimicrobial stewardship surveillance skills, developed from participation in HALT surveys. Potential areas for local prospective surveillance by LTCF could include:

1. Daily monitoring of residents for new-onset of 'alert' symptoms and signs (fever, influenza-like-illness, diarrhoea, vomiting, conjunctivitis, rash etc.). Such a programme would greatly facilitate the early identification of potentially transmissible infections and mitigate the development of outbreaks
2. Surveillance of UTI
3. Surveillance of *C. difficile* infection
4. Periodic surveillance of antimicrobial use, which might be incorporated into the requirement for quarterly medicines reconciliation. This could be used to identify residents prescribed prophylaxis, to review and discontinue such antimicrobials, where appropriate and to audit compliance with local prescribing guidelines

It is recommended that surveillance protocols for each of the above be developed specifically for use by LTCF.

Guidelines for antimicrobial prescribing in primary care in Ireland were published in 2010 and updated in 2011. The updated version is available as a web version, suitable for use on mobile devices. The guidelines are endorsed by the RCPI Clinical Advisory Group for HCAI and Antimicrobial Resistance and by the ICGP. It is recommended that these guidelines are formally adopted for use in each LTCF. The guidelines may be viewed at www.antibioticprescribing.ie

Although the issue of antimicrobial resistance has been long-recognised, it has received increasing attention in recent years. Whilst improvements have been demonstrated in Ireland and abroad with regard to the proportions of invasive infections caused by MRSA, it remains a common pathogen in in LTCF, accounting for just under half of all *Staphylococcus aureus* isolates in HALT 2013 (44%).

Of particular concern is the successful dissemination of resistant *Enterobacteriaceae* (e.g., *E. coli* and *K. pneumoniae*) both in acute hospitals and LTCF. Infections caused by these bacteria are associated with increased morbidity and mortality.[16] Resistance genes encoding production of extended spectrum β lactamases (ESBLs), carbapenemases and conferring resistance to additional antimicrobial classes (e.g., fluoroquinolones and aminoglycosides) transmit readily among these bacteria. Outbreaks and increasing prevalence of resistant *Enterobacteriaceae* are well-described in Irish LTCF.[17-19] The prevalence of multi-drug resistant *Enterobacteriaceae* (i.e., ESBL positive and resistant to both fluorquinolones and aminoglycosides or carbapenemase-producers) has exhibited large increases in Ireland since 2010, with cases reported from both acute hospitals and LTCF (Source: HPSC). Indeed, just under one third (29%) of *E. coli* reported in HALT 2013 were resistant to 3rd generation cephalosporins, a potential marker for ESBL production. Strict attention to standard and contact precautions by all healthcare workers, careful antimicrobial stewardship, excellent communication between the acute hospital and LTCF, coupled with ongoing healthcare worker education and surveillance are critical to halting the progressive dissemination of multi-drug resistant bacteria. From the HALT survey, it is evident that Irish LTCF rarely receive information regarding the antimicrobial resistance profiles of common pathogens from their local microbiology laboratories. Such information is important for the development of local prescribing guidelines and to inform antimicrobial stewardship within LTCF.

Consideration should also be given to ensuring that regional HCAI and antimicrobial resistance commitees are developed further in Ireland and that such commitees are resourced to provide

support to LTCF, with regard to education and training on surveillance activities, analysis and feedback of comparative HCAI surveillance and antimicrobial resistance data.

Prevention & Education

Seasonal influenza is an annual event. A safe and effective vaccine is available, preventing up to 60% of influenza infections.[20, 21] Because of antigenic variance exhibited by the influenza virus, the vaccine must be administered on an annual basis to optimise the match between vaccine and circulating influenza types. The ideal time for vaccination is the autumn, prior to the anticipated onset of the annual influenza season, to facilitate the recipient in mounting an optimal immune response prior to potential exposure to the influenza virus. However, the vaccine may be administered at any time during the influenza season and should be considered for any person in a category for which annual seasonal influenza vaccine is recommended. National guidelines are available on the prevention and management of influenza outbreaks in residential care facilities, with vaccination of residents and healthcare workers key guideline recommendations.[22] Of the 190 LTCF participating in HALT 2013, 94% overall reported that annual seasonal influenza vaccine is offered to residents, with 67% of rehabilitation and 82% of psychiatric LTCF offering vaccination. A survey of influenza vaccine uptake in residents of HSE-owned LTCF during the 2012-2013 influenza season reported that 73% of residents had been immunised against influenza since the start of the season, a decline of 15% on the previous influenza season.[23]

Death is reported in 0.5-1.0 per 1000 cases of influenza. Research undertaken by the HPSC, as part of a wider European study estimates that over the last eight influenza seasons, between 200 and 500 people in Ireland died each year from influenza-related illness.[24] There is a wealth of evidence that the elderly are at increased risk of both hospitalisation and death from influenza infection.[25-27] During the 2012-13 influenza season in Ireland, 72 outbreaks of influenza-like-illness (ILI) were reported, with 63 ultimately confirmed as due to influenza. The majority of the outbreaks occurred in LTCF, predominantly affecting elderly patients. Of 32 deaths reported during the 2012-13 influenza season, the median patient age was 86 years and 10 of those deaths were associated with influenza outbreaks.[28]

LTCF residents are likely to come into contact with influenza virus via infected healthcare workers and visitors. The protective effect of the seasonal influenza vaccine is diminished in elderly or immunocompromised patients. It is for these reasons that vaccination of healthcare workers is recommended in Irish immunisation guidelines.[29] However, a survey of influenza vaccine uptake in healthcare workers employed in HSE-owned Irish LTCF, with 89% of LTCF providing data, reported

that only 15% availed of the opportunity to receive annual seasonal influenza vaccine during the 2012-13 influenza season.[23] A recent systematic review of the effect of influenza vaccination of healthcare personnel on morbidity and mortality among patients concluded that this intervention can enhance patient safety as there is evidence that it reduces the rate of hospitalisation and death due to influenza.[30] Seasonal influenza vaccination should be offered to all residents and staff of Irish LTCF, regardless of ownership, throughout the season, with up-to-date records maintained of resident and staff immunisation status. It is imperative that residents and staff have easy access to vaccination in the workplace and that clear and accurate information is provided to inform their decisions on vaccination. The percentage of residents and staff immunised against influenza should be a key performance indicator subject to regular review by the senior management team of every LTCF.

In addition to annual seasonal influenza vaccination, LTCF residents should be assessed for immunisation against *Streptococcus pneumoniae* and hepatitis B virus, where recommended by the Immunisation Guidelines for Ireland. Up-to-date and accessible vaccination records should be maintained for every resident.

The use of antimicrobials to prevent infection (prophylaxis) is not uncommon. However, the evidence for this practice is limited, especially for the indications where it appears to be most frequently used in LTCF. In the 2013 HALT survey, UTI prevention accounted for the majority of prophylactic prescribing. However, prophylaxis against RTI and skin infection was particularly prevalent in the intellectually disabled LTCF and it is recommended that the indications for and duration of prophylaxis in this resident population should be further evaluated in conjunction with any available evidence for such practices. In the largest care type (GN>12m), 86% of all prophylaxis was for UTI prevention. The majority was prescribed within the LTCF (87%), with hospital-based specialists accounting for just 11% of prophylactic antimicrobials.

In 2011, national guidelines for the prevention of catheter-associated UTI were published by the HPSC and after the publication of the 2011 HALT national report, the HALT steering group and community antimicrobial stewardship committee developed a guideline for diagnosis and management of UTI in long-term care residents >65 years, which states that antimicrobial prophylaxis is not recommended for the prevention of symptomatic UTI in catheterised patients.[31, 32] It is therefore of concern that 16% of GN>12m residents prescribed UTI prophylaxis in 2013 were reportedly catheterised.

The 2011 guideline also states that antimicrobial prophylaxis may be considered in patients for whom the number of urinary infections are of such frequency or severity that they chronically

impinge on function and well-being.[32, 33] Guidance is also provided on signs and symptoms of UTI, the indications for sending a urine specimen to the microbiology laboratory and on the interpretation of culture results. In 2013, the GN>12m residents who were prescribed antimicrobial prophylaxis were significantly more likely to be female, incontinent, disoriented and immobile and the majority had been resident in the LTCF for more than one year. Where residents are incontinent and disoriented, typical signs and symptoms of recurrent UTI may be more difficult to elicit. Therefore, one might expect that it would be more difficult to justify the use of prophylaxis in such patients, particularly where diagnostic uncertainty is commonplace.[33]

The staff who work in LTCF need education regarding the differences between asymptomatic bacteriuria and symptomatic UTI. The presence of a positive urinary culture in the absence of urinary tract-specific signs and symptoms may not equate to a UTI. It is possible that residents may have been mistakenly labelled as suffering from recurrent UTIs, solely on the basis of repeated positive urine culture results. The most prescribed UTI prophylaxis agents were trimethoprim (86% of all trimethoprim prescribed for GN>12m residents) and nitrofurantoin (71% of all nitrofurantoin prescribed for GN>12m residents).

The HALT survey did not capture data regarding the duration of the prescription. However, it is recommended that a trial of urinary tract prophylaxis should not exceed six months.[33, 34] The decision to prescribe prophylaxis should not be taken lightly and the resident must be fully informed of the potential risks associated with antimicrobial exposure, particularly their increased susceptibility to *Clostridium difficile* infection.

It is also important that any resident for whom nitrofurantoin is being prescribed for a prolonged period is counselled about the potential serious complications of hepatic and pulmonary toxicity.[35] In France, following a national drug monitoring alert issued in 2011, based on a frequency of one case of severe hepatic or pulmonary toxicity per 7,666 nitrofurantoin prescriptions >1 month duration, the French Agency for the Safety of Medicine and Health Products (ANSM) published guidelines which recommended that nitrofurantoin must not be used for UTI prophylaxis.[36]

Those who prescribe and dispense antimicrobials must understand that when an antimicrobial is prescribed for long-term prophylaxis, that agent may be lost as a future potential therapeutic agent, owing to the development of antimicrobial resistance. The emergence and dissemination of ESBL-producing *Enterobacteriaceae* in LTCF is a cause for concern. Nitrofurantoin is one of the very limited oral antimicrobial options for treating uncomplicated UTI due to ESBL-producing *E. coli* and the loss of this agent via uncontrolled prophylaxis further diminishes therapeutic options. Finally,

indiscriminate and prolonged courses of antimicrobial prophylaxis are costly both in economic terms and in valuable nursing time, with regard to daily dispensing and administration.
There is evidence that the repeated HALT surveys and publication of the UTI guideline for LTCF have had a positive impact on reducing prophylactic prescribing in Ireland. The overall prevalence has decreased from 4.3% to 3.8% and the UTI prophylaxis prevalence has decreased from 3.8% to 2.8%, between 2010 and 2013.

Older age, immunocompromise and antimicrobial exposure are major risk factors for CDI. National guidelines for the surveillance, diagnosis and management of CDI were updated in 2013 it is recommended that they are also implemented by all Irish LTCF.[37]

Prospective surveillance and feedback of antimicrobial consumption is a key component of any antimicrobial stewardship programme and it is recommended that this is advanced in each LTCF.[38] Consumption surveillance could be reported for the overall LTCF, broken down further for individual units/wards within the LTCF or for individual prescribers. Where the LTCF receives the supply of prescription medication from an acute hospital pharmacy or a community pharmacy, a summary report of antimicrobial consumption and expenditure by that LTCF should be requested on a periodic basis (i.e., quarterly or biannually) by mutual agreement between the LTCF and pharmacy management. The findings of each report should be formally discussed locally, fed back to medical and nursing staff and trends monitored over time. With new developments in information technology being utilised in general practice, GPs may also be able to obtain electronic summary reports of their individual antimicrobial prescribing practices. The ability to further stratify prescribing by patient/resident location and by indication should be sought. It is recommended that the future provision of prescriber-level feedback to GPs on antimicrobial use be explored via existing mechanisms, such as the Irish Primary Care Research Network.

As most GPs are self-employed and based within the community, it is important that they have easy access to ongoing educational activities on HCAI prevention and management, antimicrobial resistance and antimicrobial stewardship and that such educational activities are linked to continuing professional development credits, as part of the annual requirements of clinical professional competence schemes. Educational materials should be available via a variety of routes, including e-learning, publications and face-to-face educational workshops. The development of specific educational ‘toolkits’ for HCAI prevention and antimicrobial prescribing for use by trainee GPs and GPs should be progressed, in conjunction with the ICGP.

LTCF residents and their families have an important role to play in the prevention of HCAI and antimicrobial resistance in LTCF. Residents and their visitors should receive practical education on the importance of social hand hygiene and be provided with easy access to hand hygiene products. It is also recommended that educational materials, including information leaflets and access to on-line resources be developed specifically for use by LTCF residents and their families. Information leaflets on hand hygiene, influenza vaccination, prudent use of antibiotics and resistant organisms, such as MRSA, extended spectrum beta lactamases (ESBLs), CRE and vancomycin resistant enterococci (VRE) should be developed for LTCF and displayed prominently within each LTCF. The local HALT survey results and quality improvement plans within each LTCF should also be shared with residents and their families.

5. Priorities for Implementation

Immediate priorities

1. Existing national guidelines for antimicrobial prescribing in primary care (www.antibioticprescribing.ie) should be formally implemented in every LTCF
2. Existing national guidelines for prevention of HCAI should be formally implemented in every LTCF
3. Seasonal influenza vaccination should be offered to all residents of LTCF and the percentage of LTCF residents immunised against influenza should be a key performance indicator
4. Seasonal influenza vaccination should be offered to all staff of LTCF and the percentage of LTCF staff immunised against influenza should be a key performance indicator
5. UTI prophylaxis should not be prescribed to residents with indwelling urinary catheters
6. Where UTI prophylaxis is deemed to be indicated, the resident should be counselled regarding the potential risks and this should be documented. The duration of prophylaxis should never exceed six months without a formal review by the prescriber
7. The provision of periodic antimicrobial consumption summary reports to individual LTCF by the local dispensing pharmacy should be developed

Short–to-medium term priorities

1. The requirement for every LTCF to implement and demonstrate ongoing evidence of local HCAI prevention programmes and antimicrobial stewardship practices should be clearly stated within the regulatory standards for registration and inspection of all types of LTCF
2. The appointment of a minimum of one whole-time equivalent (WTE) specialist community IPCN per 250 LTCF beds should progressed, with priority given to areas without any existing specialist community IPCN resource
3. The development of the infection prevention and control (IPC) link practitioner/nurse role within the existing staff of each LTCF should also be encouraged and facilitated
4. There should be an overarching mechanism within each LTCF to ensure the coordination of resident medical care and this could be further enhanced by the adequate resourcing of access to external expert advice at a regional level
5. The development of a national inter-healthcare facility transfer communication template should be progressed and implemented in every acute hospital and LTCF

6. The development of national protocols and guidance for local HCAI incidence surveillance and antimicrobial stewardship should be progressed
7. The capacity of local IT systems to provide prescriber-level feedback to individual GPs, regarding antimicrobial prescribing should be developed and progressed
8. Periodic reports of regional microbiology laboratory antimicrobial resistance data on key pathogens isolated in specimens submitted from LTCF residents should be progressed through regional HCAI and antimicrobial resistance committees
9. Every LTCF must have a formal programme for ongoing staff education and training on HCAI prevention practices and antimicrobial stewardship practices.
10. Educational and training materials on HCAI prevention and management, antimicrobial stewardship and antimicrobial resistance should be developed specifically for use by GPs in training and in practice.
11. Educational materials (e.g., information leaflets, on-line resources) of relevance to HCAI prevention and antimicrobial stewardship should be developed specifically for and accessible by both LTCF residents and their families/carers

Medium-to-long term priorities

- Future HALT surveys should capture information regarding nursing and healthcare assistant staffing levels and skill mix within participating LTCF
- Participation in future HALT surveys should be actively encouraged by the HSE Social Care Directorate and by the licensing and regulatory bodies for LTCF in Ireland
- Regional HCAI and antimicrobial resistance committees should be further developed, with a remit to also provide education, training and support for analysis and feedback of HCAI surveillance data to individual LTCF

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7. Appendices

7.1 Appendix A: List of Acronyms used in this Report

ABHR	Alcohol-Based Hand Rub
ASC	Antimicrobial Stewardship Committee
CDC	US Centers for Disease Control & Prevention
CDI	*Clostridium difficile* infection
CRE	Carbapenem resistant *Enterobacteriaceae*
ECDC	European Centre for Disease Prevention and Control
ESBL	Extended Spectrum Beta Lactamase
FAQ	Frequently-Asked Questions
GN>12m	General nursing homes with LOS > 12 months
GP	General Practitioner
HAI	Hospital-acquired Infection
HALT	Healthcare-Associated Infections in Long-Term Care Facilities
HCAI	Healthcare-Associated Infection
HIQA	Health Information & Quality Authority
HPSC	Health Protection Surveillance Centre
HSE	Health Service Executive
IPC	Infection Prevention & Control
IPCC	Infection Prevention & Control Committee

IPCN	Infection Prevention & Control Nurse
LOS	Length-of-Stay
LTCF	Long-Term Care Facility
LTCF<12m	LTCF (either general nursing home or mixed care type) with LOS < 12 months
MHC	Mental Health Commission
Mixed>12m	Mixed care facilities with LOS > 12 months
MRSA	Meticillin Resistant *Staphylococcus aureus*
MSSA	Meticillin Susceptible *Staphylococcus aureus*
MDRO	Multi-Drug Resistant Organisms
PPE	Personal Protective Equipment
PPS	Point Prevalence Survey
RCPI	Royal College of Physicians of Ireland
RTI	Respiratory Tract Infection
SHEA	Society for Healthcare Epidemiology of America
UTI	Urinary Tract Infection
VRE	Vancomycin Resistant Enterococci
WIV-ISP	Scientific Institute for Public Health, Brussels, Belgium
WTE	Whole Time Equivalent

7.2 **Appendix B:** HALT 2013 National Steering Group Membership

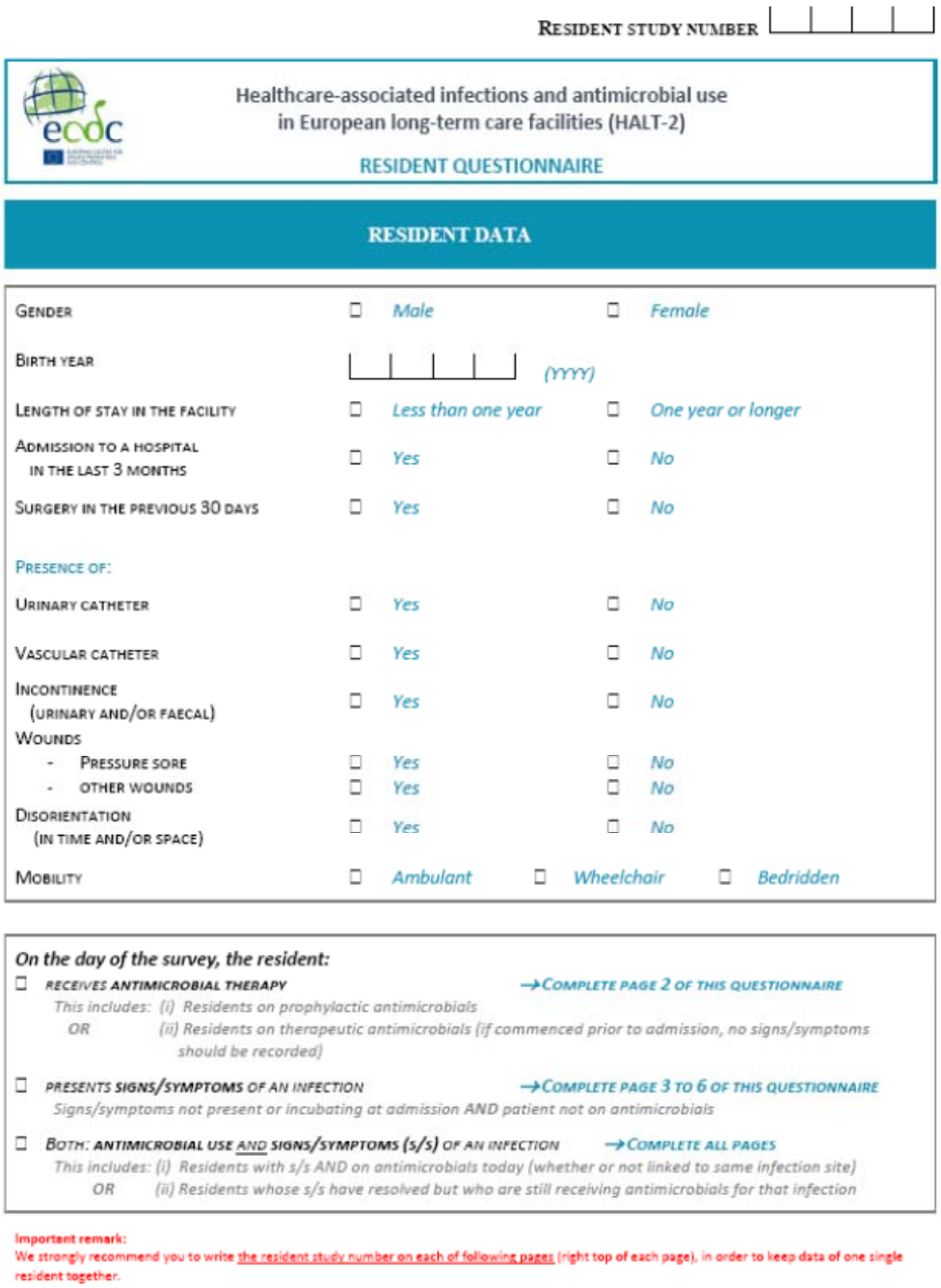
- Dr Karen Burns, Consultant Microbiologist, HSE-HPSC & Beaumont Hospital (Chair)
- Ms Sheila Donlon, Infection Prevention & Control Nurse Manager, HSE-HPSC
- Ms Fiona Roche (PhD), Surveillance Scientist, HSE-HPSC
- Ms Siobhan Dowling, Administrative Assistant, HSE-HPSC
- Ms Margaret Nadin, Project Manager, Chronic Illness, NMPD DNE & HCAI Clinical Programme
- Dr Fidelma Fitzpatrick, Consultant Microbiologist, HSE-HPSC, Beaumont Hospital & RCPI/HSE Clinical Lead in HCAI & AMR
- Ms Grainne Parker, Infection Prevention & Control Nurse, HSE Public Health, South-east
- Ms Mags Moran, Infection Prevention & Control Nurse, HSE Community, North-west
- Dr Nuala O'Connor, General Practitioner & ICGP HCAI Lead
- Dr Diarmuid O'Shea, Consultant Geriatrician, St Vincent's University Hospital & RCPI/HSE Clinical Lead in Elderly Care
- Dr Ian Callanan, Clinical Audit Facilitator, National Lead Clinical Audit, HSE & St Vincent's Healthcare Group
- Ms Fiona McMahon, Senior Executive Manager, Office of the Nursing & Midwifery Services Director
- Dr Joanne O'Gorman, Clinical Microbiologist, National Virus Reference Laboratory
- Mr Ultan Molloy, Community Pharmacist, Mayo & Irish Pharmacy Union, Community Pharmacy Committee Member
- Ms Ruth Maher, Head of Monitoring, HSE Quality & Patient Safety Directorate
- Ms Sinead Morrisey, Practice Development Facilitator, Nursing Homes Ireland
- Ms Deirdre Lang, Director of Nursing, St John's Community Hospital, Enniscorthy & Irish Association of Directors of Nursing & Midwifery

7.3 **Appendix C:** HALT Data Collection Forms

Data collection forms can be found on the HALT section of the HPSC website here:

http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Surveillance/HCAIinlongtermcarefacilities/

HALT Resident questionnaire:



RESIDENT STUDY NUMBER ____

Healthcare-associated infections and antimicrobial use in European long-term care facilities (HALT-2)

RESIDENT QUESTIONNAIRE

RESIDENT DATA

GENDER	☐	Male	☐	Female	
BIRTH YEAR	____	(YYYY)			
LENGTH OF STAY IN THE FACILITY	☐	Less than one year	☐	One year or longer	
ADMISSION TO A HOSPITAL IN THE LAST 3 MONTHS	☐	Yes	☐	No	
SURGERY IN THE PREVIOUS 30 DAYS	☐	Yes	☐	No	
PRESENCE OF:					
URINARY CATHETER	☐	Yes	☐	No	
VASCULAR CATHETER	☐	Yes	☐	No	
INCONTINENCE (URINARY AND/OR FAECAL)	☐	Yes	☐	No	
WOUNDS					
- PRESSURE SORE	☐	Yes	☐	No	
- OTHER WOUNDS	☐	Yes	☐	No	
DISORIENTATION (IN TIME AND/OR SPACE)	☐	Yes	☐	No	
MOBILITY	☐	Ambulant	☐	Wheelchair	☐ Bedridden

On the day of the survey, the resident:

☐ RECEIVES ANTIMICROBIAL THERAPY → COMPLETE PAGE 2 OF THIS QUESTIONNAIRE
This includes: (i) Residents on prophylactic antimicrobials
OR (ii) Residents on therapeutic antimicrobials (if commenced prior to admission, no signs/symptoms should be recorded)

☐ PRESENTS SIGNS/SYMPTOMS OF AN INFECTION → COMPLETE PAGE 3 TO 6 OF THIS QUESTIONNAIRE
Signs/symptoms not present or incubating at admission AND patient not on antimicrobials

☐ BOTH: ANTIMICROBIAL USE AND SIGNS/SYMPTOMS (S/S) OF AN INFECTION → COMPLETE ALL PAGES
This includes: (i) Residents with s/s AND on antimicrobials today (whether or not linked to same infection site)
OR (ii) Residents whose s/s have resolved but who are still receiving antimicrobials for that infection

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

RESIDENT STUDY NUMBER |_|_|_|_|

ANTIMICROBIAL TREATMENT DATA					
		ANTIMICROBIAL 1	ANTIMICROBIAL 2	ANTIMICROBIAL 3	ANTIMICROBIAL 4
ANTIMICROBIAL NAME (capital letters)		………………………	………………………	………………………	………………………
ADMINISTRATION ROUTE		☐ *Oral* ☐ *Parenteral (IM, IV or SC)* ☐ *Other*	☐ *Oral* ☐ *Parenteral (IM, IV or SC)* ☐ *Other*	☐ *Oral* ☐ *Parenteral (IM, IV or SC)* ☐ *Other*	☐ *Oral* ☐ *Parenteral (IM, IV or SC)* ☐ *Other*
END DATE / REVIEW DATE OF TREATMENT KNOWN?		☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*
TYPE OF TREATMENT		☐ *Prophylactic* ☐ *Therapeutic*	☐ *Prophylactic* ☐ *Therapeutic*	☐ *Prophylactic* ☐ *Therapeutic*	☐ *Prophylactic* ☐ *Therapeutic*
ANTIMICROBIAL GIVEN FOR		☐ *Urinary tract* ☐ *Genital tract* ☐ *Skin or wound* ☐ *Respiratory tract* ☐ *Gastrointestinal* ☐ *Eye* ☐ *Ear, nose, mouth* ☐ *Systemic infection* ☐ *Unexplained fever* ☐ *Other (specify)* ……………………… ………………………	☐ *Urinary tract* ☐ *Genital tract* ☐ *Skin or wound* ☐ *Respiratory tract* ☐ *Gastrointestinal* ☐ *Eye* ☐ *Ear, nose, mouth* ☐ *Systemic infection* ☐ *Unexplained fever* ☐ *Other (specify)* ……………………… ………………………	☐ *Urinary tract* ☐ *Genital tract* ☐ *Skin or wound* ☐ *Respiratory tract* ☐ *Gastrointestinal* ☐ *Eye* ☐ *Ear, nose, mouth* ☐ *Systemic infection* ☐ *Unexplained fever* ☐ *Other (specify)* ……………………… ………………………	☐ *Urinary tract* ☐ *Genital tract* ☐ *Skin or wound* ☐ *Respiratory tract* ☐ *Gastrointestinal* ☐ *Eye* ☐ *Ear, nose, mouth* ☐ *Systemic infection* ☐ *Unexplained fever* ☐ *Other (specify)* ……………………… ………………………
WHERE PRESCRIBED?		☐ *In this facility* ☐ *In the hospital* ☐ *Elsewhere*	☐ *In this facility* ☐ *In the hospital* ☐ *Elsewhere*	☐ *In this facility* ☐ *In the hospital* ☐ *Elsewhere*	☐ *In this facility* ☐ *In the hospital* ☐ *Elsewhere*
WHO PRESCRIBED?		☐ *GP* ☐ *Medical doctor employed by LTCF* ☐ *Specialist* ☐ *Other*	☐ *GP* ☐ *Medical doctor employed by LTCF* ☐ *Specialist* ☐ *Other*	☐ *GP* ☐ *Medical doctor employed by LTCF* ☐ *Specialist* ☐ *Other*	☐ *GP* ☐ *Medical doctor employed by LTCF* ☐ *Specialist* ☐ *Other*
FOR URINE: DIPSTICK TEST BEFORE PRESCRIBING?		☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*
WAS A CULTURE SAMPLE TAKEN?		☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*
ISOLATED MICROORGANISMS (if culture was taken)					
NAME OF ISOLATED MICROORGANISM (please use code list)	1	|_|_|_|_|_|_|	|_|_|_|_|_|_|	|_|_|_|_|_|_|	|_|_|_|_|_|_|
	2	|_|_|_|_|_|_|	|_|_|_|_|_|_|	|_|_|_|_|_|_|	|_|_|_|_|_|_|
	3	|_|_|_|_|_|_|	|_|_|_|_|_|_|	|_|_|_|_|_|_|	|_|_|_|_|_|_|
*IN CASE OF ACIBAU, CIT***, ENB***, ENC***, ESCCOL, KLE***, MOGSPP, PRT***, PSEAER, SER***, STAAUR*					
ANTIMICROBIAL RESISTANCE (see code list)	1	☐ 0 ☐ 1 ☐ 2 ☐ ?	☐ 0 ☐ 1 ☐ 2 ☐ ?	☐ 0 ☐ 1 ☐ 2 ☐ ?	☐ 0 ☐ 1 ☐ 2 ☐ ?
	2	☐ 0 ☐ 1 ☐ 2 ☐ ?	☐ 0 ☐ 1 ☐ 2 ☐ ?	☐ 0 ☐ 1 ☐ 2 ☐ ?	☐ 0 ☐ 1 ☐ 2 ☐ ?
	3	☐ 0 ☐ 1 ☐ 2 ☐ ?	☐ 0 ☐ 1 ☐ 2 ☐ ?	☐ 0 ☐ 1 ☐ 2 ☐ ?	☐ 0 ☐ 1 ☐ 2 ☐ ?

RESIDENT STUDY NUMBER ☐☐☐☐

SIGNS AND SYMPTOMS OF AN INFECTION

IMPORTANT REMARK:

All active healthcare associated infection (HAI) present on the day of the survey should be reported. An infection is active when signs/symptoms of the infection are present on the survey date OR signs/symptoms were present in the past and the resident is (still) receiving treatment for that infection on the survey date. The presence of symptoms and signs in the two weeks (14 days) preceding the PPS day should be verified in order to determine whether the treated infection matches one of the case definitions of healthcare-associated infection

No signs/symptoms should be reported in the software. Only the decisions in the grey text boxes should be transferred.

* **Fever**: 1) single > 37.8°C oral/tympanic membrane or 2) repeated > 37.2°C oral or > 37.5°C rectal or 3) > 1.1°C over baseline from any site (oral, tympanic, axillary)
** **Leucocytosis**: 1) Neutrophilia > 14,000 leucocytes/mm^3 or 2) left shift (>6% bands or ≥ 1500 bands/mm^3)
§ **Acute change in mental status from baseline**: Acute onset + fluctuating course + inattention AND either disorganized thinking or altered level of consciousness
§§ **Acute functional decline**: New 3 point increase in total ADL score (Range 0-28) from baseline based on 7 ADL items (bed mobility, transfer, locomotion, dressing, toilet use, personal hygiene, eating) each scored from 0 (independent)-4 (total dependence) OR increased dependency defined by scales other than ADL

URINARY TRACT INFECTIONS

☐ Resident without a urinary catheter	☐ Resident with a urinary catheter
SIGNS AND SYMPTOMS *AT LEAST ONE OF THE FOLLOWING (Ⓐ, Ⓑ or Ⓒ) CRITERIA:* ☐ Ⓐ Acute dysuria OR acute pain/swelling or tenderness of the testes, epididymis, or prostate ☐ Ⓑ Fever* OR leukocytosis** AND One or more of the following: ☐ Acute costovertebral angle pain ☐ Suprapubic pain/tenderness ☐ Gross hematuria ☐ New or marked increase in frequency ☐ New or marked increase in urgency ☐ New or marked increase in incontinence ☐ Ⓒ Two or more (in the absence of fever or leucocytosis): ☐ Frequency (new/increased) ☐ Suprapubic pain ☐ Urgency (new/increased) ☐ Gross hematuria ☐ Incontinence (new/increased)	*SIGNS AND SYMPTOMS* *AT LEAST ONE OF THE FOLLOWING (Ⓐ, Ⓑ, Ⓒ or Ⓓ) CRITERIA:* ☐ Ⓐ Fever*, rigors, OR new onset hypotension with NO alternate site of infection ☐ Ⓑ Acute change mental status § OR acute functional decline §§ with NO alternate diagnosis AND leukocytosis** ☐ Ⓒ New onset suprapubic or costovertebral angle pain or tenderness ☐ Ⓓ Purulent discharge around catheter or acute pain, swelling or tenderness of testes, epididymis, or prostate
URINE CULTURE ☐ Not Done, negative or test results unknown ☐ Urine culture done AND: ☐ At least 10^5 cfu/ml of no more than 2 species of micro-organisms in a voided urine sample OR ☐ At least 10^2 cfu/ml of any number of organisms in a specimen collected by in-and-out catheter	*URINE CULTURE* ☐ Not done, negative or test results unknown ☐ Urine culture done AND: ☐ At least 10^5 cfu/ml of any organism(s) in a urinary catheter specimen

INFECTION CONFIRMATION

☐ Signs and symptoms AND urine culture positive: *INFECTION CONFIRMED*
☐ Signs and symptoms AND urine culture not done, negative or results unknown: *INFECTION PROBABLE*

URINE DIPSTICK RESULT (nitrites and/or leucocytes) ☐ Negative ☐ Positive ☐ Not done

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RESIDENT STUDY NUMBER

RESPIRATORY TRACT INFECTIONS

COMMON COLD or PHARYNGITIS

*AT LEAST **TWO** OF THE FOLLOWING CRITERIA:*

- ☐ Runny nose or sneezing
- ☐ Stuffy nose (i.e. congestion)
- ☐ Sore throat or hoarseness or difficulty in swallowing
- ☐ Dry cough
- ☐ Swollen or tender glands in the neck (cervical lymphadenopathy)

INFECTION CONFIRMATION

- ☐ Criteria fully met: *INFECTION **CONFIRMED***

FLU *diagnosis can be made also outside the Flu season*

BOTH OF THE FOLLOWING CRITERIA MUST BE MET:

- ☐ Fever *(for definition see top of page 3)*

AND

- ☐ At least three of the following:
  - ☐ Chills
  - ☐ New headache or eye pain
  - ☐ Myalgias or body aches
  - ☐ Malaise or loss of appetite
  - ☐ Sore throat
  - ☐ New or increased dry cough

INFECTION CONFIRMATION

- ☐ Criteria fully met: *INFECTION **CONFIRMED***

LOWER RESPIRATORY TRACT INFECTIONS

- ☐ Resident with a POSITIVE chest x-ray for pneumonia or a new infiltrate

SIGNS AND SYMPTOMS

BOTH OF THE FOLLOWING CRITERIA MUST BE MET:

- ☐ At least one of respiratory signs or symptoms:
  - ☐ New or increased cough
  - ☐ New/increased sputum production
  - ☐ O_2 saturation < 94% or reduced >3% from baseline
  - ☐ Abnormal lung examination (new or changed)
  - ☐ Pleuritic chest pain
  - ☐ Respiratory rate ≥ 25 breaths/min

AND

- ☐ One or more constitutional signs/symptoms (fever, leucocytosis, confusion, acute functional decline; *for definitions see top of page 3*)

INFECTION CONFIRMATION

- ☐ Signs/symptoms criteria met AND chest x-ray positive: *PNEUMONIA INFECTION **CONFIRMED***

- ☐ Resident without a POSITIVE chest x-ray for pneumonia or a new infiltrate OR chest x-ray not done

SIGNS AND SYMPTOMS

BOTH OF THE FOLLOWING CRITERIA MUST BE MET:

- ☐ At least two of respiratory signs or symptoms:
  - ☐ New or increased cough
  - ☐ New/increased sputum production
  - ☐ O_2 saturation < 94% or reduced >3% from baseline
  - ☐ Abnormal lung examination (new or changed)
  - ☐ Pleuritic chest pain
  - ☐ Respiratory rate ≥ 25 breaths/min

AND

- ☐ One or more constitutional signs/symptoms (fever, leucocytosis, confusion, acute functional decline; *for definitions see top of page 3*)

Absence of other conditions such as chronic hearth failure that could account for symptoms

INFECTION CONFIRMATION

- ☐ Criteria fully met: *OTHER LOWER RESPIRATORY TRACT INFECTION **CONFIRMED***

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RESIDENT STUDY NUMBER ☐☐☐☐

SKIN INFECTIONS

CELLULITIS/SOFT TISSUE/WOUND INFECTIONS

ONE OF THE FOLLOWING (Ⓟ or Ⓢ) CRITERIA MUST BE MET:

- ☐ Ⓟ Pus at a wound, skin, or soft tissue site
- ☐ Ⓢ Four or more new or increasing signs/symptoms at affected site:
  - ☐ Heat
  - ☐ Tenderness or pain
  - ☐ Redness
  - ☐ Serous drainage
  - ☐ Swelling
  - ☐ One constitutional sign/symptom (fever, leucocytosis, confusion, acute functional decline; *for definitions see top of page 3)*

INFECTION CONFIRMATION

- ☐ Criteria fully met: *INFECTION **CONFIRMED***

ANTIBIOTIC USE

- ☐ Local AB used for treatment (e.g. ointment, unguent)

SCABIES

BOTH OF THE FOLLOWING CRITERIA MUST BE MET:

- ☐ Maculopapular and/or itching rash

AND

- ☐ At least one of the following:
  - ☐ Physician diagnosis
  - ☐ Laboratory confirmation (positive scraping or biopsy)
  - ☐ Epidemiological linkage to a case of scabies with lab confirmation

INFECTION CONFIRMATION

- ☐ Criteria fully met: *INFECTION **CONFIRMED***

HERPES SIMPLEX OR ZOSTER INFECTION

BOTH OF THE FOLLOWING CRITERIA MUST BE MET:

- ☐ A vesicular rash

AND

- ☐ Physician diagnosis or laboratory confirmation

INFECTION CONFIRMATION

- ☐ Criteria fully met: *INFECTION **CONFIRMED***

FUNGAL INFECTION

BOTH OF THE FOLLOWING CRITERIA MUST BE MET:

- ☐ Characteristic rash or skin lesions

AND

- ☐ Physician diagnosis or lab confirmed fungal pathogen from scraping or biopsy

INFECTION CONFIRMATION

- ☐ Criteria fully met: *INFECTION **CONFIRMED***

GASTROINTESTINAL INFECTIONS

GASTROENTERITIS

ONE OF FOLLOWING (Ⓓ, Ⓥ or Ⓑ) CRITERIA MUST BE MET:

- ☐ Ⓓ Diarrhoea, three or more liquid or watery stools above normal baseline for the resident in 24-hr period
- ☐ Ⓥ Vomiting, two or more episodes in 24-hr period
- ☐ Ⓑ Both of the following:
  - ☐ Positive stool specimen for bacterial or viral pathogen

  AND
  - ☐ At least one of the following: nausea, vomiting, abdominal pain or tenderness, diarrhoea

INFECTION CONFIRMATION

- ☐ Criteria fully met: *INFECTION **CONFIRMED***

CLOSTRIDIUM DIFFICILE INFECTION

BOTH OF THE FOLLOWING CRITERIA MUST BE MET:

- ☐ At least one of the following: diarrhoea (three or more liquid or watery stools above normal baseline for the resident within 24-hr period) OR presence of toxic megacolon at x-ray

AND

- ☐ At least one of the following:
  - ☐ Positive stool sample for toxin A or B, or positive CD culture or positive PCR
  - ☐ Pseudomembranous colitis found at endoscopy, surgery or biopsy

INFECTION CONFIRMATION

- ☐ Signs/symptoms criteria met + positive test OR pseudomembraneous colitis: *INFECTION **CONFIRMED***

RESIDENT STUDY NUMBER

EYE, EAR, NOSE AND MOUTH INFECTIONS

CONJUNCTIVITIS

ONE OF THE FOLLOWING (Ⓐ, Ⓑ or Ⓒ) CRITERIA MUST BE MET:

- ☐ Ⓐ Pus appearing from one or both eyes, present for at least 24 hours
- ☐ Ⓑ New or increased conjunctival erythema, with or without itching
- ☐ Ⓒ New or increased conjunctival pain, present for at least 24 hours

Symptoms must not be due to allergy or trauma to the conjunctiva

INFECTION CONFIRMATION

- ☐ Criteria fully met: *INFECTION CONFIRMED*

ANTIBIOTIC USE

- ☐ Local AB used for treatment (e.g. ointment, unguent)

SINUSITIS

- ☐ Sinusitis diagnosed by physician

INFECTION CONFIRMATION

- ☐ Criteria fully met: *INFECTION CONFIRMED*

EAR

ONE OF THE FOLLOWING (Ⓐ or Ⓒ) CRITERIA MUST BE MET:

- ☐ Ⓐ Diagnosis by a physician of any ear infection
- ☐ Ⓒ New drainage from one or both ears (non purulent drainage must be accompanied by additional symptoms, such as ear pain or redness)

INFECTION CONFIRMATION

- ☐ Criteria fully met: *INFECTION CONFIRMED*

ORAL CANDIDIASIS

BOTH OF THE FOLLOWING CRITERIA MUST BE MET:

- ☐ Presence of raised white patches on inflamed mucosa OR plaques on oral mucosa

AND

- ☐ Diagnosed by a dentist or a physician

INFECTION CONFIRMATION

- ☐ Criteria fully met: *INFECTION CONFIRMED*

BLOODSTREAM INFECTIONS

ONE OF THE FOLLOWING (Ⓐ or Ⓑ) CRITERIA MUST BE MET:

- ☐ Ⓐ Two or more blood cultures positive for the same organism
- ☐ Ⓑ A single blood culture documented with an organism thought not to be a contaminant

AND

At least one of the following:

- ☐ Fever *(for definition see top of page 3)*
- ☐ New hypothermia (<34.5° C, or does not register on the thermometer being used)
- ☐ A drop in systolic blood pressure of >30 mm Hg from baseline

INFECTION CONFIRMATION

- ☐ Criteria fully met: *INFECTION CONFIRMED*

UNEXPLAINED FEVER

- ☐ The resident must have documentation in the medical record of fever *(for definition see top of page 3)* on two or more occasions at least 12 hours apart in any 3-day period, with no known infectious or non-infectious cause

INFECTION CONFIRMATION

- ☐ Criteria fully met: *INFECTION CONFIRMED*

OTHER INFECTION(S)

Please specify

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7.4 Appendix D: Prescribed Antimicrobials in GN>12m, by top three body sites and indications.

Table 7.4.1 Antimicrobials prescribed for the urinary tract in GN>12m.

Antimicrobial name	Number of prescriptions (%)	Antimicrobial name	Number of prescriptions (%)
Treatment for UTI		**Prophylaxis against UTI**	
amoxicillin and enzyme inhibitor	29 (26.9)	trimethoprim	92 (48.2)
nitrofurantoin	29 (26.9)	nitrofurantoin	71 (37.2)
ciprofloxacin	20 (18.5)	cefalexin	9 (4.7)
trimethoprim	14 (13)	amoxicillin and enzyme inhibitor	6 (3.1)
cefalexin	6 (5.6)	ciprofloxacin	6 (3.1)
amoxicillin	4 (3.7)	amoxicillin	2 (1)
cefaclor	2 (1.9)	other	5 (2.6)
cefuroxime	2 (1.9)		
other	2 (1.9)		
Total	**108 (100)**	**Total**	**191 (100)**

Table 7.4.2 Antimicrobials prescribed for the respiratory tract in GN>12m.

Antimicrobial name	Number of prescriptions (%)	Antimicrobial name	Number of prescriptions (%)
Treatment for RTI		**Prophylaxis against RTI**	
Amoxicillin and enzyme inhibitor	57 (43.5)	Amoxicillin and enzyme inhibitor	4 (28.6)
Amoxicillin	23 (17.6)	Azithromycin	3 (21.4)
Clarithromycin	18 (13.7)	Clarithromycin	2 (14.3)
Ciprofloxacin	5 (3.8)	Other	5 (35.7)
Doxycycline	3 (2.3)		
Cefaclor	2 (1.5)		
Cefuroxime	2 (1.5)		
Piperacillin and enzyme inhibitor	2 (1.5)		
Cefixime	2 (1.5)		
Erythromycin	2 (1.5)		
Levofloxacin	2 (1.5)		
Other	13 (9.9)		
Total	**131 (100)**	**Total**	**14 (100)**

Table 7.4.3 Antimicrobials prescribed for skin/wound indication in GN>12m.

Antimicrobial name	Number of prescriptions (%)	Antimicrobial name	Number of prescriptions (%)
Treatment of skin infection		**Prophylaxis against skin infection**	
flucloxacillin	41 (52.6)	doxycycline	3 (25)
amoxicillin and enzyme inhibitor	10 (12.8)	ciprofloxacin	2 (16.7)
phenoxymethylpenicillin	8 (10.3)	tetralysal	2 (16.7)
amoxicillin	3 (3.8)	other	5 (41.7)
ciprofloxacin	2 (2.6)		
clarithromycin	2 (2.6)		
metronidazole	2 (2.6)		
minocycline	2 (2.6)		
other	8 (10.3)		
Total	**78 (100)**	**Total**	**12 (100)**

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