Point Prevalence Survey of Healthcare-Associated Infections & Antimicrobial Use in Long-Term Care Facilities (HALT): May 2016

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Table of Contents

Acknowledgements

All of the HALT 2016 participating facilities are listed in Appendix A

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- Local HALT coordinators
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Executive Summary

In May 2016, 10,044 residents in 224 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 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 (HSE), the managers, doctors and nurses caring for residents in all of the participating LTCF 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, friends, carers 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 224 LTCF, the majority were owned by the HSE [n=136; 61%], followed by private [n=54; 24%] and voluntary services [n=34; 15%]
- The median capacity of participating LTCF was 42 beds (range = 5 – 176) and the median bed occupancy on the HALT survey date was 93%
- Overall, single room accommodation accounted for a median of 71% of available beds. The proportion of single room accommodation in HSE-owned (52%) was lower than that of private (83%) and voluntary (87%) LTCF
- For the purposes of data analysis and reporting, the HALT steering group stratified the 224 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):** 88 long-stay facilities with 4,722 residents
    ii. **Mixed care type facilities >12 months (Mixed>12m):** 46 long-stay facilities with 2,499 residents

iii. **LTCF caring for residents with intellectual disabilities (Intellectually disabled):** 31 long-stay facilities with 1,251 residents

iv. **LTCF (either general nursing homes or mixed care type facilities) <12 months (LTCF<12m):** 14 short-stay facilities with 441 residents

v. **LTCF caring for residents with psychiatric conditions (Psychiatric):** 23 long-stay facilities with 505 residents

vi. **Other care types:** Facilities caring for residents with palliative care needs (seven long-stay facilities with 134 residents), rehabilitation needs (five long-stay facilities with 245 residents), physical disabilities (one long-stay facilities with 13 residents) and 'other' care types (nine long-stay facilities with 234 residents)

Nurse and healthcare assistant staffing, medical care and coordination, infection prevention & control & antimicrobial stewardship

- For the first time, HALT 2016 collected information on nurse and healthcare assistant staffing ratios per 100 LTCF beds, with differences observed based on LTCF ownership and LTCF care type. The observed staffing ratios do not necessarily reflect the national picture for multiple reasons and additional information which directly influences staffing levels was not collected (e.g., resident dependency and comorbidities)
- Overall, resident medical care was provided by the resident's own general practitioner (GP) in 49.5%, by a directly-employed doctor in 28.5% and by a mix of GP plus directly-employed doctor care in 22% of LTCF. However, when LTCF were stratified by ownership, GP-led medical care was 96% in private LTCF versus 33% in HSE LTCF
- A designated coordinating physician, with responsibility for coordination and standardisation of policies/practices for resident medical care within the LTCF was available for 65% of LTCF overall and for 56% of private LTCF
- An active local infection prevention and control committee (IPCC) was reported by 61% of LTCF
- Access to a staff member with infection prevention and control (IPC) training was reported by 76% of LTCF overall and by 57% of private LTCF. For the vast majority of LTCF with a trained IPC staff member, that person was an infection prevention and control nurse (IPCN) (93.5%). However, for the majority of LTCF (58%), the IPCN was not based in the LTCF on a day-to-day basis
- A written local hand hygiene policy was available in 95% of LTCF, with provision of a staff hand hygiene training session in the past 12 months reported by 83% of LTCF. The available

products for hand hygiene were alcohol-based hand rub (ABHR) and liquid soap in 96% and 95% of LTCF, respectively

- Compliance with hand hygiene opportunities was not collected in HALT 2016
- The provision of seasonal influenza vaccination for residents was not universal, with 9% of LTCF overall reporting this was not routine local practice
- The vast majority (98%) reported having no active local antimicrobial stewardship committee (ASC), training on antimicrobial prescribing was not provided by 94% and 56% of LTCF reported having no local antimicrobial prescribing guidelines
- Prescriber feedback regarding local antimicrobial consumption was available in just 14% of LTCF
- LTCF with a designated coordinating physician were significantly more likely to demonstrate positive local antimicrobial stewardship practices such as; an active ASC, training for prescribers and local prescribing guidelines

Resident demographics, nursing care requirements and HCAI risk factors

- Female residents predominated in most care types, other than psychiatric and palliative LTCF. The proportion of residents aged ≥85 years was highest in GN>12m (49%), Mixed>12m (47%) and LTCF<12m (41%). In contrast, 1% of intellectually disabled LTCF residents were aged ≥ 85 years
- Selected 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 palliative care LTCF
- Almost two percent (n=170) of residents with an infection or taking antimicrobials, had a history of hospitalisation within three months of the survey

LTCF-acquired infections (LAI)

- For infections acquired in long-term care, the national crude prevalence was 4.4% and the median prevalence was 3.4%. The median prevalence was higher in LTCF<12m (6.6%), rehabilitation (4.9%) and mixed>12m (4.5%). The highest prevalence was reported in palliative care LTCF (8.3%), which may reflect underlying illness and the prevalence of HCAI risk factors encountered in that unique resident cohort

- The most prevalent LAI types were: respiratory tract infections (RTI), urinary tract infections (UTI) and skin infections; affecting 1.5%, 1.5% and 1.1% of all residents, respectively
- A relevant microbiological specimen had been obtained for 37% of infections, with microorganisms isolated in 14%. *Escherichia coli* (35%) and *Staphylococcus aureus* (29%) were the most frequently reported microorganisms. Of those with available antimicrobial susceptibility results, 4% of *E. coli* were resistant to 3rd generation cephalosporins and 16% of *S. aureus* were meticillin/flucloxacillin resistant (i.e., MRSA). There were no LAI associated with carbapenem resistant *Enterobacteriaceae* (CRE) reported during the HALT survey

Hospital-acquired infections (HAI)

- For the first time, HALT 2016 collected data on hospital-acquired infections (HAI), whereby the resident was transferred to the LTCF with an active HAI or developed a HAI on day one or day two following transfer to the LTCF. No HAI were reported by 88% of LTCF. The crude national prevalence of HAI in Irish LTCF was 0.4%. Therefore, the vast majority of HCAI in LTCF in Ireland are acquired within the LTCF

Antimicrobial use and antimicrobial resistance

- The national crude antimicrobial use prevalence was 9.8%, with a median antimicrobial use prevalence of 8.3%. The median prevalence was higher in LTCF<12m (12.1%) and rehabilitation LTCF (10.9%). At 30.8%, the prevalence in palliative care LTCF was more similar to that reported in acute hospitals
- The majority of antimicrobials were prescribed within the LTCF (83%)
- Overall, 59% of antimicrobials were prescribed to treat infection. However, antimicrobial prophylaxis accounted for the majority of prescriptions in intellectually disabled LTCF (54%)
- During HALT 2016, 3.4% of Mixed>12m and 3.1% of GN>12m residents were prescribed antimicrobials for UTI prophylaxis. Prophylaxis against RTI was most prevalent in intellectually disabled (2.0%) and palliative care (1.5%) LTCF

Priorities for Implementation

There have been four HALT surveys conducted in Ireland since 2010. The findings of the most recent survey in May 2016 demonstrates that HCAI and antimicrobial use remain prevalent issues in Irish LTCF, regardless of the LTCF care type. The annual increase in LTCF participating in HALT is a positive finding, with 96 LTCF performing their first HALT survey in 2016 and 39 having participated in all four HALT surveys to date. There is now evidence that participation in repeated HALT surveys has impacted positively on the prevalence of infection and antimicrobial use in 2016 for the 39 LTCF that have completed all four HALT surveys, as shown in Figure 4.1.5. However, many Irish LTCF have yet to undertake a HALT survey and participation in surveillance alone is not enough to drive sustained improvement. The findings of the HALT surveys to date and the recommended priorities now need to be implemented.

The existing gaps in resourcing have become acutely evident, in the context of a rapidly increasing national incidence of antimicrobial resistant bacteria, such as multi-drug resistant *Klebsiella pneumoniae* (MDRKP) and carbapenem resistant *Enterobacteriaceae* (CRE), with cases and outbreaks in Irish LTCF reported. For HSE-owned LTCF, the development of an Accountability Framework for Quality & Safety within the Social Care Division is welcomed and has potential to drive the implementation of many of the recommendations for HSE Social Care Division within this HALT report. However, the delivery of residential care in Ireland is not limited to services provided by the HSE and antimicrobial resistant bacteria will not respect boundaries of services providers. Therefore, it is vitally important that implementation of the recommended priorities and investment in resources ensures that residents in all Irish LTCF, regardless of care type and ownership have equitable access to the specialist input of multi-disciplinary infection prevention and control and antimicrobial stewardship teams and geriatricians with community input and that regional HCAI & antimicrobial resistance (AMR) Committees are established in each community healthcare organisation (CHO), with membership, governance and oversight including all LTCF, regardless of ownership.

The recommended priorities for implementation arising from the findings of HALT 2016 are outlined in the following tables. For each theme, the column describing ‘who is involved’ in delivering on implementation is not intended to restrict participation and will require more in-depth discussion to attribute ownership on publication of this report. Within the tables, LTCF management team refers to all LTCF, regardless of care type or ownership.

Theme	Priority	Who is involved?	Timeline	Comment
Standards	Adaptation of key principles of HIQA National Standards for PCHCAI*, including antimicrobial stewardship activities within each LTCF Revised Standards expected 2017	LTCF management team	Short term	HIQA & Mental Health Commission (MHC) PCHCAI & antimicrobial stewardship Standards specific to these care settings are needed
Licensing & Regulation	Require all LTCF to demonstrate evidence of compliance with key principles of PCHCAI standards as part of monitoring inspection for licensing	• HIQA • MHC • LTCF management team	Short tem	HIQA & Mental Health Commission (MHC) PCHCAI & antimicrobial stewardship Standards specific to these care settings are needed
Governance	Develop multi-disciplinary regional HCAI & AMR Committees to provide governance, oversight, guidance of HCAI prevention, surveillance and antimicrobial stewardship within each CHO**	• HSE Social Care Division • Departments of Public Health • Private and voluntary LTC providers • ICGP • Microbiology laboratories • IPU – Community pharmacy	Short term	Membership, terms of reference, reporting relationships and action plans need to be developed and define to guide regional committee structures and ensure similar delivery of service across each CHO
Governance	Regardless of geographical boundaries of acute hospital groups and CHOs, each LTCF should have established active lines of communication with the acute hospital(s) to and from which the residents are transferred, the microbiology laboratory which processes resident specimens and the local Department of Public Health	• LTCF management, nursing and physician team • Acute hospital management, clinician and nursing teams • Microbiology laboratory • Department of Public Health	Short term	
Organisation	Review existing geography, whereby acute hospital group catchment areas, public health regions and CHOs are not currently aligned	• Department of Health • HSE Social Care Division • HSE Health & Wellbeing Division • Departments of Public Health	Medium term	Realignment is needed

*HIQA PCHCAI = Health Information & Quality Authority National Standards for Prevention & Control of Healthcare-Associated Infections (2009)

Theme	Priority	Who is involved?	Timeline	Comment
LTCF staffing	Ensure that every LTCF has nurse staffing levels that reflect the number and case mix of residents in the facility Ensure that every LTCF has healthcare assistant staffing levels that reflect the number and case mix of residents in the facility Ensure that the skill mix of nursing and healthcare assistants appropriate for the needs of the residents	• Department of Health • HSE Social Care Division • HSE Clinical Programmes • NMBI • Private and voluntary LTC providers • LTCF management teams • HIQA • MHC	Short term	Gap analysis, workforce planning are required Need to define acceptable staffing standards within different care types
LTCF staffing	Ensure every LTCF has a nominated coordinating physician, with evidence of this to be sought as part of monitoring inspection for licensing	• HSE Social Care Division • HSE Clinical Programmes • Private & voluntary LTC providers • ICGP • Regional HCAI & AMR Committees • HIQA & MHC	Short term	Definition of recommended elements of coordinating physician job description that are of relevance to HCAI prevention and antimicrobial stewardship is needed
LTCF staffing	Develop the IPC link nurse/practitioner role within each LTCF in each CHO	• HSE Social Care Division • Private and voluntary LTC providers • Regional HCAI & AMR Committees	Short term – For LTCF without a designated on-site IPCN, ensure every LTCF has a nominated IPC link nurse and a nominated community IPCN with whom they can liaise	Curriculum, educational and training needs and assessment materials need to be developed to progress these roles

Theme	Priority	Who is involved?	Timeline	Comment
CHO IPC & stewardship team staffing	Progress appointment of community IPCNs within each CHO Specialist advice should be available for every LTCF within each CHO, regardless of care type or ownership	• Department of Health • HSE Social Care Division • Private and voluntary LTC providers • Departments of Public Health • Regional HCAI & AMR Committees	Short term – Ensure every CHO has access to at least one IPCN Medium term – Build IPCN team resources and ensure that within every CHO, the recommended IPCN resource for 1.0 WTE per 250 LTCF beds is achieved	Gap analysis, workforce planning, definition of the job description and multi-disciplinary team building are integral to ensuring development of a sustainable, proactive and responsive community IPCN workforce
CHO IPC & stewardship team staffing	Ensure every CHO has designated Antimicrobial Pharmacist with dedicated sessions to provide specialist input Specialist advice should be available for every LTCF within each CHO, regardless of care type or ownership	• HSE Social Care Division • HSE Clinical Programme • Regional HCAI & AMR Committees	Short term	Workforce planning, definition of the job description and multi-disciplinary team building are integral to ensuring development of a sustainable, proactive and responsive community antimicrobial stewardship workforce
CHO IPC & stewardship team staffing	Ensure every CHO has a designated Consultant Microbiologist with dedicated sessions to provide specialist input	• HSE Social Care & Acute Hospitals Divisions on basis that consultant appointment likely to be shared between acute and community setting • HSE Clinical Programme • Regional HCAI & AMR Committees	Short term	Definition of the recommended elements of the job description of a Consultant Microbiologist post with community remit is needed
CHO IPC & stewardship team staffing	Ensure every CHO has a designated Consultant Geriatrician with dedicated sessions to provide specialist input Specialist advice should be available for every older person LTCF within each CHO, regardless of ownership	• HSE Social Care & Acute Hospitals Divisions on basis that consultant appointment likely to be shared between acute and community setting • HSE Clinical Programme • Regional HCAI & AMR Committees	Short term	Definition of the recommended elements of the job description of a Consultant Geriatrician post with community remit is needed

Theme	Priority	Who is involved?	Timeline	Comment
Education for LTCF staff	Standard & transmission-based precautions, IPC risk assessment, device management, key messages about antimicrobial resistant bacteria, HCAI prevention, diagnosis, treatment and management, antimicrobial stewardship	• HSE Social Care Division • HSE Clinical Programmes & Advisory Groups • HPSC	Short term	Curriculum, educational and training needs and assessment materials need to be developed Link training to CPD credits
Education for GPs	Standard & transmission-based precautions, IPC risk assessment, device management, key messages about antimicrobial resistant bacteria, HCAI prevention, diagnosis, treatment and management, antimicrobial stewardship	• ICGP • HSE Social Care Division • HSE Clinical Programmes & Advisory Groups • HPSC	Short term	Curriculum, educational and training needs and assessment materials need to be developed Link training to CPD credits
Education for LTCF residents, their families, friends and carers	Development of user-friendly information materials on key messages	• HSE Health & Wellbeing Division • HPSC • HSE Communications • Regional HCAI & AMR Committees • Patient representative organisations	Short term	Information leaflets Information videos Dedicated website Residents stories

Theme	Priority	Who is involved?	Timeline	Comment
Communication	Develop and implement a national interfacility transfer document template to ensure systematic communication of known or suspected transmissible pathogens (influenza, norovirus, C. difficile ifnection) and multi-drug resistant organisms (CRE/CPE, ESBLs, VRE, MRSA etc.) when residents are transferred between healthcare settings	• HSE Social Care Division • HSE Clinical Programmes & Advisory Groups • NMBI • HPSC • Regional HCAI & AMR Committees	Short term	
Seasonal influenza vaccination of healthcare workers	Staff seasonal influenza vaccine uptake should be an annual KPI, with targets within every CHO	• Department of Health • HSE Health & Wellbeing Division • HSE Social Care Division • Departments of Public Health • HPSC • Regional HCAI & AMR Committees	Short term	Peer vaccinator programmes require roll-out Educational materials specific to the LTCF setting need to be developed
Seasonal influenza vaccination of residents	Resident seasonal influenza vaccine uptake should be an annual KPI, with targets within every CHO	• HSE Health & Wellbeing Division • Departments of Public Health • HPSC • Regional HCAI & AMR Committees	Short term	

Theme	Priority	Who is involved	Timeline	Comment
Guidelines	Require all LTCF to demonstrate evidence of implementation of the elements of existing national antimicrobial prescribing guidelines for primary care	• HIQA • MHC • LTCF management teams • Regional HCAI & AMR Committees • HPSC analysis of HALT PPS results • ICGP • CPD audit performed by prescribers	Short term	www.antibioticprescribing.ie
Guidelines	Require all LTCF to demonstrate evidence of implementation of the elements of existing national guidelines relevant to urinary tract infection (UTI), • Diagnosis and management of UTI in LTCF residents >65 years (2011) • Prevention of catheter-associated UTI (2011)	• HIQA • MHC • LTCF management teams • Regional HCAI & AMR Committees	Short term	Review and update of the guidelines are required
Guidelines	Require all LTCF to demonstrate evidence of implementation of the elements of existing national guidelines for prevention and control of antimicrobial resistant bacteria that apply to the particular healthcare setting • MRSA • MDRO other than MRSA (ESBLs, CRE/CPE, VRE etc.	• HIQA • MHC • LTCF management teams • Regional HCAI & AMR Committees • Departments of Public Health	Short term	Review and update of the guidelines are required
Guidelines	Require all LTCF to demonstrate evidence of implementation of the elements of existing national guidelines for *C. difficile* that apply to the healthcare setting	• HIQA • MHC • LTCF management teams • Regional HCAI & AMR Committees • Departments of Public Health	Short term	Review and update of the guidelines as required

Theme	Priority	Who is involved	Timeline	Comment
Guidelines	Require all LTCF to demonstrate evidence of implementation of the elements of existing national guidelines prevention and management of influenza outbreaks in residential care facilities	• HIQA • MHC • LTCF management teams • Regional HCAI & AMR Committees • Departments of Public Health	Short term	Review and update of the guidelines as required
Guidelines	A national guideline should be developed on urinary tract infection prophylaxis	• HSE Clinical Programmes & Advisory Groups • HPSC • ICGP • Microbiology, nephrology, urology representation	Short term	UTI prophylaxis • Lack of evidence to support practice • Costs money • Driver for antimicrobial resistance • Driver for C. difficile infection risk • Loss of the agent for future treatment • Side effects of prolonged courses

Theme	Priority	Who is involved?	Timeline	Comment
Surveillance	Evidence of participation in HALT surveys should be sought as part of monitoring inspection for licensing	• HIQA • MHC	Short term	
Surveillance	Participation in future HALT surveys should be required and specified in service level agreements for service provision between HSE and non-HSE LTC providers	• HSE Social Care Division • Private and voluntary LTC providers • Regional HCAI & AMR Committees • HPSC	Medium term	HSE Social Care Division should review HALT 2016 participant list, identify and follow up with LTCF that did not undertake the survey in 2016 to identify barriers to participation and promote future participation
Surveillance	Develop prospective HCAI incidence surveillance programmes of relevance to LTCF settings	• HPSC • Regional HCAI & AMR Committees	Medium term	Protocol development, training, IT-based user-friendly surveillance process, with timely feedback and reports are integral to this process
Surveillance	Develop prospective antimicrobial prescribing surveillance programmes of relevance to LTCF settings	• HPSC • ICGP • Regional HCAI & AMR Committees • Irish Pharmaceutical Union (IPU) • HSE ICT Division	Medium term	Protocol development, training, IT-based user-friendly surveillance process, with timely feedback and reports are integral to this process
Surveillance	Develop regional antimicrobial resistance surveillance reporting template for key pathogens against first line treaments and key indicator agents (3^{rd} generation cephalosporins and carbapenems for *Enterobaceriaceae*, flucloxacilin for *S. aureus*	• Department of Health • Microbiology laboratories • MEDLIS project team • HPSC • Regional HCAI & AMR Committees	Medium term	Potential examples for inclusion: • *E. coli* & *K. pneumoniae* in urines from LTCF residents (MSU vs CSU) • *S. aureus* in swabs from LTCF residents • *C. difficile* positive faeces from LTCF residents Lack of geographical alignment of acute hospitals group microbiology laboratories and CHOs hinders provision of meaningful data

Theme	Priority	Who is involved?	Timeline	Comment
Key performance indicators (KPIs)	Develop meaningful KPIs for LTCF Template for every KPI needs to be developed to ensure staff know how and when to collect the data, how to report the data and how to interpret the data Same methodology to be used in every LTCF within each CHO Start with KPIs that demonstrate evidence that staff have received key training for HCAI prevention and antimicrobial stewardship[%] Progress to KPIs that demonstrate implementation of HCAI prevention & antimicrobial stewardship measures[$] Ensure a system for monitoring KPIs	• HSE Social Care Division • HSE Clinical Programmes • NMBI • HPSC • Regional HCAI & AMR Committees • LTCF management teams	Short term[%] Medium term[$]	[%] • Hand hygiene – practical, e-learning • Standard precautions – practical, e-learning • Transmission-based precautions – practical, e-learning • IPC risk assessment • Influenza prevention education session [$] • Hand hygiene compliance • Urinary catheter management • Rates of antimicrobial use • % of residents prescribed antimicrobial prophylaxis
Quality Improvement	Develop systems whereby findings of surveillance are used to inform quality improvement priorities within CHOs and individual LTCFs	• HSE Clinical Programmes • HPSC • Regional HCAI & AMR Committees • LTCF management teams	Medium term	

Plain Language Summary

Background

During May 2016, 224 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. An invitation to participate in the HALT survey has been extended to all European Union countries.

During April 2016, staff members from the 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 was done for the following reasons:

1. To count the number of residents with an infection, which may have occurred as a result of healthcare: so-called 'healthcare associated infection' or HCAI for short
2. To count the number of residents 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 2016 and to compare progress since the HALT survey was last undertaken in Ireland 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, friends, carers 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 2016.

In this report, each of the participating 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.

Long-term care facility-acquired infections

These are infections that developed more than two days after a resident was admitted to the LTCF. Such infections are important because they can cause harm to residents. Not every infection can be prevented from happening, but every opportunity should be taken to prevent infection, whenever possible.

In Ireland, there were 10,044 residents counted in 224 LTCF. Of those, 441 had a LTCF-acquired infection at the time of the survey. This means that 4.4% or just under one-in-twenty residents present in Irish LTCF in May 2016 had a LTCF-acquired infection. 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, which may include chest infections and pneumonia
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 an infection were more likely to have some of the common 'risk factors'. Well-known risk factors for developing infection can include: having had a recent operation, having a drip or a bladder catheter and being older. Three LTCF residents were reported to have acquired *Clostridium difficile* infection during the HALT survey.

Antibiotic use

Antibiotics are extremely important to treat 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 10,044 residents who were counted, 981 were prescribed antibiotics. This means that 9.8% or about one-in-ten residents present in Irish LTCF in May 2016 were taking an

antibiotic. 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.

This survey shows 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 becoming commonplace 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 the fourth national survey conducted in May 2016 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. (5-6)

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 2016, under the auspices of the Royal College of Physicians of Ireland (RCPI) Clinical Advisory Group on HCAI & AMR **(Appendix B)**. The steering group met on four occasions between January and October 2016 to plan for the HALT survey and the report of its findings.

In January 2016, 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 2016, 214 healthcare workers attended one of six 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 D**). All training materials were posted on the 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, friends or carers, for LTCF staff and General Practitioners (GPs).

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 2016, 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. (7) 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. (8) 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). (8)

Similar to previous HALT surveys performed in 2010, 2011 and 2013, participants in HALT 2016 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 and 2016, 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. (**Appendix D** – Resident Questionnaire).

For the first time in 2016, the HALT survey also collected information on hospital-acquired infections (HAI), whereby a resident returned from the hospital to complete their HAI treatment course in the LTCF or developed signs and symptoms meeting surveillance criteria for infection on day one or day two following transfer to the LTCF. As a HAI, surgical site infection (SSI) was added as a separate infection type to the HALT 2016 protocol. Specific definitions for timing of infection acquisition were also utilised for CDI and SSI.

For the purposes of this report, healthcare-associated infections (HCAI) are subdivided into two separate categories:

1. Long-term care facility (LTCF)-acquired infections (LAI) – Collected in all HALT surveys to date
2. Hospital-acquired infections (HAI) – Collected in HALT 2016 only

In prior HALT surveys, whenever 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. In HALT 2016, the protocol changed, whereby information on microbiology samples was sought only on residents who fulfilled a HCAI surveillance definition. Therefore, the microbiology findings from 2016 are not comparable with those of previous HALT surveys.

A local HALT report was issued by HPSC to each of the 224 participating LTCF by November 2016.

Data Management & Analysis

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

The complete dataset from Ireland was also returned to the HALT European Coordinating Team for inclusion in the European HALT analysis and report, which is expected to be published in 2018.

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. During May 2016, two members of the HALT national coordinating team visited one LTCF and conducted a parallel HALT survey. The anonymous data collected simultaneously by the local HALT team and the validation team were returned for inclusion in the European HALT validation analysis and report.

Of 224 LTCF, 35 (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. HALT 2016 Results

3.1 National Overview

Description of Participating LTCF

There was an excellent response to participate in the voluntary 2016 HALT survey, with a continued increase in participating LTCF; from 69 (2010), 108 (2011), 190 (2013) to 224 (2016), as displayed in Table 3.1.1. There has also been an annual increase in participating LTCF across care types (Table 3.1.1), although fewer general nursing homes participated in 2016 than in previous years. Thirty-nine LTCF have participated in all four HALT surveys to date, 64 have participated in the last three surveys (2011, 2013 and 2016), 119 have participated in the last two surveys (2013 and 2016), with 96 (43%) participating in HALT for the first time in 2016.

In Ireland, HSE-funded community health services are geographically distributed into Community Healthcare Organisations (CHOs). For the first three HALT surveys in Ireland (2010, 2011 & 2013), HSE-owned LTCF were stratified by HSE region, which have been replaced by CHOs since 2014. For comparison, Table 3.1.1 displays the HSE owned LTCF annual participation by HSE region and Figure 3.1.1 displays the percentage of HSE-owned LTCF by CHO that participated in HALT 2016.

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

Category	2010	2011	2013	2016
by Ownership				
HSE	61	84	128	136
South	8	18	38	45
West	32	34	42	46
Dublin Mid Leinster	14	22	23	20
Dublin North East	7	10	25	25
Private	8	24	39	54
Voluntary	n/a	n/a	23	34
by Care Type				
General nursing homes	30	58	103	88
Mixed care facilities	16	16	26	46
LTCF <12 month stay	n/a	n/a	15	14
Intellectually disabled	8	15	24	31
Psychiatric	3	5	11	23
Palliative care	1	1	4	7
Physically disabled	1	1	2	1
Rehabilitation	1	1	3	5
Other	3	1	2	9
National	**69**	**108**	**190**	**224**

* Nine LTCF self-selected the 'Other care type' category in 2016, indicating their resident case mix did not fit in the more common LTCF categories. These included: Mixed care type LTCF (n=5), young chronically ill unit (n=2), dementia specific facility (n=1) and a low dependency residential unit (n=1).

Refer to **Appendix E** for the CHO map of Ireland.

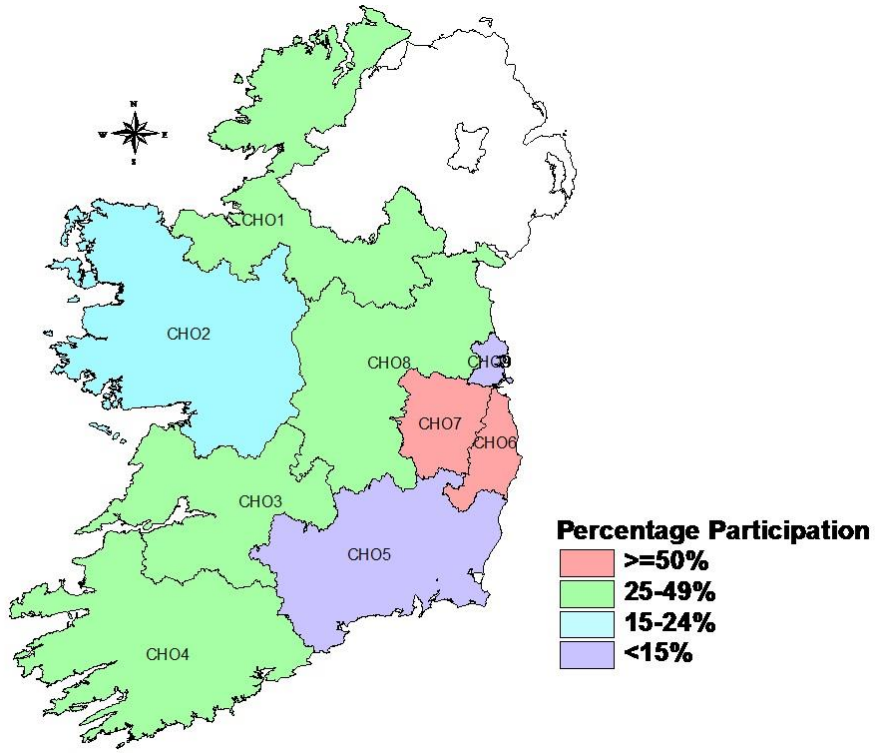

Figure 3.1.1. HSE-owned LTCF by CHO that participated in HALT 2016.

LTCF were categorised into eight major care types, as displayed in Table 3.1.2.

- 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)
- LTCF caring for residents with physical disabilities (Physically disabled)
- LTCF caring for residents for intensive rehabilitation (Rehabilitation)
- LTCF caring for residents with palliative care needs (Palliative care)
- Other care types: Nine LTCF self-selected the 'Other' category in 2016, indicating their resident case mix did not fit in the more common LTCF categories. These included: Mixed care type LTCF (n=5), young chronically ill unit (n=2), dementia specific facility (n=1) and a low dependency residential unit (n=1)

Table 3.1.2 also displays further breakdown of each care type, by ownership, bed numbers, overall bed occupancy and proportion of single rooms. Overall, there was a median of 42 beds (range = 5 - 176 beds) per LTCF, with 59 beds in privately-owned, 51 beds in voluntary and 33 beds in HSE-owned LTCF.

Overall, the median bed occupancy was 93%, with a median single room availability of 71%. While HSE-owned facilities tended to have fewer beds, there were differences in single room availability based on ownership, with single rooms less common in HSE-owned (52%), than LTCF under private (83%) and voluntary (87%) ownership.

Table 3.1.2 Breakdown of participating LTCF, by ownership and care type.

Category	No. of LTCF	Size of facility			Total residents Surveyed	Median proportion of single rooms	Median percentage of beds occupied
	n	median	min	max	n	%	%
by Ownership							
HSE	136	33	5	167	5213	52	91
Private	54	59	19	140	3031	83	95
Voluntary	34	51	10	176	1800	87	94
by Care Type							
General nursing >12 months	88	55	18	167	4722	73	98
Mixed >12 months	46	50	20	142	2499	61	91
LTCF <12 months	14	35	16	72	441	52	87
Intellectually disabled	31	28	5	176	1251	92	96
Psychiatric	23	22	10	86	505	57	86
Palliative care	7	19	8	48	134	80	79
Physically disabled	1	14	14	14	13	100	93
Rehabilitation	5	64	14	72	245	44	90
Other	9	27	13	60	234	53	85
National	224	42	5	176	10044	71	93

Governance Structures

Provision of Nursing & Medical Care

Availability of 24-hour qualified nursing care is a prerequisite for participation in the HALT survey. For the first time, the HALT 2016 survey collected data on the total number of whole time equivalent (WTE) registered nurses (excluded pre-registration student nurses) and WTE healthcare assistants (HCA) working in each LTCF, with the ratio expressed per 100 LTCF beds. Caution is required in interpretation of these results, as they represent staffing levels in LTCF that participated in HALT 2016 and do not necessarily reflect the staffing levels within all LTCF in Ireland.

Differences in nurse staffing ratios were more evident than HCA staffing ratios, when LTCF were stratified by ownership, as displayed in Table 3.1.3. Voluntary-owned LTCF had a mean WTE nursing staff to 100 beds ratio of 61.6, versus 55.2 for HSE-owned and 19.3 for privately-owned LTCFs. The differences in nurse staff:bed ratios by ownership may reflect differences in the types of residents and resident dependency levels. While selected nursing care load indicator information was collected, such as incontinence, disorientation and impaired mobility, in-depth information on resident dependency and co-morbidity was not collected and would be integral to further interpretation of staffing:bed ratios. Within the most common LTCF care types that had participation of >10 LTCF, differences in WTE nursing staff to 100 beds ratios were evident, with higher nurse staffing levels in LTCF caring for residents with psychiatric and intellectual disabilities. HCA staffing to bed ratios were similar between the nursing home-type LTCF, higher in intellectually disabled LTCF and lower in psychiatric LTCF.

Table 3.1.3 Ratios of WTE nursing staff and HCA per 100 beds, by ownership and care type.

Category	No. of LTCF (n)	No. Eligible Residents	WTE Nurses per 100 beds			WTE HCA per 100 beds		
			Mean	Min	Max	Mean	Min	Max
by Ownership								
HSE	136	5213	55.2	5.0	270.0	51.1	0.0	200.0
Private	54	3031	19.3	3.6	41.4	47.7	16.1	72.6
Voluntary	34	1800	61.6	15.2	126.3	63.3	20.3	220.0
by Care Type								
General nursing >12 months	88	4722	32.2	8.1	77.6	50.9	29.1	102.5
Mixed >12 months	46	2499	36.7	3.6	63.5	50.6	10.8	103.7
LTCF <12 months	14	441	44.2	24.1	65.0	46.0	19.0	91.4
Intellectually disabled	31	1251	71.1	32.5	108.3	87.0	0.0	220.0
Psychiatric	23	505	77.4	24.0	270.0	19.1	0.0	82.6
National	**224**	**10044**	**47.6**	**3.6**	**270.0**	**52.2**	**0.0**	**220.0**

Care type categories with <10 LTCF were excluded from this analysis

For HSE-owned LTCF participating in HALT 2016, further analysis of WTE nurse and HCA staffing levels by CHO and by care type within each CHO was not carried out, in view of a wide range in participation of HSE-owned LTCF by CHO (n= 5 – 38), coupled with variance in numbers of individual care types within each CHO (n= 1 – 41).

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 49%, a directly-employed doctor in 29% and in the remaining 22%, a mixed care model was observed, with both GPs and directly-employed doctors providing medical care.

Differences were also observed based on LTCF ownership. While the vast majority of privately-owned LTCF opted for the GP-led model of care (96%), a more heterogenous model of care (GP only, directly employed medical staff only or a mixture of the two) was evident for HSE and voluntary-owned LTCF.

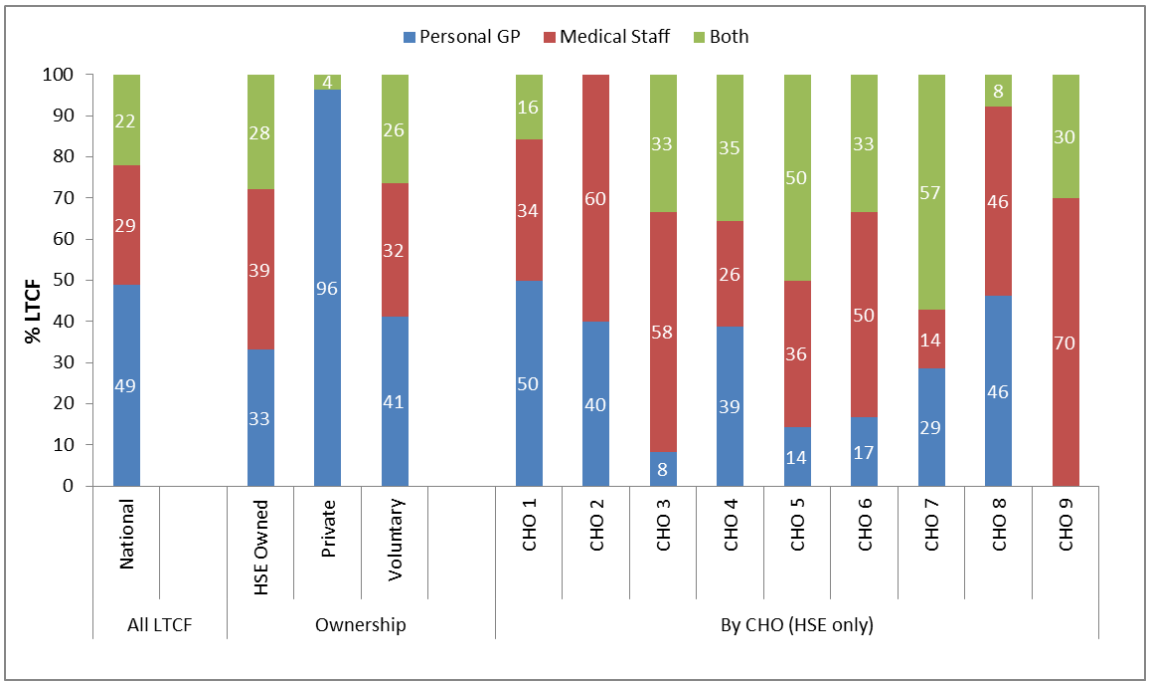

Figure 3.1.2 Models of medical care provision in LTCF, by ownership type and CHO (for HSE-owned facilities)

Regional differences were also observed within HSE-owned LTCF, as displayed in Figure 3.1.3.

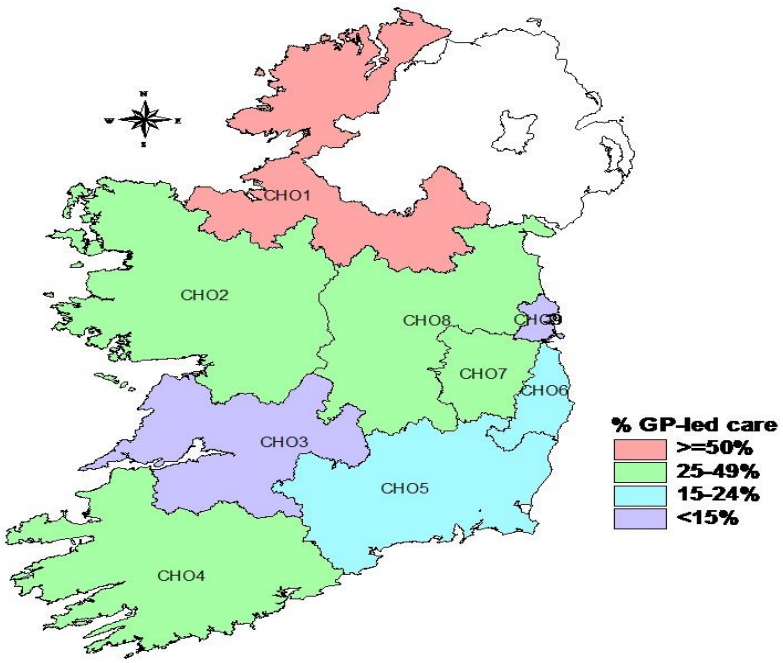

Figure 3.1.3 Proportion of GP-led care in LTCF, by CHO.

The medical care model also varied by LTCF care type, as displayed in Figure 3.1.4. GPs provided the majority of medical care in GN>12 (67%) and intellectually disabled LTCF (52%). Medical care in palliative care and rehabilitation LTCF was more likely to be provided by directly-employed medical staff.

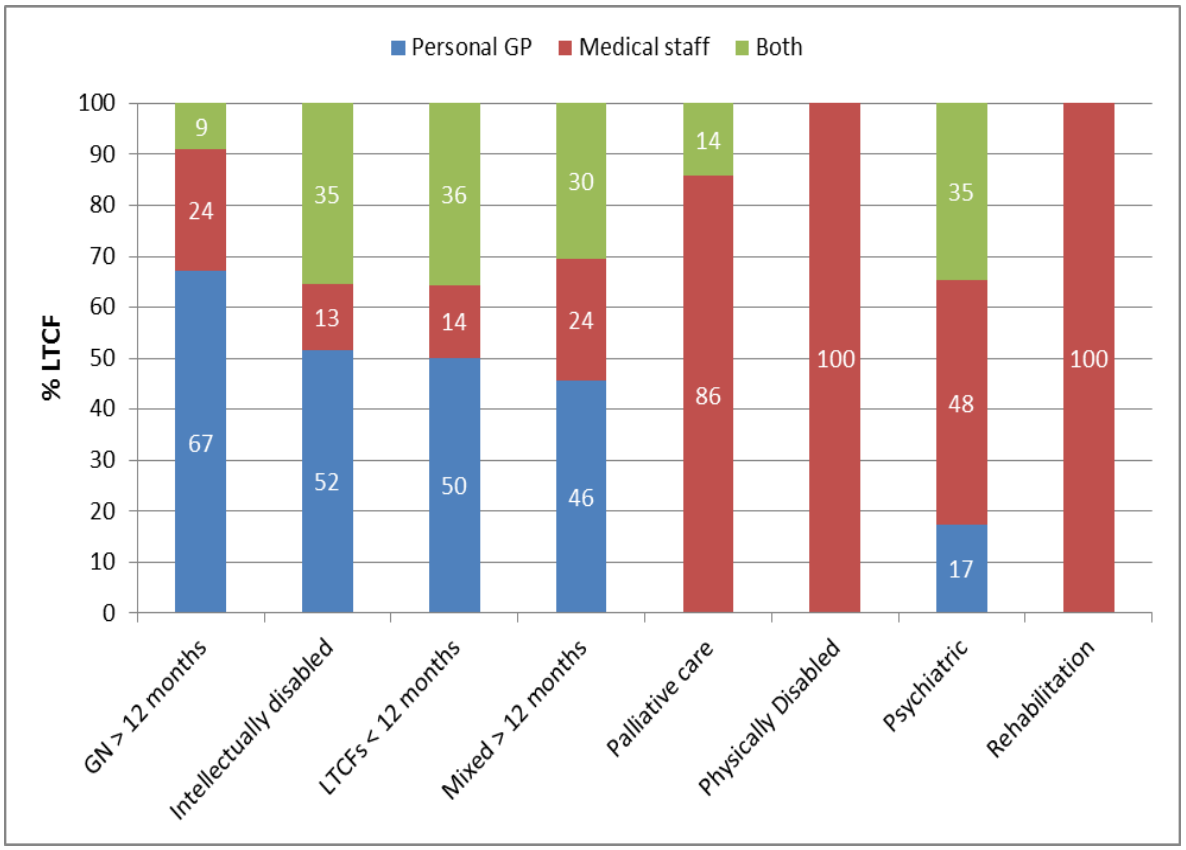

Figure 3.1.4 Models of medical care provision in LTCF, by care type.

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 3.1.5 displays the coordination of medical care.

Overall, 35% reported having no coordinating physician. For the 65% with a coordinating physician, a variety of models of coordination were delivered; external (38%), internal (19%) or a mixture of both (8%). Privately-owned LTCF were more likely to report having no coordinating physician (44%). For those that had a coordinating physician, the vast majority provided external coordination, which correlates with the predominantly GP-led medical care model observed in private LTCF.

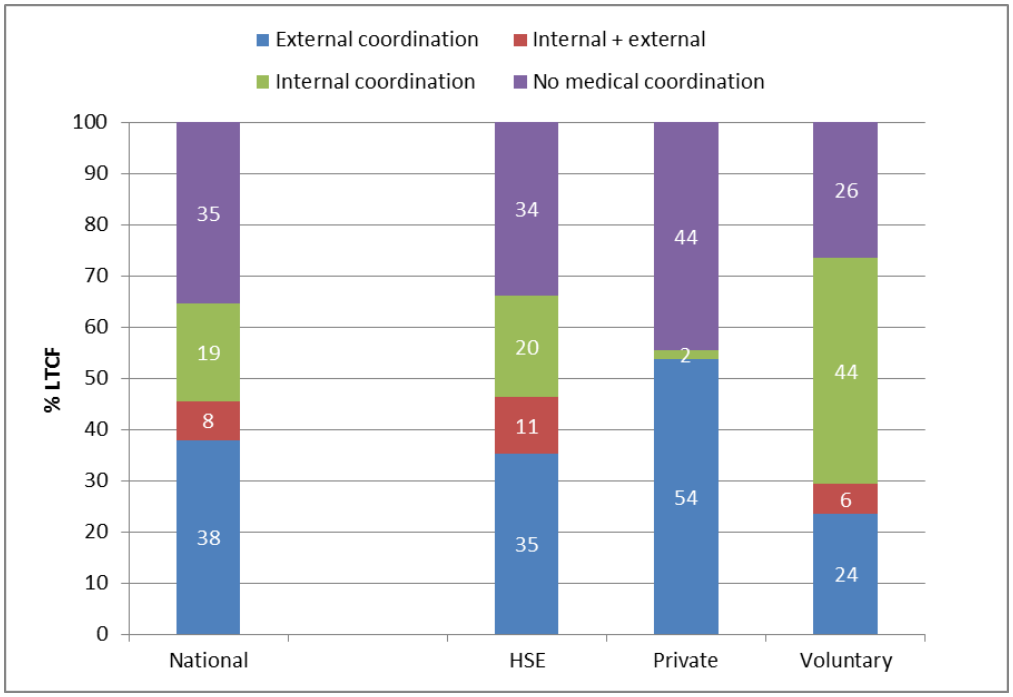

Figure 3.1.5 Coordination of medical care, by LTCF ownership.

Differences in coordination of medical care were also observed when facilities were stratified by care type (Figure 3.1.6). Absence of a coordinating physician was commoner in intellectually disabled LTCF (42%) and GN>12 (39%), whereas a coordinating physician was present in the majority of palliative care LTCF (86%).

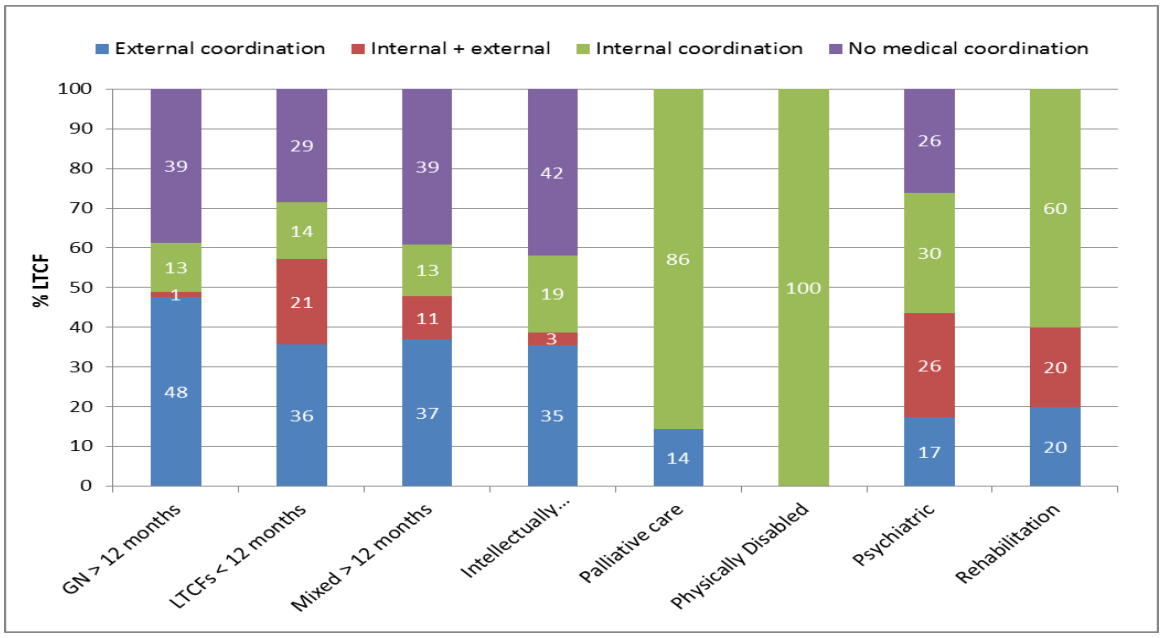

Figure 3.1.6 Coordination of medical care, by care type.

Infection Prevention & Control (IPC) Practices

Table 3.1.4 displays the IPC structures, educational practices and protocols. 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	Management of vascular catheters	Mangement of enteral feeding
	%			%			%				
by Ownership type											
Private (n = 54)	57	72	35	81	81	11	89	89	87	37	83
Voluntary (n = 34)	76	68	56	88	88	44	94	97	94	50	85
HSE (n=136)	83	83	73	83	88	14	97	97	88	49	83
by Care Type											
GN > 12 months (n = 88)	70	81	53	84	82	9	91	90	89	40	84
Private only (n = 40)	58	73	38	80	75	10	85	85	83	25	80
Voluntary only (n = 7)	71	100	43	71	86	43	100	86	86	43	71
HSE only (n = 41)	83	85	71	90	88	2	95	95	95	54	90
Mixed > 12 months (n = 46)	76	89	63	85	85	15	100	100	98	43	93
Intellectually disabled (n = 31)	87	71	65	84	94	16	90	97	90	39	84
LTCFs < 12 months (n = 14)	86	85	57	86	86	36	100	100	100	71	93
Psychiatric (n = 23)	61	65	70	74	87	35	96	96	52	39	48
Palliative care (n = 7)	100	43	71	86	100	57	100	100	100	86	71
Physically Disabled (n =1)	100	0	100	0	100	0	100	100	100	100	100
Rehabilitation (n = 5)	100	60	100	80	100	20	100	100	100	100	100
National	**76**	**78**	**61**	**83**	**86**	**18**	**95**	**95**	**89**	**46**	**83**

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

Overall, 170 (76%) LTCF reported access to a staff member with IPC training. HSE LTCF or voluntary LTCF were more likely to have access to staff with IPC training (83% and 76%, respectively) than private LTCF (57%).

Of 170 LTCF with access to an IPC-trained staff member, 99 (58%) reported that person was not based within the LTCF on a day-to-day basis, 48 (28%) reported that person was based within the LTCF on an ongoing basis and 23 (14%) reported 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=159; 93.5%). Ten LTCF (6%) reported having both a nurse and a doctor with IPC training and one LTCF (0.5%) reported having a doctor with IPC training.

In addition to having access to staff with IPC training, information was sought on access to external expert IPC advice (e.g., from the local hospital or Department of Public Health). Overall, 175 LTCF (78%) reported having access to such advice, with no access reported by 49 LTCF (22%). Access to expert IPC advice was less common in psychiatric LTCF (65%), rehabilitation LTCF (60%) and palliative care LTCF (43%).

Infection Prevention and Control Committee (IPCC)

An active local IPCC was reported by 137 (61%) LTCF, with a median of three meetings per year (range = 0 - 12). Private GN >12 (38%), voluntary GN >12 (43%) and LTCF <12 months (57%) were less likely to have an IPCC.

Staff Training

Overall, provision of IPC training was available in the majority of LTCF (86%) for nursing and paramedical staff, but in the minority of LTCF (18%) for medical staff. Private LTCF offered less access to staff IPC training for nursing, paramedical and medical staff. Medical staff were more likely to receive IPC training if they worked in a voluntary-owned LTCF (44%) or a palliative care LTCF (57%).

Hand Hygiene Training

Overall, 83% reported that a staff hand hygiene training session had been organised during the previous year (2015). This figure was higher in voluntary LTCF (88%) and HSE GN>12 (90%). Hand hygiene training was lower in psychiatric LTCF (74%) and voluntary GN>12 (71%).

Seventy-three percent of LTCFs reported completing hand hygiene training in 2014 and 66% reported hand hygiene training in both 2014 and 2015.

Access to Hand Hygiene Products

The HALT protocol did not specify whether data on hand hygiene product availability applied to staff use only or whether resident hand hygiene products could be included.The vast majority of LTCF reported having alcohol-based hand rub (ABHR) (96%) and liquid soap (95%) as available hand hygiene products (Table 3.1.5). Alcohol-based wipes were reported to be available in 41% of LTCF, ABHR was reported as the preferred hand hygiene method in 68%. Data on the estimated volume of ABHR consumed during the previous year (2015) was provided by 78% of LTCF, reporting an average consumption of 145 litres. Hand washing with a non-antiseptic soap was the preferred method in 20% and hand washing with antiseptic soap in 8% of LTCF.

Observation of Hand Hygiene Opportunities

For the first time, HALT 2016 collected data on observation of hand hygiene opportunities within individual LTCF during the previous year (2015). Data on compliance with hand hygiene opportunities was not collected. However, 51% of LTCF reported that formal audit of staff hand hygiene compliance was carried out in the previous year (2015).

Table 3.1.5 Availability of hand hygiene products, preferred hand hygiene methods and observed opportunities.

Hand hygiene products/methods	% of LTCFs
Product	
Alcohol rub	96
Liquid soap	95
Wipes	41
Bar soap	1
Preferred Method	
Hand disinfection with an alcohol solution	68
Hand washing with water and a non antiseptic soap	20
Hand washing with water and an antiseptic soap	8
Unanswered	4
Observed hand hygiene opportunities	
0	56
1-100	36
>100-499	5
>500	3
Hand hygiene audit 2015	
Yes	51
No	33

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 95% overall, with lower rates reported from intellectually disabled LTCF (90%) and private GN>12 (85%)
- *Hand hygiene*: Available in 95% overall, with lower rates reported from voluntary GN>12 (86%) and private GN>12 (85%)
- *Management of urinary catheters:* Available in 89% overall, with lower rates reported from private GN>12 (83%) and psychiatric LTCF (52%)

- *Management of vascular catheters:* Available in 46% overall, with lower rates reported from intellectually disabled and psychiatric LTCF (both 39%) and private GN>12 (25%)
- *Management of enteral feeding:* Available in 83% overall, with lower rates reported from voluntary GN>12 and palliative care LTCF (both 71%) and psychiatric LTCF (48%)

Table 3.1.6 displays the surveillance and additional IPC activities. Further description of these categories is provided subsequently.

Table 3.1.6 Overview of surveillance and general IPC 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 = 54)	46	59	59	59	85	81	61	81	72	57
Voluntary (n = 34)	29	47	65	41	91	94	74	91	91	38
HSE (n = 136)	25	48	68	43	93	86	79	84	68	36
by Care Type										
GN > 12 months (n = 88)	36	59	70	53	88	83	74	82	68	47
Private only (n = 40)	45	63	58	60	80	80	63	78	65	63
Voluntary only (n = 7)	43	71	71	57	100	86	71	86	86	71
HSE only (n = 41)	27	54	83	46	93	85	85	85	68	27
Mixed > 12 months (n = 46)	41	46	70	48	96	93	76	87	83	35
Intellectually disabled (n = 31)	13	39	42	26	94	87	65	84	71	23
LTCFs < 12 months (n = 14)	7	36	50	57	100	86	64	93	71	79
Psychiatric (n = 23)	22	35	61	26	87	70	74	70	48	22
Palliative care (n = 7)	29	86	71	86	71	100	86	100	100	86
Physically Disabled (n = 1)	100	100	100	0	100	100	100	100	100	0
Rehabilitation (n = 5)	40	60	100	40	100	100	80	100	100	20
National	**31**	**50**	**65**	**46**	**91**	**86**	**74**	**84**	**73**	**42**

MDROs: Multi-drug resistant organisms

HCAI Surveillance Programme

- Some form of a HCAI surveillance programme was reported by 31% (n=69) of LTCF (Table 3.1.6). Ongoing participation in repeated HALT surveys could be regarded as a HCAI surveillance programme. Some care types were more likely to report having HCAI surveillance activities; private GN>12 (45%), voluntary GN>12 (43%) and mixed >12 (41%). HCAI surveillance was less common in psychiatric (22%), intellectually disabled LTCF (13%) and LTCF <12 months (7%)
- Audits of IPC policies and procedures were reported by 50%, feedback of surveillance results to staff by 65% and monitoring of incidence of MDRO by 46%
- Notably, facilities with an active IPCC were 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 86% overall, with lower levels reported from private LTCFs (81%)
- A system in place for the organisation, control and feedback on hand hygiene was reported as available in 74% overall, with lower levels reported from intellectually disabled LTCF (65%), LTCF <12 months (64%) and private GN<12 (63%)
- A system for management of patients with MDRO (e.g., patient isolation, additional IPC precautions) was available in 84% overall, with less availability in psychiatric LTCF (70%) and private GN>12 (78%)
- Overall, a system for development of resident care protocols available in 73%, with lower availability in HSE GN>12 (68%) and psychiatric LTCF (48%)
- Overall, 91% reported that seasonal influenza vaccine is offered to residents. However, lower figures were reported from psychiatric LTCF (87%) and private GN>12 (80%)

Antimicrobial Stewardship Practices

Antimicrobial stewardship practices, stratified by LTCF ownership, care type and presence of a designated coordinating physician are displayed in Table 3.1.7.

Table 3.1.7 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 = 54)	2	7	20	7	26	17	0	48	20	30
Voluntary (n = 34)	0	12	59	24	21	3	3	41	18	21
HSE (n=136)	3	4	50	11	16	8	0	35	35	7
by Care Type										
GN > 12 months (n = 88)	2	5	34	9	26	15	0	43	28	22
Private only (n = 40)	3	8	20	8	28	18	0	45	20	33
Voluntary only (n = 7)	0	14	43	29	43	0	0	71	14	57
HSE only (n = 41)	2	0	46	7	22	15	0	37	39	5
Mixed > 12 months (n = 46)	2	13	48	15	22	11	0	41	22	17
Intellectually disabled (n = 3	0	6	42	16	3	3	3	13	10	13
LTCFs < 12 months (n = 14)	0	0	43	14	7	0	0	36	21	0
Psychiatric (n = 23)	4	4	43	4	13	4	0	61	52	4
Palliative care (n = 7)	0	14	100	29	43	0	0	57	71	0
Physically Disabled (n =1)	0	0	100	0	0	0	0	0	100	0
Rehabilitation (n = 5)	0	0	80	40	0	0	0	20	20	0
by Presence of a Coordinating Physician										
With a CP	3	10	50	17	22	8	1	41	30	14
Without a CP	1	0	34	4	14	11	0	37	27	14
Chi-test (p-value)	0.53	**0.001**	**0.03**	**0.004**	0.14	0.45	0.67	0.57	0.63	0.92
National	**2**	**6**	**44**	**12**	**19**	**9**	**0**	**39**	**29**	**14**

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

Overview of Antimicrobial Stewardship Practices & Guidelines

- The vast majority of LTCF (n=219; 98%) reported having no antimicrobial stewardship committee (ASC). Of the five LTCF with an ASC (2%), one was privately-owned
- Additionally, the vast majority (94%) reported that annual training on antimicrobial prescribing was not provided
- A local antimicrobial prescribing guideline was available in 99 LTCF (44%) overall. Private GN>12 were less likely (20%) than palliative care (100%) and rehabilitation LTCF (80%) to have guidelines
- Most LTCF (n=193; 86%) reported having no restrictions on the types of antimicrobials that could be prescribed for residents. Of the 31 LTCF that reported having a restricted antimicrobial list, the types of restricted antimicrobials are displayed in Table 3.1.8

Table 3.1.8 Types of restricted antimicrobials.

Restricted antimicrobials	Number of LTCFs	(%)
Carbapenems	17	55
Intravenous antimicrobials	16	52
3rd generation cephalosporins	15	48
Vancomycin	14	45
Glycopeptides	9	29
Mupirocin	9	29
Fluoroquinolones	7	23
Broad-spectrum antibiotics	2	6

- Access to the advice of a pharmacist as required, was reported by 88 LTCF (39%) overall. Voluntary GN>12 (71%), psychiatric (61%) and palliative care LTCF (57%) reported more access to pharmacist advice
- The HALT survey did not collect data on methods for gathering local consumption data. Local antimicrobial consumption data was collected by the minority of LTCF (12%). It was uncommon practice for antimicrobial consumption data to be reported back to GPs and very uncommon for LTCF to report having access to summary reports of antimicrobial resistance in key pathogens from their local microbiology laboratory (9%)

- A minority (19%) 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 for infection (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 219 (98%) who answered, urine dipstick was performed routinely in 133 (61%) and sometimes in 86 (39%)
- Specific information was also sought on the availability of local antimicrobial prescribing guidelines for three common infection types, as displayed in Table 3.1.9. Private LTCF were less likely to have guidelines for RTI and UTI

Table 3.1.9 Written antimicrobial treatment guidelines.

	Antimicrobial treatment guidelines		
	Respiratory tract infections	Urinary tract infections	Wound and soft tissue infections
	%		
by Ownership			
Private	22	39	35
HSE	32	51	34
Voluntary	41	56	35
by Presence of a Coordinating			
With a CP	41	53	41
Without a CP	14	42	22
National	**31**	**49**	**34**

- 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 training of prescribers on antimicrobial use, availability of antimicrobial prescribing guidelines, including site specific infection guidelines and antimicrobial consumption data

3.2 HCAI

Description of Residents

Table 3.2.1 displays an overview of the resident demographics, selected care load indicators and HCAI risk factors, by LTCF ownership and by care type in Table 3.2.2. Female residents predominated, other than in psychiatric and palliative LTCF. There were higher proportions of residents aged ≥85 years in private LTCF (51%) and HSE LTCF (38%). GN>12 (49%), mixed care >12 (47%) and LTCF <12 months (41%) also had a higher proportion of residents ≥85 years. Nursing care load indicators (incontinence, disorientation and impaired mobility) were evident, but varied in prevalence across all care types. Overall, there was a heavy burden of all care load indicators in care types: GN>12, mixed >12 and LTCF <12 months.

HCAI risk factors were most prevalent in palliative care LTCF, where urinary (31%), vascular (18%) catheters, pressure sores (20%) and 'other wounds' (28%) were much more common than for other care types. Overall, recent surgery within the past 30 days was uncommon (2%). Residents of the physically disabled, psychiatric and intellectually disabled LTCF were less likely to have HCAI risk factors.

Table 3.2.1 Resident demographics, care load indicators and HCAI risk factors, by LTCF ownership.

Ownership	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)
	%									
Private (n=54)	31	51	56	55	37	6	0	3	9	1
Voluntary (n=34)	37	21	48	48	40	5	2	3	13	3
HSE (n=136)	42	38	58	49	47	7	0	4	9	2
National	**38**	**39**	**56**	**50**	**43**	**7**	**1**	**3**	**9**	**2**

Table 3.2.2 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	49	61	57	47	6	0	3	9	1
Mixed > 12 months	36	47	59	54	46	8	0	4	10	2
LTCFs < 12 months	41	41	53	49	41	12	0	3	10	5
Intellectually disabled	47	1	47	38	32	2	0	1	9	1
Psychiatric	56	7	40	32	23	2	0	2	2	0
Palliative care	54	13	45	34	54	31	18	20	28	3
Physically Disabled	38	0	54	8	77	8	0	0	0	0
Rehabilitation	39	28	21	14	16	7	3	4	10	3
Other	39	29	43	44	35	7	1	2	24	16
National	**38**	**39**	**56**	**50**	**43**	**7**	**1**	**3**	**9**	**2**

Long-Term Care Facility-Acquired Infections (LAI)

There were 441 residents with 455 LAI, giving a national crude prevalence of LAI of 4.4%, with a median prevalence of 3.4%. Table 3.1.3 displays the LAI prevalence, by care type. Similar to the distribution of HCAI risk factors, as displayed in Table 3.2.2 above, the median prevalence of LAI was highest in palliative care LTCF (8.3%). Higher median LAI prevalence was recorded for LTCF care types associated with recent hospitalisation; LTCF <12 months (6.6%) and rehabilitation LTCF (4.9%). LAI prevalence was lower in intellectually disabled and psychiatric LTCF.

Table 3.2.3 LAI prevalence, by care type.

Facility Type	Total eligible residents	Number of residents with an infection	LAI Prevalence (%)		
			Crude[a]	Median (IQR[b])	
GN > 12 months	4,722	189	4.0%	3.5	(0 - 6.2)
Mixed > 12 months	2,499	130	5.2%	4.5	(2.6 - 6.9)
LTCFs < 12 months	441	25	5.7%	6.6	(0 - 12.8)
Intellectually disabled	1,251	40	3.2%	0.0	(0 - 4.8)
Psychiatric	505	19	3.8%	0.0	(0 - 1.4)
Palliative care	134	16	11.9%	8.3	(2.9 - 16.1)
Physically Disabled	13	2	15.4%	15.4	(15.4 - 15.4)
Rehabilitation	245	12	4.9%	4.9	(0 - 10.9)
Other	234	8	3.4%	0.0	(0 - 5.4)
National	**10,044**	**441**	**4.4%**	**3.40**	**(0 - 6.7)**

[a] The crude prevalence of residents with a LAI 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.

Infection Types

Figure 3.2.1 displays the prevalence of LAI, by care type.

RTI

- RTI was the joint most prevalent LAI, affecting 1.5% of all residents. In the HALT protocol, RTI were further categorised into; lower RTI (85.6%), common cold (7.5%), pneumonia (6.2%) and flu (0.7%), with the latter definition based on clinical symptoms only

UTI

- UTI was the joint most prevalent LAI, affecting 1.5% of all residents. In total, 33.3% were reported as microbiologically-confirmed UTI
- UTI was the most prevalent (or one of the most prevalent) infections, reported by palliative care (3.7%) and rehabilitation (3.3%) LTCF. UTI was less prevalent in intellectually disabled LTCF (1.0%)

Skin infections

- Skin infections were the second most prevalent LAI, affecting 1.1% of all residents. The vast majority were further categorised as cellulitis (85%)
- Skin infections were the most prevalent infections reported in intellectually disabled LTCF (1.1%) and were slightly more prevalent in LTCF <12 months (1.4%) and mixed >12 months (1.3%)

CDI

- LTCF acquired *C. difficile* infection (CDI) affected 0.02% of all residents (n=3). All cases were microbiologically confirmed

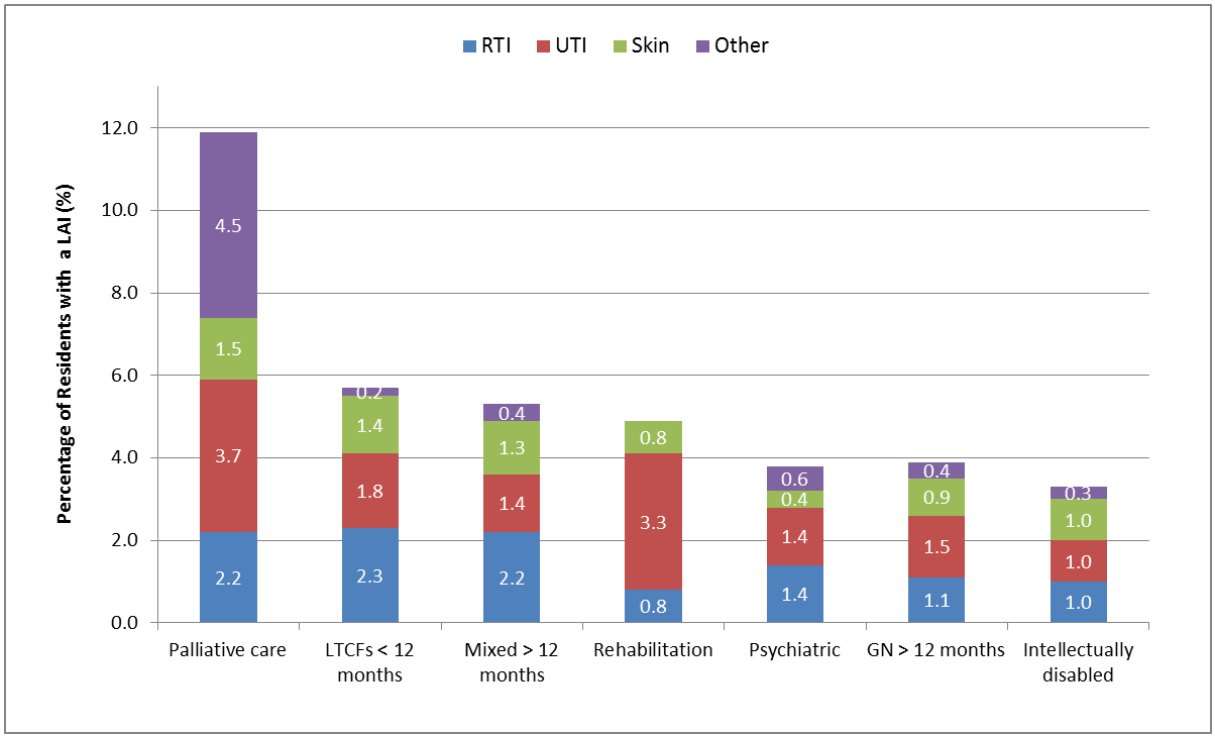

Figure 3.2.1 Percentage of residents with LAI, by care type.
Only LTCF care types including > 100 eligible residents were included for this analysis. Some residents had >1 LAI. Within palliative care – 'other' category included oral candidiasis (n=5) and bloodstream infection (n=1).

Hospital-Acquired Infections (HAI)

For the first time, HALT 2016 collected data on hospital-acquired infections (HAI). There were 42 HAI in 39 residents reported by 27 (12%) LTCF. The national crude prevalence of HAI was 0.4%, with a median HAI prevalence of 0%. Therefore, HAI were uncommon in Irish LTCF in May 2016, with the vast majority of HCAI categorised as LAI.

Table 3.2.4 displays the HAI prevalence, by care type. Similar to the distribution of HCAI risk factors, as displayed in Table 3.2.2 above, the crude prevalence of HAI was highest in palliative care LTCF (6%). A slightly higher crude HAI prevalence was recorded for LTCF care types associated with recent hospitalisation; LTCF <12 months (0.9%) and rehabilitation LTCF (1.2%).

Table 3.2.4 HAI prevalence, by care type.

Facility Type	Total eligible residents	residents with an infection	HAI Prevalence (%)		
			Crude[a]	Median (IQR[b])	
GN > 12 months	4,722	12	0.3%	0.00	(0 - 0)
Mixed > 12 months	2,499	10	0.4%	0.00	(0 - 0)
LTCFs < 12 months	441	4	0.9%	0.00	(0 - 1.3)
Intellectually disabled	1,251	1	0.1%	0.00	(0 - 0)
Psychiatric	505	1	0.2%	0.00	(0 - 0)
Palliative care	134	8	6.0%	0.00	(0 - 6.3)
Physically Disabled	13	0	0.0%	0.00	(0 - 0)
Rehabilitation	245	3	1.2%	0.00	(0 - 0)
Other	234	0	0.0%	0.00	(0 - 0)
National	**10,044**	**39**	**0.4%**	**0.00**	**(0 - 0)**

[a] The crude prevalence of residents with a HAI 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.

Infection Types

Figure 3.2.2 displays the prevalence of HAI, by care type.

RTI: Overall, RTIs were the joint most prevalent HAI, affecting 0.11% of all residents. RTI were further categorised into; lower RTI (45.5%), common cold (9%) and pneumonia (45.5%)

Skin infections: Skin infections were the joint most prevalent HAI, affecting 0.11% of all residents. All HAI skin infections were further categorised as cellulitis. Skin infections were the most prevalent (or one of the most prevalent) infections reported by rehabilitation LTCF (0.4%)

UTI: Overall, UTI was the second most prevalent HAI, affecting 0.06% of all residents. None of these were reported as microbiologically-confirmed UTI

CDI: *C. difficile* infection affected 0.04% of all residents. All four cases of CDI were microbiologically confirmed

SSI: Two residents (0.02%) were reported to have had surgical site infections, both of which were superficial. Both were residents of GN>12 months. Neither were microbiologically-confirmed

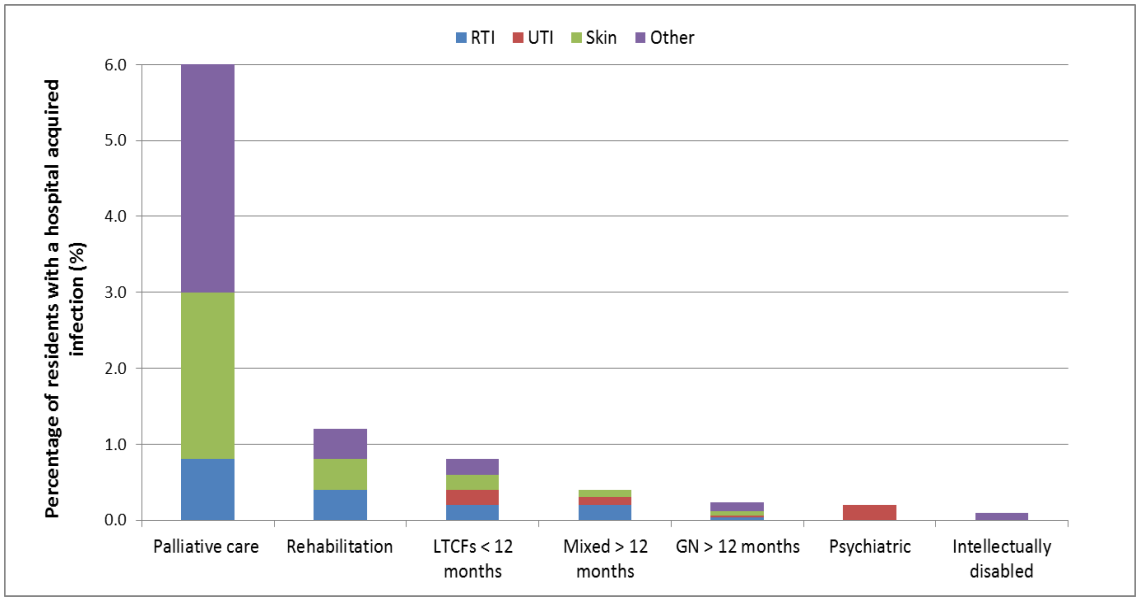

Figure 3.2.2 Percentage of residents with HAI, by care type.

Only LTCF care types including > 100 eligible residents were included for this analysis. Some residents had >1 HAI. Within palliative care – 'other' category included oral candidiasis (n=3) and bloodstream infection (n=1).

Microbiology Results – Pathogens & Antimicrobial Resistance

In prior HALT surveys, whenever 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. In HALT 2016, the protocol changed, whereby information on microbiology samples was sought only on residents who fulfilled a HCAI surveillance definition. Therefore, the microbiology findings from 2016 are not comparable with those of previous HALT surveys. Within this report, only the microbiology results for confirmed LAI will be considered. Figure 3.2.3 displays the microbiology status of the 455 LAI.

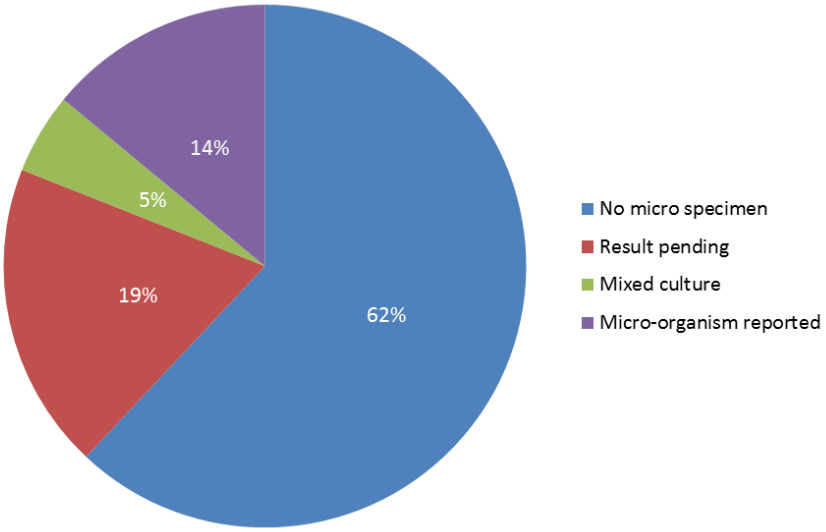

Figure 3.2.3. Microbiology status of LAI.

For 284 infections, no specimen had been sent for microbiological examination (62%). Of 171 LAI with a microbiology specimen sent, the result was pending or unavailable for 84 (49%), a mixed culture was reported for 22 (13%). There were 65 LAI with at least one microorganism detected. In total, there were 70 microorganisms reported, with five LAI having two or more reported microorganisms.

Figure 3.2.4 displays the reported microorganisms for LAIs. *Escherichia coli (E. coli)* was the most frequently detected (35%), followed by *Staphylococcus aureus* (29%).

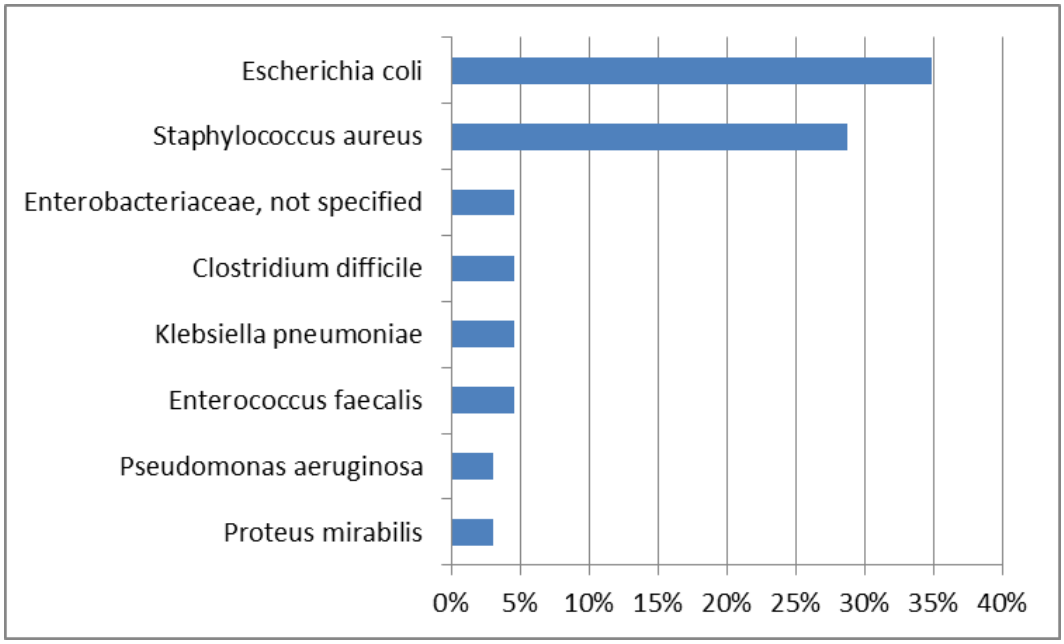

Figure 3.2.4. LAI causative microorganisms.

Figures 3.2.5 and 3.2.6 display the proportion of pathogens reported from relevant positive microbiological specimens taken from urinary tract and skin/wound LAIs. *E. coli* was the most frequently isolated organism of 36 UTI with positive microbiology (62%, n=22), with *S. aureus* the most frequently isolated organism from 17 skin/wound infections with positive microbiology (82%, n=14). Just two RTIs had positive microbiology; *Serratia marcescens* (n=1) and unspecified Candida species (n=1),with the latter likely colonising flora in the setting of RTI.

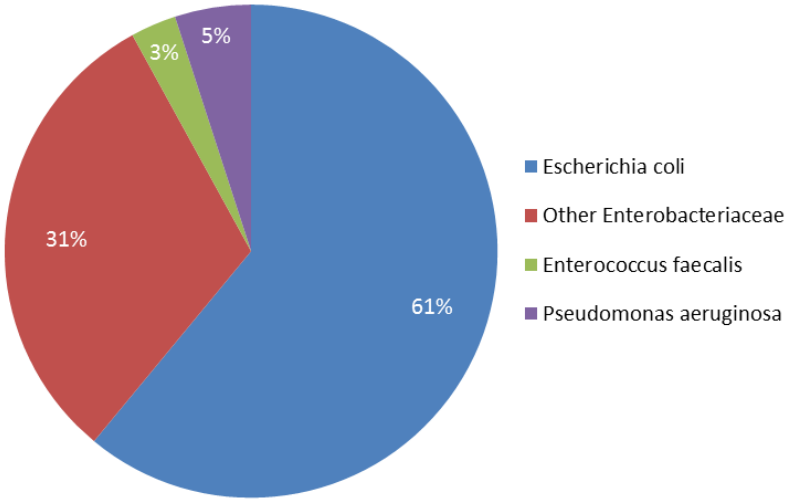

Figure 3.2.5 Causative pathogens of LTCF-acquired UTIs

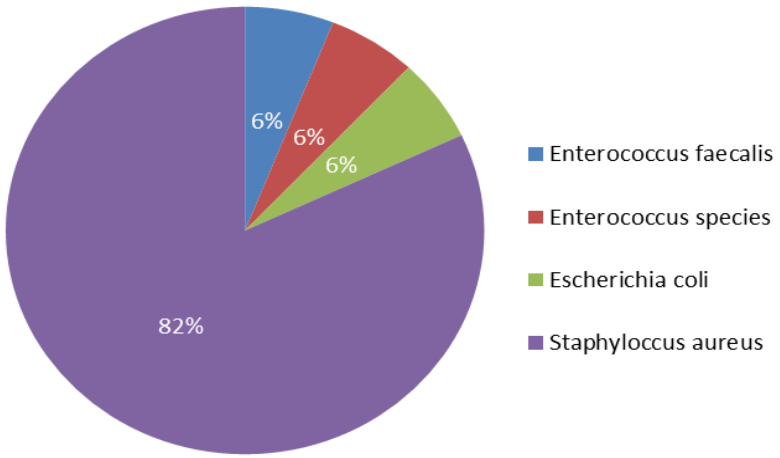

Figure 3.2.6 Causative pathogens of LTCF-acquired skin/wound infections

Of 23 *E. coli* isolates, 3rd generation cephalosporin (3GC) susceptibility results were unknown for 52%, 44% were susceptible to 3GC, 4% were resistant to 3GC. There were no LAI with a positive microbiology result for carbapenem resistant *Enterobacteriaceae* (CRE) reported (Figure 3.2.7).

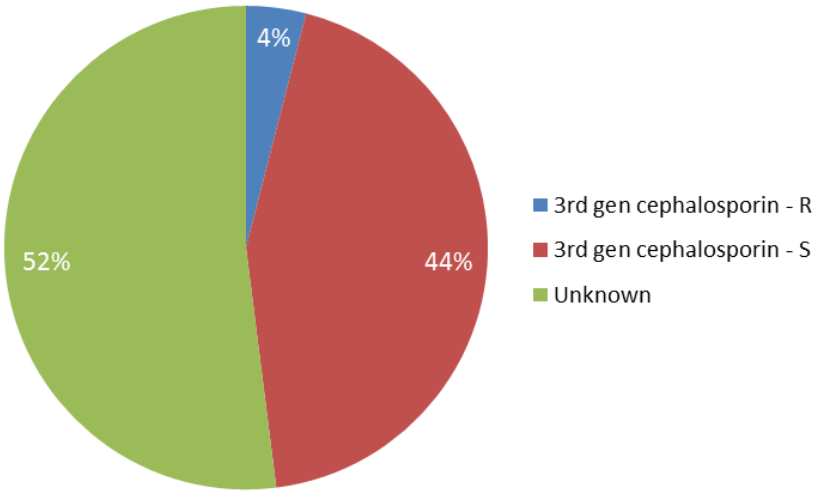

Figure 3.2.7 *E. coli* antimicrobial susceptibility results.

Of 19 *Staphylococcus aureus* isolates, 74% were susceptible (MSSA) and 16% were resistant to meticillin/flucloxacillin (MRSA). For 10%, antimicrobial susceptibility results were unknown. (Figure 3.2.8)

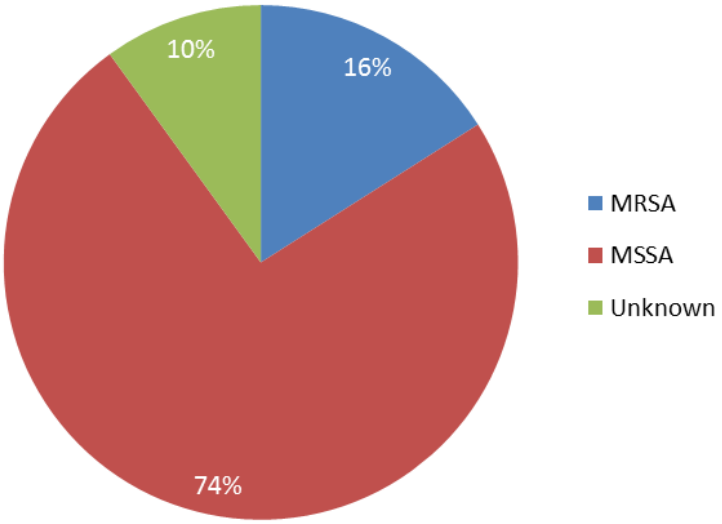

Figure 3.2.8 *Staphylococcus aureus* antimicrobial susceptibility results.

3.3 Antimicrobial Use

The national crude prevalence of antimicrobial use was 9.8%, with a median prevalence of 8.3%. Table 3.3.1 displays antimicrobial use prevalence, by care type. The median prevalence was highest in palliative care LTCF (30.8%).

Table 3.3.1 Antimicrobial use prevalence, by care type.

Care Type	Total eligible residents	Number of residents on antimicrobials	Antimicrobial prevalence (%)	
			Crude	median (IQR)
GN > 12 months	4722	444	9.4	8.6 (5.3-13.6)
Mixed > 12 months	2499	250	10.0	8.2 (5.7-12.5)
LTCFs < 12 months	441	49	11.1	12.1 (6.9-19)
Intellectually disabled	1251	102	8.2	5.2 (0.3-16.7)
Psychiatric	505	39	7.7	6.7 (2.4-9.2)
Palliative care	134	44	32.8	30.8 (25.7-36.3)
Physically Disabled	13	0	0.0	0.0 (0-0)
Rehabilitation	245	22	9.0	10.9 (6.6-15.6)
Other	234	31	13.2	15.0 (9.1-17.6)
National	10044	981	9.8	8.3 (4.5-15.1)

Antimicrobial Prescribing Location

Across all care types, 83% of antimicrobials were prescribed within the LTCF, as displayed in Figure 3.3.1. A higher proportion of antimicrobials had been prescribed in the hospital for rehabilitation (21%) and palliative care (16%) LTCF and LTCF <12 months (13%).

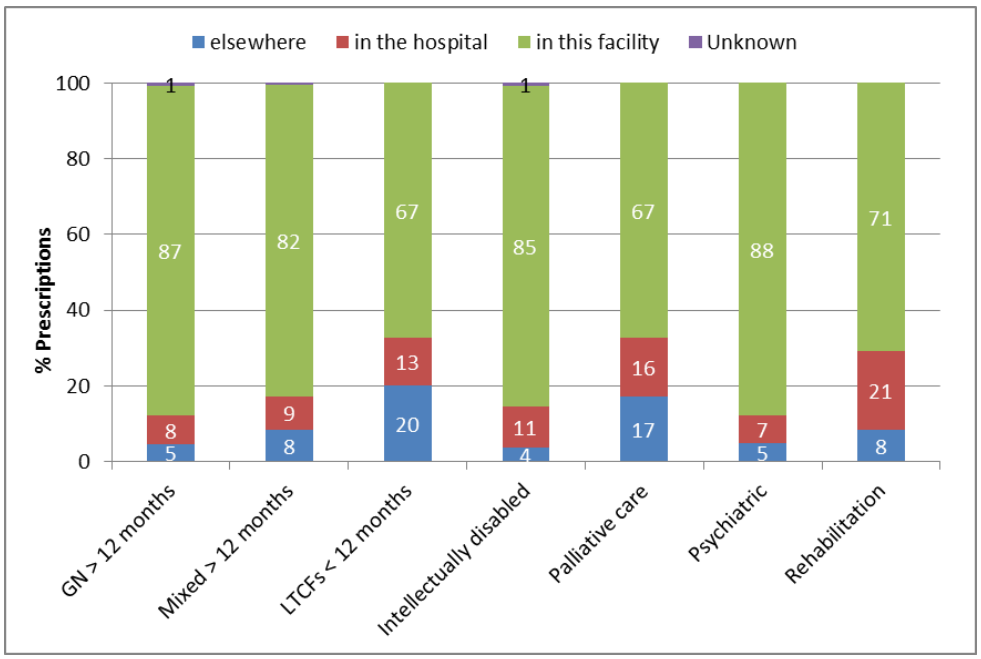

Figure 3.3.1 Antimicrobials, by prescribing location and care type.

Body Sites for which Antimicrobials were Prescribed

Figures 3.3.2 and 3.3.3 display the breakdown of antimicrobial use, by body site and antimicrobial indication, respectively. Over one third (36%) of therapeutic antimicrobials were prescribed for RTI. The majority of prophylactic antimicrobials (68%) were prescribed to prevent UTI.

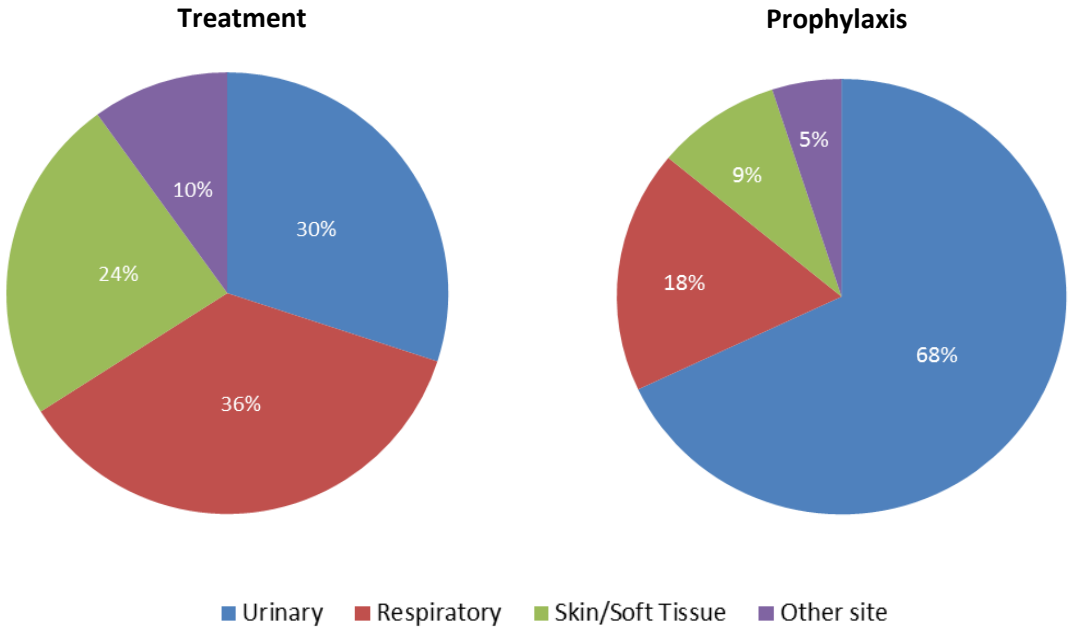

Figure 3.3.2 Treatment antimicrobial use by body site (n=615) & **Figure 3.3.3**. Prophylactic antimicrobial use by body site (n=434)

Figure 3.3.4 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 5% of all residents. Palliative care (7%) had a slightly higher prevalence, while psychiatric, rehabilitation (both 4%) and intellectually disabled (2%) LTCF had a lower prevalence of prescribing for urinary tract indications
- The respiratory tract was the second most prevalent site, accounting for antimicrobials prescribed to 3% of all residents. Palliative care (6%) had a higher prevalence than other facility types
- Skin or wounds were the third most prevalent site, accounting for antimicrobials prescribed to just under 2% of all residents. Palliative care (5%) & intellectually disabled (3%) LTCF had a higher prevalence of prescribing for skin or soft tissue indications than other facility types

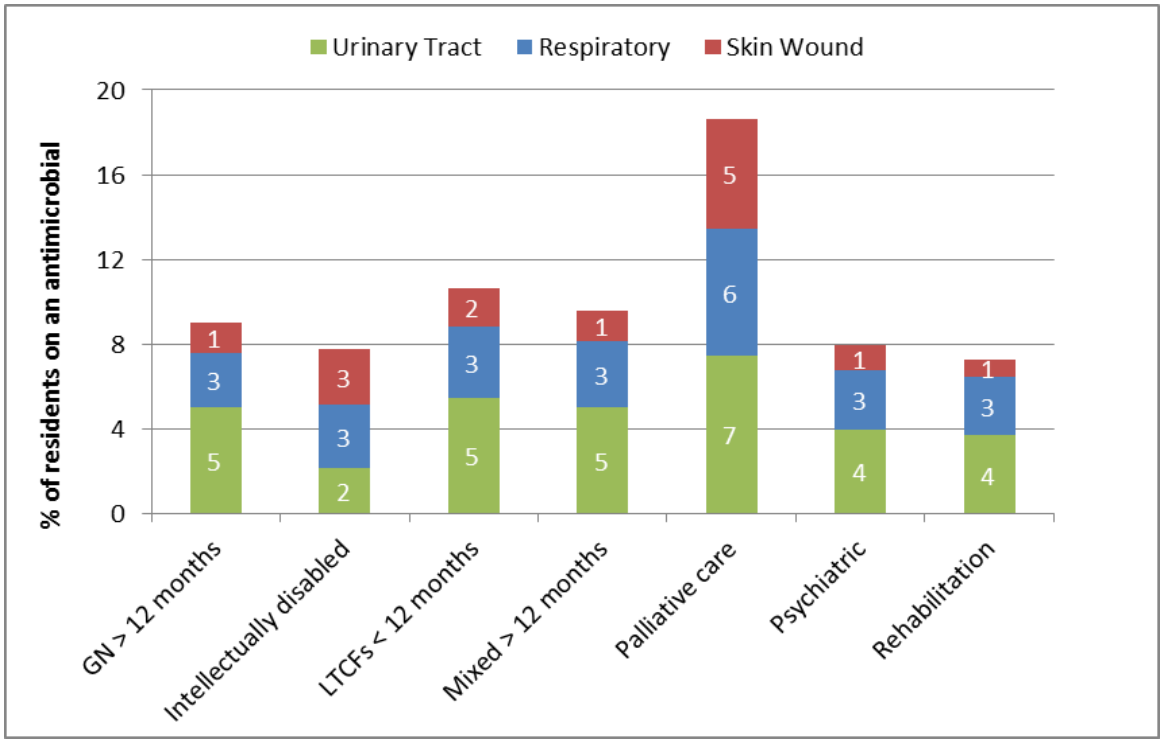

Figure 3.3.4 Prevalence of antimicrobial use, by body site and care type.
Only LTCF care types including > 100 eligible residents were included in this breakdown.

Reasons for which Antimicrobials were Prescribed

The reason for antimicrobials varied across care types, as displayed in Figure 3.3.5. Overall, the majority were prescribed to treat infection (59%). However, the opposite was true in intellectually disabled LTCF, where prophylaxis accounted for the majority of antimicrobial prescriptions (54%).

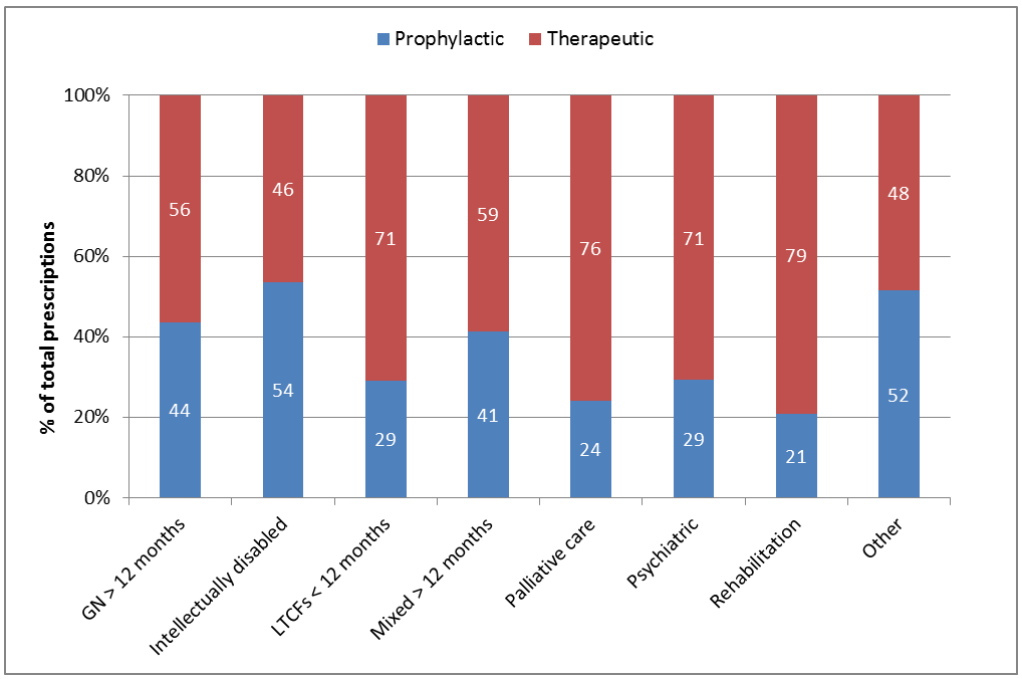

Figure 3.3.5 Reason for antimicrobials, by care type.

Figure 3.3.6 displays the breakdown of treatment antimicrobials, by care type. RTI was most prevalent indication (2.1% of all residents), particularly in palliative care (5.2%) and LTCF <12 months (3.2%). UTI treatment was prevalent in palliative care (5.2%) and rehabilitation (2.9%). Skin/wound infection treatment was most prevalent in palliative care (5.2%) and LTCF <12 months (1.8%).

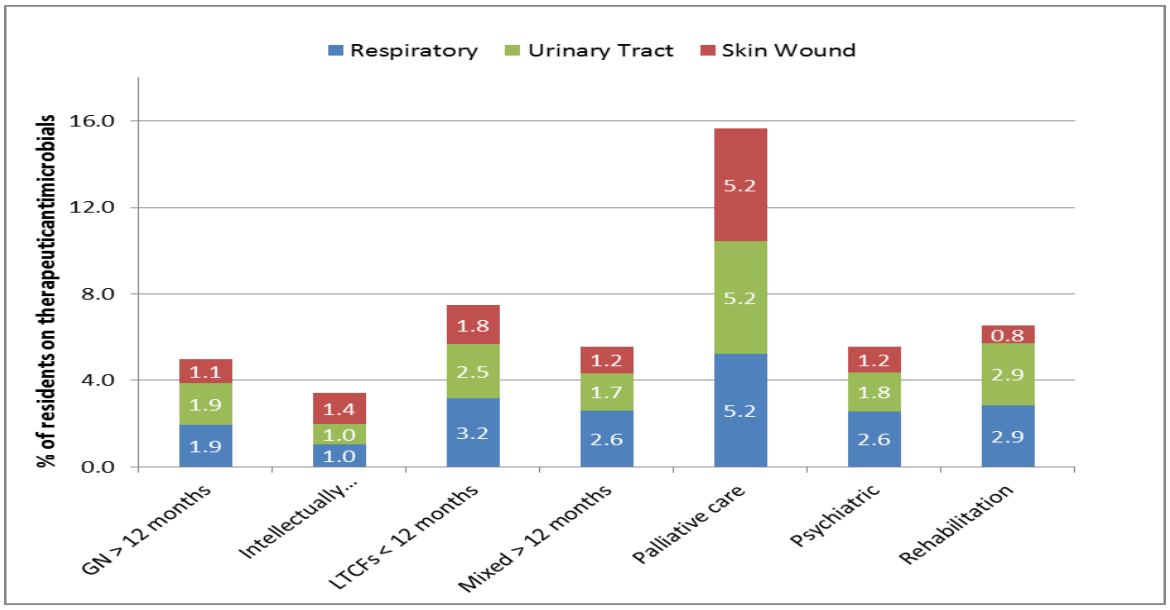

Figure 3.3.6 Body sites for treatment of infection, by care type.
Only LTCF care types including > 100 eligible residents were included in this breakdown.

Figure 3.3.7 displays the breakdown of prophylactic antimicrobials, by care type. UTI prevention was the most prevalent indication and at 3.4% was highest in Mixed>12m, followed by LTCF <12m (3.2%) and GN>12 months (3.1%). Respiratory tract prophylaxis was particularly prevalent in intellectually disabled (2.0%) and palliative care (1.5%) LTCF.

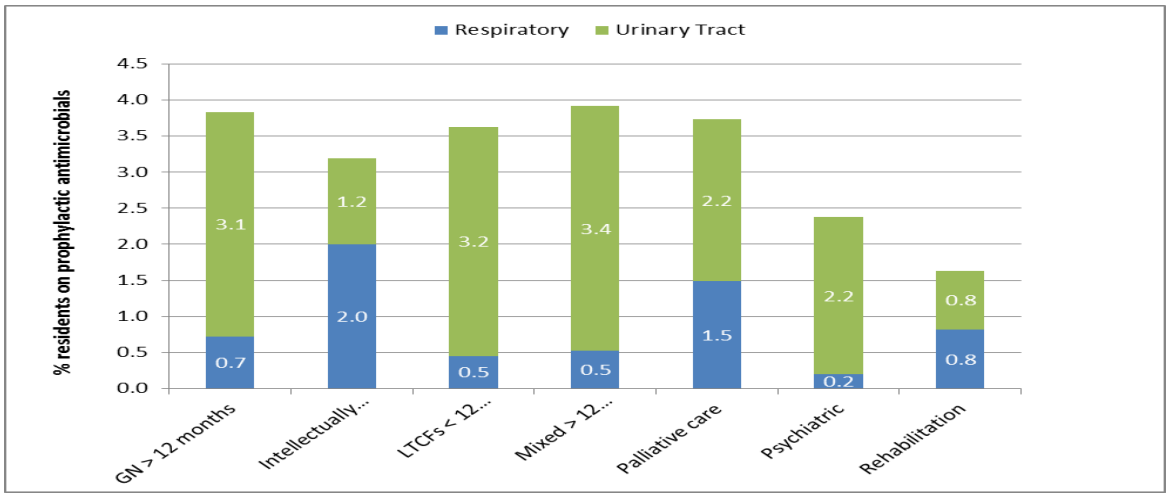

Figure 3.3.7 Body sites for prevention of infection (prophylaxis), by care type.
Only LTCF care types including > 100 eligible residents were included in this breakdown.

Prescribed Antimicrobials

Nitrofurantoin was the most commonly prescribed antimicrobial. Trimethoprim, co-amoxiclav, flucloxacillin, amoxicillin, cefalexin and azithromycin were also frequently prescribed, as displayed in Figure 3.3.8. Figures 3.3.9 & 3.3.10 display the breakdown of the top five treatment and prophylaxis antimicrobials, respectively.

The oral route accounted for 95% of antimicrobial administration overall, with treatment antimicrobials administered via the oral route in 91.5%, the parenteral (IV) route in 6.5%, with 2% administered via other routes (e.g., inhaled). There were no residents prescribed tuberculosis treatment at the time of the HALT survey. Figure 3.3.11 displays the breakdown of prescribed antimicrobials, by care type. Co-amoxiclav accounted for 41% of prescriptions in psychiatric LTCF.

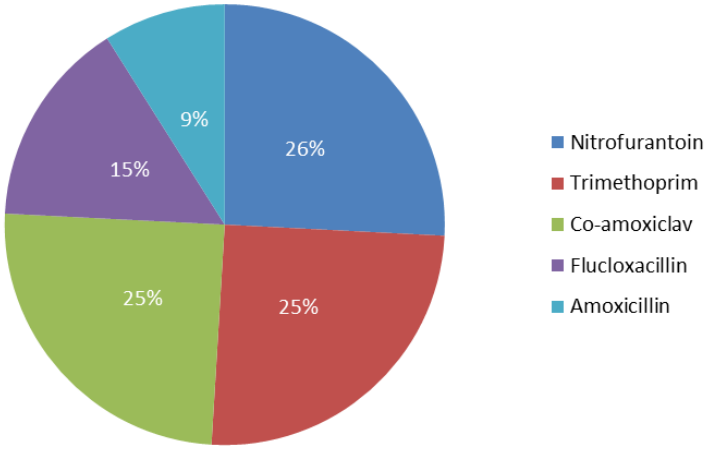

Figure 3.3.8 Top five antimicrobials prescribed in LTCF, overall

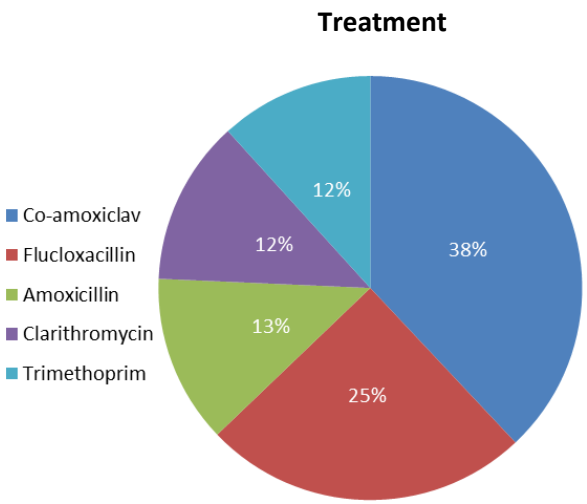

Figure 3.3.9 Top five treatment antimicrobials

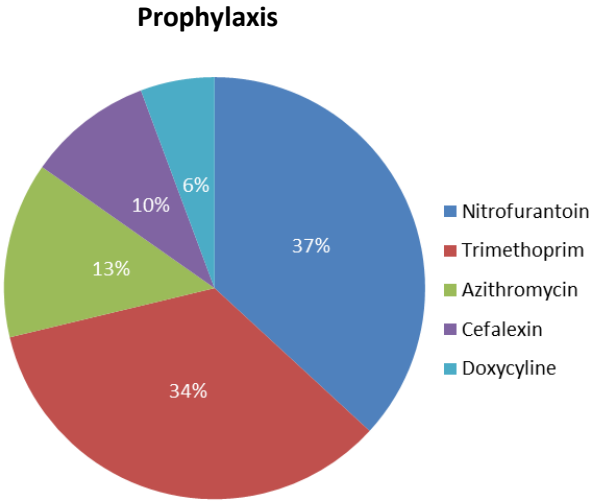

Figure 3.3.10 Top five prophylactic antimicrobials

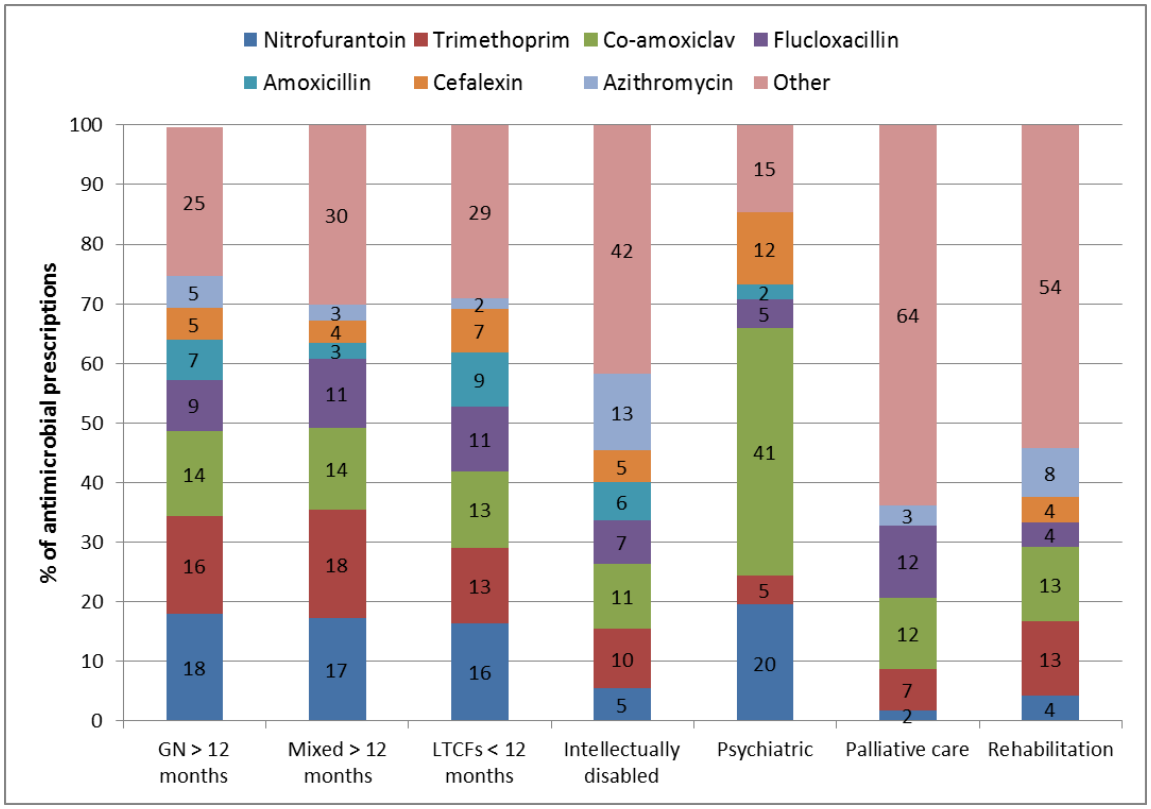

Figure 3.3.11 Prescribed antimicrobials, by care type.

4. Previous HALT Surveys

The 2016 HALT survey was the fourth such PPS performed in Irish LTCF. A review of the key HCAI and antimicrobial use prevalence results across the four HALT surveys (May 2010, 2011, 2013 and 2016) is described in this section. Please see the '**Methods**' section for a more detailed description of differences in the methodology between the HALT surveys. Hospital-acquired infection data was collected in HALT 2016 only.

LTCF-acquired infection (LAI): 2010 - 2016

Owing to differences in methodology and infection surveillance definitions, caution should be taken when reviewing the annual infection prevalence results of 2010 and 2011 versus 2013 and 2016, as they are not directly comparable. Table 4.1.1 displays an overview of the four HALT surveys. There was an annual increase in the number of participating LTCF and residents surveyed.

Table 4.1.1 LAI: 2010 – 2016.

National LTCF-acquired infection prevalence data	Year			
	2010[a]	2011[a]	2013[b]	2016
Number of LTCFs that participated in survey	69	108	190	224
Number of residents surveyed	4170	5922	9318	10044
Number of residents with signs/symptoms of an infection	266	384	563	638
Number of residents with infections[a]	149	242	497	441
Number of infections	156	253	511	455
Residents with more than one infection	7	11	14	14
Crude prevalence of residents with a LTCF-acquired infection, %	**3.6**	**4.1**	**5.3**	**4.4**
National median prevalence, %	2.8	4.2	4.2	3.4
National interquartile range, %	0 - 5.5	1.9 - 7.2	1.9 - 8.3	0-6.7

[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 four HALT surveys were; GN >12 months, Mixed >12m and intellectually disabled LTCF. Table 4.1.2 displays the annual number of participants, eligible residents and median infection prevalence for each care type. Again, caution should be taken when reviewing the annual infection prevalence results, as they are not directly comparable.

Table 4.1.2 LTCF-acquired infection prevalence in the three commonest care types: 2010 – 2016.

Care type	Year	Number of LTCFs	Number of residents	Median Infection prevalence
GN > 12 months	2010	30	2487	2.7
	2011	58	3916	3.95
	2013	103	5807	4.2
	2016	88	4722	3.5
Mixed > 12 months	2010	16	660	1.45
	2011	16	778	2.85
	2013	26	1409	6.1
	2016	46	2499	4.5
Intellectually disabled	2010	8	510	2.4
	2011	15	740	4.8
	2013	24	1060	2.2
	2016	31	1251	0.0

Infection Types

The annual breakdown of infection types is displayed in Figure 4.1.1. Caution is required when reviewing the annual results, because substantial revisions were made to the definitions of some infection types in 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. While 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

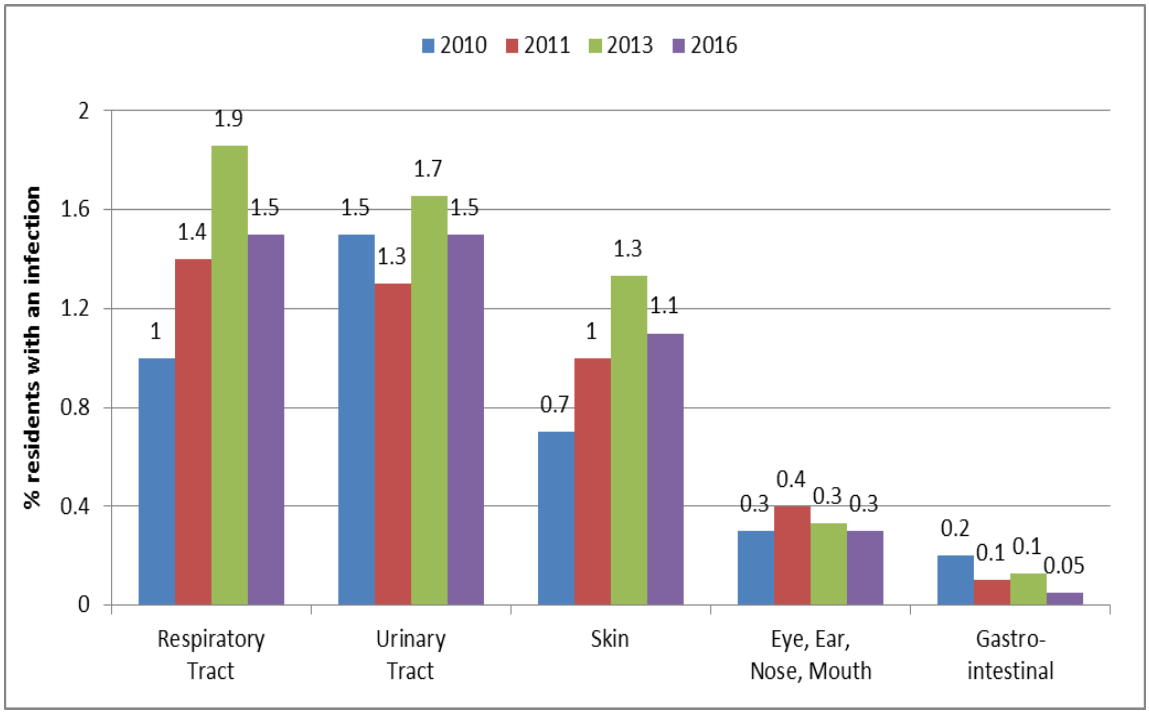

Figure 4.1.1 Prevalence of HCAI types: 2010 – 2016**.**

Antimicrobial Use: 2010 - 2016

Table 4.1.3 provides an overview of the antimicrobial use prevalence across the four HALT surveys. While the crude prevalence has remained stable, there was a welcome decrease in the median prevalence from 2011 to 2016 (10% versus 8.3%). There has been no increase in the proportion of antimicrobials administered via the intravenous route across the four surveys. The vast majority were administered via the oral route.

Table 4.1.3 Antimicrobial use prevalence: 2010 – 2016.

	Year			
National antimicrobial prevalence data	**2010**	**2011**	**2013**	**2016**
Number of residents surveyed	4170	5922	9318	10044
Number of residents on antimicrobials	426	601	913	981
Number of antimicrobials prescribed	453	636	971	1049
Number of residents on more than one antimicrobial, (%	25 (0.6)	34 (0.6)	55 (0.6)	60 (0.6)
Crude prevalence of residents on antimicrobials, %	**10.2**	**10.2**	**9.8**	**9.8**
National median prevalence, %	9.5	10	9.7	8.3
National interquartile range, %	5.3 - 14.3	7.4 - 14.2	5 - 14.5	4.5 - 15

Body Sites and Reasons for which Antimicrobials were Prescribed

Figure 4.1.2 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%) but increased slightly in 2016 (4.7%). 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%), which remained stable in 2016.

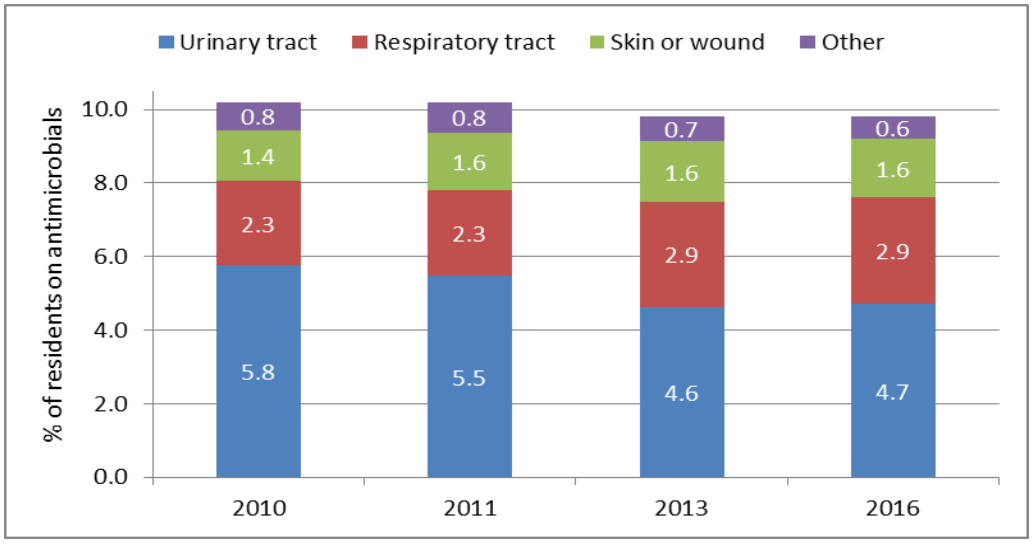

Figure 4.1.2 Breakdown of antimicrobial use prevalence, by body site: 2010 – 2016.

Figure 4.1.3 displays annual trends in the reasons for antimicrobials. Although a downward trend in the prevalence of prescribing for prophylaxis was observed between 2010 and 2013 (4.3% to 3.8%), this increased to 4.3% in 2016. The prevalence of prescribing for treatment of infection increased slightly from 2011 to 2016 (5.7% to 6.1%).

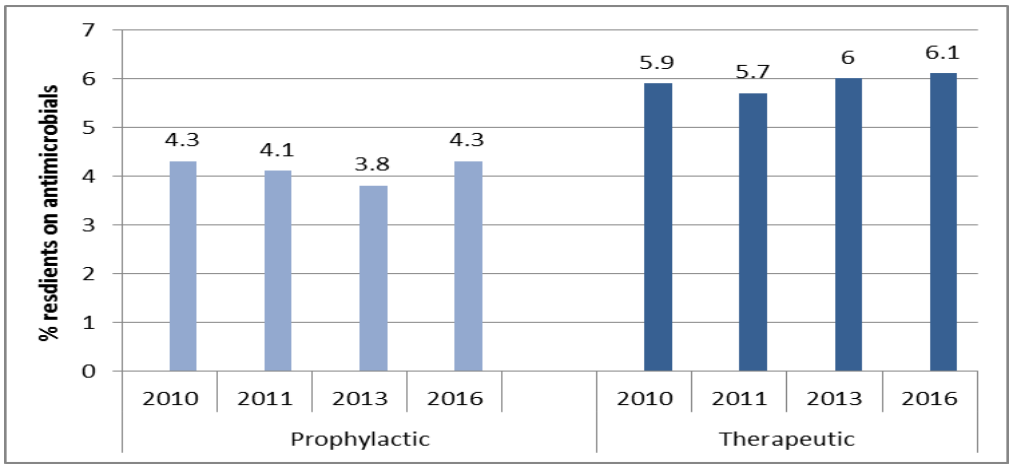

Figure 4.1.3 Reasons for prescribed antimicrobials: 2010 – 2016.

Figure 4.1.4 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%) followed by a slight increase to 2.9% in 2016. RTI prophylaxis has increased across the four HALT surveys (0.2% to 0.8%). The prevalence of antimicrobial treatment has remained relatively stable.

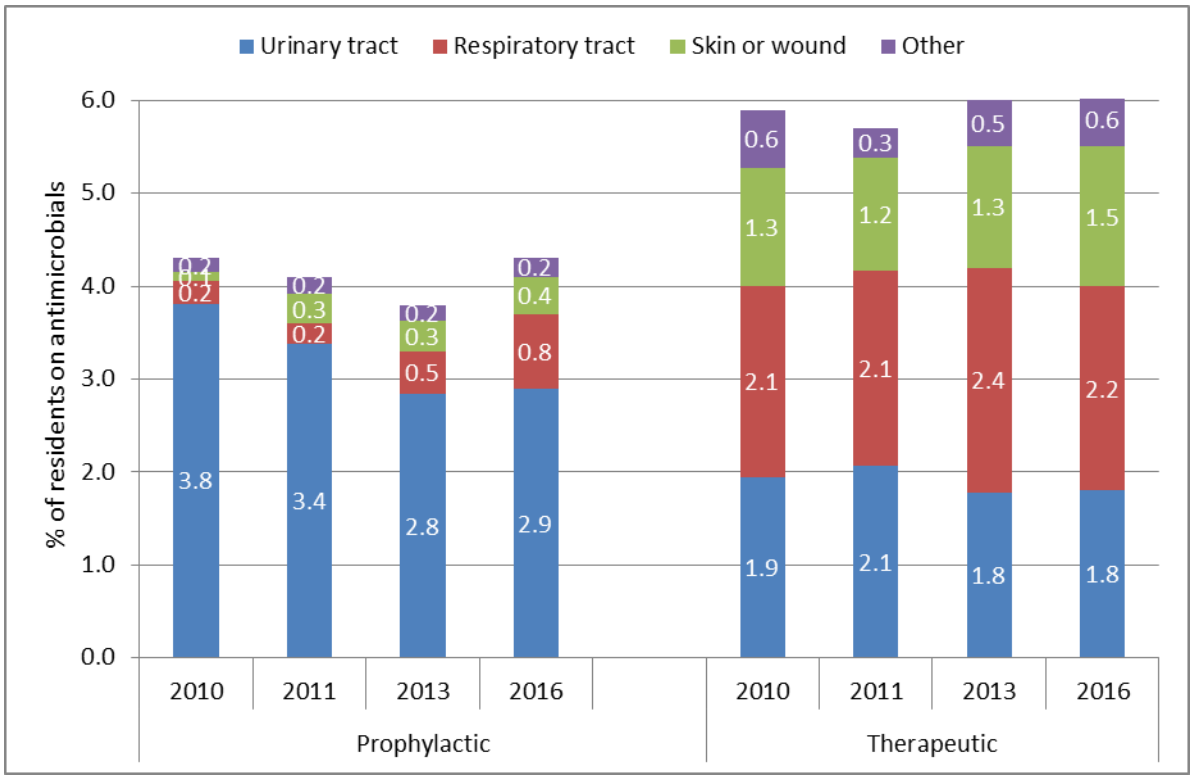

Figure 4.1.4 Reasons for prescribed antimicrobials by body site: 2010 – 2016.

Antimicrobial Use by Care Type

The three commonest care types in all HALT surveys were GN >12 months, Mixed >12 months and intellectually disabled LTCF. Table 4.1.4 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. While the median overall antimicrobial use prevalence decreased in the GN>12 group between 2010 and 2016 (11.9% to 8.6%), there was an increase in the prevalence of antimicrobial prophylaxis (2.8% to 3.8%). Median antimicrobial prophylaxis prevalence decreased in intellectually disabled LTCF (1.8% - 0%). In 2016, there was a decrease in the median antimicrobial treatment prevalence for all three care types.

Table 4.1.4 Antimicrobial use prevalence in the three commonest care types: 2010 – 2016.

Care type	Year	Number of LTCFs	Number of residents	Antimicrobial prevalence (%)		
				Overall median	Prophylactic median	Therapeutic median
GN > 12 months	2010	30	2487	11.85	3.7	5.65
	2011	58	3916	10.25	2.9	6
	2013	103	5807	9.1	2.8	5.1
	2016	88	4722	8.6	3.8	4.2
Mixed > 12 months	2010	16	660	9.6	4.05	4.55
	2011	16	778	11.6	4.35	5.3
	2013	26	1409	11.2	3.1	6.8
	2016	46	2499	8.2	3.2	4.4
Intellectually disabled	2010	8	510	4.6	0	4.1
	2011	15	740	5.4	1.9	2.9
	2013	24	1060	7.5	1.8	4.4
	2016	31	1251	5.2	0	4.0

Thirty-nine LTCF have participated in all four HALT surveys to date. Figure 4.1.5 displays the collective LAI and antimicrobial use prevalence (overall, therapeutic and prophylactic) for those 39 LTCF, versus the collective LAI and antimicrobial use prevalence for the 96 LTCF that participated in HALT for the first time in 2016.

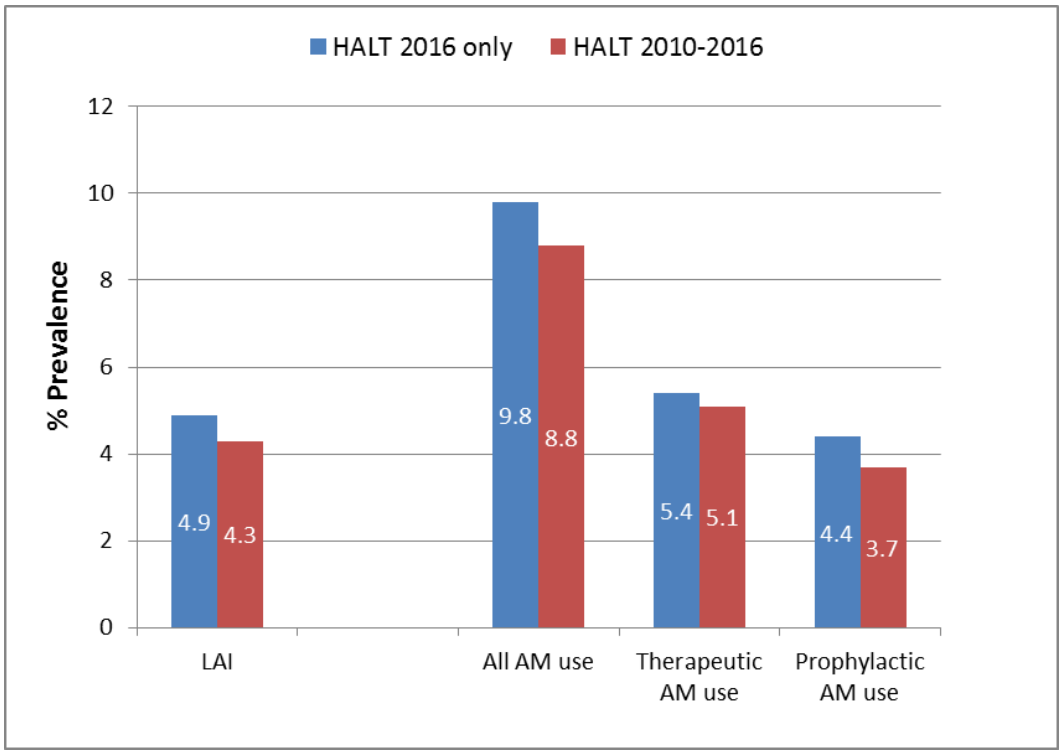

Figure 4.1.5 2016 LAI and antimicrobial use in first time HALT participants (n=96 blue) versus LTCF that performed all four HALT surveys to date (n=39 red).

5. Discussion

Ireland contributed approximately 10% of the total resident population in the 2010 and 2013 European HALT surveys, with 2016 data expected from ECDC in 2018. Four HALT surveys have been undertaken in Ireland (May 2010, 2011, 2013 and 2016) and there has been a welcomed annual increase in the numbers of participants, including HSE, voluntary and private LTCF. In 2016, 96 LTCF performed their first HALT survey (43%). This highlights the ongoing dedication of healthcare professionals in Irish LTCF to improving the quality and safety of resident care. However, the majority of residential care facilities registered with HIQA did not participate in HALT 2016. It is recommended that evidence of each LTCF's participation in HALT surveys be actively sought during future monitoring inspections conducted by Health Information & Quality Authority (HIQA) and the Mental Health Commission (MHC) and that all LTCF are encouraged to and facilitated in participating in future HALT surveys.

The voluntary HALT survey provides participants with valuable information regarding infrastructure, staffing, models of medical care, IPC and antimicrobial stewardship practices, resident dependency levels, HCAI risk factors, HCAI and antimicrobial prescribing in Irish LTCF. 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 84% of residents surveyed. The results demonstrate differences between Irish LTCF care types, with regard to resident demographics, nursing care load indicators, HCAI risk factors, LAI & HAI prevalence, infection types, antimicrobial use prevalence and antimicrobial prescribing practices. The female gender predominated across LTCF care types, other than psychiatric and palliative care LTCF. Residents of intellectually disabled, psychiatric and palliative care LTCF tended to have a younger age profile than residents of other care types. In November 2016, participating LTCF were 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.

Standards

In Ireland, facilities providing residential care to older people are legally required to register with HIQA. In 2009, HIQA published National Quality Standards for Residential Care Settings for Older People in Ireland and updated Standards were published in 2016, with facilities inspected by HIQA according to these standards. (10,11) There were 580 older persons LTCF listed as registered on HIQA's website in February 2017.

Inpatient facilities providing care and treatment to people with a mental illness must be listed on the register of approved centres, maintained by the MHC, the responsible body for regulating and monitoring mental health services in Ireland. In 2007, MHC published a Quality Framework for Mental Health Services in Ireland, which comprises 24 standards and mental health services are monitored according to these standards. (14) According to the MHC Annual Report for 2015, there were 61 approved centres with 2,767 beds in December 2015. (41) 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 crude infection prevalence in psychiatric LTCF was very similar to that in GN>12m (3.8% and 4.0%, 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. (15) According to the National Intellectual Disability Database (NIID), in December 2015, there were 7,724 people in residential care settings in Ireland. (45)

Staffing

The requirement for each LTCF to have sufficient staff with necessary skills to deliver safe resident care is enshrined in HIQA Standards for residential care of older people and people with disabilities and in the MHC standards for psychiatric facilities. (11, 14, 15)

The 2016 HALT survey sought information on nurse and healthcare assistant staffing levels within participating LTCF for the first time. The analysis for the European HALT survey reports published to date have focused on nursing homes and mixed care type LTCF only. Upon publication of the European HALT report by ECDC, which is expected during 2018, it will be possible to compare both nurse and HCA staffing levels in the general nursing homes and mixed care type LTCF in all EU Member States.

The nurse and HCA staffing data collected in HALT 2016 are not representative of the national picture and should not be used to interpret nurse and HCA staffing levels for Irish LTCF in general, for many reasons including; heterogeneity in care types, different categories of LTCF ownership, the voluntary nature of the HALT survey, with incomplete participation in 2016. The wide range in numbers of participating HSE-owned LTCF precluded analysis by CHO. Additionally, selected resident care load indicators were collected in HALT, with no information on resident dependency or comorbidities collected, which directly influence staffing levels within LTCF.

The HALT survey results have consistently demonstrated 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 when stratified by CHO, much commoner in CHOs 1, 2, 4, and 8 (Figure 3.1.2 and Appendix E). 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 2016 was 42 beds. In HALT 2016, the coordinating physician role was established in 62% of Irish LTCF overall (up from 45% in 2013) and 56% of privately-owned LTCF (up from 26% in 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.

A recommended intervention is the resourcing of external healthcare professionals to provide specialist advice to all of the LTCF within a CHO, regardless of ownership. 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 advice and oversee the development of antimicrobial stewardship, infection prevention and control education, guidelines and surveillance programmes, as part of a wider multi-disciplinary community IPC and antimicrobial stewardship team.

There is undoubtedly a severe shortage of specialist IPC resources for Irish LTCF. Almost one quarter of all LTCF participating in HALT 2016 (24%) reported having no access to a staff member with specialist IPC training, which reflects an improvement from 38% without access in HALT 2013. The deficit was even more marked in privately-owned LTCF (43%), but improved from 90% in HALT 2013.

Additional analysis performed after HALT 2013, reported an overall estimated WTE IPCN:LTCF bed ratio for Ireland of 1:496 which was much higher than the 1:250, previously recommended by a Canadian expert group. (16) 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. During 2015, the HSE HCAI & AMR Clinical Programme commenced a project to identify current IPCN resources for non-acute healthcare settings in Ireland. Key findings included; variance in the IPC service provided across LTCF, with many areas reporting limited or no access to an IPCN, a lack of clarity regarding the job specification for community IPCNs, with many working in isolation without the support of a multi-disciplinary team, covering large geographical areas, without administrative support and a lack of clarity surrounding governance and reporting relationships within CHOs, which were established in 2014. There is a need for each CHO to undertake a gap analysis of existing community IPCN resources and to develop a workforce plan to recruit sufficient numbers of community IPCNs, who will have a remit over all LTCF within the CHO, regardless of care type or ownership. Building multi-disciplinary IPC and antimicrobial stewardship teams within each CHOs is a critical intervention to address the priorities identified from HALT surveys performed to date.

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. (17) 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. While the development of an IPC link nurse 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.

Links between the acute hospital and LTCF

Infection acquired within LTCF is a common issue, with a crude prevalence of 4.4% in all LTCF residents in May 2016. This figure is 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. (18) The hospital PPS will be repeated across Ireland in May 2017.

For the first time, HALT 2016, collected data on HAI, in addition to long-term care acquired infections (LAI), which has been collected as part of all HALT surveys to date. The addition of a HAI category added complexity to the HALT protocol and data collector training. A data field 'infection imported' was added to the resident questionnaire to capture HAI. This was straightforward if a resident developed signs and symptoms matching the surveillance case definition and required timeline for HAI (e.g., symptom onset on day one or day two after discharge from hospital to the LTCF or specific timelines for CDI and SSI). However, if a resident was transferred from hospital to the LTCF already on treatment for a HAI which had begun while in the hospital, the protocol allowed the resident to be categorised as having a HAI, despite data collectors not having access to documented evidence of signs or symptoms for the infection which started in the hospital. This questions the validity of the categorisation of such HAI, in the absence of access to documentation that the surveillance definition for the infection was actually met. In 2016, just 12% of LTCF reported a total of 42 HAI, with the vast majority of all HCAI (455; 92%) acquired within the LTCF (LAI). These findings and the practical difficulties encountered during training and data collection support a recommendation that HAI data is excluded from future European HALT surveys.

During HALT 2013, 2% of LTCF residents were absent from the facility owing to hospitalisation. This data was not captured in HALT 2016. The 2013 results highlighted the frequent exchange of patients/residents between acute hospitals and LTCF. LAI 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. 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 a transmissible infection such as influenza-like illness or diarrhoea of potentially infectious aetiology or a resident has a positive result for an antimicrobial resistant organism (e.g., MRSA, ESBLs, CRE/CPE, VRE etc.) or a resident is being transferred from a LTCF with an ongoing 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 antimicrobial 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 to capture critical information should be progressed at a national level and disseminated for local implementation by all acute hospitals and LTCF.

Antimicrobial stewardship & surveillance

After four HALT surveys, while the crude prevalence of antimicrobial use in Irish LTCF has remained unchanged, with around 1 in 10 residents prescribed antimicrobials, the median prevalence has decreased, from 10% (2011) to 8.3% (2016). The 2013 European HALT report found that residents of Irish LTCF were more than twice as likely to be on an antimicrobial than their European counterparts, where the crude prevalence of antimicrobial use was just 4.4%. Ireland ranked sixth highest of 19 EU Member States participating in HALT 2013 for the proportion of prophylactic antimicrobials. (6) It is a positive finding that for the 39 Irish LTCF that have participated in all HALT surveys to date, overall antimicrobial prevalence (8.8%), therapeutic prevalence (5.1%) and prophylactic prevalence (3.7%) was lower than for the 96 LTCF participating in their first HALT in 2016 (9.8%, 5.4%, 4.4%, respectively).

Guidelines for antimicrobial prescribing in primary care in Ireland were issued in 2010 and are periodically updated by the Primary Care Antimicrobial Guidelines Editorial Group. The guidelines are available as a web version, suitable for use on mobile devices. The guidelines are endorsed by the RCPI & HSE Clinical Advisory Group for HCAI and AMR and by the Irish College of General Practitioners (ICGP) and it is recommended that these guidelines are used to guide prescribing in LTCF. Co-amoxiclav is rarely recommended for treatment of infection in the community. In the Irish guidelines, co-amoxiclav is a first line antimicrobial for quite limited infection indications (e.g.,

pyelonephritis, bite wounds) and a second line antimicrobial for sinusitis and infective exacerbations of COPD unresponsive to first line treatments. Despite the recommendations of national guidelines, in HALT 2016, co-amoxiclav accounted for 41% of all antimicrobials in psychiatric LTCF, versus 11 – 14% for all other care types. Of therapeutic prescriptions, co-amoxiclav was the most commonly prescribed antimicrobial accounting for 38% of all prescriptions. Formal implementation of the primary care prescribing guidelines within all Irish LTCF, regardless of care type is recommended and has potential to positively impact on unnecessary use of broad spectrum antimicrobials, such as co-amoxiclav. The guidelines may be viewed at www.antibioticprescribing.ie

Periodic PPS is useful to monitor trends over time, but can't 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, training and user-friendly data collection methods for incidence surveillance be developed specifically nationally, for use by LTCF within each CHO.

In HALT 2016, microbiology data was gathered for residents who met the case definition for infection. This differs from previous HALT surveys when microbiology data was gathered for residents prescribed antimicrobials, regardless of infection. Therefore, the microbiology data from 2016 is not comparable with prior HALT surveys. For the purposes of this report, analysis of microbiology relates to LAI only, as microbiology results may not have been available to data collectors for HAI, whereby specimens were submitted while the resident remained in hospital.

For the majority of LAI, no microbiology specimen was submitted to the laboratory (62%), with microorganisms reported in just 14% of specimens taken from residents with LAI. The presence of a

microorganism in a clinical specimen does not necessarily confirm it was the causative pathogen of the LAI (e.g., detection of candida from sputum reflects colonisers, rather than pathogens).

Although the issue of AMR has been long-recognised, it has received increasing attention in recent years. 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. (19) Resistance genes encoding production of extended spectrum β lactamases (ESBLs), carbapenemases and conferring resistance to additional antimicrobial classes (e.g., fluoroquinolones and aminoglycosides), whereby bacteria are termed multi-drug resistant (MDR) transmit readily. Outbreaks and increasing prevalence of antimicrobial resistant *Enterobacteriaceae* are well-described in Irish LTCF. (20 – 22) Indeed, *Enterobacteriaceae* (*E. coli, K. pneumoniae, Proteus mirabilis* and other *Enterobacteriaceae*) were the commonest microorganisms reported from residents with LAI in HALT 2016.

The prevalence of MDR-*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). Increasing incidence of MDR-*K. pneumoniae* (MDRKP) resulted in the establishment of a national enhanced surveillance system in 2014. To the end of Q3 2016, it had become evident that MDRKP are widely disseminated across the Irish healthcare system, with 15% of isolates reported from LTCF residents (Source: HPSC). Of even greater concern, 16% of those were also carbapenem resistant (CRE).

Resistance to 3rd generation cephalosporins (3GC) is a potential marker for ESBL production. Unfortunately, 3GC susceptibility results were unavailable for 52% of *E. coli* isolates in HALT 2016, with 4% confirmed 3GC resistant. Fortunately, there were no cases of CRE reported during HALT 2016.

Improvements have been demonstrated in Ireland and abroad with regard to the proportions of invasive infections caused by MRSA. In HALT 2016, *Staphylococcus aureus* accounted for 29% of reported microorganisms, with 16% of *S. aureus* reported as MRSA.

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.

Strict attention to standard and transmission-based 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 antimicrobial resistant bacteria.

It is recommended that regional HCAI and AMR Committees are established within each CHO, with governance over all LTCF within the CHO, regardless of care type or ownership and multi-disciplinary membership, including representation from LTCF, local acute hospitals and their microbiology laboratories, community pharmacies, Departments of Public Health and the multi-disciplinary community IPC & antimicrobial stewardship teams. Such Commitees should be resourced to provide support to all LTCF within the CHO, with regard to education and training, surveillance activities, data analysis, monitoring of agreed key performance indicators (KPIs) and feedback of comparative HCAI surveillance and AMR data.

Prevention & Education

Seasonal influenza is an annual event. A safe vaccine is available, with an interim overall vaccine efficacy (VE) estimate of 46% for those aged >65 years in the US 2016/17 season. VE depends on match between vaccine and circulating influenza virus, with age and immune status also contributing factors. (23, 24) 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. (25) Of the 224 LTCF participating in HALT 2016, 91% overall reported that annual seasonal influenza vaccine is offered to residents, a decline from 94% in 2013. However, an increase in participation by palliative care LTCF in 2016 may have contributed to this. A survey of influenza vaccine uptake in residents of HSE-owned LTCF during the 2015-2016 influenza season reported that 87% of residents had been immunised against influenza since the start of the season, an increase from 73% on the previous influenza season. (26)

Death is reported in 0.5 – 1.0 per 1000 cases of influenza. Research undertaken by the HPSC estimates between 200 and 500 people in Ireland die each year from influenza-related illness. There is a wealth of evidence that the elderly are at increased risk of both hospitalisation and death from influenza infection. (27 – 29) During the 2015-16 influenza season in Ireland, 36 influenza outbreaks

were notified, 21 of which were in LTCF. Of 84 deaths reported during the 2015-16 influenza season, the median patient age was 65 years and four deaths were associated with influenza outbreaks. (30)

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. (31) However, a survey of influenza vaccine uptake in healthcare workers in 101 Irish LTCF during the 2015-16 influenza season, reported that just 26% had availed of the opportunity to be vaccinated, an increase from 15% during the 2012-13 season. (26) A 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. (32) A Cochrane review on influenza vaccination for healthcare staff caring for LTCF residents aged >60 years found just five studies for inclusion and reported serious risks of methodological bias and very low quality evidence arising from the included studies. The review highlighted the need for high quality randomised control trials in this area. (44) 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 staff have easy access to vaccination in the workplace, through peer vaccinator programmes and that clear and accurate information is provided to inform their decisions on vaccination. The percentage of residents and staff immunised against influenza annually should be a KPI subject to regular review by the senior management team of every LTCF and via the governance structures of regional HCAI & AMR Committees.

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.

Hand hygiene is an evidence-based intervention to prevent transmission of pathogenic microorganisms and to prevent HCAI. The World Health Organisation (WHO) has published Guidelines for Hand Hygiene in Healthcare and the WHO five moments for hand hygiene are the basis for hand hygiene education programmes and audit of compliance. (46) ABHR is the preferred method recommended by WHO for hand hygiene when hands are not visibly soiled. In 2016, 68% of LTCF reported that ABHR was the preferred hand hygiene method, an improvement from 53% in 2013.

Hand hygiene education and compliance audit are well-established in acute hospitals in Ireland, with biannual acute hospital compliance audit results published on the HPSC website since 2011 and training for lead hand hygiene auditors in acute hospitals coordinated by the HPSC. (47) While hand hygiene training was reported to have been provided in the past year by 83% of LTCF in HALT 2016, this was a reduction from 88% in 2013. Compliance audit of hand hygiene was reported to have been carried out in the past year by 51% of LTCF. Further data on the protocol, methodology and audit results was not captured by HALT 2016. It must be noted that hand hygiene compliance audit protocols for acute hospitals are not automatically transferrable to LTCF settings and development of national hand hygiene compliance audit protocols and tools specific to LTCF are required, with roll out of lead hand hygiene auditor training and a train-the-trainer approach for hand hygiene audit, to ensure that meaningful hand hygiene audits are conducted, using the same methodology and that audit results are comparable across different CHOs.

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 2016, UTI prevention accounted for 68% of prophylactic prescribing and was particularly prevalent in Mixed>12m (3.4%), LTCF<12m (3.2%) and GN>12m (3.1%). However, the prevalence of prophylaxis against RTI has increased from 2.3% (2010) to 2.9% (2016) and in 2016 was particularly prevalent in intellectually disabled (2%) and palliative care (1.5%) LTCF. It is recommended that the indications for and duration of prophylaxis in these resident populations should be further evaluated, in conjunction with any available evidence for such practices.

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. (33, 34) It is therefore of concern that 17% of residents prescribed UTI prophylaxis in 2016 were reportedly catheterised (n=50 of 294).

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. (34) 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. 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 (34)

LTCF staff education regarding the differences between asymptomatic bacteriuria and symptomatic UTI is required. 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 HALT survey did not capture data regarding the duration of antimicrobial prescriptions. However, it is recommended that a trial of urinary tract prophylaxis should not exceed six months. 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. (37) 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 published guidelines which recommended that nitrofurantoin must not be used for UTI prophylaxis. (38)

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 AMR. 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 decreased from 4.3% to 3.8% between 2010 and 2013, but increased back to 4.3% in 2016. The UTI prophylaxis prevalence decreased from 3.8% to 2.8% between 2010 and 2013, remaining stable at 2.9% in 2016. The fact that 43% of LTCF were first-time participants in HALT may have contributed to the 2016 findings.

Older age, immunocompromise and antimicrobial exposure are major risk factors for CDI. In HALT 2016, seven residents with CDI were reported, of whom four were deemed to have hospital-acquired CDI. National guidelines for the surveillance, diagnosis and management of CDI were updated in 2014 and it is recommended that they are also implemented by all Irish LTCF. (39)

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. (40) 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, AMR and antimicrobial stewardship and that such educational activities are linked to continuing professional development (CPD) 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, friends and carers have an important role to play in the prevention of HCAI and AMR 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, friends and carers, with input from patient representative organisations. Information leaflets on hand hygiene, influenza vaccination, prudent use of antibiotics and antibiotic resistant bacteria, such as MRSA,

ESBLs, CRE and 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.

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7. Appendices

Appendix A: List of HALT 2016 participating LTCF

HSE-owned LTCF

Name of Facility	CHO Area	Facility Type
St Mary's Hospital	1	GN > 12 months
Lisdarn Unit for Older Person	1	GN > 12 months
Virginia Services for Older Person	1	GN > 12 months
Breffni care Unit	1	GN > 12 months
Sullivan Centre	1	GN > 12 months
The Sheil Community Hospital	1	GN > 12 months
The Rock	1	GN > 12 months
Arus Breffni	1	GN > 12 months
St Patrick's Community Hospital	1	GN > 12 months
St John's Community Hospital	1	GN > 12 months
Tonnyglasson Disability Group Home	1	Intellectually disabled
Ros na Ri Disability Group Home	1	Intellectually disabled
Millbrook House	1	Intellectually disabled
Coill Aoibhinn	1	Intellectually disabled
Inbhear na Mara	1	Intellectually disabled
James Connolly Hospital	1	Intellectually disabled
Drogheda Ward, Sean O'Hare unit	1	Intellectually disabled
Cloonamahon Learning Disability Services	1	Intellectually disabled
Ard Greine Court, Sean O'Hare Unit & Associated Services	1	Intellectually disabled
Cregg House	1	Intellectually disabled
Piermount House, Dungloe	1	Intellectually disabled
Buncrana Community Hospital	1	LTCFs < 12 months
Carndonagh Community Hospital	1	LTCFs < 12 months
Donegal Community Hospital	1	LTCFs < 12 months
Falcarragh Community Hospital	1	LTCFs < 12 months
Killybegs Community Hospital	1	LTCFs < 12 months
Ard Aoibhinn Dementia Unit	1	LTCFs < 12 months

Name of Facility	CHO Area	Facility Type
St Joseph's Community Hospital	1	LTCFs < 12 months
Our Lady's Hospital Manorhamilton	1	LTCFs < 12 months
Dungloe Community Hospital	1	Mixed > 12 months
Ramelton Community Hospital	1	Mixed > 12 months
Arus Carolan	1	Mixed > 12 months
St Christopher's Centre/Hospice	1	Other
Donegal Hospice	1	Palliative care
Blackwater House	1	Psychiatric
Park House	1	Psychiatric
Rowanfield House	1	Psychiatric
Sliabh na Rua SRU, Mental Health Services	1	Psychiatric
Aras Mhuire Community Nursing Unit	2	GN > 12 months
St Fionnan's Community Unit	2	Mixed > 12 months
An Coilin, Teach Aisling, St Anne's	2	Psychiatric
St Anne's (Mayo Mental Health Services)	2	Psychiatric
Teach Aisling (Mayo Mental Health Services)	2	Psychiatric
St Conlon's Community Nursing Unit	3	GN > 12 months
St Ita's Hospital	3	GN > 12 months
Dean Maxwell Community Nursing Unit	3	Mixed > 12 months
Ennistymon Community Hospital	3	Mixed > 12 months
Raheen Community Hospital	3	Mixed > 12 months
St Joseph's Hospital Ennis	3	Mixed > 12 months
St Camillus' Hospital	3	Mixed > 12 months
Community Hospital of the Assumption	3	Mixed > 12 months
Cappahard Mental Health, Ennis, Co Clare	3	Psychiatric
O'Connell House	3	Psychiatric
St Camillus Hospital (Tearmann Ward)	3	Psychiatric
St Ita's Community Hospital - Rehabilitation Dept	3	Rehabilitation
St Finbarr's LTCF Douglas, Cork	4	GN > 12 months
Heather House Community Nursing Unit	4	GN > 12 months
Tralee Community Nursing Unit	4	GN > 12 months
Killarney Community Hospital LTCF	4	GN > 12 months
Castletownbere Community Hospital	4	GN > 12 months

Name of Facility	CHO Area	Facility Type
Dunmanway Community Hospital	4	GN > 12 months
Macroom Community Hospital	4	GN > 12 months
Millstreet Community Hospital	4	GN > 12 months
St Joseph's Residential Unit	4	GN > 12 months
Farranlea Road Community Nursing Unit - Care of the Elderly	4	GN > 12 months
St Raphael's Centre	4	Intellectually disabled
Cluainn Fhionnain Disability Services	4	Intellectually disabled
Killarney Community Hospital District	4	LTCFs < 12 months
Fermoy Community Hospital	4	LTCFs < 12 months
Listowel Community Hospital District ward	4	LTCFs < 12 months
Kinsale Community Hospital	4	Mixed > 12 months
Bandon Community Hospital	4	Mixed > 12 months
Mount Carmel Hospital	4	Mixed > 12 months
Caherciveen Community Hospital	4	Mixed > 12 months
Listowel Community Hospital	4	Mixed > 12 months
Midleton Community Hospital	4	Mixed > 12 months
Schull Community Hospital	4	Mixed > 12 months
West Kerry Community Hospital	4	Mixed > 12 months
Youghal Community Hospital	4	Mixed > 12 months
Kanturk Community Hospital	4	Mixed > 12 months
Cois Abhann Residential Facility	4	Other
Skibbereen Community Hospital	4	Other
Farranlea Road Community Nursing Unit - Cedar	4	Other
Mount Alvernia Hospital	4	Psychiatric
St Stephen's Hospital	4	Psychiatric
St Finbarr's Rehab Douglas Cork	4	Rehabilitation
St Columbas's Hospital	5	GN > 12 months
Kelvin Court, St Dympna's Hospital	5	Intellectually disabled
St Canice's Hospital (St Gabriel's Unit)	5	LTCFs < 12 months
Sacred Heart Hospital Carlow	5	Mixed > 12 months
Dungarvan Community Hospital	5	Mixed > 12 months
St Patrick's Hospital	5	Mixed > 12 months
Cluain Arann Community Nursing Unit	5	Mixed > 12 months

Name of Facility	CHO Area	Facility Type
Gorey District Hospital	5	Other
Carlow District Hospital	5	Other
Castlecomer District Hospital	5	Palliative care
Selskar Ward C/O Farnogue Unit	5	Psychiatric
Haywood Lodge, Clonmel	5	Psychiatric
St Ottermans Hospital - St Aidans Alzheimer unit	5	Psychiatric
St Otterman's Hospital - Grangemore Rehabilitation unit	5	Psychiatric
Baltinglass District Hospital	6	GN > 12 months
Belvilla	6	GN > 12 months
St Colman's Residential Care Centre	6	GN > 12 months
Clonskeagh Community Nursing Unit	6	GN > 12 months
Newcastle Hospital - Avonmore	6	Psychiatric
Clonskeagh Hospital-Le Brun House and Whitethorn House	6	Psychiatric
St Vincent's Hospital, Athy	7	GN > 12 months
Hospital 4 Residential Centre	7	GN > 12 months
Cherry Orchard Hospital Care of the Elderly	7	GN > 12 months
Meath Community Unit	7	GN > 12 months
Maynooth Community Care Unit	7	Mixed > 12 months
Cherry Orchard Hospital Young Chronically Ill	7	Other
Kildare West Wicklow Mental Health Services	7	Psychiatric
St Joseph's Community Residential Nursing Unit	8	GN > 12 months
St Oliver Plunkett Hospital	8	GN > 12 months
Beaufort House	8	GN > 12 months
St Brigid's Hospital, Shaen Portlaoise	8	GN > 12 months
Birr Community Nursing Unit	8	GN > 12 months
Cluain Lír CNU	8	GN > 12 months
St Vincent's Centre	8	GN > 12 months
Riada House	8	LTCFs < 12 months
St Joseph's Care Centre	8	Mixed > 12 months
St Vincent's Community Nursing Unit	8	Mixed > 12 months
St Joseph's Hospital Ardee	8	Mixed > 12 months
An Solosan	8	Psychiatric
St Brigid's Hospital, St Ita's Ward	8	Psychiatric

Name of Facility	CHO Area	Facility Type
St Marys Hospital, Phoenix Park, Dublin	9	GN > 12 months
Raheny Community Nursing Unit	9	GN > 12 months
St Joseph's Hospital IDS - Care of the Elderly	9	Intellectually disabled
Lusk Community Unit	9	Mixed > 12 months
St Clare's Nursing Home	9	Mixed > 12 months
Claremont Residential	9	Mixed > 12 months
St Mary's Phoenix Park Physically Disabled Ward	9	Physically Disabled
Fairview Community Rooms	9	Psychiatric
Phoenix Care Centre	9	Psychiatric
St Mary's Phoenix Park Rehab Ward	9	Rehabilitation

Private LTCF

Name of Facility	CHO Area	Facility Type
St Eunan's Nursing Home	1	GN > 12 months
Oakview Nursing Home	1	GN > 12 months
Drumbear Nursing Home	1	GN > 12 months
Brindley Healthcare - Brentwood Manor	1	Mixed > 12 months
Abbeybreaffy Nursing Home	2	GN > 12 months
Aras Chois Fharraige	2	GN > 12 months
Holy Family Nursing Home	2	GN > 12 months
Rushmore Nursing Home	2	GN > 12 months
Tearmainn Bhride	2	GN > 12 months
Ballinderry Nursing Home	2	GN > 12 months
St Marys Residential Care Centre	2	GN > 12 months
Millrace Nursing Home	2	GN > 12 months
Cuan Chaitriona Nursing Home	2	GN > 12 months
Brindley Healthcare - Brookvale Manor	2	GN > 12 months
Rivervale Nursing Home	3	GN > 12 months
Kilrush Nursing Home	3	GN > 12 months
The Park Nursing Home	3	GN > 12 months
Milford Nursing Home	3	Mixed > 12 months
St Anthony's Nursing Home	3	Mixed > 12 months

Name of Facility	CHO Area	Facility Type
St Michaels Nursing Home	3	Mixed > 12 months
Maryborough Nursing Home	4	GN > 12 months
Haven Bay Care Centre	4	GN > 12 months
Beaumont Residential Care	4	GN > 12 months
St Luke's Home	4	GN > 12 months
Cuil Didin	4	GN > 12 months
Norwood Grange	4	GN > 12 months
Glyntown Care Centre	4	Mixed > 12 months
Greenhill Nursing Home	5	GN > 12 months
Strathmore Lodge Nursing Home	5	GN > 12 months
Drakelands House Nursing Home	5	Mixed > 12 months
Knockeen Nursing Home	5	Mixed > 12 months
Cairnhill Nursing Home	6	GN > 12 months
Aclare House Nursing Home	6	GN > 12 months
Carysfort Nursing Home	6	GN > 12 months
Orwell House Nursing Home	6	Mixed > 12 months
Marymount Care Centre	7	GN > 12 months
TLC Centre Maynooth	7	GN > 12 months
Glenaulin Nursing Home	7	GN > 12 months
Parke House Nursing Home	7	Mixed > 12 months
Esker Ri	8	GN > 12 months
Woodlands House	8	GN > 12 months
Newbrook Group - Portiuncula Nursing Home	8	GN > 12 months
Sunhill Nursing Home	8	GN > 12 months
Kilbrew Recuperation and Nursing Care	8	GN > 12 months
Our Lady's Manor	8	GN > 12 months
Newbrook Nursing Home	8	GN > 12 months
Oakdale Nursing Home	8	LTCFs < 12 months
Sonas Nursing Home, Athlone	8	Mixed > 12 months
La Verna Nursing Home	9	GN > 12 months
Riverside Nursing Home	9	GN > 12 months
Cara Care Centre	9	GN > 12 months
Elm Green Nursing Home	9	Mixed > 12 months

Name of Facility	CHO Area	Facility Type
Swords Nursing	9	Mixed > 12 months
Tara Winthrop Private Clinic	9	Mixed > 12 months

Voluntary LTCF

Name of Facility	CHO Area	Facility Type
Galway Hospice Foundation	2	Palliative care
Daughter of Charity, St Vincent's Centre	3	Intellectually disabled
Milford Care Centre (Hospice)	3	Palliative care
Our Lady of Fatima Home	4	GN > 12 months
Cope Foundation	4	Intellectually disabled
Cope Foundation Riverview Retirement Home	4	Intellectually disabled
Cope Foundation Teach Cairde	4	Intellectually disabled
St Mary of the Angels - Campus area	4	Intellectually disabled
Brothers of Charity St Patrick's Hospital	4	Intellectually disabled
Kerry Parents and Friends Association - Gleeb	4	Intellectually disabled
Cope Foundation - Glasheen	4	Intellectually disabled
Gowran Abbey Nursing Home	5	GN > 12 months
Leopardstown Park Hospital	6	GN > 12 months
St Marys Home Ballsbridge	6	GN > 12 months
Our Lady's Manor Dalkey	6	GN > 12 months
St Marys Centre Telford Ltd	6	Mixed > 12 months
St Joseph's Centre, Crinken Lane	6	Other
Caritas Convalescent Centre	6	Other
Peamount Long-term Care	7	GN > 12 months
Peamount Intellectual Disability	7	Intellectually disabled
St Louise's Centre	7	Intellectually disabled
Stewarts Care	7	Intellectually disabled
Cheeverstown House DC1, 2, 3 & 4	7	Intellectually disabled
Our Lady's Hospice & Care Services - Extended care unit	7	Mixed > 12 months
Harold's Cross Palliative Care Unit	7	Palliative care
Harold's Cross Rehab Unit	7	Rehabilitation
Peamount Rehabilitation	7	Rehabilitation

Name of Facility	CHO Area	Facility Type
Santa Sabina House	9	GN > 12 months
St Michael's House LTCF	9	Intellectually disabled
St Vincent's Centre	9	Intellectually disabled
St Michael's House Extra 1	9	Intellectually disabled
St Michael's House Extra 2	9	Intellectually disabled
St Francis' Hospice Raheny	9	Palliative care
St Francis Hospice Blanchardstown	9	Palliative care

HSE-owned LTCF, stratified by CHO and by care type

Facility Type	CHO 1	CHO 2	CHO 3	CHO 4	CHO 5	CHO 6	CHO 7	CHO 8	CHO 9
GN > 12 months	10	1	2	10	1	4	4	7	2
Mixed > 12 months	3	1	6	10	4	0	1	3	3
LTCFs < 12 months	8	0	0	3	1	0	0	1	0
Intellectually disabled	11	0	0	2	1	0	0	0	1
Palliative care	1	0	0	0	1	0	0	0	0
Psychiatric	4	3	3	2	4	2	1	2	2
Physically Disabled	0	0	0	0	0	0	0	0	1
Rehabilitation	0	0	1	1	0	0	0	0	1
Other	1	0	0	3	2	0	1	0	0

Appendix B: HALT 2016 National Steering Group Membership

- Dr Karen Burns, Consultant Microbiologist, HSE-HPSC & Beaumont Hospital (Chair)
- Ms Helen Murphy, Infection Prevention & Control Nurse Manager, HSE-HPSC
- Ms Margaret Nadin, Project Manager, HSE NMPDU, Dublin-North East
- Ms Mary McKenna, Lead Infection Prevention & Control ADON, HSE HCAI & AMR Clinical Programme, Quality Improvement Division
- Ms Grainne Parker, Communicable Disease Control Nurse, Public Health Department, HSE South (South East)
- Ms Mags Moran, Community Infection Control Nurse Manager, Donegal Community Services, HSE West
- Dr Nuala O'Connor, General Practitioner & ICGP Lead HSE HCAI & AMR Clinical Programme, Quality Improvement Division
- Dr Diarmuid O'Shea, Consultant Geriatrician, St Vincent's University Hospital & HSE Clinical Programme for Older People, Clinical Lead
- Dr Mimi Fan, Consultant Geriatrician, Mater Hospital, Irish Society for Physicians in Geriatric Medicine
- Ms Fiona McMahon, Project Manager, HSE NMPDU Mid-West/ONMSD
- Mr Gerry Clerkin, Head of Quality & Safety, HSE Social Care Division
- Ms Linda Moore, Quality, Standards & Compliance Officer, HSE National Mental Health Division
- Ms Lisa Malone, Practice Development Facilitator, Nursing Homes Ireland
- Dr Fidelma Fitzpatrick, Consultant Microbiologist, Beaumont Hospital & Senior Lecturer in Microbiology, RCSI
- Dr Fiona Roche, Trinity College Dublin, Bioinformatics Support Research Fellow
- Dr Ian Callanan, Group Clinical Audit Facilitator, St Vincent's Healthcare Group
- Dr Akke Vellinga, Senior Lecturer & Epidemiologist, School of Medicine, NUI Galway
- Ms Sheila Donlon, ADON Infection Prevention & Control Department, Beaumont Hospital
- Mr Sean Egan, Regulatory Lead for Antimicrobial Stewardship, Health Information & Quality Authority
- Ms Meera Tandan, PhD student, NUI Galway
- Ms Rita Torrans, Community Pharmacist, Abbey Healthcare, Irish Pharmaceutical Union
- Ms Josephine Galway, Director of Nursing, St Columba's Hospital & Castlecomer District Hospital, Irish Association of Directors of Nursing & Midwifery

The HALT 2016 Steering Group has been convened under the auspices of the Royal College of Physicians of Ireland & Health Service Executive Clinical Advisory Group on Healthcare-Associated Infections & Antimicrobial Resistance

Appendix C: Acronyms used in this Report

ABHR	Alcohol-Based Hand Rub
AMR	Antimicrobial Resistance
ASC	Antimicrobial Stewardship Committee
CDC	US Centers for Disease Control & Prevention
CDI	*Clostridium difficile* infection
CHO	Community Healthcare Organisation
CPD	Continuing Professional Development
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
HCA	Healthcare Assistant
HCAI	Healthcare-Associated Infection
HIQA	Health Information & Quality Authority
HPSC	Health Protection Surveillance Centre
HSE	Health Service Executive
ICGP	Irish College of General Practitioners

IPC	Infection Prevention & Control
IPCC	Infection Prevention & Control Committee
IPCN	Infection Prevention & Control Nurse
KPI	Key Performance Indicator
LAI	Long-Term Care Facility-Acquired Infection
LOS	Length-of-Stay
LTCF	Long-Term Care Facility/Facilities
LTCF<12m	LTCF (either general nursing home or mixed care type) with LOS < 12 months
MDR	Multi-drug resistant
MDRKP	MDR *Klebsiella pneumoniae*
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
SSI	Surgical Site Infection
UTI	Urinary Tract Infection
VE	Vaccine Efficacy

VRE Vancomycin Resistant Enterococci

WHO World Health Organisation

WIV-ISP Scientific Institute for Public Health, Brussels, Belgium

WTE Whole Time Equivalent

3GC 3rd Generation Cephalosporins

Appendix D: HALT Resident Questionnaire & HCAI definitions

http://www.hpsc.ie/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Surveillance/HCAIinlongtermcarefacilities/DocumentationandsoftwareforundertakingHALT/File,15619,en.pdf

Resident study number |_|_|_|_|

ecdc

Healthcare-associated infections and antimicrobial use in European long-term care facilities (HALT-3)

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 an* ***antimicrobial agent*** → *Complete Part A*
  This includes: (i) Residents receiving prophylactic antimicrobials
  OR (ii) Residents receiving therapeutic antimicrobials
- ☐ *Presents confirmed or probable* ***infection(s)*** → *Complete Part B*
  Residents with infection(s) AND resident not receiving antimicrobials
- ☐ *Both:* ***antimicrobial use*** *AND* ***infection(s)*** → *Complete Part A & B*
  This includes: (i) Residents with infection(s) AND receiving antimicrobials today (whether or not linked to same infection site)
  OR (ii) Residents whose signs/symptoms of an infection have resolved but who are still receiving antimicrobials for that infection

PART A: ANTIMICROBIAL USE

	Antimicrobial 1	Antimicrobial 2	Antimicrobial 3	Antimicrobial 4
Antimicrobial name	....	....	....	....
Administration route *Parenteral = IM, IV or SC*	☐ *Oral* ☐ *Parenteral* ☐ *Other*	☐ *Oral* ☐ *Parenteral* ☐ *Other*	☐ *Oral* ☐ *Parenteral* ☐ *Other*	☐ *Oral* ☐ *Parenteral* ☐ *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* ☐ *Surgical site* ☐ *Tuberculosis* ☐ *Systemic infection* ☐ *Unexplained fever* ☐ *Other (specify)*	☐ *Urinary tract* ☐ *Genital tract* ☐ *Skin or wound* ☐ *Respiratory tract* ☐ *Gastrointestinal* ☐ *Eye* ☐ *Ear, nose, mouth* ☐ *Surgical site* ☐ *Tuberculosis* ☐ *Systemic infection* ☐ *Unexplained fever* ☐ *Other (specify)*	☐ *Urinary tract* ☐ *Genital tract* ☐ *Skin or wound* ☐ *Respiratory tract* ☐ *Gastrointestinal* ☐ *Eye* ☐ *Ear, nose, mouth* ☐ *Surgical site* ☐ *Tuberculosis* ☐ *Systemic infection* ☐ *Unexplained fever* ☐ *Other (specify)*	☐ *Urinary tract* ☐ *Genital tract* ☐ *Skin or wound* ☐ *Respiratory tract* ☐ *Gastrointestinal* ☐ *Eye* ☐ *Ear, nose, mouth* ☐ *Surgical site* ☐ *Tuberculosis* ☐ *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*

PART B: HEALTHCARE-ASSOCIATED INFECTIONS

		Infection 1	Infection 2	Infection 3	Infection 4
Infection code		|_|_|_|_|_|_|	|_|_|_|_|_|_|	|_|_|_|_|_|_|	|_|_|_|_|_|_|
If 'other', please specify		....	....	....	....
Present at (re-)admission		☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*	☐ *No* ☐ *Yes*
Date of onset (dd/mm/yy)		|_|_|/|_|_|/|_|_|	|_|_|/|_|_|/|_|_|	|_|_|/|_|_|/|_|_|	|_|_|/|_|_|/|_|_|
Origin of infection		☐ *Current LTCF* ☐ *Other LTCF* ☐ *Hospital* ☐ *Unknown*	☐ *Current LTCF* ☐ *Other LTCF* ☐ *Hospital* ☐ *Unknown*	☐ *Current LTCF* ☐ *Other LTCF* ☐ *Hospital* ☐ *Unknown*	☐ *Current LTCF* ☐ *Other LTCF* ☐ *Hospital* ☐ *Unknown*
A. Name of isolated microorganism (please use code list) B. Tested antimicrobial(s) and resistance Only for STAAUR, ENC***, ACIBAU, PSEAER or Enterobacteriaceae (CIT***, ENB***, ESCCOL, KLE***, MOGSPP, PRT***, SER***)	1. A	|_|_|_|_|_|_|	|_|_|_|_|_|_|	|_|_|_|_|_|_|	|_|_|_|_|_|_|
	B	|_|_|_| |_| |_|_|_| |_|	|_|_|_| |_| |_|_|_| |_|	|_|_|_| |_| |_|_|_| |_|	|_|_|_| |_| |_|_|_| |_|
	2. A	|_|_|_|_|_|_|	|_|_|_|_|_|_|	|_|_|_|_|_|_|	|_|_|_|_|_|_|
	B	|_|_|_| |_| |_|_|_| |_|	|_|_|_| |_| |_|_|_| |_|	|_|_|_| |_| |_|_|_| |_|	|_|_|_| |_| |_|_|_| |_|
	3. A	|_|_|_|_|_|_|	|_|_|_|_|_|_|	|_|_|_|_|_|_|	|_|_|_|_|_|_|
	B	|_|_|_| |_| |_|_|_| |_|	|_|_|_| |_| |_|_|_| |_|	|_|_|_| |_| |_|_|_| |_|	|_|_|_| |_| |_|_|_| |_|

[1] Tested antibiotic(s): STAAUR: oxacillin (OXA) or glycopeptides (GLY); ENC***: GLY only; Enterobacteriaceae: 3[rd]-gen cephalosporins (C3G) or carbapenems (CAR); PSEAER and ACIBAU: CAR only. [2] Resistance: S=sensitive, I=intermediate, R=resistant, U=unknown

Healthcare-associated infections and antimicrobial use in European long-term care facilities (HALT-3)

CASE DEFINITIONS OF INFECTIONS

IMPORTANT REMARK:

All **active infections** 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.

Infections can only be reported as 'imported' for residents recently transferred from another healthcare facility (i.e. hospital or other LTCF) and still treated for an infection on the PPS day in the absence of documentation on (all) signs/symptoms that were present in the past.

* **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/SYMPTOMS	***SIGNS/SYMPTOMS***
*AT LEAST **ONE** OF THE FOLLOWING (①, ② or ③) CRITERIA:*	*AT LEAST **ONE** OF THE FOLLOWING (①, ②, ③ or ④) CRITERIA:*
❒ ① Acute dysuria OR acute pain/swelling or tenderness of the testes, epididymis, or prostate	❒ ① Fever*, rigors, OR new onset hypotension with NO alternate site of infection
❒ ② 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	❒ ② Acute change mental status § OR acute functional decline §§ with NO alternate diagnosis AND leukocytosis**
❒ ③ Two or more (in the absence of fever or leucocytosis): ☐ Frequency (new/increased) ☐ Urgency (new/increased) ☐ Incontinence (new/increased) ☐ Suprapubic pain ☐ Gross hematuria	❒ ③ New onset suprapubic or costovertebral angle pain or tenderness
	❒ ④ Purulent discharge around catheter or acute pain, swelling or tenderness of testes, epididymis, or prostate
URINE CULTURE	***URINE CULTURE***
❒ Not Done, negative or test results unknown	❒ 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 10^5 cfu/ml of any number of organisms in a specimen collected by in-and-out catheter	❒ Urine culture done AND: ☐ At least 10^5 cfu/ml of any organism(s) in a urinary catheter specimen

INFECTION CONFIRMATION

- ❒ Signs/symptoms AND urine culture positive: *INFECTION **CONFIRMED** (= **UTI-C**)*
- ❒ Signs/symptoms AND urine culture not done, negative or results unknown: *INFECTION **PROBABLE** (= **UTI-P**)*
- ❒ Infection treated on PPS day but no documentation of signs/symptoms *(hospital or other LTCF infections only)* *INFECTION **IMPORTED** (= **UTI-I**)*

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

- ❒ Infection criteria fully met: *INFECTION **CONFIRMED** (= **COLD-C**)*
- ❒ Infection treated on PPS day but no documentation of signs/symptoms: *INFECTION **IMPORTED** (= **COLD-I**) (hospital or other LTCF only)*

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

- ❒ Infection criteria fully met: *INFECTION **CONFIRMED** (= **FLU-C**)*
- ❒ Infection treated on PPS day but no documentation of signs/symptoms: *INFECTION **IMPORTED** (= **FLU-I**) (hospital or other LTCF only)*

LOWER RESPIRATORY TRACT INFECTIONS

❒ Resident **with** a POSITIVE chest x-ray for pneumonia or a new infiltrate	❒ Resident **without** a POSITIVE chest x-ray for pneumonia or a new infiltrate OR chest x-ray not done
SIGNS/SYMPTOMS	***SIGNS/SYMPTOMS***
***BOTH** OF THE FOLLOWING CRITERIA MUST BE MET:*	***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* §§)	❒ 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 heart failure that could account for symptoms

INFECTION CONFIRMATION	***INFECTION CONFIRMATION***
❒ Signs/symptoms criteria met AND chest x-ray positive: *PNEUMONIA INFECTION **CONFIRMED** (= **PNEU-C**)*	❒ Infection criteria fully met: *OTHER LOWER RTI **CONFIRMED** (= **LRTI-C**)*
❒ Infection treated on PPS day but no documentation of signs/symptoms *(hospital or other LTCF only)*: *PNEUMONIA INFECTION **IMPORTED** (= **PNEU-I**)*	❒ Infection treated on PPS day but no documentation of signs/symptoms *(hospital or other LTCF only)*: *OTHER LOWER RTI **IMPORTED** (= **LRTI-I**)*

RESIDENT STUDY NUMBER

SKIN INFECTIONS

CELLULITIS/SOFT TISSUE/WOUND INFECTIONS

ONE OF THE FOLLOWING (① or ②) CRITERIA MUST BE MET:

- ① Pus at a wound, skin, or soft tissue site
- ② 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

- Infection criteria fully met: *INFECTION* ***CONFIRMED*** (= **SKIN-C**)
- Infection treated on PPS day but no documentation of signs/symptoms: *INFECTION* ***IMPORTED*** (= **SKIN-I**) *(hospital or other LTCF only)*

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

- Infection criteria fully met: *INFECTION* ***CONFIRMED*** (= **SCAB-C**)
- Infection treated on PPS day but no documentation of signs/symptoms: *INFECTION* ***IMPORTED*** (= **SCAB-I**) *(hospital or other LTCF only)*

NOTE:
If the infection matches one of the Surgical Site Infection (SSI) definitions, please give priority to the SSI. Do not apply another case definition for the same infection.

HERPES SIMPLEX OR ZOSTER INFECTION

BOTH OF THE FOLLOWING CRITERIA MUST BE MET:

- A vesicular rash

AND

- Physician diagnosis or laboratory confirmation

INFECTION CONFIRMATION

- Infection criteria fully met: *INFECTION* ***CONFIRMED*** (= **HERP-C**)
- Infection treated on PPS day but no documentation of signs/symptoms: *INFECTION* ***IMPORTED*** (= **HERP-I**) *(hospital or other LTCF only)*

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

- Infection criteria fully met: *INFECTION* ***CONFIRMED*** (= **FUNG-C**)
- Infection treated on PPS day but no documentation of signs/symptoms: *INFECTION* ***IMPORTED*** (= **FUNG-I**) *(hospital or other LTCF only)*

SURGICAL SITE INFECTIONS

Infection occurs within 30 days after the operation date if no implant is left in place or within 90 days if implant is in place

SUPERFICIAL INCISIONAL

BOTH OF THE FOLLOWING CRITERIA MUST BE MET:

- Infection involves only skin and subcutaneous tissue of the incision

AND

- At least one of the following:
  - Purulent drainage with or without laboratory confirmation, from the superficial incision
  - Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision
  - At least one of the following signs or symptoms of infection:
    - Tenderness or pain
    - Localised swelling
    - Redness
    - Heat

AND

Superficial incisional SSI made by a surgeon or attending physician

INFECTION CONFIRMATION

- Infection criteria fully met: *INFECTION* ***CONFIRMED*** (= **SSSI-C**)
- Infection treated on PPS day but no documentation of signs/symptoms *(hospital or other LTCF only)*: *INFECTION* ***IMPORTED*** (= **SSSI-I**)

DEEP INCISIONAL

BOTH OF THE FOLLOWING CRITERIA MUST BE MET:

- Infection appears to be related to the operation and infection involves deep soft tissue (e.g. fascia, muscle) of the incision

AND

- At least one of the following:
  - Purulent drainage from the deep incision but not from the organ/space component of the surgical site
  - A deep incision spontaneously dehisces or is deliberately opened by a surgeon when the patient has at least one of the following signs or symptoms: fever (> 38 °C), localised pain or tenderness, unless incision is culture-negative.
  - An abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histopathologic or radiologic examination.
  - Diagnosis of deep incisional SSI made by a surgeon or attending physician

INFECTION CONFIRMATION

- Infection criteria fully met: *INFECTION* ***CONFIRMED*** (= **DSSI-C**)
- Infection treated on PPS day but no documentation of signs/symptoms *(hospital or other LTCF only)*: *INFECTION* ***IMPORTED*** (= **DSSI-I**)

ORGAN/SPACE

BOTH OF THE FOLLOWING CRITERIA MUST BE MET:

- Infection appears to be related to the operation and infection involves any part of the anatomy (e.g. organs and spaces) other than the incision which was opened or manipulated during an operation

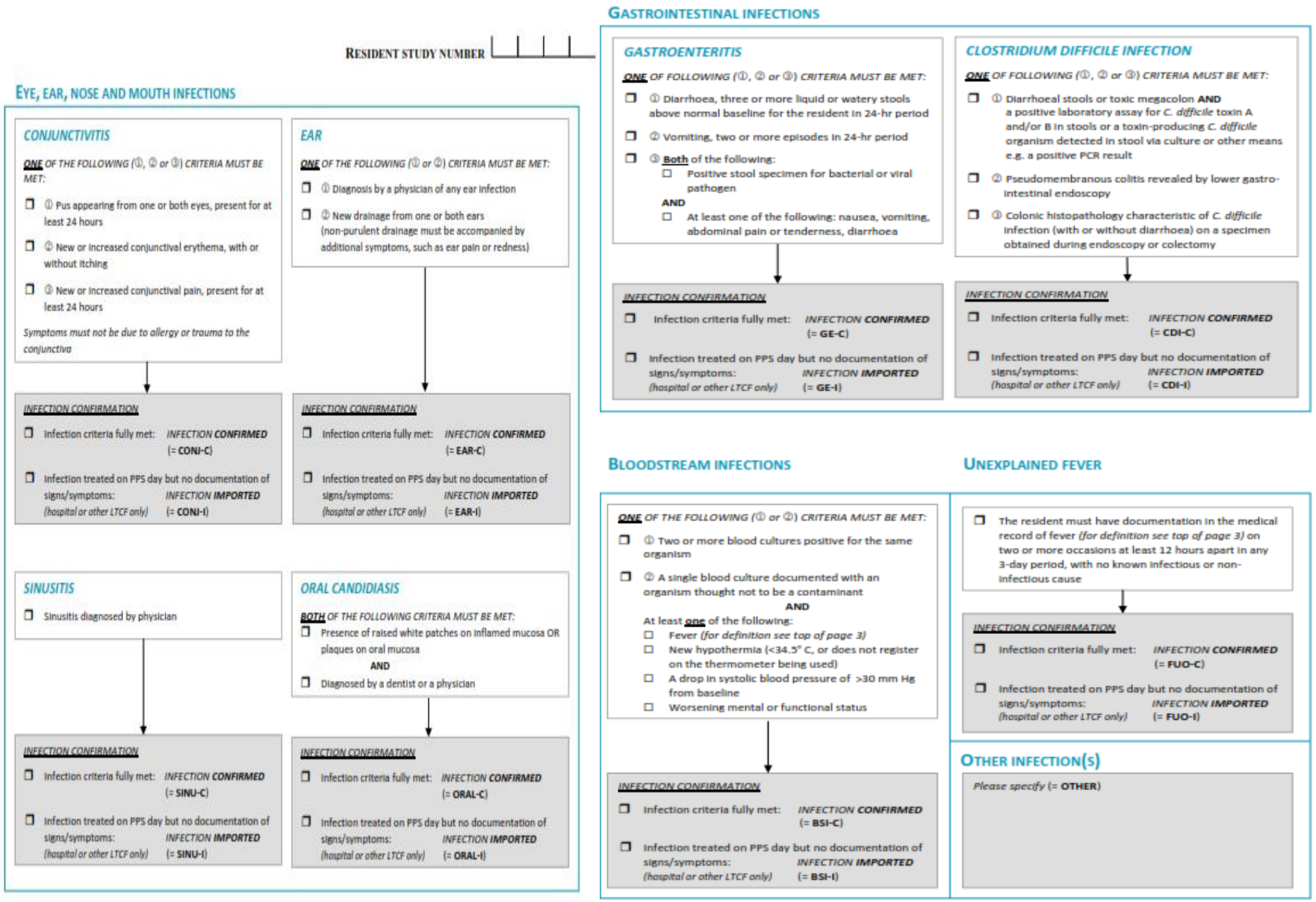
AND

- At least one of the following:
  - Purulent drainage from a drain that is placed through a stab wound into the organ/space
  - Organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space
  - An abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination
  - Diagnosis of organ/space SSI made by a surgeon or attending physician

INFECTION CONFIRMATION

- Infection criteria fully met: *INFECTION* ***CONFIRMED*** (= **OSSI-C**)
- Infection treated on PPS day but no documentation of signs/symptoms *(hospital or other LTCF only)*: *INFECTION* ***IMPORTED*** (= **OSSI-I**)

NOTE:
If the infection matches one of the Surgical Site Infection (SSI) definitions, please give priority to the SSI. Do not apply another case definition for the same infection.


RESIDENT STUDY NUMBER
EYE, EAR, NOSE AND MOUTH INFECTIONS
CONJUNCTIVITIS
ONE OF THE FOLLOWING (①, ② or ③) CRITERIA MUST BE MET:
① Pus appearing from one or both eyes, present for at least 24 hours
② New or increased conjunctival erythema, with or without itching
③ 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
Infection criteria fully met: INFECTION CONFIRMED (= CONJ-C)
Infection treated on PPS day but no documentation of signs/symptoms: (hospital or other LTCF only) INFECTION IMPORTED (= CONJ-I)
EAR
ONE OF THE FOLLOWING (① or ②) CRITERIA MUST BE MET:
① Diagnosis by a physician of any ear infection
② New drainage from one or both ears (non-purulent drainage must be accompanied by additional symptoms, such as ear pain or redness)
INFECTION CONFIRMATION
Infection criteria fully met: INFECTION CONFIRMED (= EAR-C)
Infection treated on PPS day but no documentation of signs/symptoms: (hospital or other LTCF only) INFECTION IMPORTED (= EAR-I)
SINUSITIS
Sinusitis diagnosed by physician
INFECTION CONFIRMATION
Infection criteria fully met: INFECTION CONFIRMED (= SINU-C)
Infection treated on PPS day but no documentation of signs/symptoms: (hospital or other LTCF only) INFECTION IMPORTED (= SINU-I)
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
Infection criteria fully met: INFECTION CONFIRMED (= ORAL-C)
Infection treated on PPS day but no documentation of signs/symptoms: (hospital or other LTCF only) INFECTION IMPORTED (= ORAL-I)
GASTROINTESTINAL INFECTIONS
GASTROENTERITIS
ONE OF FOLLOWING (①, ② or ③) CRITERIA MUST BE MET:
① Diarrhoea, three or more liquid or watery stools above normal baseline for the resident in 24-hr period
② Vomiting, two or more episodes in 24-hr period
③ 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
Infection criteria fully met: INFECTION CONFIRMED (= GE-C)
Infection treated on PPS day but no documentation of signs/symptoms: (hospital or other LTCF only) INFECTION IMPORTED (= GE-I)
CLOSTRIDIUM DIFFICILE INFECTION
ONE OF FOLLOWING (①, ② or ③) CRITERIA MUST BE MET:
① Diarrhoeal stools or toxic megacolon AND a positive laboratory assay for C. difficile toxin A and/or B in stools or a toxin-producing C. difficile organism detected in stool via culture or other means e.g. a positive PCR result
② Pseudomembranous colitis revealed by lower gastro-intestinal endoscopy
③ Colonic histopathology characteristic of C. difficile infection (with or without diarrhoea) on a specimen obtained during endoscopy or colectomy
INFECTION CONFIRMATION
Infection criteria fully met: INFECTION CONFIRMED (= CDI-C)
Infection treated on PPS day but no documentation of signs/symptoms: (hospital or other LTCF only) INFECTION IMPORTED (= CDI-I)
BLOODSTREAM INFECTIONS
ONE OF THE FOLLOWING (① or ②) CRITERIA MUST BE MET:
① Two or more blood cultures positive for the same organism
② A single blood culture documented with an organism thought not to be a contaminant
AND
At least one of the following:
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
Worsening mental or functional status
INFECTION CONFIRMATION
Infection criteria fully met: INFECTION CONFIRMED (= BSI-C)
Infection treated on PPS day but no documentation of signs/symptoms: (hospital or other LTCF only) INFECTION IMPORTED (= BSI-I)
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
Infection criteria fully met: INFECTION CONFIRMED (= FUO-C)
Infection treated on PPS day but no documentation of signs/symptoms: (hospital or other LTCF only) INFECTION IMPORTED (= FUO-I)
OTHER INFECTION(S)
Please specify (= OTHER)

Appendix E: Community Healthcare Organisations (CHO) Map of Ireland