



Healthcare-Associated Infections and Antimicrobial Use in Long-Term Care Facilities (HALT) 2017 Survey

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EXECUTIVE SUMMARY

NURSING HOME SUMMARY

Nursing Home Characteristics

- 55 (21%) Nursing homes submitted data on 2,321 eligible residents
- The proportion of female residents was 66.3%.
- The proportion of over 85 year old residents was 44.5%
- The proportion of residents with Care Load Indicators:
 - 72.3% were incontinent
 - 64.3% were disorientated
 - 54.2% were either in a wheelchair or bedridden
- The proportion of residents with HCAI Risk Factors
 - 5.2% had a urinary catheter *in situ*
 - 0.3% had a vascular catheter *in situ*
 - 8.8% had a wound (3.8% pressure sores and 5% other wounds)
 - 0.3% had undergone recent surgery

Healthcare Associated Infections

- 77 residents had 78 HCAs
- The prevalence of HCAI was 3.3% (range 0-15.4%)
- 15 (27.3%) Nursing homes recorded 0 infections
- 43.5% of reported HCAs were urinary tract infections
- UTI prevalence was 1.5%
- 35% of reported HCAs were respiratory tract infections
- RTI prevalence was 1.2%
- 20.5% of reported HCAs were skin and soft tissue infections
- SSTI prevalence was 0.7%

Antimicrobial Prescribing

- A total of 248 antimicrobials were prescribed
- The prevalence of antimicrobial use was 10.5%
- 50.4% of all prescriptions were for prophylaxis.
- 99.6% of prescriptions were antibacterials.
- The main target sites for prescriptions were UTI (68.5%), RTI (21.0%) and SSTI (9.3%).
- 95.2% were prescribed by a GP
- 86.2% were prescribed within the Nursing Home
- 100% were administered orally
- 51.6% of all prescriptions did not have a review / end date
- 97.6% of therapeutic prescriptions had a review / end date recorded
- No prescriptions for prophylaxis had a review / end date recorded
- 29.5% of HCAs had samples sent for laboratory testing
- 5.1% of HCAs had laboratory results available
- The most commonly prescribed antimicrobial agents were trimethoprim (22.6%), cefalexin (21.8%) and nitrofurantoin (17.3%).

RESIDENTIAL HOME SUMMARY

Residential Home Characteristics

- 15 (34%) Residential homes submitted data on 293 eligible residents
- The proportion of female residents was 73%.
- The proportion of over 85 year old residents was 46.8%
- The proportion of residents with Care Load Indicators:
 - 35.2% were incontinent
 - 53.6% were disorientated
 - 4.1% were either in a wheelchair or bedridden
- The proportion of residents with HCAI Risk Factors
 - 3.4% had a urinary catheter *in situ*
 - 0 had a vascular catheter *in situ*
 - 6.5% had a wound (5.5% pressure sores and 1% other wounds)
 - 2.7% had undergone recent surgery

Healthcare Associated Infections

- 20 residents had 20 HCAs
- The prevalence of HCAI was 6.8% (range 0-19%)
- 5 (33.3%) Residential homes recorded 0 infections.
- 55% of HCAs reported were urinary tract infections
- UTI prevalence was 3.8%
- 25% of HCAs reported were skin and soft tissue infections
- SSTI prevalence was 1.7%
- 10% of HCAs reported were respiratory tract infections (10%)
- RTI prevalence was 0.7%

Antimicrobial Prescribing

- A total of 27 antimicrobials were prescribed
- The prevalence of antimicrobial use was 9.2%
- 44.4% of all prescriptions were for prophylaxis.
- 100% of prescriptions were antibacterials.
- The main target sites for prescriptions were UTI (70.3%), SSTI (18.5%) and RTI (11.1%).
- 96.3% were prescribed by a GP
- 88.9% were prescribed within the Residential Home
- 100% were administered orally
- 44.4% of all prescriptions did not have a review / end date
- 80% of therapeutic prescriptions had a review / end date recorded
- 25% of prescriptions for prophylaxis had a review / end date recorded
- 25% of HCAs had samples sent for laboratory testing
- 5% of HCAs had laboratory results available
- The most commonly prescribed agents were nitrofurantoin (37.1%), flucloxacillin (14.8%) and cefalexin (11.1%).

PRIORITIES

- Explore opportunities for collaboration amongst all GP practices currently providing services to the same LTCF to strengthen and improve the links between LTCF and primary care, particularly with respect to IPC and AMS.
- Continue to work with relevant teams to improve diagnosis of infection and prescribing within LTCFs through primary care.
- Continue to raise awareness of the availability of formal IPC advice through PHA.
- Continue to reduce the HCAI burden by addressing modifiable risk factors through the proper training and the practice of good IPC.
- Develop and Implement interventions to reduce the burden of RTIs
- Implement interventions to further reduce the burden of UTIs in LTCFs.
- Promote development of pragmatic guidance and protocols on prevention and management of SSTI.
- Further improve support and education within LTCFs around antimicrobial prescribing guidance and IP&C policy and guidelines for the prevention or reduction of infections.
- Promote active review of residents on antimicrobial therapy in LTCFs.
- Undertake five-yearly point prevalence surveys in LTCFs.

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ABBREVIATIONS

AMR	Antimicrobial Resistance
AMS	Antimicrobial Stewardship
ATC	Anatomical Therapeutic Chemical classification system (WHO)
CI	Confidence Interval
CDC	Centre for Disease Prevention and Control
ECDC	European Centre for Disease Prevention and Control
EU	European Union
FTE	Full time equivalent
HCAI	Healthcare Associated Infection
HALT	Healthcare Associated Infections and Antimicrobial Use in Long Term Care Facilities
HSC Trust	Health and Social Care Trust
IPC	Infection Prevention and Control
IV	Intravenous
LRTI	Lower Respiratory Tract Infection
LTCF	Long-Term Care Facility
MRSA	Methicillin Resistant <i>Staphylococcus aureus</i>
MDRO	Multi Drug-Resistant Organism
NI	Northern Ireland
NIECR	Northern Ireland Electronic Care Record
OR	Odds Ratio
PHA	Public Health Agency (Northern Ireland)
PPS	Point Prevalence Survey
RQIA	Regulation and Quality Improvement Authority
SHEA	Society for Healthcare Epidemiology of America
SSTI	Skin and Soft Tissue Infection
URTI	Upper Respiratory Tract Infection
UTI	Urinary Tract Infection
RTI	Respiratory Tract Infection
WHO	World Health Organisation

DEFINITIONS

Antibiotics are substances used to kill bacteria and are also known as antibacterials.

Antimicrobial is a general term for any compound with a direct action on micro-organisms used for the treatment and/or prevention of infections. In this survey antimicrobials included antibacterials, antifungals and antiprotozoals. Topical antimicrobials, antiviral agents and antiseptics were excluded from this survey. For the purposes of the survey, antimicrobials are classified using the Anatomical Therapeutic Chemical (ATC) classification system.

Antimicrobial Resistance is the ability of micro-organisms to grow in the presence of an antimicrobial that would normally kill them or limit their growth.

Antimicrobial Stewardship promotes the appropriate use of antimicrobials (including antibiotics) to improve patient outcomes, reduce microbial resistance, and decrease the spread of infections caused by multidrug-resistant organisms (MDROs). It includes the selection of the appropriate drug, dose, route of administration and treatment duration.

Asymptomatic bacteriuria is the presence of bacteria in the urine at a level indicating infection but without clinical symptoms.

Healthcare Associated Infections refer to infections that develop whilst resident in a healthcare facility e.g. LTCF or hospital. For the survey, infections were diagnosed from signs and symptoms using decision algorithms based on CDC/SHEA case definitions [1] which are based on the McGeer criteria [2] for the surveillance of infections in LTCFs.

Imported Infections refer to active infections diagnosed when patients were resident in another setting or within 2 days of having been transferred to a LTCF.

Nursing homes are residential facilities providing nursing care 24 hours per day.

Prevalence is usually expressed as the percentage of a population found to have e.g. a healthcare associated infection and/or be treated with antimicrobials.

Point prevalence surveys assess the prevalence of an issue at a specific point in time.

Prophylactic treatment or **prophylaxis** refers to an antimicrobial prescribed to prevent the occurrence of an infection.

Residential homes are facilities providing residential care. They are staffed 24 hours a day, providing board and general personal care to the residents. Such premises are provided for those who require ongoing care and supervision in the circumstances where nursing care would normally be inappropriate.

Significance is a statistical term defined as a p value <0.05.

Trust-controlled refers to LTCFs under the control of one of the five Health and Social Care (HSC) Trusts. In Northern Ireland, health services are geographically distributed into HSC Trusts which are funded and owned by the state and are 'not for profit'.

Uroprophylaxis is a term used for an antimicrobial prescribed to prevent urinary tract infections.

SECTION 1 HALT3 2017

1.1 LTCF: Healthcare Associated Infections and Antimicrobial Use

This report outlines the findings of a point prevalence survey (PPS) conducted in September/October 2017 to assess the prevalence of healthcare associated infections and antimicrobial prescribing practices in long term care facilities (LTCFs). This PPS is a part of HALT-3, a European wide PPS, coordinated by the ECDC. Each of the four UK countries as well as the Republic of Ireland participated. Similar surveys were undertaken in Northern Ireland in 2010 and 2013 [3].

1.2 Background

Healthcare associated infections (HCAI) and increasing rates of antimicrobial resistance are potentially serious health threats. As residents in LTCFs often have complicated underlying medical conditions and are generally from older age groups, they are more susceptible to infection [4]. Good infection prevention and control (IPC) practices and antimicrobial stewardship (AMS) are essential to prevent HCAI and to slow the emergence of antimicrobial resistance (AMR).

1.3 Aims and Objectives

The aims of the survey were to:

- Estimate the prevalence of HCAs and antimicrobial use in LTCFs.
- Measure structure and process indicators of infection prevention and control (IPC) in LTCFs.

The data will be useful to:

- Quantify the prevalence of HCAs and antimicrobial use in LTCFs and in the EU/EEA region.
- Identify need for intervention, training and/or additional infection prevention and control (IPC) resources.
- Identify priorities for national and local intervention and raise awareness.

1.4 Methodology

The HALT survey was developed by the ECDC and the Scientific Institute of Public Health, Brussels, Belgium for use in European member states. The survey was conducted using standard forms and a protocol [5] which were adapted for use in Northern Ireland.

The HALT survey in Northern Ireland took place in September / October 2017 and was coordinated by the Public Health Agency (PHA) and overseen by a multi-disciplinary steering group. A letter of invitation was sent from PHA and the Regulation and Quality Improvement Authority (RQIA) to all Nursing homes in Northern Ireland in August 2017. In addition, a number of Trust-controlled Residential homes expressed an interest in participating in the survey. During August 2017, healthcare workers attended one of seven regional training sessions to learn about the survey protocol and methodology.

Seventy LTCFs participated in the survey (55 Nursing homes and 15 Trust-controlled Residential homes). A dedicated helpline was established at the PHA to address any queries that arose during the survey and information leaflets were prepared for residents, their families and staff.

1.4.1 Data Collection

Data was collected on two levels:

Institutional questionnaire [Appendix 1] collected general data (ownership, presence of a qualified nurse), denominator data (total number of available and occupied beds, for residents admitted to hospital, residents with signs/symptoms of infection, receiving antimicrobials, residents with a urinary/vascular catheter, with incontinence, pressure sores, wounds, disorientation or with an impaired mobility) and information on medical care and coordination, infection control structure and antibiotic policy.

Resident questionnaire [Appendix 2] was completed for each resident who was receiving antimicrobials on the day of the survey and / or had an infection on the day of the survey. Information was also collected regarding gender, year of birth, urinary/vascular catheter, incontinence [urinary/faecal], pressure sores, wounds, disorientation and impaired mobility [wheelchair/bedridden].

1.4.2 Data Validation

Northern Ireland also contributed data to a European validation study [6]. This was designed to validate the HALT data collection across Europe. During October 2017, local coordinators from PHA visited three Nursing homes and conducted a parallel survey. As part of the validation process, an external ECDC validator assessed the local validation team. The data, collected simultaneously by both the local team and the validation team, were returned to the European validation study coordinating team for inclusion in a European HALT validation analysis.

1.4.3 Data Analysis

Using data from the resident and institutional questionnaires, the prevalence of healthcare associated infection and antimicrobial use was determined. Prevalence was calculated as a proportion of all eligible residents at the time survey. Prevalence results were calculated for HCAI, antimicrobial use, care load indicators and risk factors for HCAI. The frequency and distribution of HCAs were also calculated.

The questionnaire data also provided a description of the characteristics of the residents and their LTCFs. This allowed an analysis of the contribution of these characteristics to HCAI and antimicrobial use.

SECTION 2 RESULTS

2.1 CHARACTERISTICS OF PARTICIPATING LTCFs

2.1.1 Participation

All the Nursing homes in Northern Ireland were invited to participate in the survey. In addition, all Residential homes under the control of the Health and Social Care (HSC) Trusts were offered the same opportunity.

In total, 55 private Nursing homes and 15 Trust-controlled Residential homes participated in the survey during September/October 2017.

2.1.3 Response Rate and Location of Facilities

Nursing Homes

According to the RQIA, There were 257 Nursing homes in Northern Ireland in March 2017. Of these, 55 submitted data for the survey, giving a response rate of approximately 21%.

The Nursing homes that submitted data were distributed across all five HSC Trusts. Fourteen (25.5%) were located in the Southern Trust, 13 (23.6%) in Northern Trust, 11 (20%) in South Eastern Trust, 10 (18.2%) in Western Trust and 7 (12.7%) in Belfast Trust [Table 1].

Table 1 Distribution of participating Nursing Homes by HSC Trust

	All Nursing Homes	Participating Nursing Homes
HSC Trust	Number (%)	Number (%)
Belfast	54 (21.0%)	7 (12.7%)
Northern	62 (24.1%)	13 (23.6%)
South Eastern	53 (20.6%)	11 (20.0%)
Southern	49 (19.1%)	14 (25.5%)
Western	39 (15.2%)	10 (18.2%)

**Facilities with identical postcodes were grouped*

In March 2017, there were a total of 10,869 RQIA-approved Nursing home places. The average number of places per home was 42.3 [Table 2]. The participating Nursing homes had an average of 44.8 places per home. There was no significant difference in the size of all Nursing homes compared with those that submitted data. Participating Nursing homes ranged in size from 19 to 81 beds (median 44) and the proportion of single rooms per 100 beds ranged from 40.9% - 100% (median = 97.5%).

Table 2 Nursing Home Approved Places and Participation

	Number of Approved places	Average Number of Places
All Nursing homes in Northern Ireland (n=257)	10,869	42.3
Nursing homes that submitted data (n=55)	2,466	44.8

To meet the inclusion criteria, residents had to live full-time in the facility, be resident for at least 24 hours and be present at 8 a.m. on the day of the survey. At the time of the survey, the 55 participating Nursing homes indicated that they had a capacity

of 2,446 beds and a total of 89 were unoccupied. Of the 2,357 beds that were in use, 36 residents did not meet the above inclusion criteria making 2,231 eligible for inclusion. The occupancy rate was 96.4%.

Residential Homes

Of the 44 Trust-controlled Residential homes in Northern Ireland, 15 submitted data to the PHA giving an approximate response rate of 34%

The 15 Residential homes were located in three of the five HSC Trusts. Six were in the South Eastern Trust, four in the Southern Trust and five in the Western Trust [Figure 1]. No Residential homes from Belfast and the Northern HSC Trusts participated in the survey.

There were a total of 1101 RQIA-approved Trust-controlled Residential home places. The average number of places per home was 24.7 [Table 3]. The participating Residential homes had an average of 29.7 places per home. Participating Residential homes ranged in size from 16 to 39 beds (median 30) and the proportion of single rooms per 100 beds ranged from 87.5% - 100% (median = 100%).

The 15 participating Residential homes had a total of 446 beds and 146 unoccupied beds. A further 7 residents did not meet the inclusion criteria leaving a total of 293 Residential home residents eligible for the survey. The occupancy rate was 67.3%.

Table 3 Residential Home Approved Places and Participation

	Number of Approved Places	Average Number of Places
All Trust-controlled Residential homes (n=44)	1101	24.7
Participating Residential Homes (n=15)	446	29.7

Facility Staffing Levels

Nursing Homes

Full time equivalent (FTE) staffing levels were also collected. Nursing homes reported an average of 0.2 nurses per resident and 0.6 health care assistants per resident.

Residential Homes

Residential homes had an average nursing staffing of 0.003 per resident and an average healthcare assistant staffing level of 0.8 per resident.

Figure 1 Geographical Distribution of Participating LTCFs



Summary Point: Nursing Homes

- 21% of Nursing homes submitted data to the HALT survey
- 55 Nursing homes submitted data on 2,321 eligible residents

Summary Point: Residential Homes

- 34% of Residential homes submitted data to the HALT survey
- 15 Residential homes submitted data on 293 eligible residents

2.2 LTCF Resident Characteristics

2.2.1 Resident Characteristics

Data was collected on the gender and age of the residents. Residents were grouped according to their age on the day of survey into those over 85 years and those 85 years and under.

Nursing Homes

Of the 2,321 Nursing home residents were 66.3% female (n=1,538), while male residents accounted for 33.7% (n=783). The majority of Nursing home residents (44.5%; n=1033) were older than 85 years. The proportion of those over 85 years varied between Nursing homes and ranged from 0 to 96.4% of the population.

Residential Homes

Of the 293 Residential home residents 73.0% (n=214) were female and 27.0% (n=79) were male. The majority of the Residential home population, (46.8%; n=137) were older than 85 years old. The proportion of those over 85 years varied between Residential homes and ranged from 35.3 to 62.5% of the population.

Summary Point: Nursing Homes

- The proportion of female residents was 66.3%.
- The proportion of over 85 year old residents was 44.5%

Summary Point: Residential Homes

- The proportion of female residents was 73%.
- The proportion of over 85 year old residents was 46.8%

2.2.2 Care Load Indicators

Three 'care load indicators' were used:

- Incontinence: (both faecal and/or urinary);
- Disorientation (in time and/or in space) and;
- Impaired mobility (wheelchair bound or bedridden).

Nursing Homes

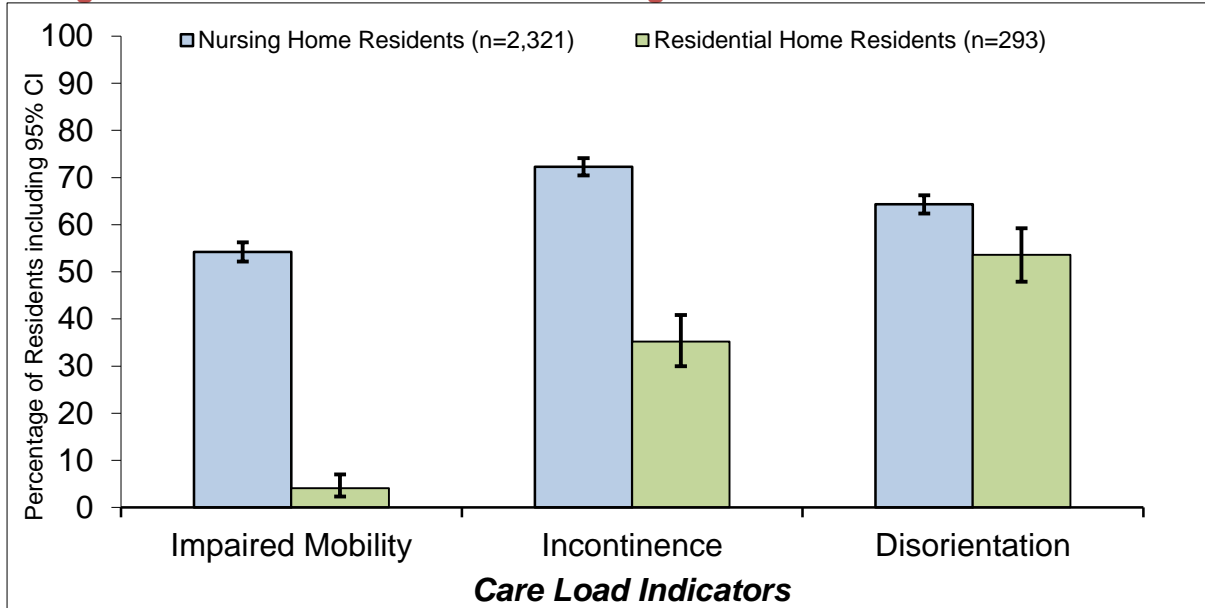
Amongst Nursing home residents, the incontinence rate was 72.3% (n=1,677). Disorientation was present in 64.3% (n=1,493) of Nursing home residents and 54.2% (n=1,258) of Nursing home residents were described as having impaired mobility.

Residential Homes

Amongst Residential home residents, the incontinence rate was 35.2% (n=103). Residents with disorientation accounted for 53.6% (n=157) and only a small proportion, 4.1% (n=12) of residents had impaired mobility.

Figure 2 shows the frequency of care load indicators amongst Nursing home and Residential home residents.

Figure 2 Care Load Indicators in Nursing and Residential Home Residents



Summary Point: Nursing Homes

- The proportion of residents with Care Load Indicators:
 - 72.3% were incontinent
 - 64.3% were disorientated
 - 54.2% had impaired mobility (either in a wheelchair or bedridden)

Summary Point: Residential Homes

- The proportion of residents with Care Load Indicators:
 - 35.2% were incontinent
 - 53.6% were disorientated
 - 4.1% had impaired mobility (either in a wheelchair or bedridden)

2.2.3 Risk Factors

Although any patient is at risk of developing an HCAI, a number of factors have been identified that increase the risk of infection. The survey looked at the presence of three risk factors for HCAI in the participating LTCFs:

- 1) Those residents with invasive devices *in situ*. The survey focused on two device types, urinary catheters and vascular catheters.
- 2) Wounds were classified into two types, 'pressure sores' and 'other wounds'. 'Other wounds' included e.g. leg ulcers, traumatic or surgical wounds (if >30days post-surgery with no implant), insertion sites for gastrostomy, or tracheostomy sites (>90 days post-surgery with an implant in place). If the infection matched one of the Surgical Site Infection (SSI) definitions, priority was given to the SSI and another case definition for the same infection was not applied.
- 3) Recent surgery referred to residents who had undergone surgery in the previous 30 days.

Figure 3 below shows the frequency of risk factors for HCAI amongst Nursing home and Residential home residents.

Nursing Homes

Urinary catheters were present in 5.2% (n=121) of residents while vascular catheters were found in 0.3% (n=6).

A total of 8.8% (n=205) residents were reported as having a wound. The majority of wounds were 'other wounds' (5%; n=116), while pressure sores accounted for 3.8% (n=89) of residents.

0.3% (n=7) of residents had undergone surgery in the 30 prior to the day of the survey.

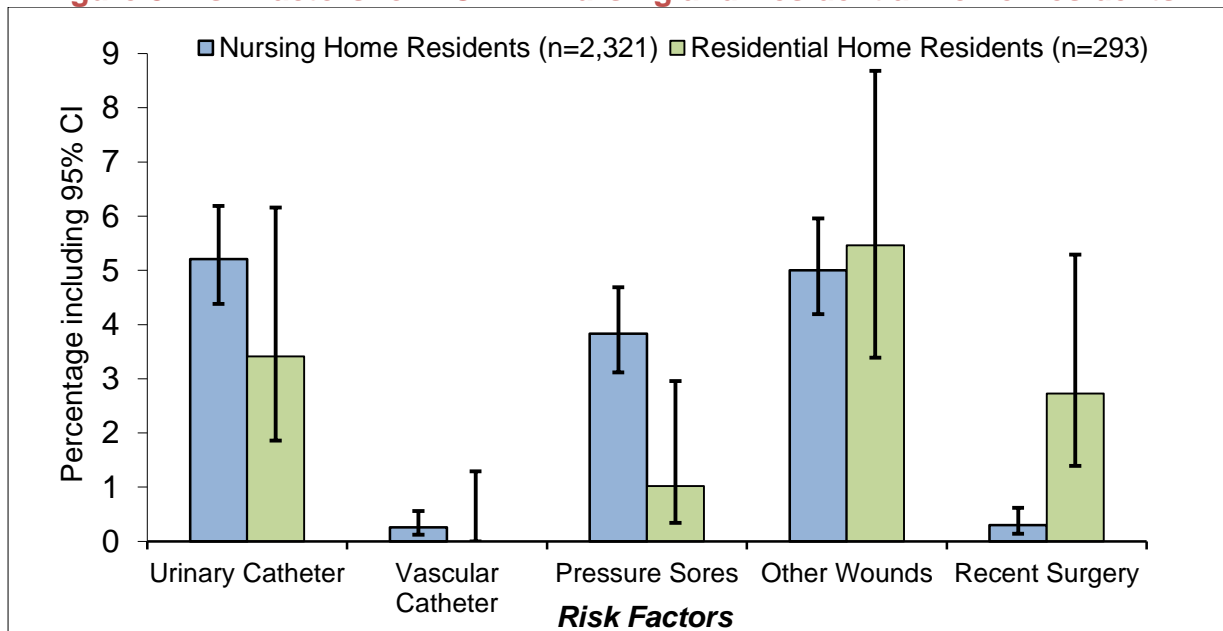
Residential Homes

Urinary catheters were present in 3.4% (n=10) of residents while there were no (0%) vascular catheters in Residential home residents.

A total of 6.5% (n=19) residents were reported as having had a wound. The majority (5.5%; n=16) had 'other wounds' while 1% (n=3) had pressure sores.

2.7% (n=8) of residents had undergone surgery in the 30 days prior to the day of the survey.

Figure 3 Risk Factors for HCAI in Nursing and Residential Home Residents



Summary Point: Nursing Homes

- The proportion of residents with HCAI Risk Factors
 - 5.2% had a urinary catheter *in situ*
 - 0.3% had a vascular catheter *in situ*
 - 8.8% had a wound (3.8% pressure sores and 5% other wounds)
 - 0.3% had undergone recent surgery

Summary Point: Residential Homes

- The proportion of residents with HCAI Risk Factors
 - 3.4% had a urinary catheter *in situ*
 - 0 had a vascular catheter *in situ*
 - 6.5% had a wound (1% pressure sores and 5.5% other wounds)
 - 2.7% had undergone recent surgery

2.3 Healthcare Associated Infection and Antimicrobial Use

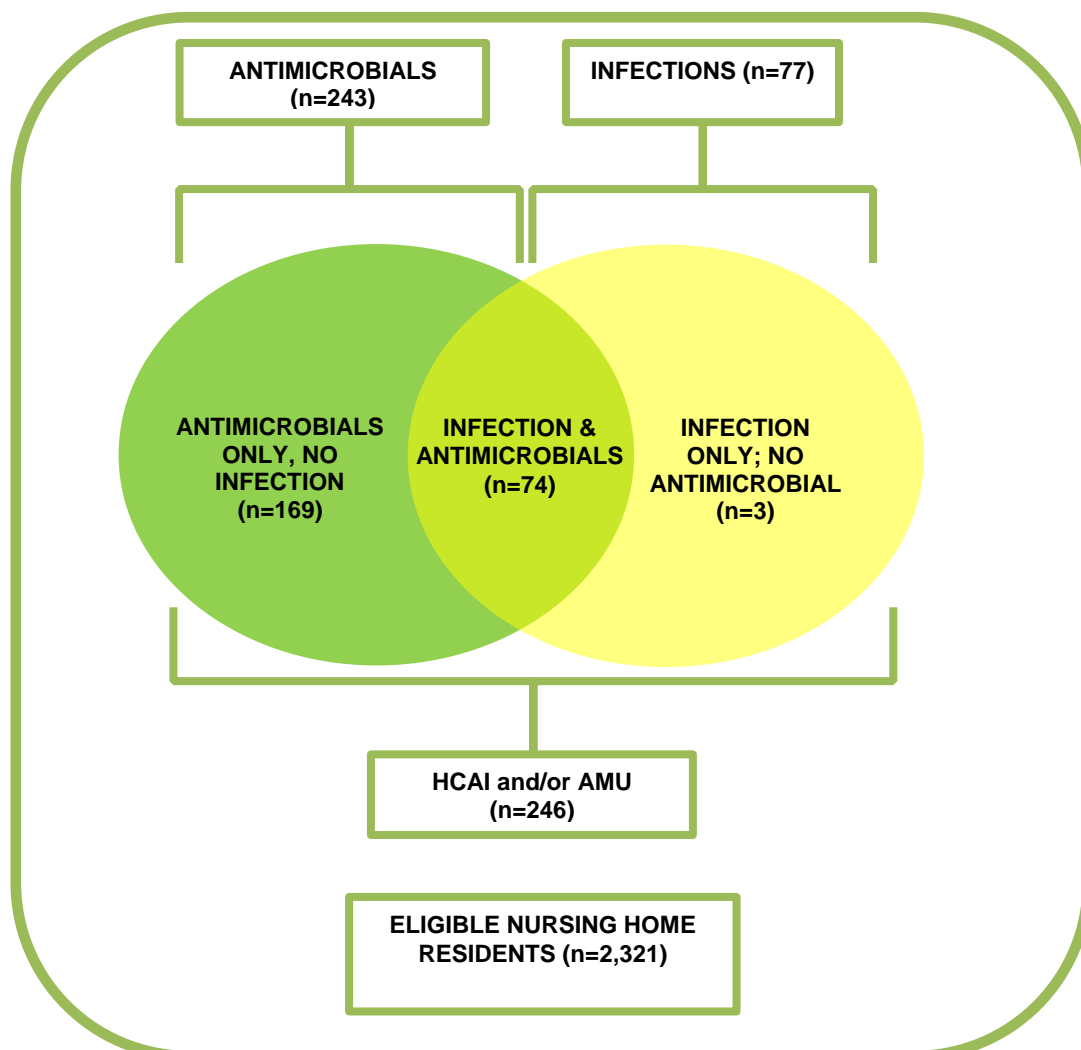
Nursing Homes

Of the 2,321 eligible residents, 246 (10.6%) had signs and symptoms of an infection and/or were receiving an antimicrobial, on the day of the survey [Figure 4]. Three residents (0.13%) had an infection but were not receiving antimicrobials. There were 169 residents (7.3%) in receipt of antimicrobials that did not have signs and symptoms of infection and 74 residents (3.2%) had both an infection and were receiving antimicrobials. The total number of residents taking antimicrobials was 243 (10.5%) and the total number with an infection was 77 (3.3%).

Residential Homes

Of the 293 eligible residents, 34 (11.6%) had signs and symptoms of an infection and/or were receiving an antimicrobial, on the day of the survey. Seven residents (2.4%) had an infection but were not receiving antimicrobials. There were 14 residents (4.8 %) in receipt of antimicrobials that did not have signs and symptoms of infection and 13 residents (4.4 %) had both an infection and were receiving antimicrobials. The total number of residents taking antimicrobials was 27 (9.2%) and the total number with an infection was 20 (6.8%).

Figure 4 Nursing Home Residents with HCAI and / or Receiving Antimicrobials



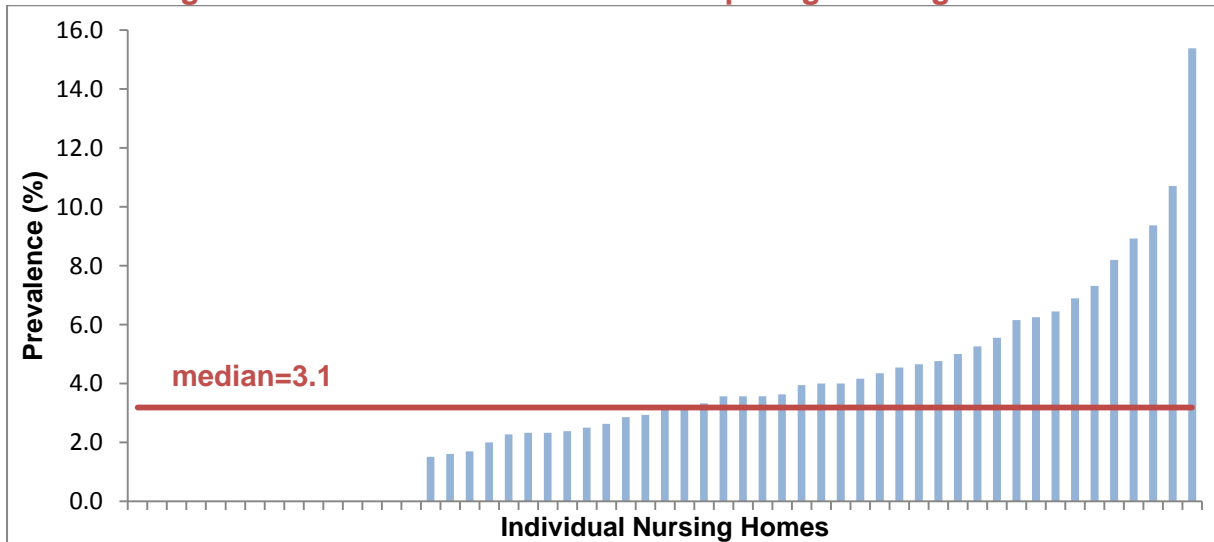
2.4 Healthcare Associated Infections (HCAs)

2.4.1 Prevalence of Healthcare Associated Infection

Nursing Homes

There were 78 infections recorded in 77 Nursing home residents. One resident (1.3%) had two infection sites while the remaining 76 (98.7%) had only one [Figure 5]. The prevalence of HCAI was 3.3% (95% CI 2.7 - 4.1%; 77/2321) and ranged from 0% to 15.4% (median 3.1%). Fifteen (27.3%) of Nursing homes recorded no (0) infections. Three (1.2%) residents with signs and symptoms of an infection were not receiving antimicrobials at the time of the survey.

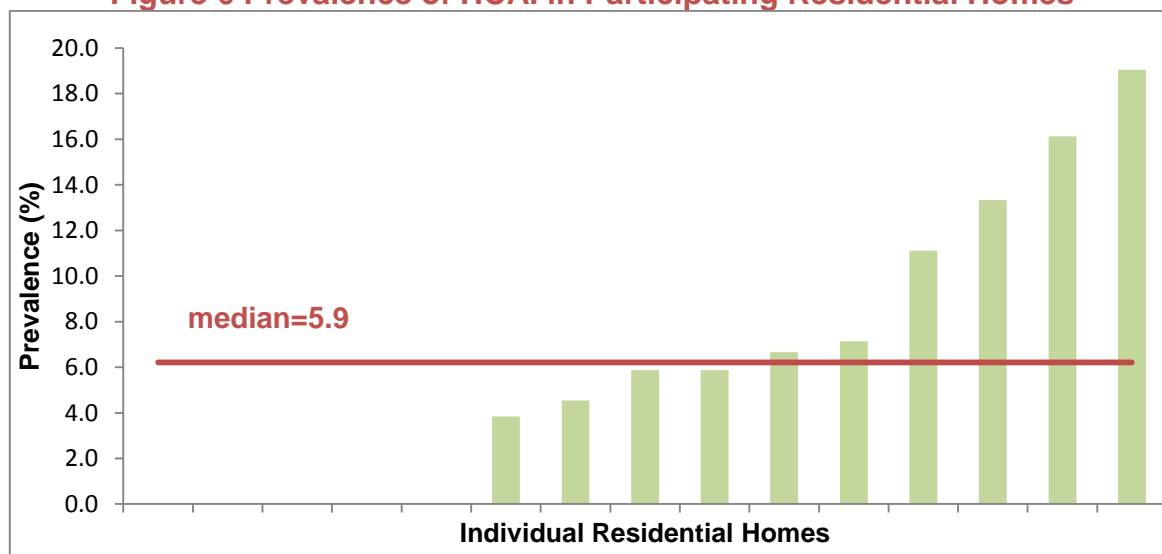
Figure 5 Prevalence of HCAI in Participating Nursing Homes



Residential Homes

There were 20 infections recorded in 20 Residential home residents. HCAI prevalence was 6.8% (20/293) and ranged from 0% to 19% (median 5.9%) [Figure 6]. Five Residential homes recorded no (0) infections. Seven (20.6%) residents with infection signs and symptoms were not receiving antimicrobials at the time of the survey.

Figure 6 Prevalence of HCAI in Participating Residential Homes



Summary Point: Nursing Homes

- 77 residents had 78 HCAs
- The prevalence of HCAI was 3.3%
- HCAI prevalence in Nursing homes ranged from 0% to 15.4%
- 15 (27.3%) Nursing homes recorded 0 infections.

Summary Point: Residential Homes

- 20 residents had 20 HCAs
- The prevalence of HCAI was 6.8%
- HCAI prevalence in Residential homes ranged from 0% to 19%
- 5 (33.3%) Residential homes recorded 0 infections.

2.4.2 Prevalence of HCAI and Resident Characteristics

The HCAI prevalence in both types of homes was compared by age and gender, as well as by care load indicator (incontinence, disorientation, impaired mobility); and risk factors (urinary catheter, surgery in last 30 days, pressure sores and other wounds) [Table 4].

Nursing Homes

Resident Characteristics

HCAI prevalence was 3.8% in male residents compared with 3.1% in female residents and 3.8% in those 85 years and under compared with 2.7% in the over 85s. Residents with HCAs ranged in age from 38-101 years.

Care Load Indicators

HCAI prevalence was 3.8% in Nursing home residents with incontinence compared to 2.2% in those without and was with 3.7% in those with impaired mobility compared to 2.8% in those without. Prevalence of HCAI in those with disorientation (3.3%) was similar to those without (3.4%).

Risk Factors

HCAI prevalence was higher in Nursing home residents with a urinary catheter (11.6% with, compared to 2.9% without), recent surgery (28.6% with, compared to 3.2% without), pressure sores (7.9% with, compared to 3.1% without) and 'other wounds' (12.1% with, compared to 2.9% without). There were no residents with a HCAI that had a vascular catheter.

Table 4 Prevalence of HCAI in Nursing Homes

		2012	2017		
		HCAI Prevalence (%) (95%CI)	HCAI Prevalence (%) (95% CI)	Number of Residents (% Residents)	Number with HCAI (%)
Gender	Male	4.85% (3.12 – 7.45)	3.8% (2.7 – 5.4)	783 (33.7%)	30 (39.0%)
	Female	5.76% (4.38 – 7.53)	3.1% (2.3 – 4)	1538 (66.3%)	47 (61.0%)
Age	≤85	3.90% (2.67 – 5.65)	3.8% (2.9 – 5.0)	1288 (55.5%)	49 (63.6%)
	>85	6.42% (4.70 – 8.73)	2.7% (1.9 – 3.9)	1033 (44.5%)	28 (36.3%)
Incontinence	No	3.75% (2.39 – 5.85)	2.2% (1.3 – 3.6)	644 (27.7%)	14 (18.2%)
	Yes	6.55% (5.01 – 8.54)	3.8% (3 – 4.8)	1677 (72.3%)	63 (81.8%)
Disorientation	No	3.63% (2.33 – 5.59)	3.4% (2.4 – 4.8)	828 (35.7%)	28 (36.4%)
	Yes	6.54% (4.95 – 8.58)	3.3% (2.5 – 4.3)	1493 (64.3%)	49 (63.6%)
Impaired Mobility	No	3.92% (2.63 – 5.82)	2.8% (2 - 4)	1063 (45.8%)	30 (39.0%)
	Yes	6.85% (5.16 – 9.04)	3.7% (2.8 – 4.9)	1258 (54.2%)	47 (61.0%)
Urinary Catheter	No	4.94% (3.84 – 6.34)	2.9% (2.2 – 3.7)	2200 (94.8%)	63 (81.8%)
	Yes	13.51% (7.51 – 23.12)	11.6% (7 – 18.5)	121 (5.2%)	14 (18.2%)
Vascular Catheter	No	-	3.3% (2.7 – 4.1)	2315 (99.7%)	77 (100%)
	Yes	-	0% (0 - 39.0)	6 (0.3%)	0
Recent Surgery	No	5.27% (4.16 – 6.66)	3.2% (2.6 – 4)	2314 (99.7%)	75 (97.4%)
	Yes	30.00% (10.78 – 60.32)	28.6% (8.2 – 64.1)	7 (0.3%)	2 (2.6%)
Pressure Sores	No	4.50% (3.46 – 5.82)	3.1% (2.5 – 3.9)	2232 (96.2%)	70 (90.9%)
	Yes	30.95% (19.07 – 46.03)	7.9% (3.9 – 15.4)	89 (3.8%)	7 (9.1%)
Other wounds	No	4.34% (3.32 – 5.67)	2.9% (2.2 – 3.6)	2205 (95%)	63 (81.8%)
	Yes	21.74% (13.64 – 32.82)	12.1% (7.3 – 19.2)	116 (5.0%)	14 (18.2%)

Residential Homes

Resident Characteristics

HCAI prevalence was slightly higher in male residents (n=6/79; 7.6%) compared with female residents (n=14/214; 6.5%) and higher in those aged over 85 years (n=11/137; 8.0%) compared with 85 years and under (n=9/156; 5.8%). Residents with HCAs ranged in age from 64-98 years.

Care Load Indicators

HCAI prevalence was the same for residents with incontinence (n=7/103; 6.8% compared to n=13/190; 6.8% without). The prevalence of HCAI was higher in those with impaired mobility (n=1/12; 8.3%) compared to those without (n=19/281; 6.8%) and in those with disorientation (n=13/157; 8.3%) was compared to those without (n=7/136; 5.1%).

Risk Factors

HCAI prevalence was higher in Residential home residents with a urinary catheter (n=2/10; 20.0% with, compared to n=18/283; 6.4% without), with recent surgery (n=1/8; 12.5% with, compared to n=19/285; 6.7% without), with pressure sores (n=1/3; 33.3% with, compared to n=19/290; 6.6% without) and with 'other wounds' (n=4/16; 25.0% with, compared to n=16/277; 5.8% without).

Table 5 Prevalence of HCAI in Residential Homes

		2017		
		Prevalence of HCAI (95% CI)	Number of Residents (% Residents)	Number with HCAI (%)
Gender	Male	7.6% (3.5-15.6)	79 (26.7%)	6 (30%)
	Female	6.5% (3.9-10.7)	214 (73.0%)	14 (70%)
Age	≤85	5.8% (3.1-10.6)	156 (53.2%)	9 (45%)
	>85	8.0% (4.5-13.8)	137 (46.8%)	11 (55%)
Incontinence	No	6.8% (4.0-11.4)	190 (64.8%)	13 (65%)
	Yes	6.8% (3.3-13.4)	103 (35.2%)	7 (35%)
Disorientation	No	5.1% (2.5-10.2)	136 (46.4%)	7 (35%)
	Yes	8.3% (4.9-13.7)	157 (53.6%)	13 (65%)
Impaired Mobility	No	6.8% (4.4-10.3)	281 (95.9%)	19 (95%)
	Yes	8.3% (1.5-35.4)	12 (4.1%)	1 (5%)
Urinary Catheter	No	6.4% (4.1-9.8)	283 (96.6%)	18 (90%)
	Yes	20% (5.7-51.0)	10 (3.4%)	2 (10%)
Vascular Catheter	No	6.8% (4.5-10.3)	293 (100%)	20 (100%)
	Yes	-	0 (0%)	0
Recent Surgery	No	6.7% (4.3-10.2)	285 (97.3%)	19 (95%)
	Yes	12.5% (2.2-47.1)	8 (2.7%)	1 (5%)
Pressure Sores	No	6.6% (4.2-10.0)	290 (99.0%)	19 (95%)
	Yes	33.3% (6.1-79.2)	3 (1.0%)	1 (5%)
Other Wounds	No	5.8% (3.6-9.2)	277 (94.5%)	16 (80%)
	Yes	25.0% (10.2-49.5)	16 (5.5%)	4 (20%)

Summary Point: Nursing Homes

Resident Characteristics:

- Higher prevalence in male residents (3.8% v 3.1%)
- Higher prevalence in those 85 years and under (3.8% v 2.7%)

Care Load Indicators:

- Higher prevalence in those with incontinence (3.8% v 2.2%)
- Higher prevalence in those with impaired mobility (3.7% v 2.8%)
- Similar prevalence in those with disorientation (3.4% v 3.3%)

Risk Factors:

- Higher prevalence in those with urinary catheters (11.6% v 2.9%)
- Zero prevalence in those with vascular catheters (0% v 3.3%)
- Higher prevalence in those with recent surgery (28.6% v 3.2%)
- Higher prevalence in those with pressure sores (7.9% v 3.1%)
- Higher prevalence in those with 'other wounds' (12.1% v 2.9%)

Summary Point: Residential Homes

Resident Characteristics:

- Higher prevalence in male residents (7.6% v 6.5%)
- Higher prevalence in those over 85s (8.0% v 5.8%)

Care Load Indicators:

- Same prevalence in those with incontinence (6.8% v 6.8%)
- Higher prevalence in those with impaired mobility (8.3% v 6.8%)
- Higher prevalence in those with disorientation (8.3% v 5.1%)

Risk Factors:

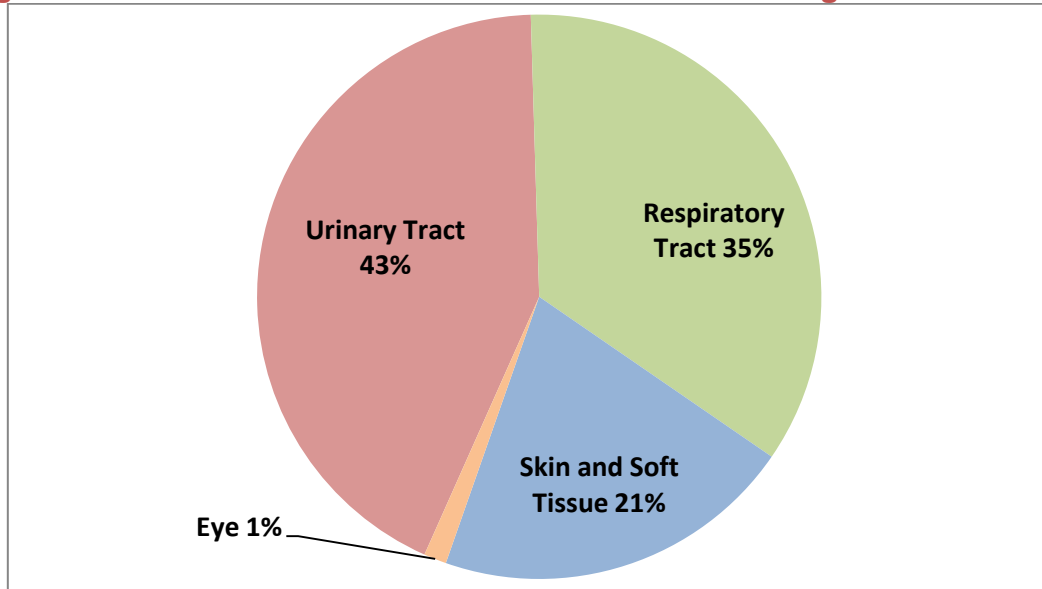
- Higher prevalence in those with urinary catheter (20% v 6.4%)
- No residents had a vascular catheter in place
- Higher prevalence in those with recent surgery (12.5% v 6.7%)
- Higher prevalence in those with pressure sores (33.3% v 6.6%)
- Higher prevalence in those with 'other wounds' (25.0% v 5.8%)

2.4.3 Distribution of Healthcare Associated Infections in LTCFs

Nursing Homes

Urinary tract infections (43%; n=34), respiratory tract infections (35.1%; n=27) and skin and soft tissue infections (20.8%; n=16) were the most commonly reported infections in Nursing homes. There was 1 (1.3%) reported case of eye infection [Figure 7].

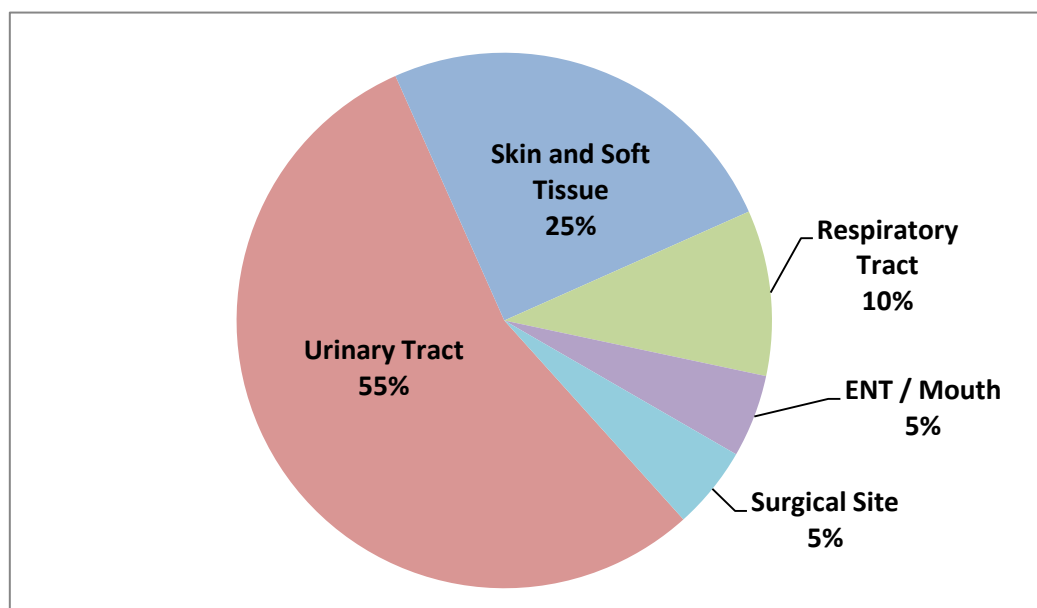
Figure 7 Healthcare Associated Infection Sites in Nursing Home Residents



Residential Homes

The most commonly reported infection sites and the order of frequency was similar for Residential homes when compared with Nursing homes [UTI (n=11; 55%), RTI (n=2; 10%) and SSTI (n=5; 25%)]. The other infection sites reported were a single oral infection (n=1; 5%) and a surgical site infection (n=1; 5%) [Figure 8].

Figure 8 Healthcare Associated Infection Sites in Residential Home Residents



Summary Point: Nursing Homes
Urinary tract infections (43%), respiratory tract infections (35%), and skin and soft tissue infections (21%) were the most commonly reported infection sites.
Summary Point: Residential Homes
Urinary tract infections (55%), skin and soft tissue infections (25%), and respiratory tract infections (10%) were the most commonly reported infection sites.

2.5 Antimicrobial Use

2.5.1 Prevalence of Antimicrobial Use

Nursing Homes

On the day of the survey, a total of 248 antimicrobials were prescribed. Five residents were in receipt of more than one antimicrobial resulting in a prevalence of antimicrobial use in Nursing homes of 10.5% [range 1.6 - 25% (median 10.7%)]. [Figure 9]

Residential Homes

On the day of the survey, a total of 27 antimicrobials were prescribed. There were no (0) residents in receipt of more than one antimicrobial resulting in a prevalence of 9.2%. There were two Residential homes where there were no (0) residents taking antimicrobials; antimicrobial use ranged from 0.0% to 33.3% (median 6.9%) [Figure 10].

Summary Point: Nursing Homes
<ul style="list-style-type: none"> • A total of 248 antimicrobials were prescribed • The prevalence of antimicrobial use was 10.5%
Summary Point: Residential Homes
<ul style="list-style-type: none"> • A total of 27 antimicrobials were prescribed • The prevalence of antimicrobial use was 9.2%

2.5.2 Purpose of Prescription and Target Infection Sites

Nursing Homes

Over half of the 248 prescriptions were given as prophylaxis (n=125; 50.4%) while 49.6% (n=123) were prescribed for therapeutic reasons [Table 6].

The main infection sites targeted were the urinary tract in 68.5% (n=170) of cases, followed by the respiratory tract (n=52; 21%) and then by skin and soft tissue (n=23; 9.3%) [Table 6].

Table 6 Number and Prevalence of Antimicrobials by Site and By Infection

Treated Site	2012		2017	
	Purpose of Treatment		Purpose of Treatment	
	Prophylaxis	Therapeutic	Prophylaxis (%)	Therapeutic (%)
Urinary Tract	65 (72.2%)	25 (27.8%)	118 (69.4)	52 (30.6%)
Respiratory Tract	4 (16.6%)	20 (83.3%)	5 (9.6%)	47 (90.4%)
Skin and Soft Tissue	1 (6.3%)	15 (93.8%)	1 (4.3%)	22 (95.7%)
Other		5 (100%)-	1 (33.3%)	2 (66.7%)
TOTAL	51.5 %	48.5%	125 (50.4%)	123 (49.6%)

Residential Homes

Over half of the 27 prescriptions were given therapeutically (n=15; 55.6%), while 44.4% (n=12) were prescribed as prophylaxis.

The main infection sites targeted were the urinary tract (n=19; 70.4%), followed by the skin and soft tissue infections (n=5; 18.5%) and then respiratory tract (n=3; 11.1%).

Summary Point: Nursing Homes

- 50.4% of all prescriptions were for prophylaxis.
- The most frequent target site for prescriptions mirrored the most common infection sites.

Summary Point: Residential Homes

- 44.4% of all prescriptions were for prophylaxis.
- The most frequent target site for prescriptions mirrored the most common infection sites.

2.5.3 Antimicrobial Prescribing

2.5.3.1 Prescriber Role and Prescribing Location

Nursing Homes

The majority of antimicrobials (n=236; 95.2%) given in Nursing homes were prescribed by a general practitioner (GP). Most of these were prescribed within the Nursing home (n=214; 86.2%). There were 22 prescriptions (8.9%) prescribed by the GP outside of the facility (actual location information is not recorded). Twelve residents (4.8%) were prescribed antimicrobials in hospital [Table 7].

Table 7 Prescriber Role and Location for Nursing Homes

Location and Role of Prescriber	2012	2017
	Number (%)	Number (%)
GP: ALL	131 (94.9%)	236 (95.2%)
GP: Nursing home	108 (78.3%)	214 (86.2%)
GP: Elsewhere	23 (16.7%)	22 (8.9%)
Other Doctor: In hospital	5 (3.6%)	12 (4.8%)
Unknown	2 (1.4%)	0

Residential Homes

The majority of antimicrobials (n=26; 96.3%) given in Residential homes were prescribed by a GP within the home (n=24; 88.9%) although there were 2 prescriptions (7.4%) prescribed by the GP outside of the facility (actual location information is not recorded). One resident's prescription (3.7%) was prescribed in hospital [Table 8].

Table 8 Prescriber Role and Location for Residential Homes

Location and Role of Prescriber	2012	2017
	Number (%)	Number (%)
GP: ALL	15 (71.4%)	26 (96.3%)
GP: Residential home	-	24 (88.9%)
GP: Elsewhere	-	2 (7.4%)
Other Doctor: In hospital	3 (14%)	1 (3.7%)
Another Medical Doctor	3 (14%)	-
Unknown	0	0

Summary Point: Nursing Homes

- 95.2% were prescribed by a GP
- 86.2% were prescribed in the Nursing Home

Summary Point: Residential Homes

- 96.3% were prescribed by a GP
- 88.9% were prescribed in the Residential Home

2.5.3.2 Route of Administration

Nursing Homes

All the antimicrobials prescribed were for oral administration (n=248; 100%).

Residential Homes

All the antimicrobials prescribed were for oral administration (n=27; 100%).

Summary Point: Nursing Homes

- 100% were administered orally

Summary Point: Residential Homes

- 100% were administered orally

2.5.3.3 Review or End Date for Antimicrobials

Nursing Homes

Participating Nursing homes were asked if antimicrobial prescriptions had a review or end date. Regardless of the purpose of the prescription, 48.4% (n=120) responded in the affirmative, whilst the remainder (51.6%; n=128) did not have an end or review date. The majority of therapeutic antimicrobials had an end/review date recorded (n=120; 97.6%) while none (0) of the prophylactic antimicrobials had this.

Residential Homes

There were end or review dates for 15 (55.6%) of the 27 prescriptions and no response for one. Twelve (80%) of the 15 therapeutic prescriptions had an end/review date; and one Residential home did not provide a response. Only a quarter (n=3) of the prophylaxis prescriptions written had end or review dates.

Summary Point: Nursing Homes

- 51.6% of all prescriptions did not have a review / end date
- 97.6% of therapeutic prescriptions had a review / end date recorded
- No prescriptions for prophylaxis had a review / end date recorded

Summary Point: Residential Homes

- 44.4% of all prescriptions did not have a review / end date
- 80% of therapeutic prescriptions had a review / end date recorded
- 25% of prescriptions for prophylaxis had a review / end date recorded

2.5.4 Selection of Antimicrobials and Microbiology Results

In the model employed in the UK, microbiology results are generally sent from the laboratory directly to GPs and are not routinely shared with LTCFs. Data was however, collected on laboratory testing and the outcomes of any tests performed.

Nursing Homes

Fifty five (70.5%) of the HCAs did not have a laboratory test performed. Although 23 (29.5%) samples were submitted for testing, results for 17 (73.9%) were not available on the day of the survey. For the remainder, (n=6; 26.1%), results were available.

Residential Homes

Fifteen (75%) of the HCAs did not have a laboratory test performed. For the remainder (n=5, 25%), samples were submitted for analysis. Four (20%) did not have results available on the day of the survey.

Summary Point: Nursing Homes <ul style="list-style-type: none">• 29.5% of HCAs had samples sent for laboratory testing• 5.1% of HCAs had results available
Summary Point: Residential Homes <ul style="list-style-type: none">• 25% of HCAs had samples sent for laboratory testing• 5% of HCAs had results available

2.5.5 Antimicrobials Prescribed

Antimicrobials were reported using the WHO Anatomical Therapeutic Chemical (ATC) classification system which classifies the active substances in a drug in a hierarchy with five different levels.

Nursing Homes

Antibacterials for systemic use (ATC J01) accounted for the majority of prescriptions (n=247, 99.2%) with only two (0.8%) prescriptions being for antiprotozoals (ATC P01). Drug preparations containing a combination of antimicrobials accounted for 18 prescriptions (7.3%); the majority of prescriptions were for single antimicrobial preparations.

The three most frequently prescribed classes of antimicrobials were the beta-lactams (n=65, 26.2%) followed by the trimethoprim and sulphphonamide class (n=57, 22.9%), and then the cephalosporins (n=55, 22.2%) [Table 9].

Table 9 Classes of Antimicrobials Prescribed in Nursing Homes

Antimicrobial Class	ATC Code	Number (%)
Beta-Lactams	J01C	65 (26.2%)
Trimethoprim and Sulphonamide	JO1E	57 (22.9%)
Cephalosporins	J01D	55 (22.2%)
Nitrofurans derivatives	J01X	43 (17.3%)
Macrolides and Lincosamides	J01F	10 (4.0%)
Tetracyclines	J01A	9 (3.6%)
Quinolones	J01M	6 (2.4%)
Nitroimidazole derivatives	P01A	2 (0.8%)
Combination of Antimicrobials	J01R	1 (0.4%)

Residents in Nursing homes were prescribed a total of 17 different antimicrobial agents [Table 10]. The three most commonly prescribed antimicrobial agents were

trimethoprim (n=56, 22.6%), cefalexin (n=54, 21.8%) and nitrofurantoin (n=43, 17.3%).

Table 10 Individual Antimicrobials Prescribed in Nursing Homes

Individual Antimicrobials	2012	2017
	Frequency (%)	Frequency (%)
Trimethoprim	40 (29.0%)	56 (22.6%)
Cefalexin	12 (8.7%)	54 (21.8%)
Nitrofurantoin	30 (21.7%)	43 (17.3%)
Amoxicillin	15 (10.9%)	28 (11.3%)
Co-Amoxiclav	8 (5.8%)	16 (6.5%)
Flucloxacillin	9 (6.5%)	15 (6%)
Doxycycline	2 (1.4%)	9 (3.6%)
Ciprofloxacin	2 (1.4%)	6 (2.4%)
Other Penicillins	0 (-)	6 (2.4%)
Clarithromycin	6 (4.3%)	5 (2%)
Azithromycin	2 (1.4%)	3 (1.2%)
Metronidazole	1 (0.7%)	2 (0.8%)
Erythromycin	2 (1.4%)	1 (0.4%)
Fluconazole combination	1 (0.7%)	1 (0.4%)
Cefradine	1 (0.7%)	1 (0.4%)
Co-Trimoxazole	0 (-)	1 (0.4%)
Clindamycin	0 (-)	1 (0.4%)
Ceftriaxone (IV)	1 (0.7%)	0 (-)
Chloramphenicol	1 (0.7%)	0 (-)
Cubicin (IV)	1 (0.7%)	0 (-)
Unknown Agent	2 (1.4%)	0 (-)
Topical	2 (1.4%)	EXCLUDED
Total	138 (100%)	248 (100%)

Residential Homes

Antibacterials for systemic use (ATC J01) accounted for all the prescriptions (n=27, 100%). Drug preparations containing a combination of antimicrobials accounted for two prescriptions (7.4%); the majority of prescriptions were for single antimicrobials

The three most frequently prescribed antimicrobials classes were nitrofurantoin derivatives (n=10; 37.0%), beta-lactams (n=9; 33.3%) and cephalosporins (n=3; 11.1%) [Table 11].

Table 11 Classes of Antimicrobials Prescribed in Residential Homes

Antimicrobial Class	ATC Code	Number (%)
Nitrofurantoin derivatives	J01X	10.0 (37.0%)
Beta-Lactams	J01C	9.0 (33.3%)
Cephalosporins	J01D	3.0 (11.1%)
Trimethoprim and Sulfonamides	J01E	2.0 (7.4%)
Tetracyclines	J01A	2.0 (7.4%)
Macrolides and Lincosamides	J01F	1.0 (3.7%)

There were 9 different antimicrobial agents prescribed [Table 12]. The three most commonly prescribed agents were nitrofurantoin (n=10, 37.1%), flucloxacillin (n=4, 14.8%) and cefalexin (n=3, 11.1%).

Table 12 Individual Antimicrobials Prescribed in Residential Homes

Individual Antimicrobials	2012	2017
	Frequency (%)	Frequency (%)
Nitrofurantoin	5 (7.1%)	10 (37.1%)
Flucloxacillin	1 (1.4%)	4 (14.8%)
Cefalexin	3 (4.3%)	3 (11.1%)
Amoxicillin	2 (2.9%)	2 (7.4%)
Trimethoprim	7 (35.0%)	2 (7.4%)
Co-Amoxiclav	2 (2.9%)	2 (7.4%)
Doxycycline	0 (-)	2 (7.4%)
Azithromycin	0 (-)	1 (3.7%)
Other Penicillins	0 (-)	1 (3.7%)
Total	20 (100%)	27 (100%)

Summary Point: Nursing Homes

- 99.6% of prescriptions were antibacterials.
- The most frequently prescribed classes of antimicrobials were the beta-lactams (n=65, 26.2%) followed by the trimethoprim and sulphonamides class (n=57, 22.9%), and then the cephalosporins (n=55, 22.2%).
- The most commonly prescribed antimicrobial agents were trimethoprim (22.6%), cefalexin (21.8%) and nitrofurantoin (17.3%).

Summary Point: Residential Homes

- 100% of prescriptions were antibacterials.
- The most frequently prescribed antimicrobials classes were nitrofurantoin derivatives (n=10; 37.0%), beta-lactams (n=9; 33.3%) and cephalosporins (n=3; 11.1%).
- The most commonly prescribed agents were nitrofurantoin (37.1%), flucloxacillin (14.8%) and cefalexin (11.1%).

SECTION 3 COMMON HEALTHCARE ASSOCIATED INFECTIONS

This section presents an in-depth analysis of the most common healthcare associated infections and the most frequent antimicrobial prescriptions. For the 3 most common HCAs, each section describes the rates and prevalence as they relate to resident characteristics, care load indicators and risk factors. Each HCAI is also broken down according to diagnostic certainty and microbiological results. Where samples were sent for laboratory culture, sensitivity testing was also performed including susceptibility to:

- Oxacillin (OXA), a marker for methicillin-resistance
- Glycopeptides (GLY)
- Third-generation cephalosporins (C3G)
- Carbapenems (CAR)

The AMU section describes the antimicrobial prescribing practice including the nature of the prescription (therapeutic vs prophylaxis) and adherence to the primary care prescribing guidance available at the time of the survey.

3.1 Urinary Tract

Urinary tract infections (UTIs) were the most commonly reported HCAIs in both Nursing and Residential homes. Unlike RTIs and SSTIs, UTIs were not divided into types of UTI. They were however, categorised according to certainty of diagnosis. The three groups were as follows:

- 1) Confirmed: residents with signs / symptoms and a positive urine culture.
- 2) Probable: residents with signs / symptoms and the urine culture was either not been performed, or the results were negative or unknown.
- 3) Imported: residents who had recently transferred to the LTCF and were still in receipt of treatment, but where no one had knowledge of the resident's signs/symptoms prior to transfer.

3.1.1 Urinary Tract Infections: Nursing Homes

On the day of the survey, 34 (43.5%) of the HCAI diagnoses were UTIs and the prevalence of UTIs was 1.5 (34/2321) per 100 eligible residents.

The majority of residents with a UTI were female (n=22; 64.7%). The prevalence of UTIs amongst female residents was 1.4% (22/1538) compared to 1.5% (12/783) amongst males.

The majority of residents with a UTI were aged 85 years or younger (n=22; 64.7%), a prevalence of 1.7% (22/1288). The prevalence of UTIs amongst older residents was 1.2% (12/1033).

The majority of residents with a UTI were incontinent (n=29; 85.3%); the prevalence of incontinence in those with UTIs was 1.7% (29/1677) compared to 0.8% (5/644) in those without. Those with UTIs that were disorientated accounted for 64.7% (n=22); the prevalence was 1.5% (22/1493) which was similar to those without at 1.4% (12/828). Half (n=17) of those with a UTI had impaired mobility; prevalence was 1.4% (17/1258) similar to those without at 1.6% (17/1063).

Urinary catheters were present in 11 (32.4%) of residents with an UTI (prevalence 9.1%; 11/121). One resident (2.9%) had undergone recent surgery (prevalence 14.3%; 1/7) and 3 residents (8.8%) had a pressure sore (prevalence 3.4%; 3/89). None of the residents with UTIs had a vascular catheter or 'other' wounds.

Out of 34 infections, 2 (5.9%) UTIs were confirmed with a positive urine culture. Two (5.9%) of the 34 infections were classed as imported while the remainder, (n=30; 88.2%) were classed as probable UTIs. The Nursing homes indicated that for 31 (91.2%) UTIs, there was no microbiological examination performed. For the remainder, there was 1 (2.9%) isolate that could not be identified by the lab and 2 (5.9%) positive urine cultures both isolated *Escherichia coli*. The sensitivity results for these isolates were reported as unknown.

Summary Point: Nursing Home

Resident Characteristics:

- UTIs were the most commonly reported HCAI (43.5%)
- UTI prevalence was 1.5%
- Similar in males and females (1.5% v 1.4%)
- Higher in those $\leq 85y$ v $>85y$ (1.7% v 1.2%)

Care Load Indicators:

- Higher prevalence in those with Incontinence (1.7% v 0.8%)
- Similar prevalence in those with Disorientation (1.5% v 1.4%)
- Similar prevalence in those with Impaired Mobility (1.4% v 1.6%)

Risk Factors:

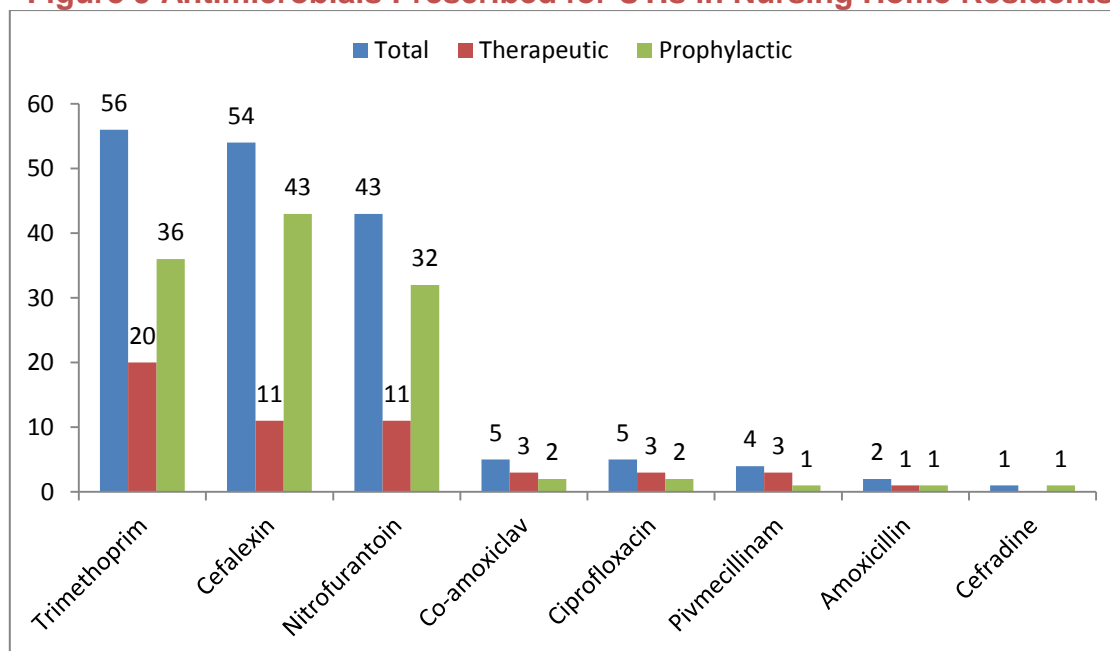
- Higher in those with Urinary Catheters (9.1% v 1.0%)
- Higher prevalence in those with Recent Surgery (14.3% v 1.4%)
- Higher prevalence in those with Pressure Sores (3.4% v 1.4%)
- None of the residents with UTIs had Vascular Catheters or 'Other Wounds'

3.1.2 Prescribing for Urinary Tract Infections in Nursing Homes

There were a total of 170 (68.5%) prescriptions for 8 different antimicrobials preparations [Figure 9]. Four residents with a UTI were in receipt of more than one antimicrobial prescription. Three medications accounted for 90% of all antimicrobials prescriptions for the treatment for UTI: trimethoprim (n=56, 32.9%), cefalexin (n=54; 31.8%) and nitrofurantoin (n=43; 25.3%).

The majority of UTI prescriptions were prescribed for prophylactic purposes (n=118; 69.4%) [Figure 9]. The prevalence of uroprophylaxis in Nursing homes was 5.1%. The rate for females was 6.2% compared with 2.9% for male residents.

Figure 9 Antimicrobials Prescribed for UTIs in Nursing Home Residents



The 2016 guidelines “Northern Ireland Management of Infection Guidelines for Primary and Community Care 2016” applied at the time of the survey. Taking into account this guidance, of the 52 therapeutic prescriptions, only 34 (65.4%) are for any of the ‘first-line’ antimicrobials in the antimicrobial guidance. Eighteen (34.6%) of the antimicrobials given therapeutically for UTIs were not prescribed in line with

this guidance; however, there was no evidence provided to indicate whether or not these antimicrobials (cefalexin, co-amoxiclav, ciprofloxacin, amoxicillin and cefradine) were prescribed on the basis of culture sensitivities.

Of the antimicrobials prescribed for uroprophylaxis, 52 (44.1%) were in line with the recurrent UTI guidance at the time. It is unclear whether the other antimicrobials prescribed for prophylaxis (cefalexin, co-amoxiclav, ciprofloxacin, pivmecillinam, amoxicillin and cefradine) were based on culture results.

Summary Point: Nursing Home

- The majority (68.5%) of prescriptions were for UTIs.
- Trimethoprim (n=56, 32.9%), cefalexin (n=54; 31.8%) and nitrofurantoin (n=43; 25) were the most frequently prescribed antimicrobials.
- The majority (69.4%) of UTI prescriptions were for prophylaxis
- The prevalence of uroprophylaxis was 5.1%
- The prevalence of uroprophylaxis was higher in women (6.2% v 2.9%)
- 65.4% of therapeutic prescriptions were in line with guidelines
- 44.1% of uroprophylaxis prescriptions were in line with guidance.

3.1.3 Urinary Tract Infections: Residential Homes

On the day of the survey, 11 (55%) of the HCAI diagnoses were UTIs and the prevalence of UTIs was 3.8 per 100 eligible residents. The majority of residents with a UTI were female (n=7; 63.6%). The prevalence of UTIs amongst female residents was 3.3% compared to 8.9% (4/79) amongst males. Six residents with a UTI were aged over 85 years, and five residents were aged 85 years or younger giving a prevalence of 4.4% (6/137) and 3.2% (5/156) respectively.

Just under half (n=5; 45.5%) of those with a UTI were incontinent resulting in a prevalence of 4.9% (5/103). Of those residents with a UTI, the majority (n=7; 63.6%) were disorientated and the prevalence of disorientation was 4.5% (7/157). Fewer of those with UTIs had impaired mobility (n=1; 9.1%) resulting in a prevalence of incontinence amongst those with UTIs of 8.3% (1/12). Urinary catheters were present in 2 (18.2%) of residents with an UTI (prevalence 20.0%; 2/10). None of the residents with UTIs had a vascular catheter. One resident (9.1%) had undergone recent surgery (prevalence 12.5%; 1/8), 1 resident (9.1%) had a pressure sore (prevalence 33.3%; 1/3), and 2 (18.2%) had 'other' wounds (prevalence 12.5%; 1/16).

All the UTIs were classed as probable infections as no microbiology results were available.

Summary Point: Residential Home

Resident Characteristics

- UTI was the most commonly reported HCAI (55%)
- UTI prevalence was 3.8%
- Higher prevalence in female v male residents (8.9% v 3.3%)
- Higher in those >85y v ≤85y (4.4% v 3.2%)

Care Load Indicators:

- Higher prevalence in those with incontinence (4.9% v 3.2%)
- Higher prevalence in disorientation (4.5% v 2.9%)
- Higher prevalence in those impaired mobility (8.3% v 3.6%)

Risk Factors:

- Higher in those with urinary catheters (20% v 3.2%)
- Higher prevalence in those with recent surgery (12.5% v 3.5%)
- Higher prevalence in those with pressure sores (33.3% v 3.4%)
- Higher prevalence in those with 'other wounds' (12.5% v 3.2%)
- None of the residents with a UTI had a vascular catheter

3.1.4 Prescribing for Urinary Tract Infections in Residential Homes

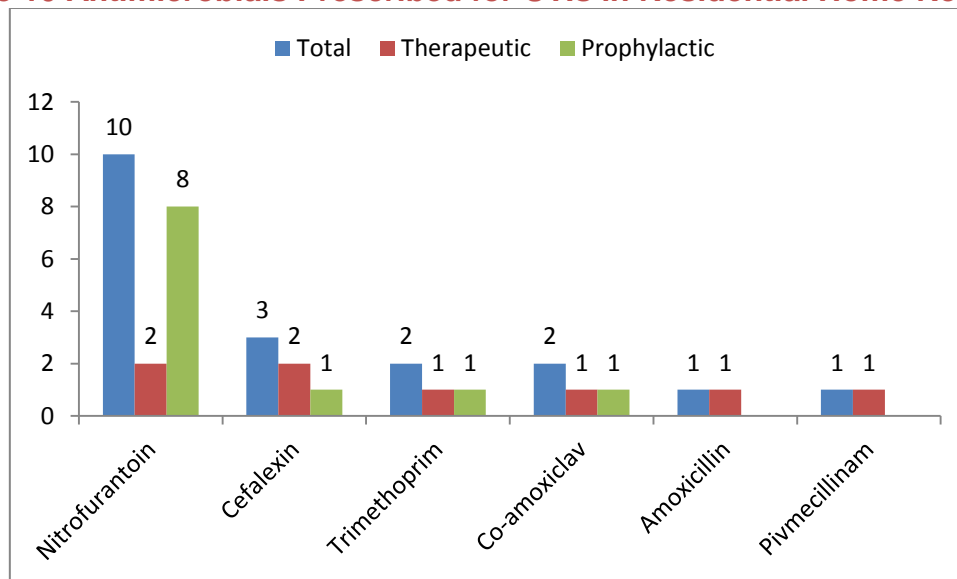
There were a total of 19 (70.4%) prescriptions for 6 different antimicrobials preparations [Figure 12]. No residents were in receipt of more than one antimicrobial prescription. The most frequently prescribed medication for UTI was nitrofurantoin which accounted for 52.6% (n=10) of all prescriptions for UTI.

Eleven (57.9%) prescriptions for UTI were prescribed for prophylaxis [Figure 10]. The prevalence of uroprophylaxis in the Residential homes was 3.8 per 100 residents (11/293). For female residents, the prevalence of uroprophylaxis was 4.7% (10/214) compared to 1.3% (1/79) of male residents. Nitrofurantoin accounted for 72.7% (n=8) of prescriptions for uroprophylaxis.

Of the antimicrobials prescribed for uroprophylaxis, 8 (72.7%) were in line with the recurrent UTI guidance at the time. It is unclear on what bases the single prescription for nitrofurantoin as prophylaxis in a male resident was prescribed as there were no UTI prophylaxis guidelines for males at the time of the survey.

Of the 8 therapeutic prescriptions, four (50%) were for any of the antimicrobials features in the UTI antimicrobial guidance. Four (50%) of the antimicrobials given therapeutically for UTIs were not prescribed in line with this guidance. There was no information provided to indicate whether or not these antimicrobials (cefalexin, co-amoxiclav and amoxicillin) were prescribed on the basis of culture sensitivities.

Figure 10 Antimicrobials Prescribed for UTIs in Residential Home Residents



Summary Point: Residential Home

- The majority (70.3%) of prescriptions were for UTIs.
- Nitrofurantoin (n=10; 52.6%) was the most frequently prescribed antimicrobial.
- The majority (57.9%) of UTI prescriptions were for prophylaxis
- The prevalence of uroprophylaxis was 3.8%
- The prevalence of uroprophylaxis was higher in women (4.7% v 1.3%)
- 50% of therapeutic prescriptions were in line with guidance
- 72.7% of prophylaxis prescriptions were in line with guidance.

3.2 Respiratory Tract

Respiratory tract infections (RTIs) were the 2nd most commonly reported HCAI in Nursing homes and the 3rd most commonly reported HCAI in Residential homes.

There were four types of RTI: identified 1) influenza-like illness ('Flu'), 2) pneumonia, 3) other lower RTI and 4) common cold syndromes / pharyngitis. The latter category has been described for the purposes of this report as upper RTIs or URTIs.

Only 2 diagnostic categories of were used to describe RTIs, confirmed and imported. With the exception of pneumonia, confirmed RTI cases were based on clinical signs / symptoms only. Confirmation of pneumonia required clinical signs /symptoms and a positive chest X-ray. For all types of RTI, imported infections were those being treated on the day of the survey, but with no documentation of signs / symptoms.

3.2.1 Respiratory Tract Infections: Nursing Homes

On the day of the survey, 27 (34.6%) of the HCAI diagnoses were RTIs and the prevalence of RTIs was 1.2 per 100 eligible residents. Of the 27 RTIs diagnosed, LRTIs were the most common (n=24; 88.9%), followed by the URTIs (n=2; 7.4%). There was one (3.7%) reported case of pneumonia and no cases of 'Flu'.

The majority of residents with a RTI were female (n=17; 63%). The prevalence of RTIs amongst female residents was 1.1% compared to 1.3% amongst males.

The proportions of those with an RTI aged over 85 and 85 years and under, were similar at 13 (48.1%) and 14 (51.9%) respectively. The prevalence for over 85 was 1.3% and for 85 years and under was 1.1%.

The majority of residents with an RTI were incontinent (n=23; 85.2%) and the prevalence of incontinence in those with RTIs was 1.4% (23/1677). Those with RTIS that were disorientated accounted for 59.3% (n=16) resulting in a prevalence of 1.1% (16/1493). Impaired mobility was present in 77.8% (n=21) of residents with an RTI, a prevalence of 1.7% (21/1258) [Table 17].

Of the residents with an RTI, only 1 (3.7%) had a urinary catheter resulting in a prevalence of 0.8% (1/121). None of the residents with RTIs had a vascular catheter, recent surgery or a pressure sore. Three (11.1%) residents with an RTI had 'Other' wounds, a prevalence of 2.6% (3/116).

Of the 27 RTIS, there were 24 LRTI, all of which were classed as confirmed. The remaining 3 RTIs were classed as a confirmed pneumonia and 2 confirmed URTIs. There were no 'imported' or probable RTIs. The Nursing homes indicated that for 24 (88.9%) RTIs, no microbiological samples were sent. For the remainder (n=3; 11.1%), there was 1 (33.3%) isolate that could not be identified by the lab and 2 (66.7%) results that were not available.

Summary Point: Nursing Home

Resident Characteristics:

- RTI was the 2nd most commonly reported HCAI (34.6%)
- RTI prevalence was 1.2%
- Similar prevalence in Male and Female residents (1.1% v 1.3%)
- Similar prevalence in those over and under 85y (1.3% v 1.1%)
- LRTIs were the most common type of RTI (88.9%)

Care Load Indicators:

- Higher prevalence in those with Incontinence (1.4% v 0.6%)
- Similar prevalence in those with Disorientation (1.1% v 1.3%)
- Higher prevalence in those with Impaired Mobility (1.7% v 0.6%)

Risk Factors:

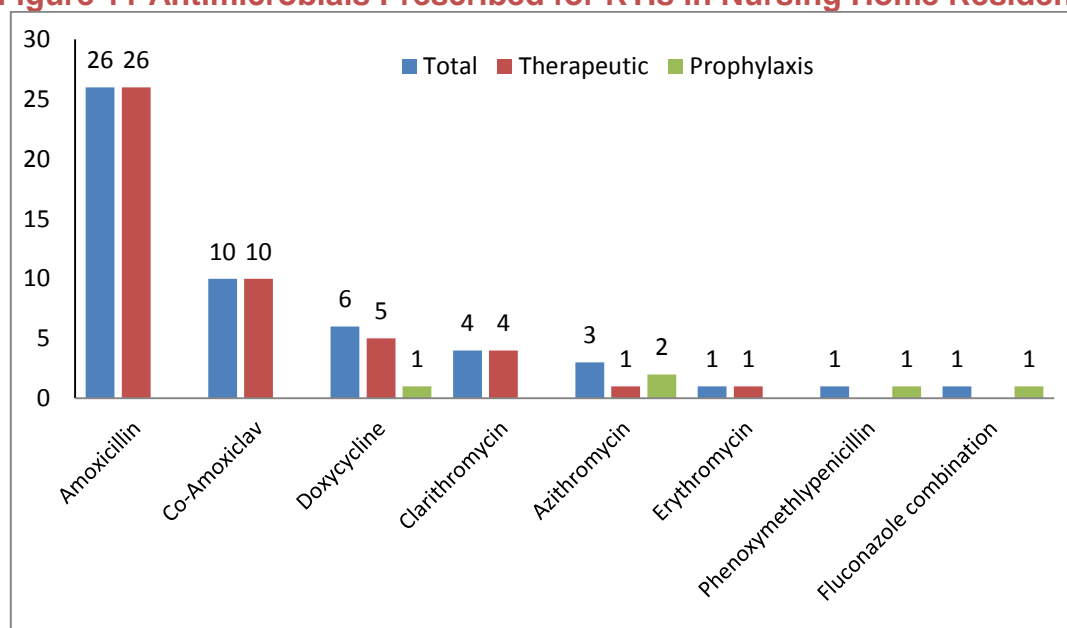
- Lower in those with Urinary Catheters (0.8% v 1.2 %)
- Higher prevalence in those with 'Other Wounds' (2.6% v 1.1%)
- None of the residents with UTIs had Vascular Catheters, Recent Surgery or Pressure Sores

3.2.2 Prescribing for Respiratory Tract Infections in Nursing Homes

There were a total of 52 (21.0%) prescriptions for 8 different antimicrobials. There were no residents in receipt of more than one antimicrobial. Amoxicillin accounted for half of all prescriptions (n=26; 50%).

The distribution of antimicrobials prescribed for treatment and prophylaxis of RTIs is shown in Figure 11; the majority of RTI prescriptions were prescribed for therapeutic purposes (n=47; 90.4%). Only 5 (9.6%) prescriptions were for prophylaxis.

Figure 11 Antimicrobials Prescribed for RTIs in Nursing Home Residents



The 2016 guidelines (Northern Ireland Management of Infection Guidelines for Primary and Community Care 2016) applied at the time of the survey, and differentiated between the treatment of URTIs, LRTIs and pneumonias.

Therapeutic recommendations for URTIs included phenoxymethylpenicillin as 'first-line' followed by clarithromycin. Both of the residents with URTIs were prescribed amoxicillin, which was not in line with guidance at the time.

For the 24 receiving treatment for LRTIs (non-pneumonic), the recommended first line antimicrobial was amoxicillin, followed by doxycycline and clarithromycin. The majority (n=17; 70.8%) of prescriptions were in line with guidance (amoxicillin n=10; doxycycline n=4; clarithromycin n=3). Seven (29.2%) prescriptions (1 for azithromycin and 6 for co-amoxiclav) were not in keeping with guidelines.

The guidelines for the treatment of pneumonia apply specifically to community acquired pneumonia and the severity of the condition dictates the choice of antimicrobial. For those being treated for pneumonia and remaining 'at home' i.e. within the care facility, the first line choice was amoxicillin, followed by clarithromycin, and doxycycline. The single prescription for pneumonia was for co-amoxiclav which was not in line with primary care guidance but was initiated in hospital.

Of the remaining (n=20; 42.5%) therapeutic antimicrobials prescribed (amoxicillin n=14; doxycycline n=1; co-amoxiclav n=3; clarithromycin n=1) all bar erythromycin (n=1; 2.1%) featured in the 2016 guidelines for the treatment of RTIs. However, there was no clear indication as to the type of RTI they were being used to treat, making adherence difficult to assess. Of the 52 therapeutic prescriptions, 36 (69.2%) potentially met with RTI guidance. There is no indication, including no culture results, as to why this medication was selected.

There was no common choice of respiratory tract prophylaxis antimicrobial. Azithromycin was prescribed twice, doxycycline, phenoxymethylcillin and a drug preparation containing azithromycin, secnidazole and fluconazole were each prescribed once. The guidelines gave no recommendations for prophylaxis in respiratory tract infections.

Summary Point: Nursing Home

- The 2nd (21.0%) most common reason for prescriptions were RTIs.
- Amoxicillin accounted for 50% of prescriptions.
- 90.4% of RTI prescriptions were therapeutic
- 69.2% of therapeutic prescriptions were in line with guidance
- 9.6% of RTI prescriptions were prophylactic in nature
- There were no primary care guidelines for prophylaxis at the time of the survey.

3.2.3 Respiratory Tract Infections: Residential Homes

On the day of the survey, 2 (10%) of the HCAI diagnoses were RTIs and the prevalence of RTIs was 0.7 per 100 eligible residents. The two RTIs diagnosed were both classified as confirmed LRTI.

Both residents with an RTI were female (n=2). The prevalence of RTIs amongst female residents was 0.9% (2/214). Residents with a RTI were both over 85 years old (prevalence 1.5%; 2/137).

Both residents with an RTI were classified as disorientated (prevalence 1.3%; 1/157) and one was incontinent (1.0%; 1/103). Neither had impaired mobility.

None of the residents with RTIs had any Risk Factors for HCAI.

None of the RTIs had samples sent for laboratory testing.

Summary Point: Residential Home

HCAI prevalence was:

- RTI were the third most common HCAIs (10%)
- RTI prevalence was 0.7%
- Higher prevalence in Female residents (0.9% v 0%)
- Higher in those over 85years (1.5% v 0%)

Care Load Indicators:

- Higher prevalence in those with Incontinence (1.0% v 0.5%)
- Higher prevalence in Disorientation (1.3% v 0%)
- None of the residents with RTIs had impaired mobility.

Risk Factors:

- None of the residents with RTIs had any Risk Factors for HCAI.

3.2.4 Prescribing for Respiratory Tract Infections in Residential Homes

There were a total of 3 (11.1%) prescriptions for 3 different antimicrobials preparations [Figure 12]. No residents were in receipt of more than one antimicrobial prescription. Two of the antimicrobials prescribed (amoxicillin and doxycycline) were prescribed for therapeutic purposes. Azithromycin (n=1) was prescribed prophylactically.

There were 2 LRTIs (non-pneumonic) recorded, only 1 of which was in receipt of an antimicrobial, the first line recommendation, amoxicillin. Although the prescription for the other therapeutic prescription of doxycycline gave no indication as to the type of RTI being treated, therefore it is difficult to assess whether or not this prescriptions was in line with.

There were no primary care guidelines regarding prophylaxis for RTIs, so it is unclear on what basis the single prescription of azithromycin was made.

Summary Point: Residential Home

- The 3rd (11.1%) most common reason for prescription was RTIs.
- Two out of 3 prescriptions were therapeutic
- 1 out of 3 prescriptions was prophylaxis
- Adherence to guidelines could not be assessed

3.3 Skin and Soft Tissue

Skin and soft tissue infections (SSTIs) were the 3rd most commonly reported HCAIs in Nursing homes and the 2nd most commonly reported HCAIs in Residential homes.

There were 4 categories of SSTIs: 1) cellulitis/soft tissue/wound infection, 2) scabies, 3) herpes simplex or herpes zoster infection and 4) fungal infection.

Only 2 categories of diagnostic certainty were used to describe SSTIs, confirmed and imported. For each of the different types of SSTI, with the exception of cellulitis/soft tissue/ wound infections, confirmed cases were based on the presence of relevant signs and symptoms and a physician diagnosis or laboratory confirmation. Diagnosis of cellulitis/soft tissue/ wound infections was based on either clinical signs and /or symptoms only. For all types of SSTIs, imported infections were those being treated on the day of the survey, but with no documentation of signs / symptoms.

3.3.1 Skin and Soft Tissue Infections: Nursing Homes

On the day of the survey, there were 16 Nursing home residents with SSTIs (20.5%). The prevalence of SSTIs was 0.7 per 100 eligible residents. Only one type of SSTI was identified, namely cellulitis / skin / wound infections.

There were equal numbers of male and female residents with a SSTI (n=8; 50%). The prevalence of SSTIs amongst female residents was 0.5% compared to 1.0% amongst males. The majority of residents with an SSTI were aged 85 years or less (n=13; 81.3%). The prevalence of SSTIs amongst older residents was 0.3% compared to 1.0% for those aged 85 years or less.

The majority of residents with an SSTI were incontinent (n=12; 75%) and the prevalence of incontinence in those with SSTIs was 0.7% (12/1677). Those with SSTIs that were disorientated accounted for 68.8% (n=11) resulting in a prevalence of 0.7% (11/1493). Impaired mobility was present in 62.5% (n=10) of residents with an SSTI, prevalence of 0.8% (10/1258).

Urinary catheters were present in 12.5% (n=2) of residents with an SSTI a prevalence of 1.7% (2/121). None of the residents with SSTIs had a vascular catheter. One resident (6.3%) had undergone recent surgery (prevalence 14.3%; 1/7), 4 residents (25%) had a pressure sore (prevalence 4.5%; 4/89), and 11 (68.8%) had 'other' wounds (prevalence 9.5%; 11/116).

Although the majority (93.8%; n=15) of infections were confirmed, 1 (6.3%) infection was an imported infection. The single imported infection and 9 of the confirmed infections did not have sampling performed (n=10; 62.5%). For the remainder, 6 (37.5%) were sent for examination but the results were unavailable for 4 (66.7%). Two (33.3%) samples for which results were available, both contained *S. aureus*. One isolate was resistant to oxacillin, a marker of methicillin-resistance, while the other sensitivities for both isolates were unknown.

Summary Point: Nursing Home

HCAI prevalence was:

- SSTI was the 3rd most commonly reported HCAI (20.5%)
- SSTI prevalence was 0.7%
- The only type of SSTI was cellulitis / skin / wound infections
- Higher prevalence in male residents (1.0% v 0.5%)
- Higher prevalence in those 85 years and under (1.0% v 0.3%)

Care Load Indicators:

- Similar prevalence in those with Incontinence (0.7% v 0.6%)
- Similar prevalence in those with Disorientation (0.7% v 0.6%)
- Similar prevalence in those with Impaired Mobility (0.8% v 0.6%)

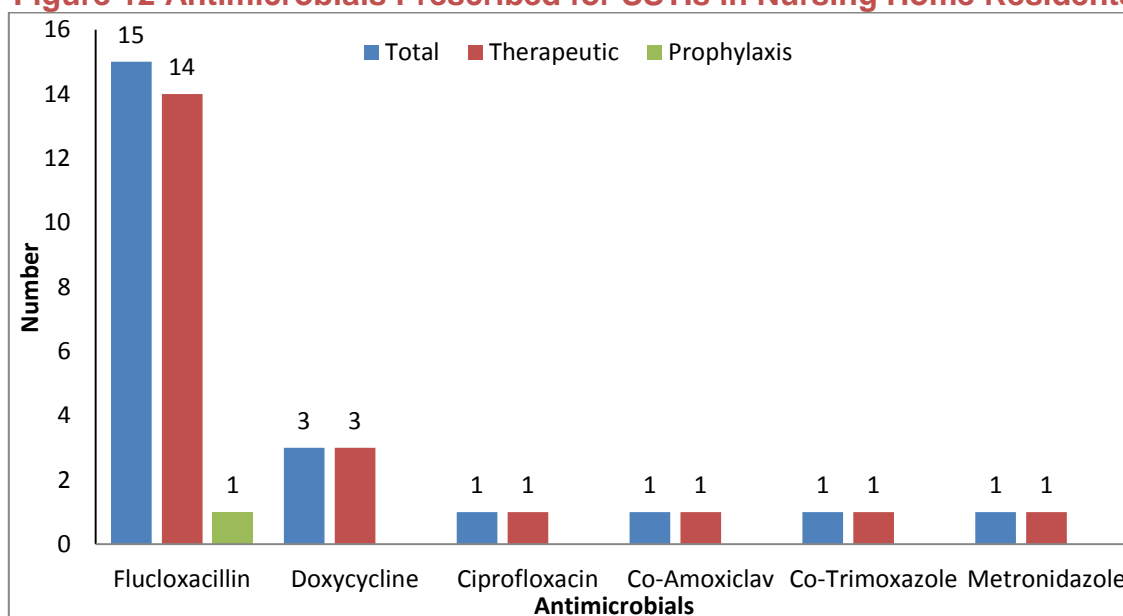
Risk Factors:

- Higher in those with urinary catheters (1.7% v 0.6%)
- Higher prevalence in those with recent surgery (14.3% v 0.6%)
- Higher prevalence in those with pressure sores (4.5% v 0.5%)
- Higher prevalence in those with 'other wounds' (9.5% v 0.2%)
- None of the residents with SSTIs had vascular catheters

3.3.2 Prescribing: for Skin and Soft Tissue Nursing Homes

There were a total of 23 (9.3%) prescriptions for 7 different antimicrobial preparations. There was 1 resident in receipt of more than one prescription. Flucloxacillin accounted for most of these prescriptions (n=15; 65.2%). The majority (n=22; 95.7%) of prescriptions were therapeutic in nature, with only one (4.3%), for flucloxacillin, being made for prophylactic purposes. The distribution of antimicrobials prescribed for SSTIs is shown in Figure 12.

Figure 12 Antimicrobials Prescribed for SSTIs in Nursing Home Residents



The therapeutic guidelines in use at the time of the survey, state that for cellulitis the first line antimicrobial of choice is flucloxacillin, with second line being clarithromycin. Where there is a risk of MRSA, the first line antimicrobial is doxycycline. The majority (74.0%; n=17) of prescriptions included antimicrobials listed in guidance.

The use of ciprofloxacin, clindamycin, co-amoxiclav, co-trimoxazole and metronidazole are not consistent with the 2016 guidelines and there was no indication given as to whether these therapeutic prescriptions were made on the basis of culture results or sensitivities or on the advice of a specialist.

There were no recommendations for primary care prescribers regarding prophylaxis in the 2016 guidelines and no information was provided regarding the reason for the prescription of flucloxacillin, although it was prescribed within the facility and by a GP.

Summary Point: Nursing Home

- The 3rd (9.3%) most common reason for prescription was SSTI.
- Flucloxacillin accounted for 65.2% of prescriptions.
- The majority (95.7%) of SSTI prescriptions were therapeutic
- 74% of therapeutic prescriptions were in line with guidance
- Adherence to prophylaxis guidance could not be assessed

3.3.3 Skin and Soft Tissue Infections: Residential Homes

On the day of the survey, there were 5 Residential home residents with SSTI (25%). The prevalence of SSTIs was 1.7 per 100 eligible residents.

Four of the 5 residents with an SSTI were female. The prevalence of SSTI amongst female residents was 1.9% compared to 1.3% amongst male residents. Three residents with an SSTI were 85 years or less. The prevalence of SSTIs amongst the over 85s was 1.5% compared with 1.9% for those aged 85 years or less.

None of the 5 residents with SSTIs had impaired mobility while 1 was noted to be incontinent (prevalence 1.0%; 1/103) and 3 were disorientated (prevalence 1.9%; 3/157).

None of the residents with SSTIs had urinary catheters, vascular catheters, recent surgery, pressure sores and 'other' wounds. A single (20%) resident with an 'Other' Wound had an SSTI, a prevalence of 6.3% (1/16).

Four (80%) of the 5 SSTIs were cellulitis / skin / wound infections and 1 (20%) was a Herpes simplex or herpes zoster infection. The majority (60%; n=3) of infections were confirmed infections, while 2 (40%) including the single herpetic infection were classed as imported. With the exception of the imported non-herpetic infection, there was no laboratory sampling performed (n=4; 80%). *S. aureus*, isolated from the single (20%) sample sent, was sensitive to oxacillin; the other sensitivity was unknown.

Summary Point: Residential Home

Resident Characteristics:

- SSTI was the 2nd most commonly reported HCAI (25%)
- SSTI prevalence was 1.7%
- Higher prevalence in Female residents (1.9% v 1.3%)
- Higher prevalence in those 85 years and under (1.9% v 1.5%)
- The majority (80%) of SSTIs were cellulitis / skin / wound infections

Care Load Indicators:

- Lower prevalence in those with Incontinence (1.0% v 2.1%)
- Higher prevalence in those with Disorientation (1.9% v 1.5%)
- None of the residents with SSTIs had Impaired Mobility (0% v 1.8%)

Risk Factors:

- Higher prevalence in those with 'Other Wounds' (6.3% v 1.4%)
- None of the residents with SSTIs had Urinary Catheters, Vascular Catheters, Recent Surgery, Pressure Sores and 'Other' Wounds.

3.3.4 Prescribing for Skin and Soft Tissue Infections in Residential Homes

There were a total of 5 (18.5%) prescriptions for 2 different antimicrobials preparations. There were no residents in receipt of more than one prescription. Flucloxacillin accounted for the majority (n=4; 80%) of these prescriptions. All 5 prescriptions were for therapeutic purposes.

Both cellulitis/skin/wound and herpetic infections were identified. The guidelines for cellulitis are the same as those described above in section 3.3.2. All 5 antimicrobials (4 for flucloxacillin, 1 for doxycycline) appear to be in keeping with guidelines.

The single patient diagnosed with a herpetic infection was not recorded as being in receipt of an antimicrobial as antivirals were excluded from the survey.

Although there were no prescriptions for prophylaxis in Residential homes, it should be noted that there are no primary care guidelines for prophylaxis of SSTIs.

Summary Point: Residential Homes

- The second (18.5%) most common reason for antimicrobial prescription
- Flucloxacillin accounted for 80% of prescriptions.
- 100% of prescriptions were therapeutic
- 100% of therapeutic prescriptions were in line with relevant guidance

SECTION 4 FACILITY COORDINATION

In addition to collecting individual level data on the healthcare associated infection and antimicrobial use, the survey collected specific information at an institutional level. This information related to medical care and coordination, infection control practice, and antimicrobial policy.

4.1 Medical Care and Coordination

This section sought to identify those responsible for the provision of medical care including antimicrobial prescribing, the nature of medical activity coordination and the accessibility of the medical / clinical records of LTCF residents. As the model of care and coordination differs across the UK and Europe, this information could provide valuable insight into the impact of the model applied on the provision of care including antimicrobial prescribing.

Nursing Homes

All (100%) of the 55 Nursing homes surveyed, indicated that medical resident care was provided by the patient's own personal GP or a group practice.

When questioned about whether medical activities in the facility were coordinated by a coordinating medical physician, 21.8% (n=12) indicated that there was no coordination of medical activity, either internally or externally. The remainder (n=43; 78.2%) of the Nursing homes indicated that there was a physician from outside the facility that coordinated medical activities.

The majority of Nursing homes (85.5%; n=47) stated that the medical / clinical records of all the residents in the facility could be consulted by the physician in charge of medical coordination of a facility. In contrast, only 14 (25.5%) of Nursing homes indicated that these records could be accessed by nursing staff.

Residential Homes

All (100%) of Trust controlled Residential homes, medical resident care was provided by the patient's own personal GP or a group practice.

External coordination of medical activities occurred in 46.7% (n=7), while no coordination was noted in 53.8% (n=8) of Residential homes. In 12 (80%) of the 15 Residential homes, medical records were accessible by the coordinating external medical physician. Compared to Nursing homes, a higher proportion (46.7%, n=7) of records were accessible by nursing staff.

4.2 Infection Prevention & Control Practice

Infection prevention and control (IPC) policy is defined as a coherent series of precautions and actions to avoid infections and transmission of pathogens within a population. This section looks at the aspects of IPC policy present in or available to the LTCF including IPC expertise, and access to IPC advice.

Nursing Homes

The majority (94.5%; n=52) of Nursing homes reported that there were persons with training in IPC available to the staff of the facility. Of those with access to an IPC trained person, 48 (92.3%) indicated that the relevant person was a nurse, while for four (7.7%), there was access to both a nurse and a doctor. In the majority of facilities, the available person was located outside of the facility (n=26; 50%). The

remainder were located within the facility (n=20; 38.5%), or both internally and externally (n=6; 11.5%).

Residential Homes

All 15 (100%) Residential homes had access to a person with training in IPC available to the staff of the facility. In 10 of these, there was access to both a doctor and a nurse with relevant training, whilst in n=5, the relevant person was a nurse. The trained personnel were located externally in the majority of homes (n=13; 86.7%), while in two homes (13.3%) there was access to both internal and external expertise.

4.3 Infection Prevention and Control Committee

Other important aspects of IPC policy surveyed were the presence of an IPC committee and the formal access to help and expertise from an external IPC team. An IPC committee was defined in the protocol as a multidisciplinary committee consisting of at least the person with training in IPC (IPC practitioner), as well as an administrator, a coordinating physician and other potential team members. This team could be based within the LTCF (internal) or sit outside the LTCF (external). Where present, the regularity of meetings of IPC committees was also surveyed.

Nursing Homes

There were no infection control committees (internal or external) in any of the Nursing homes and as a consequence, there were no committee meetings.

However, 98.2% (n=54) reported that they could ask for help and expertise from an external infection control team on a formal basis.

Residential Homes

Nine (60%) of Residential homes reported the presence of an infection control committee (internal or external). Of those with a committee, meetings ranged in frequency from three per year (n=6; 66.7%), to six per year (n=2; 22.2%), to a maximum of nine per year ((n=1; 11.1%).

All of the Residential homes reported that they could ask for help and expertise from an external infection control team on a formal basis.

4.4 Written Protocols

During the survey the availability of 5 written IPC protocols was explored.

Nursing Homes

Over 94% of Nursing homes had written protocols on hand hygiene (98.2%), and on the management of MRSA and/or other MDRO (94.5%), enteral feeding (94.5%) and urinary catheters (94.5%). Protocols on the management of vascular catheters were only available in 47.3% (n=26) of Nursing homes.

Residential Homes

All 15 (100%), Residential homes reported the availability of written protocols for management of MRSA and/or other MDROs, as well as for hand hygiene. Fourteen out of 15 (93.3%) had written guidelines on the management of urinary catheters; two (13.3%) reported protocols for the management of venous catheters / lines and one (6.7%) had this for the management of enteral feeding.

4.5 Surveillance

The survey asked if the LTCF had a programme of surveillance e.g. annual report, in place for healthcare-associated infections.

Nursing Homes

Twenty (36.4%) of Nursing homes reported that they had a surveillance programme of HCAI in their facility.

Residential Homes

Only two (13.3%) reported the presence of an HCAI surveillance programme.

4.6 Hand Hygiene

Good hand hygiene is a central principle of IPC [7]. Numerous aspects of policy and practice were surveyed including the existence of a written protocol, staff education and training and hand hygiene practice and products used within the facility.

Nursing Homes

A written protocol on hand hygiene was present in 98.2% of Nursing homes (n=54).

A hand hygiene training session for care professionals had been organised in the preceding year in 50 of the 55 Nursing homes surveyed (90.9%).

Of the list of products for hand hygiene provided, all Nursing homes reported the use of alcohol rub solution, and liquid soap (antiseptic/other). Alcohol wipes were used in 43 (78.2%) of Nursing homes and bar soap was used in clinical areas in only one home (1.8%).

The most frequently used hand hygiene method for unsoiled hands was hand washing with water and non-antiseptic soap (n=20; 36.4%), followed by hand washing with water and antiseptic soap (n=19; 34.5%) and finally hand disinfection with an alcohol rub (n=16; 29.1%).

The total volume of alcohol hand rub used for hand hygiene ranged from 10 – 600 litres per year. The volume of alcohol rub per resident ranged from 0.73 to 46.97mls per year.

The number of hand hygiene opportunities that were observed in the preceding year ranged from 0 – 480.

Residential Homes

All Residential homes reported that they had a written hand hygiene protocol in their facility.

A hand hygiene training session for care professionals had been organised in the preceding year in 14 of the 15 Residential homes surveyed (93.3%).

Of the list of products for hand hygiene provided, all Residential homes reported the use of alcohol rub solution, and liquid soap (antiseptic/other). Alcohol wipes were used in no (0%) of the Residential and no Residential homes reported the use of bar soap in clinical areas.

In Residential homes, the most frequently used hand hygiene method for unsoiled hands was hand washing with water and non-antiseptic soap (n=11; 73.3%), followed by hand disinfection with an alcohol rub (n=16; 29.1%). No Residential homes reported the use of handwashing with an antiseptic soap as a frequently used hand hygiene method.

The total volume of alcohol hand rub used for hand hygiene ranged from 4 – 192 litres per year. The volume of alcohol rub per resident ranged from 0.32 to 20.95mls per year. The number of hand hygiene opportunities that were observed in the preceding year ranged from 0 – 1092.

4.7 Antimicrobial Stewardship Resources

There are ten elements that are considered to be good practice in terms of antimicrobial stewardship. These include:

- an antimicrobial committee,
- annual regular training on appropriate antimicrobial prescribing,
- written guidelines for appropriate antimicrobial use (good practice) in the facility
- data available on annual antimicrobial consumption by antimicrobial class
- a system to remind healthcare workers of the importance of microbiological samples to inform the best antimicrobial choice
- local / regional / national antimicrobial resistance profile summaries available in the LTCF or in the local GP surgeries
- a system that requires permission from a designated person(s) for prescribing restricted antimicrobials, not included in local formulary
- advice from a pharmacist for antimicrobials not included in the formulary
- a therapeutic formulary, comprising a list of antibiotics
- feedback to the local GP on antimicrobial consumption in the facility

In addition, facilities were asked to provide further information on their system for antimicrobial restriction; namely if there was 'restrictive list' of antimicrobials and which antimicrobials were included on it. For the purposes of the survey, this restrictive list included carbapenems, third generation cephalosporins, fluoroquinolones, vancomycin, mupirocin, glycopeptides, broad spectrum antibiotics and intravenously administered antibiotics.

Nursing Homes

Of the 55 Nursing homes, ten (18.2%) indicated that all of these elements were not present. The most frequently present element was the presence of a system to remind healthcare workers of the importance of microbiological samples to inform antimicrobial choice (n=35; 63.6%). Written guidelines for appropriate antimicrobial (good practice) (n=16, 29.1%), a therapeutic formulary consisting of a list of antibiotics (n=14; 25.5%) and advice from a pharmacist for antimicrobials not included in the formulary (n=12; 21.8%), were the next most common elements. The following elements occurred less frequently:

- Data available on annual antimicrobial consumption by antimicrobial class (n=3; 5.5%)
- Annual regular training on appropriate antimicrobial prescribing (n=2; 3.6%)
- Local antimicrobial resistance profile summaries available in the LTCF or in the local GP surgeries (n=2; 3.6%)
- A system that requires permission from a designated person(s) for prescribing of restricted antimicrobial, not included in local formulary (n=2; 3.6%)
- An antimicrobial committee (n=1; 1.8%)
- Feedback to the local GP on antimicrobial consumption in the facility (n=1; 1.8%)

Two (3.6%) Nursing homes reported that they used a 'restrictive list' for prescribed antimicrobials. Their restrictive list was only for the intravenous (IV) administration of antibiotics. There were no restrictions placed on the prescription on any specific antibiotics, antibiotic families or classes as listed in the questionnaire in any of the homes.

Residential Homes

Two (13.3%) reported that they had none of the ten good practice elements of antimicrobial stewardship. Thirteen Residential homes (86.7%) indicated that the most frequently present element was the presence of a system to remind healthcare workers of the importance of microbiological samples to inform antimicrobial choice. Advice available from a pharmacist for antimicrobials not included in the formulary (n=5; 33.3%) and written guidelines for appropriate antimicrobial (good practice) (n=4, 26.9%) were the next most common elements.

The following elements occurred in only one Residential home (6.7%):

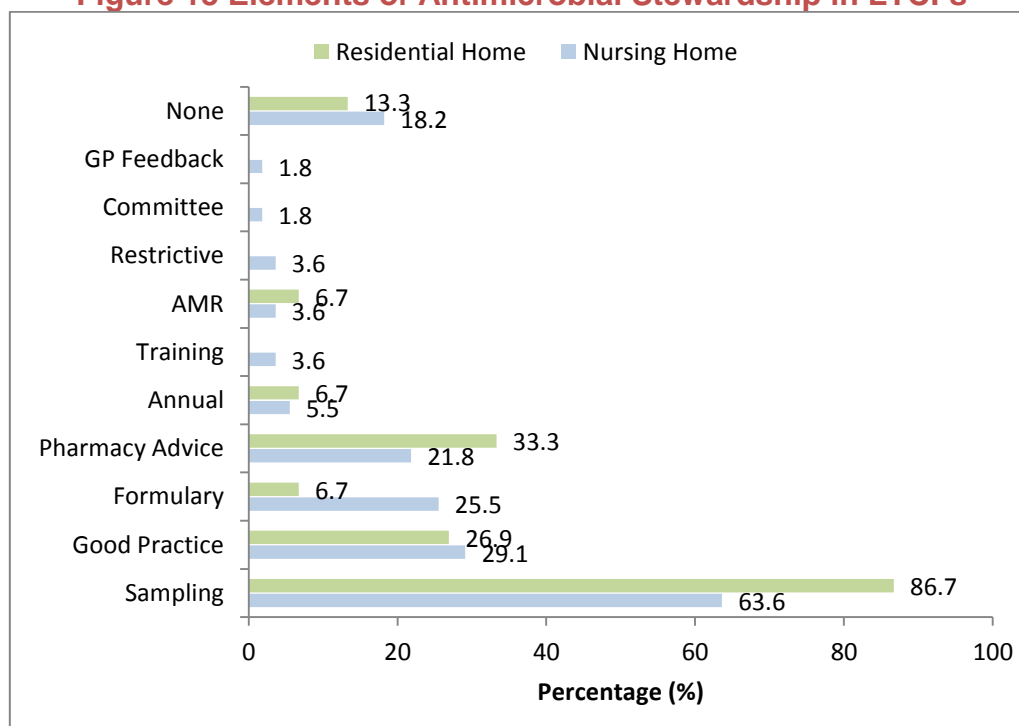
- Data available on annual antimicrobial consumption by antimicrobial class
- Local antimicrobial resistance profile summaries available in the LTCF or in the local GP surgeries
- A therapeutic formulary, comprising a list of antibiotics.

These elements occurred in none of the homes:

- An antimicrobial committee
- Annual regular training on appropriate antimicrobial prescribing
- A system that requires permission from a designated person(s) for prescribing of restricted antimicrobial, not included in local formulary
- Feedback to the local GP on antimicrobial consumption in the facility.

None of the Residential homes reported a 'restrictive list' for the prescription of antimicrobials.

Figure 13 Elements of Antimicrobial Stewardship in LTCFs



4.8 Infection Control and Antimicrobial Stewardship Resources

An important aim of the HALT survey was to develop a tool for measuring available resources for the prevention and control of infections and to assess the appropriate use of antimicrobials in LTCFs. This scoring system provides an overview of the current status of and the trends over time in IPC and AMS practice and policy in LTCFs in Northern Ireland. There is also some scope for comparison of current facilities.

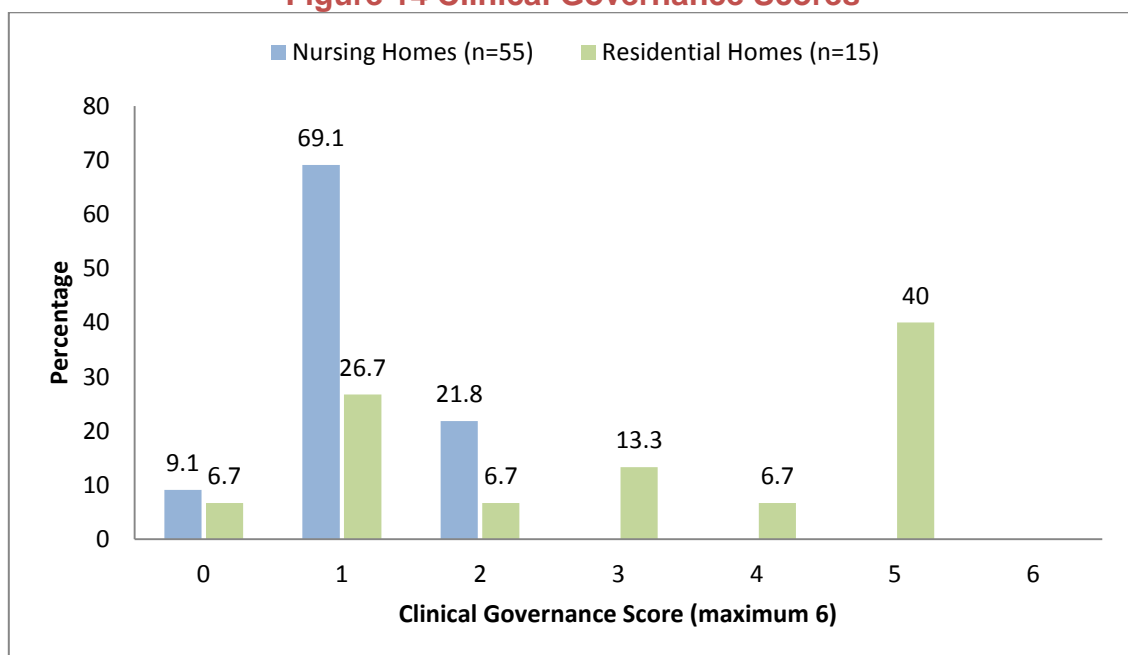
Based on questions in the institutional questionnaire elements were grouped into 7 categories [Appendix 3]. The categories of performance indicators, the elements that make up these categories and the score per answer are shown below.

4.8.1 Clinical Governance

This included organisational factors concerning infection control resources, AM policy and resident care in the facility. The maximum score possible was 6 points.

Participating Nursing homes had a mean score of 1.1 (median 1.0) compared with the Residential homes mean of 3.1 (median 3.0).

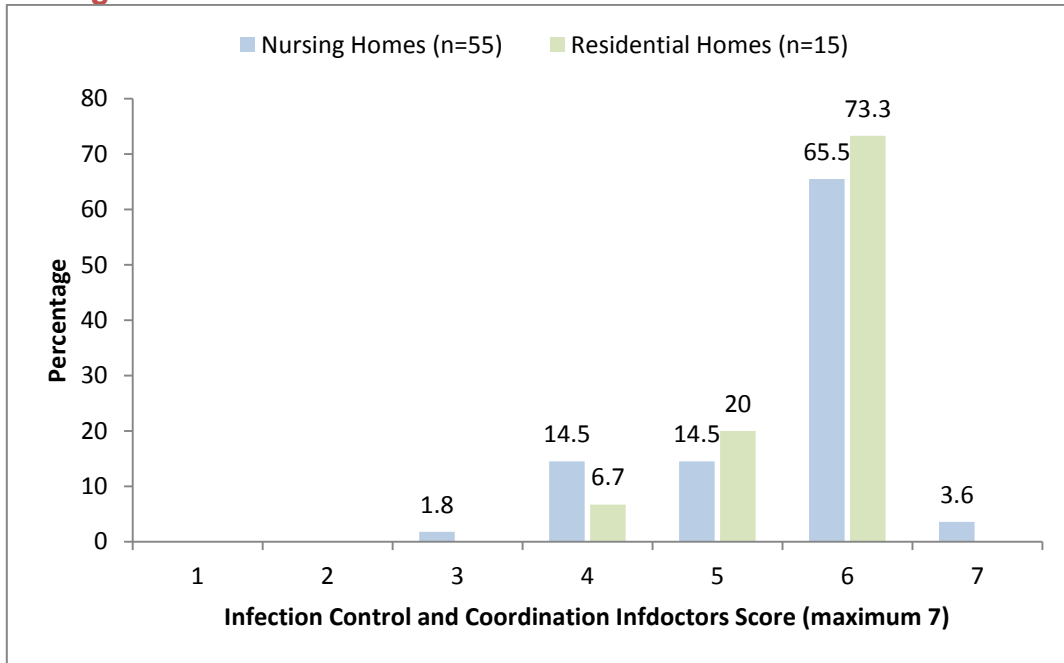
Figure 14 Clinical Governance Scores



4.8.2 Infection Control and Coordination Indicators

Infection control indicators concerned activities and efforts to prevent infections and the spread of resistant pathogens. The maximum possible score was 7. The Nursing homes mean score was 5.5, with a median of 6.0. Residential home scores were similar, with a mean of 5.7 and median of 6.0.

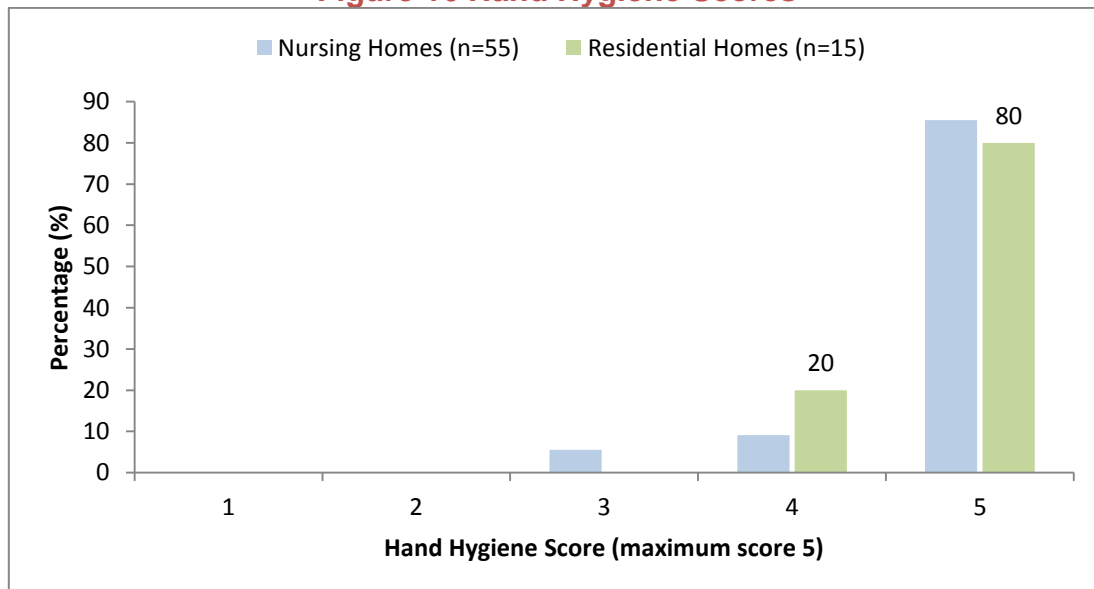
Figure 15 Infection Control and Coordination Indicators Scores



4.8.3 Hand Hygiene

This item refers to practices and efforts for the improvement of hand hygiene in the facility. The maximum score was 5. In Nursing homes, the mean score was 4.8 (median 4.0), and the comparable score for Residential homes was 4.8 (median 4.0).

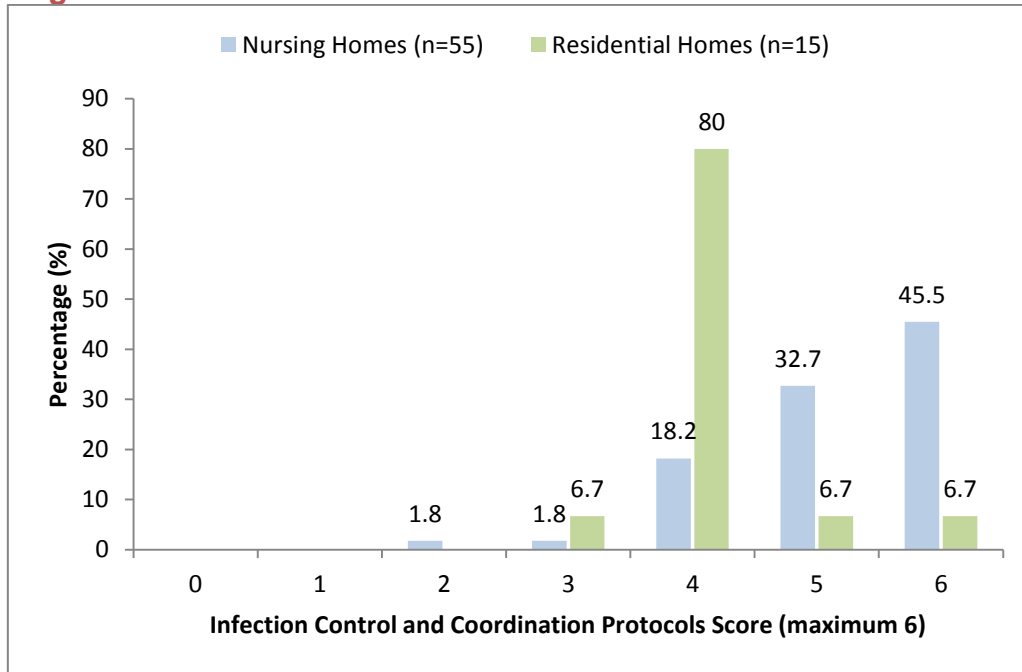
Figure 16 Hand Hygiene Scores



4.8.4 Protocols for Infection Control and Coordination

This indicator reflects the presence of written care protocols and guidelines for infection prevention and control within the facility. The maximum score possible was 6. The mean score for Nursing homes was 5.2 (median 3.0), whilst the Residential homes scored a mean of 4.1 (median 2.0).

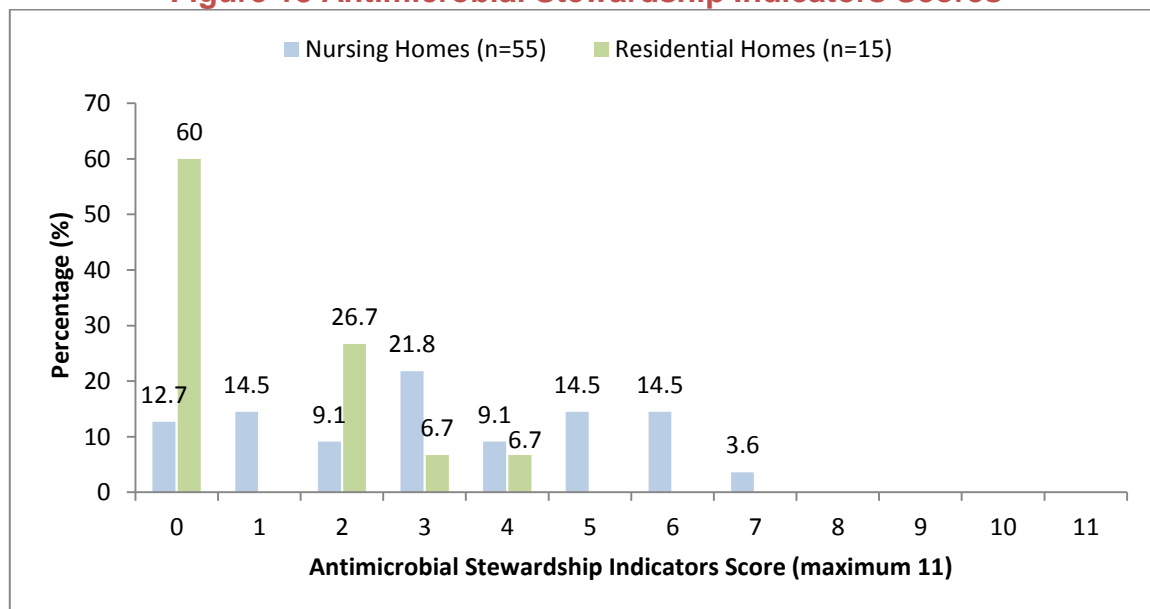
Figure 17 Protocols for Infection Control and Coordination Scores



4.8.5 Antimicrobial Stewardship Indicators

Antimicrobial stewardship indicators relate to measures to optimise rational antimicrobial use in the facilities. There were eleven elements to this item, providing a maximum score of 11. The mean score for participating Nursing homes was 3.2 (median 3.0), compared to Residential homes mean of 1.0 (median 0.0).

Figure 18 Antimicrobial Stewardship Indicators Scores

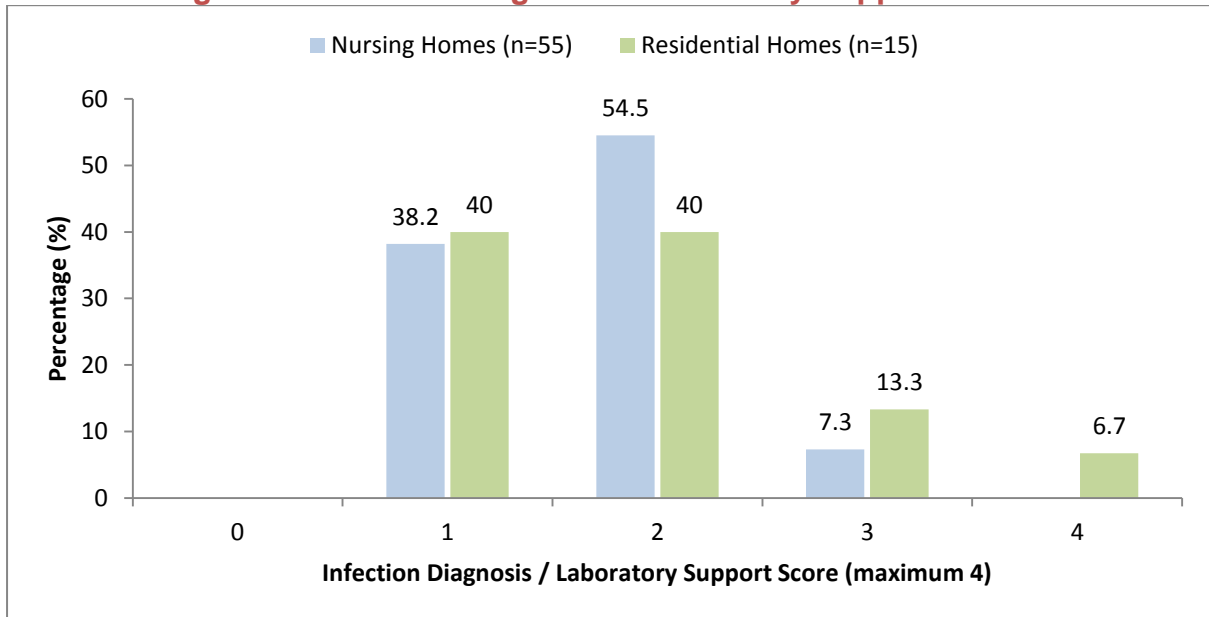


4.8.6 Infection Diagnosis / Laboratory Support

Infection diagnosis/laboratory support concerns the application of practices for supporting the diagnosis of infections in the facility in order to guide selection of appropriate antimicrobials. The maximum possible score was four. The mean score

for Nursing homes was 1.7 (median 2.0) and for Residential homes the mean was 0.9 (median 2.0).

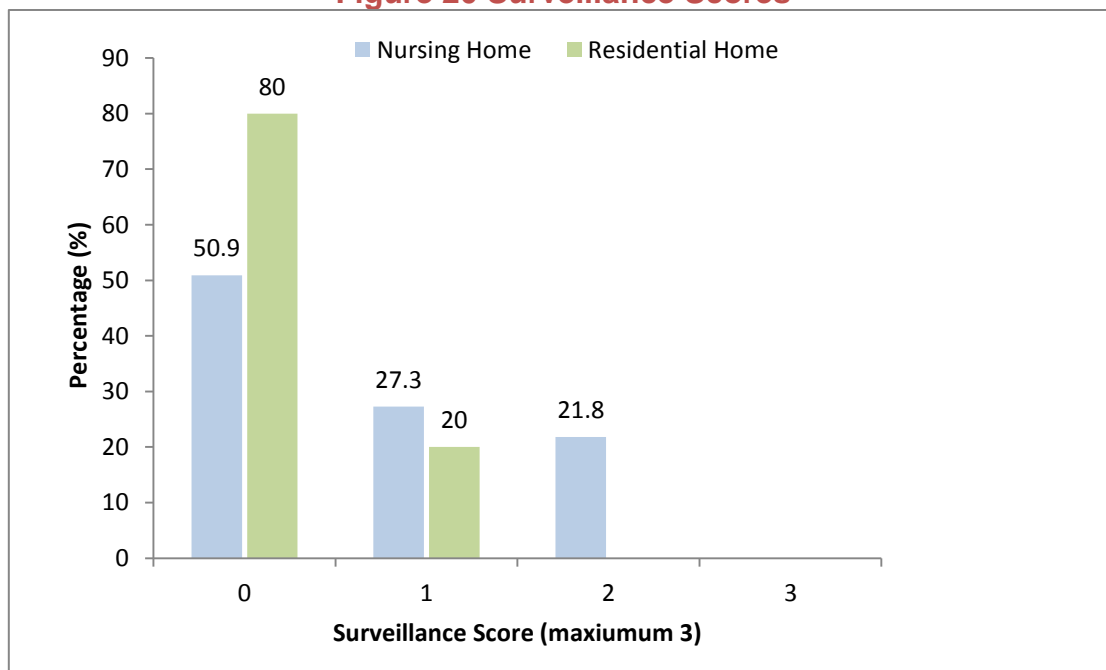
Figure 19 Infection Diagnosis / Laboratory Support Scores



4.8.7 Surveillance

Surveillance includes the presence of certain surveillance activities with a maximum score of three. The mean score for Nursing homes was 0.7 (median 0.0), as compared to Residential homes, which showed a mean of 0.2 (median 1.0).

Figure 20 Surveillance Scores



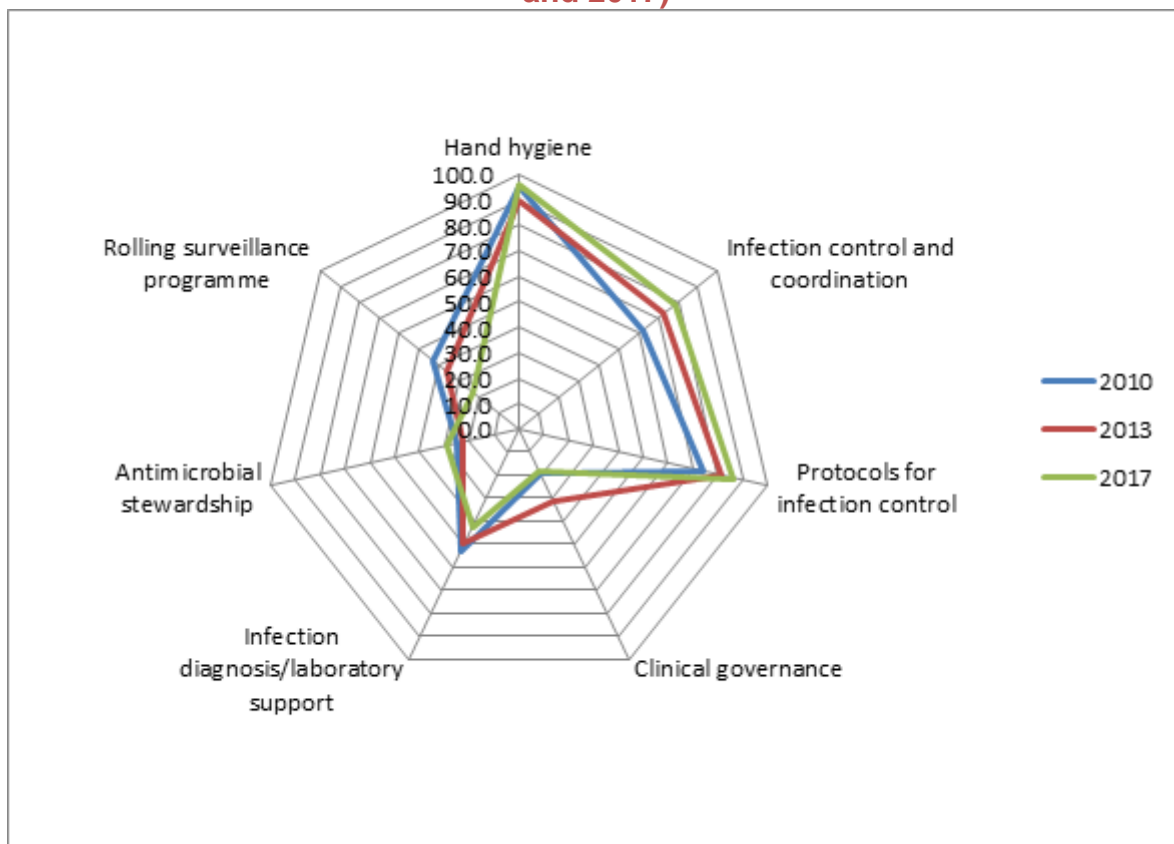
4.8.8 Comparison with Previous Scores

The overall scores for the infection control and antimicrobial stewardship items for 2017 were compared with those from 2013 and 2010. Compared with the 2013, in Nursing homes, there was an improvement in hand hygiene (4.5 to 4.8), infection

coordination and control (5.1 to 5.5), availability of protocols (4.9 to 5.2) and antimicrobial stewardship (2.5 to 3.2) scores. The 2017 scores were lower for clinical governance (1.94 to 1.1), infection diagnosis/laboratory support (1.97 to 1.7), and surveillance (1.1 to 0.7).

Compared with the 2013, in Residential homes, there was no improvement in the following scores: hand hygiene (4.8 to 4.8), antimicrobial stewardship (1.0 to 1.0), infection diagnosis/laboratory support (0.9 to 0.9), and surveillance (0.2 to 0.2). Scores increased for infection coordination and control (5.4 to 5.7) and decreased for clinical governance (3.5 to 3.1), and availability of protocols (4.8 to 4.1).

Figure 21 Comparison of IPC and AMS Scores in Nursing Homes (2010, 2013 and 2017)



SECTION 5 DISCUSSION

This report presents the findings of a repeated point prevalence survey carried out in Northern Ireland in September/October 2017. The study aimed to measure structure and process indicators relating to infection prevention and control and antimicrobial stewardship and to estimate the prevalence of healthcare associated infections and antimicrobial use in Long Term Care Facilities [LTCF].

Participation in HALT survey is voluntary, but compared with the previous survey, undertaken in 2013; there has been an increase in participation. The overall response rate was 23.3%, which is categorised by ECDC as 'good' national representativeness by the survey protocol.

5.1 Facility Characteristics

A total of 70 LTCFs participated in the HALT-3 survey in 2017. Of these, 55 were Nursing homes, LTCF that employ qualified nursing staff and cater to residents with condition(s) requiring nursing care. The remaining 15 LTCFs were Residential homes where the residents require some support but do not require nursing care.

All the Nursing homes surveyed were privately owned, with the majority being run for profit. The participating Residential homes were all Trust-controlled or statutory facilities. This distinction in ownership is important as this may dictate the nature of the governance that the facility is subject to.

Nursing homes ranged in size from 19-81 beds while Residential homes were generally smaller containing 16-39 beds.

The survey showed that those aged over 85 years and those aged 85 years and under accounted for similar proportions of residents in Nursing homes and Residential homes. These figures have not changed significantly since 2013. The gender split of residents in both facilities was similar to the 2013 survey with the majority of residents being female.

Compared with the previous survey, the 2017 results showed a higher proportion of Nursing home residents with care load indicators. There have been increases in the rates of incontinence and disorientation while impaired mobility has remained around 50%. For Residential homes, rates of disorientation and impaired mobility have changed little since 2013, although there has been a reduction in the number of residents with incontinence. A comparison of the proportion of care load indicators also showed greater functional disability in Nursing home residents compared with Residential home residents.

5.2 Facility Coordination

In NI provision of primary care for individual residing in Nursing/Care homes is the responsibility of a GP or group practice. Although there are benefits to this type of individualised service, for the LTCF, there can also be some challenges including difficulties in coordination of medical and infection prevention and control (IPC) activities.

All the Residential homes and 94.5% of Nursing homes reported access to trained IPC staff (external or internal). However, In-house access to these staff was only present in 50% of Nursing homes and 13.3% of Residential homes. Formal external IPC help and expertise is available to 100% of facilities via the PHA Health Protection Duty Room which provides advice over the phone and facility visits where appropriate.

The overall presence of written IPC protocols for hand hygiene, on the management of MRSA and/or other MDRO, enteral feeding and urinary catheters was over 90%. Protocols on the management of vascular catheters were only available in 47.3% (n=26) of Nursing homes. Continued efforts should be made to ensure that 100% of LTCFs have all relevant IPC protocols present.

Although the majority of LTCFs reported hand hygiene training sessions in the preceding year, the emphasis should remain on attaining 100%. There is a need to consider the frequency of these sessions to meet the needs taking into account staff turnover and training. The list of products for hand hygiene indicated that appropriate 'equipment' was available in 100% of Nursing and Residential homes.

5.2 Risk Factors for HCAs

Residents in Residential homes had fewer urinary catheters, vascular catheters, and pressure sores, compared with Nursing homes. More Residential home residents had recent surgery and other wounds compared with Nursing home residents.

Although the percentage of residents with risk factors was relatively small in both facility types, it was noted that in both facility types, the prevalence of HCAs was higher where each risk factor was present compared to those without any risk factors.

5.3 Healthcare Associated Infections in Long Term Care Facilities

The prevalence of HCAs in Residential homes was (6.8%) while Nursing homes prevalence was reported as (3.3%). The 2013 results showed similar HCAI prevalence in both facility types.

Urinary tract infections, respiratory tract infections, and skin and soft tissue infections were the most commonly reported HCAI in the surveyed LTCF.

5.3.1 Urinary Tract Infections

43.5% of reported HCAs were urinary tract infections. The prevalence of UTIs was higher in Residential homes compared with Nursing homes. Since 2013, the prevalence of UTIs has decreased in Nursing homes but has remained similar in Residential homes. UTI were also the most common reason for prescribing antimicrobials to treat infection in this survey. The high prevalence of incontinence and use of urinary catheters in high risk patients including older peoples should be taken into account in future quality improvement initiatives to address the burden of UTIs in LTCF.

5.3.2 Respiratory Tract Infections

Respiratory tract infections were the second most commonly reported HCAI in Nursing homes (35%) and the third most commonly reported HCAI in Residential homes (10%). There are currently no national guidelines for the prevention of pneumonia or LRTI for use in LTCF and the wider healthcare system. Development of clear guideline for the prevention of LRTI and pneumonia may assist frontline health and social care staff in reducing the risk of these infections in LTCF.

5.3.3 Skin and Soft Tissue Infections

Residential homes reported SSTIs as the second most common HCAI type (25%) while Nursing homes reported SSTI as the third most common HCAs (20.5%). The case definitions for SSTI used in this survey did not distinguish between different types of soft tissue infections. These infections may include pressure ulcers, venous ulcers, traumatic wounds or skin tears that have become infected. The key intervention for reducing infections associated with pressure ulcers and skin tears is to prevent them developing in the first place and to manage them appropriately should they develop.

5.4 Antimicrobial Prescribing in Long Term Care Facilities

The prevalence of antimicrobial use was 10.5% in Nursing homes and 9.2% in Residential homes. The most common infection sites were UTIs, RTIs and SSTIs for antibiotic prescriptions.

Over half (50.4%) of all antimicrobial prescriptions in Nursing homes were for prophylaxis compared with 44.4% in Residential homes, the remainder of prescriptions were therapeutic. The majority of prescriptions were made by GPs. The three most frequently prescribed classes of antimicrobials were the beta-lactams (26.2%), trimethoprim and sulphonamide class (22.9%), and cephalosporins (22.2%).

5.4.1 UTI Prescribing

The majority (70.3%) of prescriptions were for UTIs. Trimethoprim was the most common antibiotic prescribed for UTIs followed by cephalexin and nitrofurantoin. The majority of UTI prescriptions were for prophylaxis. The prevalence of uroprophylaxis was 5.1% in Nursing homes and 3.8% in Residential homes. The evidence base for prophylactic use of antimicrobials for UTI is limited and not current: these data provide some preliminary evidence pertaining to routine use in LTCF. It is therefore critical that the current Antimicrobial Stewardship programmes consider these finding for to reduce inappropriate prescribing in these settings.

5.4.2 RTI Prescribing

RTIs were the second and third most common reason for antimicrobial prescribing in the Nursing and Residential homes respectively. The majority of RTI prescriptions were therapeutic. A small number of prescriptions were made for prophylactic purposes. Amoxicillin, co-amoxiclav, doxycycline and clarithromycin were the most commonly prescribed antimicrobials. While, the majority of prescriptions for

amoxicillin, doxycycline and clarithromycin were in line with the current guidance, the prescriptions for azithromycin and co-amoxiclav were not in keeping with guidelines.

5.4.3 SSTI Prescribing

SSTI were the third and second most common reason for antimicrobial prescribing in the Nursing and Residential homes respectively. Flucloxacillin and doxycycline were the most commonly prescribed antimicrobials for SSTI. Only one resident received prophylaxis for SSTI, and of the therapeutic prescriptions, 74.0% in Nursing homes and 100% in Residential homes were in adherence with those listed in guidance.

5.5 Conclusion and Priorities

Healthcare associated infections place a significant burden on LTCF in Northern Ireland. This survey has provided updated evidence regarding the epidemiology of infection in LTCF and has highlighted the importance of this type of intelligence to inform priorities for quality improvement. UTI, RTI, and SSTI were the most commonly reported infections and there is a need for HCAI specific interventions to reduce the risk of these infections in the LTCFs. The survey also highlighted that a significant number of LTCF residents are receiving antimicrobials, emphasising the need for effective stewardship programmes in these settings. The most important conclusion to be drawn from the results is that IPC and AMS need to remain central priorities in the care provided by all LTCFs in Northern Ireland.

The following quality improvement priorities are recommended:

- Explore opportunities for collaboration amongst all GP practices currently providing services to the same LTCF to strengthen and improve the links between LTCF and primary care, particularly with respect to IPC and AMS.
- Continue to work with relevant teams to improve diagnosis of infection and prescribing within LTCFs through primary care.
- Continue to raise awareness of the availability of formal IPC advice through PHA.
- Continue to reduce the HCAI burden by addressing modifiable risk factors through the proper training and the practice of good IPC.
- Develop and Implement interventions to reduce the burden of RTIs
- Implement interventions to further reduce the burden of UTIs in LTCFs.
- Promote development of pragmatic guidance and protocols on prevention and management of SSTI.
- Further improve support and education within LTCFs around antimicrobial prescribing guidance and IP&C policy and guidelines for the prevention or reduction of infections.
- Promote active review of residents on antimicrobial therapy in LTCFs.
- Undertake point prevalence surveys in LTCFs every five years.

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APPENDIX 1 – INSTITUTIONAL QUESTIONNAIRE

Institutional Questionnaire (Page 1)

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

Remark: It is **essential** that each facility enrolled in HALT-3 completes this questionnaire as it collects vital data. We recommend that the person completing this questionnaire is the person in charge of the facility. If this person cannot answer some of the questions or locate the relevant information, they should request assistance from persons who are able to answer those questions. **This is especially relevant for questions relating to antimicrobial policy.**

A – GENERAL INFORMATION

DATE OF THE SURVEY IN YOUR FACILITY |_|_|_|_| 201 |_|_|

FACILITY STUDY NUMBER (*allotted by your national HALT-3 coordinator*) |_|_|_|_|_|_|_|_|_|_|

OWNERSHIP OF THE FACILITY *Public* *For profit* *Not for profit*

QUALIFIED NURSING CARE AVAILABLE 24/24h IN THE FACILITY *Yes* *No*

IN THE FACILITY:

Total number of FTE REGISTERED NURSES	_ _ _ _	FTE registered nurses
Total number of FTE NURSING ASSISTANTS	_ _ _ _	FTE nursing assistants
Total number of RESIDENT ROOMS	_ _ _ _	Rooms
Total number of SINGLE OCCUPANCY RESIDENT ROOMS	_ _ _ _	Single occupancy rooms
Total number of SINGLE OCCUPANCY RESIDENT ROOMS WITH INDIVIDUAL TOILET AND WASHING FACILITIES	_ _ _ _	Rooms with individual toilet and washing facilities

B – DENOMINATOR DATA

This table when completed will summarize the data collected in each ward (ward list) for the total population

IN YOUR FACILITY, ON THE DAY OF THE SURVEY, TOTAL NUMBER OF:

BEDS IN THE FACILITY (*both occupied and non-occupied beds*) |_|_|_|_|

OCCUPIED BEDS |_|_|_|_|



ELIGIBLE RESIDENTS:

PRESENT AT 8 AM AND NOT DISCHARGED AT THE TIME OF THE SURVEY	_ _ _ _
AGE OVER 85 YEARS	_ _ _ _
MALE RESIDENTS	_ _ _ _
RESIDENTS RECEIVING AT LEAST ONE ANTIMICROBIAL AGENT	_ _ _ _
RESIDENTS WITH AT LEAST ONE INFECTION	_ _ _ _
RESIDENTS WITH ANY URINARY CATHETER	_ _ _ _
RESIDENTS WITH ANY VASCULAR CATHETER	_ _ _ _
RESIDENTS WITH PRESSURE SORES	_ _ _ _
RESIDENTS WITH OTHER WOUNDS	_ _ _ _

APPENDIX 2 – RESIDENT QUESTIONNAIRE

Resident Questionnaire (Page 1)

RESIDENT STUDY NUMBER

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

RESIDENT DATA

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

On the day of the survey, the resident:

<input type="checkbox"/> RECEIVES AN ANTIMICROBIAL AGENT <i>This includes: (i) Residents receiving prophylactic antimicrobials OR (ii) Residents receiving therapeutic antimicrobials</i>	→ COMPLETE PART A
<input type="checkbox"/> PRESENTS CONFIRMED OR PROBABLE INFECTION(S) <i>Residents with infection(s) AND resident not receiving antimicrobials</i>	→ COMPLETE PART B
<input type="checkbox"/> BOTH: ANTIMICROBIAL USE AND INFECTION(S) <i>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</i>	→ COMPLETE PART A & B

APPENDIX 3 – INFECTION CONTROL AND ANTIBIOTIC STEWARDSHIP

The institutional questionnaire sought information on medical care and coordination, infection control practice and antimicrobial policy. Some questions within these sections were used to assess seven categories of performance indicators:

- I. Clinical Governance
- II. Infection Control (ICC)
- III. Hand Hygiene
- IV. Protocol for ICC
- V. Antimicrobial Stewardship
- VI. Infection Diagnosis / Laboratory Support
- VII. Surveillance

The composition of these performance indicators were built up by attributing a score to the response to specific questions. This information was not passed to the participating facilities in order to prevent manipulation of data to influence the results.

The seven categories of performance indicators, the elements that build up these categories, the relevant questions and the score per answer are shown below:

I – Clinical governance **6 points**

D 6. How many 'Infection control committee meetings' were organised in the previous year?

- | | |
|----------------------------|-----------------|
| If 0 meetings/year | <i>0 points</i> |
| If 1 meeting/year | <i>1 point</i> |
| If 2 meetings/year | <i>2 points</i> |
| If 3 or more meetings/year | <i>3 points</i> |

E 4. Which of following elements are present/available in the facility?

If 'an antibiotic committee' = 'Yes'

1 point

C 6. Can following persons consult the medical/clinical records of all residents in the facility?

If 'The nursing staff' = 'Yes'

1 point

If 'The physician in charge of medical coordination in the setting?' = 'Yes'

1 point

II – Infection control (ICC) indicators

7 points

D 7. If 'Has the facility access to expert Infection Control (IC) advice?' = 'Yes'

1 point

D 4. Which of the following tasks are in operation in the facility?

If 'infection prevention training of the nursing and paramedical staff = 'Yes'

1 point

If 'infection prevention training of the GPs and medical staff = 'Yes'

1 point

If 'developing care protocols' = 'Yes'

1 point

If 'designation of a person responsible for reporting and management of outbreaks' = 'Yes'

1 point

If 'supervision of disinfection and sterilisation of medical and care material' = 'Yes'

1 point

If 'organisation, control, feedback of an audit of infection policies and procedures (on regular basis)' = 'Yes'

1 point

III – Hand hygiene (HH) indicators

5 points

- D 12. If 'Last year, was a hand hygiene training session organised, including all the health care professionals from the facility?' = 'Yes' *1 point*
- D 8. If 'In the facility, is a written protocol available for: hand hygiene?' = 'Yes' *1 point*
- D 10. In the facility, which of following products are routinely used for hand hygiene?
- If 'Alcohol rub solution' = 'Yes' *1 point*
- If 'Liquid soap' = 'Yes' and 'Bar soap' = 'No' or 'empty' *1 point*
- D 4. Which of the following tasks are in operation in the facility?
- If 'Organisation, control, feedback on hand hygiene in the facility' = 'Yes' *1 point*

IV – Protocols for ICC

6 points

- D 8. In the facility, is a written protocol available for:
- If 'the management of MRSA carriers?' = 'Yes' *1 point*
- If 'the management of urinary catheters?' = 'Yes' *1 point*
- If 'the management of venous catheters/lines?' = 'Yes' *1 point*
- If 'the management of enteral feeding?' = 'Yes' *1 point*
- D 4. Which of the following tasks are in operation in the facility?
- If 'Decision on isolation & additional precautions for residents colonised with resistant microorganisms' = 'Yes' *1 point*

If 'Offering immunisation for flu to all residents' = 'Yes'

1 point

V – Antimicrobial stewardship indicators

11 points

E 4. Which of following elements are present/available in the facility?

If 'annual regular training on appropriate antibiotic prescribing' = 'Yes'

1 point

If 'written guidelines for appropriate AB use in the facility' = 'Yes'

1 point

If 'data available on annual AB consumption by AB class' = 'Yes'

1 point

If 'permission from a designated person(s) for prescribing of restricted ABs, not included in local formulary' = 'Yes'

1 point

If 'pharmacist providing advice on ABs not included in the formulary' = 'Yes'

1 point

If 'therapeutic formulary, comprising a list of antibiotics' = 'Yes'

1 point

E 5. If written therapeutic guidelines are present in the facility, are they on:

If 'Respiratory tract infections?' = 'Yes'

1 point

If 'Urinary tract infections?' = 'Yes'

1 point

If 'Wound and soft tissue infections?' = 'Yes'

1 point

E 7. If 'Is a programme for surveillance of antimicrobial consumption and feedback in place in the facility?' = 'Yes'

1 point

E 2. If 'Does the facility use a restrictive list of ABs to be prescribed? (*prescription requiring permission of a designated person or not to be used*)' = 'Yes'

1 point

VI – Infection diagnosis/laboratory support

4 points

E 6. Do you perform a urine dipstick test for detection of urinary tract infections in the facility?

If 'Routinely' = 'Yes'

2 points

If 'Sometimes' = 'Yes'

1 point

If 'Never' = 'Yes'

0 points

E 4. Which of following elements are present/available in the facility?

If 'microbiological samples taken for guidance of best AB choice' = 'Yes'

1 point

If 'Local (i.e. for that region/locality or national if small country) antimicrobial resistance profile summaries' = 'Yes'

1 point

VII – Surveillance

3 points

D 9. If 'Is a surveillance programme of healthcare-associated infections in place in the facility? (*annual summary report of number of urinary tract infections, respiratory tract infections, etc...*)' = 'Yes'

1 point

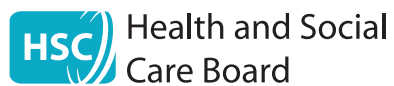
E 8. If 'Is a programme for surveillance of resistant micro-organisms in place in the facility? (*annual summary report for MRSA, Clostridium difficile, etc...*)' = 'Yes'

1 point

D 4. Which of the following tasks are in operation in the facility?

If 'Feedback on surveillance results to the nursing/medical staff of the facility' = 'Yes'

1 point



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