



Northern Ireland Prevalence Survey of Healthcare Associated Infections and Antimicrobial Use in Long Term Care Facilities (HALT)



**Public Health
Agency**

Acknowledgements

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EXECUTIVE SUMMARY

Nursing Home Results

- 31 Nursing homes took part in the survey (12% of total Nursing homes)
- 1,243 eligible patients in Nursing homes were included

Risk factors in Nursing homes

- 46.3% of patients were over the age of 85 years
- 61.4% were incontinent (faecal/urinary)
- 57.8% were disorientated
- 52.9% were either bedridden or in a wheelchair
- 6.0% had a urinary catheter
- Vascular catheter use was uncommon
- 3.4% had pressure sores
- 5.6% had 'other wounds'
- 0.8% had recent surgery

'Condition of interest' in Nursing homes

- 11.3% of patients were either receiving an antimicrobial or had an infection on the day of the survey.

Healthcare-associated infection (HCAI) in Nursing homes

- 5.5% HCAI prevalence (68 patients with 75 infections)
- HCAI prevalence ranged from 0% to 25% (median 4%).
- Six facilities (19%) recorded zero infections.
- 40% of infections were urinary tract infections
- 28% of infections were respiratory tract infections
- 25% of infections were skin/soft tissue infections

Antimicrobial use in Nursing homes

- 10.9% prevalence of antimicrobial use
- 48.5% of antimicrobials were prescribed for therapeutic reasons
- 51.5% of antimicrobials were prescribed for prophylaxis
- 5% of all patients were receiving uroprophylaxis
- The majority of antimicrobials were prescribed by a GP (94.9%)
- All therapeutic antimicrobials had an end/review date recorded
- 12.9% of prophylactic antimicrobials had an end date recorded

Residential Home Results

- 11 Trust controlled Residential homes participated
- 260 eligible patients in Residential homes were included

Risk factors in Residential homes

- 46.5% of patients were over the age of 85 years
- 44.6% were incontinent (faecal/urinary)
- 55.8% were disorientated
- 4.2% were either bedridden or in a wheelchair
- 3.1% had a urinary catheter
- 1.2% had pressure sores
- 3.9% had 'other wounds'
- 1.2% had recent surgery

'Condition of interest' in Residential homes

- 7.7% of patients were either receiving an antimicrobial or had an infection on the day of the survey.

Healthcare-associated infection (HCAI) in Residential homes

- 5.0% HCAI prevalence (13 patients with 14 infections)
- HCAI prevalence ranged from 0% to 13% (median 4.5%)
- Three facilities (27%) recorded zero infections
- 64% of infections were urinary tract infections
- 29% of infections were respiratory tract infections
- 7% of infections were skin/soft tissue infections

Antimicrobial use in Residential homes

- 7.7% prevalence of antimicrobial use
- 71.4% of antimicrobials were prescribed for therapeutic reasons
- 28.6% of antimicrobials were prescribed for prophylaxis
- 2.3% of all patients were on uroprophylaxis
- The majority of antimicrobials were prescribed by a GP (71.4%)
- End dates were recorded for 87% of therapeutic prescriptions
- None of the prescriptions for prophylaxis had an end date recorded

HALT 2013 RECOMMENDATIONS

This survey has captured important learning in relation to healthcare-associated infections (HCAIs), infection prevention & control (IPC) and antimicrobial stewardship (AMS) in long term care facilities (LTCFs) in Northern Ireland.

All LTCFs should have a robust action plan in place to ensure IPC remains a core priority, to address preventable HCAIs and to facilitate arrangements supporting AMS. Each facility's action plan should be used to drive continuous quality improvement and should address the risks identified within the particular facility and organisation. Actions progressed in each facility should reflect work undertaken locally and regionally by the Regulation and Quality Improvement Authority (RQIA), the Health and Social Care Board (HSCB) and the Public Health Agency (PHA).

1. Standards for care in Nursing and Residential Homes

Recommendations outlined in this report should be incorporated into the revised standards for care in Nursing homes which will replace the current DHSSPS Nursing Homes: Minimum Standards, January 2008 edition.

2. Leadership for Improvement

- 2.1 Results of this survey should be shared with all LTCFs, including those that did not participate in the survey. The results should be shared with all staff providing care, including: carers, medical staff, nursing staff, allied health professionals, managers and facility owners/proprietors. Findings should be used to plan future improvement programmes in each care facility.
- 2.2 In addition to a nominated lead person responsible for infection prevention & control, all LTCFs should have a nominated lead responsible for antimicrobial stewardship (AMS) within the facility. This person should be accountable to the facility manager and the care home proprietor, and should regularly receive appropriate training in AMS.
- 2.3 LTCFs should have an action plan to support improvement in healthcare-associated infections (HCAIs) and implementation of robust arrangements for antimicrobial stewardship. Implementation of the LTCF's action plan for HCAI and AMS should be the responsibility of all staff providing care and should be supported by the facility manager and care home proprietor.

2.4 In order to support implementation of this action plan, relevant staff should receive regular training in IPC and AMS to develop their skills and knowledge.

2.5 LTCFs should have a programme of audit to provide assurance that best practice for IPC and AMS is being implemented. Audit programmes should include structure, process and outcome indicators relating to IPC and AMS.

2.6 LTCFs should be encouraged to participate in public/staff information campaigns relating to IPC and AMS, for example World Health Organisation Hand-Hygiene Day (May), European Antibiotic Awareness day (November).

3. Improvement in Healthcare-Associated Infections

LTCFs should ensure that appropriate policies and procedures are in place to prevent HCAs associated with known risk factors (such as immobility, older age, and urinary catheters) and to reduce inappropriate use of antibiotics. This is likely to include visible leadership for improvement, regular staff training, access to appropriate information resources, systems for assurance, audit programmes and regular staff and patient liaison.

3.1 LTCFs should review their policy and arrangements relating to the use of urinary catheters (insertion and maintenance) in line with NICE clinical guidelines 'CG139 Infection control, prevention of healthcare-associated infection in primary and community care' and 'CG171 Urinary incontinence: the management of urinary incontinence in women' [1] [2].

3.2 LTCFs should aim to minimise the introduction and duration of urinary catheter use, particularly for those at higher risk of catheter-associated urinary tract infection or mortality from catheterisation such as elderly, women and patients with impaired immune systems. There should always be an appropriate indication for the use of urinary catheters and they should only be in place for as long as is needed [3].

3.3 Patients with suspected urinary tract infection (UTI) should have a urine specimen sent for culture as advised in 'Northern Ireland Management of Infection Guidelines for Primary Care 2013' [3]. Continuing antibiotic therapy for urinary tract infection should be based on reported culture and sensitivity results. See also Recommendation 4.3

- 3.4 To prevent/proactively manage the onset of urinary tract infection, the use of prophylactic antibiotics (antimicrobials) should be guided by the specific circumstances as outlined in the 'Northern Ireland Management of Infection Guidelines for Primary Care 2013' [3]. See also Recommendation 4.3
- 3.5 LTCFs should review their vaccination policies and procedures to ensure that regular influenza and pneumococcal vaccination is a component of their action plan for HCAI prevention and is in line with national guidance contained in 'Department of Health: Immunisation against infectious disease'. [4] All LTCF staff should be strongly encouraged to receive annual influenza vaccination.
- 3.6 Each facility should have a wound and soft tissue management protocol, which clearly outlines activities relating to prevention of pressure sores and care of patients with an established pressure sore. All LTCFs are strongly encouraged to:
- implement Pressure Ulcer Prevention Skin Bundle Care Plan for patients;
 - participate in the Regional 'Your Turn' Campaign – <http://www.your-turn.org.uk/> ;
 - consider involvement in HSC Safety Forum - Nursing home collaborative <http://www.publichealth.hscni.net/directorate-nursing-and-allied-health-professions/hsc-safety-forum>
- 4. Improvement in Antimicrobial Stewardship**
- The 'Northern Ireland Management of Infection Guidelines for Primary Care 2013' provides an approach to the treatment of common infections. [3] These guidelines should be readily accessible in all LTCFs, GP Practices and Out-of-Hours Centres. The recommendations contained in these guidelines should guide all prescribing in primary and community settings..
- 4.1 LTCFs and GP Practices should have an agreed protocol in place to manage requests for acute prescription items, particularly antibiotics (antimicrobials). This should be agreed with all relevant parties. LTCF staff should be familiar with, and receive regular training on, use of this protocol.

- 4.2 Microbiological sampling should be used to support and underpin appropriate prescribing for LTCF patients with possible or actual infection.
- 4.3 Following review of microbiology results received from laboratory services, GP Practice staff should promptly inform LTCF staff of relevant information relating to confirmed infection.
- 4.4 Microbiological results must be used, in consultation with General Practitioner, to guide continuing treatment of identified infection.
- 4.5 LTCFs must retain responsibility for ordering prescriptions for their patients. LTCF staff should check all repeat prescriptions received from the GP Practice prior to submitting them to a community pharmacy for dispensing. Whilst community pharmacy can play a vital role in advising LTCFs on medication related issues and ensuring the continuity of on-going medication supply for patients, these roles should not be delegated to the community pharmacy by the LTCF.
- 4.6 All prescriptions for antibiotics should have a clear stop or review date. This includes antibiotics used for prophylaxis (prevention of infection).
- LTCF staff should facilitate and document when a review of antibiotic therapy is completed and/or when antibiotic therapy is completed.
 - General Practitioners should review antibiotics used prophylactically for more than 6 months as per NI Management of Infection Guidelines 2013. The LTCF setting requires special consideration in this regard.
- 4.7 LTCFs should review antibiotic use on a regular basis (monthly or quarterly) to ensure the prudent use of antibiotics (antimicrobial stewardship). This review must be multidisciplinary, with input from facility manager, nominated lead person responsible for antimicrobial stewardship, infection control link staff member, nursing staff, GPs, and the pharmacy. All antibiotics should be reviewed to examine dose, duration, indication and the specific types of antibiotics used throughout the LTCF.

5. Future Point Prevalence Surveys

- 5.1 All LTCFs should regularly undertake a point prevalence survey to monitor the burden of HCAI and antibiotic (antimicrobial) use in their own facility. Ideally this should be performed on an annual basis using the protocol and tools used in 2013 HALT survey. The benefits of performing a regular local HALT survey include:
- providing up-to-date information on healthcare-associated infections, antimicrobial stewardship (prudent use of antibiotics) and IPC practice within the facility;
 - enabling staff to plan continuous improvement in patient care, for example assurance of good practice, staff education, policy updates and resource allocation;
 - enabling staff to demonstrate the benefit of improvement work implemented within the facility (thus demonstrating better patient care);
 - providing resources to assist with staff education in relating to IPC, HCAI, AMS and surveillance providing ‘information for action’.
- 5.2 A Northern Ireland point prevalence survey of IPC, HCAI and AMS in all LTCFs should be undertaken at 5-yearly intervals. This will provide important benchmarks, identify priorities and areas for improvement, evaluate the impact of interventions implemented and raise awareness of HCAI and AMS.
- 5.3 Northern Ireland region-wide point prevalence surveys in long term care facilities should coincide with future EU prevalence surveys of HCAI and antimicrobial use in LTCFs (EU surveys generally co-ordinated by the European centre for Disease Control, ECDC).

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Abbreviations

AM	Antimicrobial
CI	Confidence interval
ECDC	European Centre for Disease Prevention and Control
HALT	Healthcare-Associated Infections in Long Term Care Facilities
HCAI	Healthcare-Associated Infection
HSC	Health and Social Care
IPC	Infection Protection and Control
LTCF	Long Term Care Facility
MRSA	Meticillin resistant <i>Staphylococcus aureus</i>
NS	Not significant, i.e. $p>0.05$
PHA	Public Health Agency (Northern Ireland)
RQIA	Regulation and Quality Improvement Authority
UTI	Urinary tract infection

Definitions of terms used in HALT survey

Antibiotics are substances used to kill bacteria. Antibiotics are the same as antibacterials.

Antimicrobial Resistance - Micro-organisms are constantly evolving enabling them to efficiently adapt to new environments. Antimicrobial resistance is the ability of micro-organisms to grow in the presence of a chemical (antimicrobial) that would normally kill them or limit their growth.

Antimicrobial stewardship is an activity that promotes the appropriate use of antimicrobials (including antibiotics), improves patient outcomes, reduces microbial resistance, and decreases the spread of infections caused by multidrug-resistant organisms. The appropriate use of antimicrobials (including antibiotics) includes the appropriate selection of antimicrobials, the appropriate dosing of antimicrobials, the appropriate route and duration of antimicrobial therapy.

Antimicrobial is a general term for any compound with a direct action on micro-organisms used for treatment or prevention of infections. In this survey antimicrobials included antibiotics, antifungals and antiprotozoals. Topical antimicrobials, anti-viral agents and antiseptics were excluded from this survey.

Condition of interest is used to describe if a patient had an infection or was receiving antimicrobials on the day of the survey.

Patients are residents of Nursing and Residential homes.

Prevalence is the proportion of a population found to have a condition (in this survey the conditions were infections or receiving antimicrobials). It is arrived at by comparing the number of people found to have the condition with the total number of people studied, and is usually expressed as a percentage.

Point prevalence is the proportion of a population that had the condition at a specific point in time.

Prophylactic treatment is used to refer to an antimicrobial prescribed to prevent the occurrence of an infection.

Urophylaxis is a term used for an antimicrobial prescribed to prevent the occurrence of a urinary tract infection.

SECTION 1 HALT 2013

This report outlines the findings of a national survey conducted in May/June 2013 to assess the prevalence of healthcare-associated infections and antimicrobial prescribing practices in long-term care facilities in Northern Ireland. A similar survey was undertaken in 2010.

1.1 Background

Healthcare-associated infections (HCAI) and the consequences of increasing rates of antimicrobial resistance are potentially serious health threats for elderly people, including those living in long-term care facilities (LTCFs). Patients in Nursing homes have complicated underlying medical conditions and are from older age groups which have made them susceptible to infection^[5, 6, 7]. Good infection prevention and control practices and antimicrobial stewardship is essential in all healthcare settings to prevent HCAI and the emergence of antimicrobial resistance.

1.2 Aims and objectives

The aims of the HALT survey were to:

- Evaluate the prevalence of HCAI and antimicrobial use in LTCFs
- Describe the related infection prevention & control and antimicrobial stewardship practices and resources in LTCFs.

The obtained data will be useful to:

- Quantify the prevalence of infections and antimicrobial use in LTCFs
- Identify needs for intervention, training and/or additional infection and protection (IPC) resources
- Identify priorities for national and local intervention and raise awareness
- Foster the safety of healthcare for patients in the LTCF and the ageing population in general

1.3 Methodology

The HALT survey in Europe was developed by ECDC and the Scientific Institute of Public Health, Brussels, Belgium for use in member states. The survey was conducted across Europe using standard forms and a protocol^[8] which was adapted for use in Northern Ireland.

The HALT survey in Northern Ireland was coordinated by the Public Health Agency (PHA) and was overseen by a multi-disciplinary steering group. The HALT survey took place in Northern Ireland in May/June 2013. A letter of invitation was sent from PHA and Regulation and Quality Improvement Authority (RQIA) to all Nursing homes in Northern Ireland in April 2013. In addition a number of Trust controlled Residential homes expressed an interest in participating in the survey. During April 2013, healthcare workers attended one of eight regional training sessions to learn about the survey protocol and methodology. Only data from Nursing homes will be used for the analyses in a European report.

Forty-two LTCFs participated in the HALT survey (31 Nursing homes; 11 Trust Residential homes). A dedicated helpline was established at the PHA to address any queries that arose before, during and after the survey. Information leaflets were prepared for patients, their families and staff.

1.3.1 Collected data

Data were 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 hospitalised patients, patients with signs/symptoms of infection, receiving antimicrobials, patients 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.

Patient questionnaire (Appendix 2) was completed for each patient who had a 'Condition of interest', i.e. 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].

1.3.2 Data validation

Northern Ireland also contributed data to a European validation study^[9]. This was designed to validate the HALT data collection across Europe. During May 2013, two coordinators from PHA visited two Nursing homes and conducted a parallel survey. The data, collected simultaneously by both the local team and the validation team, were returned to the European validation study coordinating team in Bologna, Italy for inclusion in a European HALT validation analysis.

1.3.3 Analysis of prevalence data

Using data from the patient and institutional questionnaires, the prevalence of infection and the use of antibiotics were determined. They were also used to identify patient characteristics as possible determinants. Data from the institutional questionnaire were used to identify Nursing/Residential home characteristics as possible determinants.

The 'condition of interest' prevalence results were calculated as the proportion of all patients that had an infection at the time of survey and/or receiving antimicrobials. The HCAI prevalence results were calculated as the proportion of all patients that had an infection at the time of survey. The number and distribution of the HCAI rates were also calculated. The prevalence of invasive devices and antimicrobial therapy were calculated as the proportion of all patients that had a device in-situ or had been prescribed an antimicrobial at the time of survey. The Wilson method was used to calculate 95% confidence intervals (CI)^[10]. Univariate analyses based on logistic regression were carried out to examine the relationship between the intrinsic risk factors, the prevalence of 'Condition of interest', HCAI and p-values reported. Rates are reported to two decimal places.

SECTION 2 LONG TERM CARE FACILITIES

2.1 Long term care facilities participation

All Nursing homes were given the opportunity to participate in the Northern Ireland HALT survey. In addition, the Northern, Southern and South Eastern HSC Trusts submitted data from Trust-controlled Residential homes. Overall, thirty one private Nursing homes and eleven Trust controlled residential facilities participated in the survey during May 2013. The results focus primarily on Nursing homes; however, where appropriate, comparable data are given for Trust Residential homes.

2.1.1 Geographical location

Nursing homes

There were 249 Nursing homes in Northern Ireland in March 2013 (RQIA data). The majority of Nursing homes (71%) were located in the east of Northern Ireland (Antrim, Armagh, Down); and the remainder in the remaining western counties (29%), see Table 1. The distribution of facilities that submitted data was similar to this breakdown [Figure 1]. Thirty one Nursing homes submitted data to the PHA providing a response rate of 12%.

Residential homes

Eleven Trust controlled Residential performed the survey – six in the South Eastern HSC Trust, four in the Southern HSC Trust and one in the Northern HSC Trust.

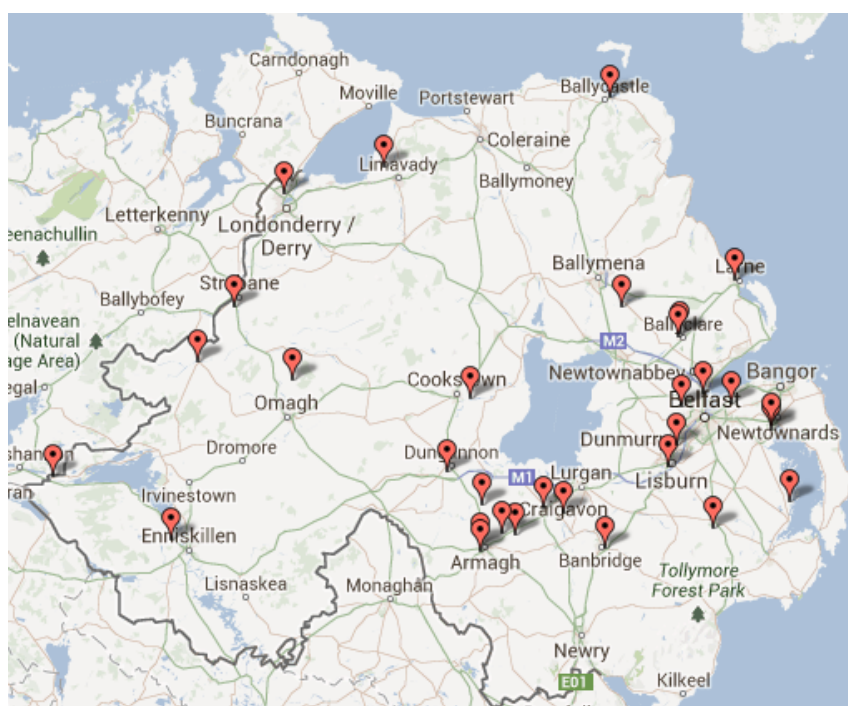


Figure 1 *Distribution of participating Nursing homes in Northern Ireland*

Table 1 *Comparative distribution by county and size of Nursing home*

County	Total Nursing homes RQIA*		Nursing homes that 'opted-in'		Attended Training		Submitted data	
	Number	%	Number	%	Number	%	Number	%
Antrim	101	40.6	24	45.3	18	39.1	9	29.0
Armagh	17	6.8	5	9.4	7	15.2	6	19.0
Down	59	23.7	10	18.9	8	17.4	6	19.0
Fermanagh	12	4.8	3	5.7	3	6.5	2	7.0
Derry/Londonderry	27	10.8	4	7.5	4	8.7	3	10.0
Tyrone	33	13.3	7	13.2	6	13.0	5	16.0
All	249	100.0	53	100.0	46	100.0	31	100.0

*Facilities with identical postcodes were grouped

2.1.2 Number of places in participating Nursing homes

In March 2013, there were 11,708 approved Nursing home places in Northern Ireland and the average number of places per home was 44 [Table 2]. Facilities that submitted data had on average 47 places. There was no significant difference in the size of all Nursing homes and those that submitted data.

Table 2 *Nursing home approved places and participation*

	Approved places (Data held by RQIA)	Average places
All Nursing homes in Northern Ireland (RQIA 249 NH)	11,708	44
Nursing homes accepted invitation to undertake survey (n=53)	2,391	45
Nursing homes that attended training (n=46)	2,158	47
Nursing homes that submitted data (n=31)	1,456	47

2.2 Characteristics of the participating long term care facilities

2.2.1 Nursing home characteristics

At the time of the survey, the 31 participating Nursing homes indicated that 1,441 beds were available. There were 1,255 occupied beds (157 unoccupied places and 29 patients were hospitalised on the day of the survey) giving an 87.1% occupancy rate. Patients were included in the survey if they lived full-time in the facility, were resident for at least 24 hours and were present at 8 a.m. on the day of the survey. After the eligibility criteria were applied, twelve patients were excluded; therefore, the number of Nursing home patients eligible for inclusion in the survey was 1,243. Participating Nursing homes ranged in size from 10 to 78 beds (median 33) and the proportion of single rooms per 100 beds ranged from 19.2% - 100% (median = 94%).

2.2.2 Residential home characteristics

The eleven participating Residential homes had 317 beds. The number of unoccupied beds was 43 (13.6%) and a further six patients were hospitalised at the time of the survey. Occupancy rate was 84.5% (268 occupied beds). Eight patients were excluded from the survey; leaving 260 eligible patients for inclusion in the survey. Participating Residential homes ranged in size from 11 to 37 beds (median 23) with the proportion of single rooms ranging from 90% - 100% (median = 100%).

Summary point:

- 12% of Nursing homes submitted data to HALT survey
- 31 Nursing homes submitted data on 1,243 eligible patients
- 11 Trust Residential homes submitted data on 260 patients

SECTION 3 RESULTS

3.1 Age, gender, care load indicators and risk factors

3.1.1 Age and gender

Nursing homes

In the 1,243 Nursing home patients, 46.3% were older than 85 years and varied between Nursing homes, ranging from 0% of the population to 75% of the population. There were 851 (68.5%) female patients, males accounted for 31.5%.

Residential homes

In Residential homes, 46.5% of the patients were older than 85 years. Females accounted for 69.2% of the Residential home population.

3.1.2 Care load indicators – comparison of Nursing and Residential homes

Three indicators for the care load in the LTCFs were explored during this survey: faecal and/or urinary incontinence, disorientation in time and/or in space and impaired mobility (wheelchair bound or bedridden). Figure 2 shows the prevalence of the care load indicators in Nursing homes and Residential homes. The incontinence rate was higher in Nursing homes (61.4%) compared to Residential homes (44.6%). A second care load indicator – disorientation in time and/or in space – scored 57.8% in Nursing homes compared to 55.8% in Residential homes. The prevalence of impaired mobility was much greater in the Nursing home population compared to the Residential home population (52.9% compared to 4.2%).

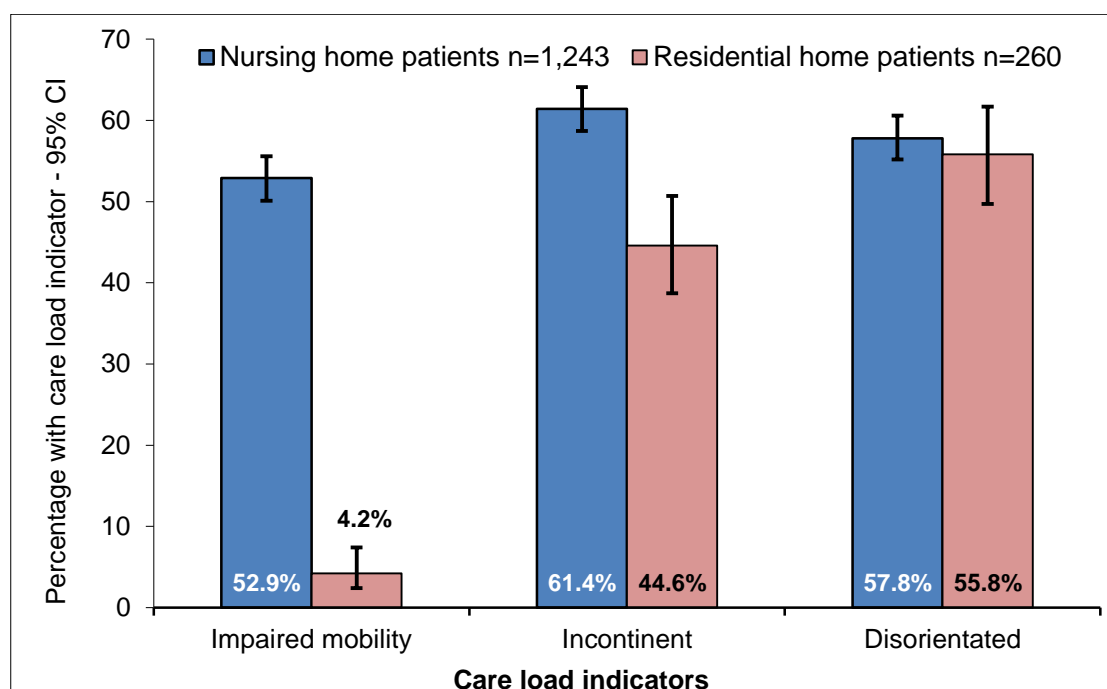


Figure 2 Proportion of patients by care load indicators for Nursing and Residential homes

3.1.3 Risk factors – comparison of Nursing and Residential homes

The risk factors examined were:

- Device usage, i.e. urinary catheters, vascular catheters,
- Categories of wounds were applied as risk factors: ‘pressure sores’ and ‘other wounds’, e.g. leg ulcers, traumatic or surgical wounds, insertion sites for gastrostomy, tracheostomy.
- Surgery (within 30 days prior to the survey).

Nursing home patients were more likely than Residential home patients to have a urinary catheter, vascular catheter, pressure sore and other wounds, however, the differences were not statistically significant [Figure 3].

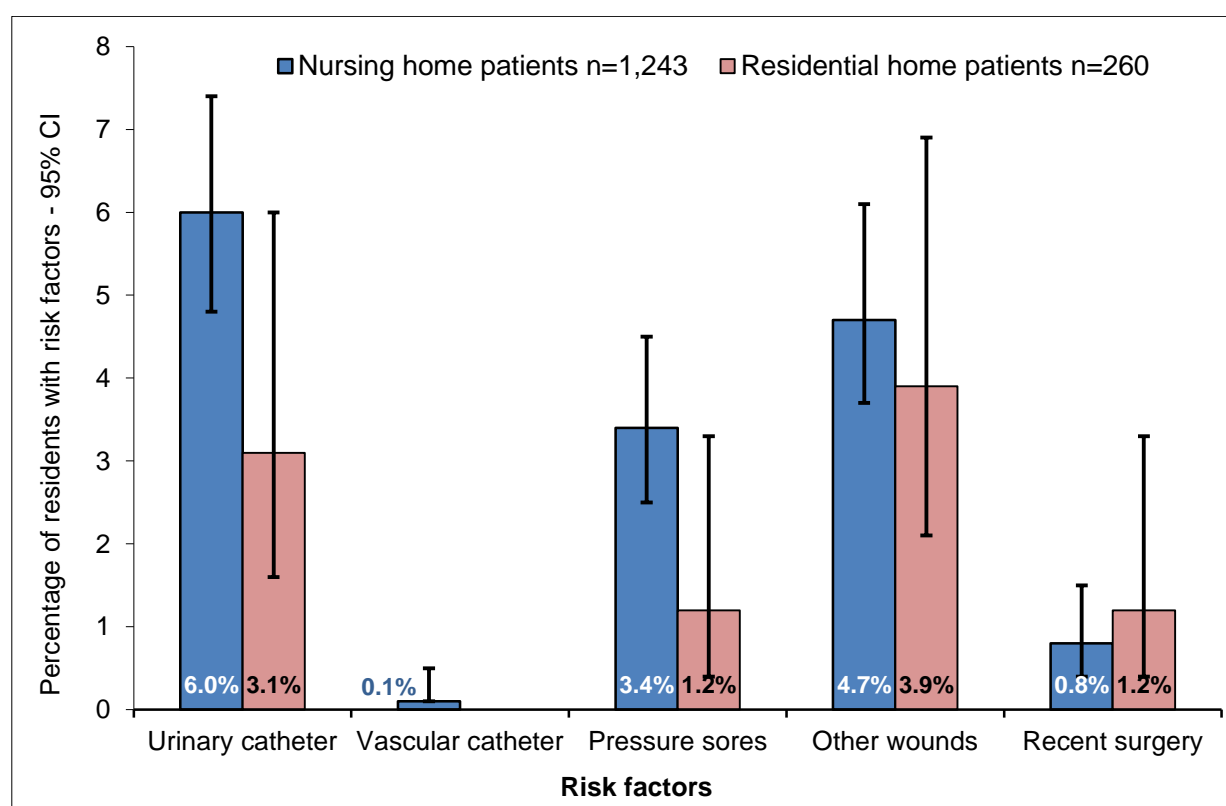


Figure 3 Comparison of the prevalence of risk factors in Nursing and Residential homes.

3.2 Condition of interest

In the 31 Nursing homes and 1,243 eligible patients, there were 141 patients (11.3%) with a 'condition of interest', i.e. were either receiving an antimicrobial or had an infection on the day of the survey [Figure 4].

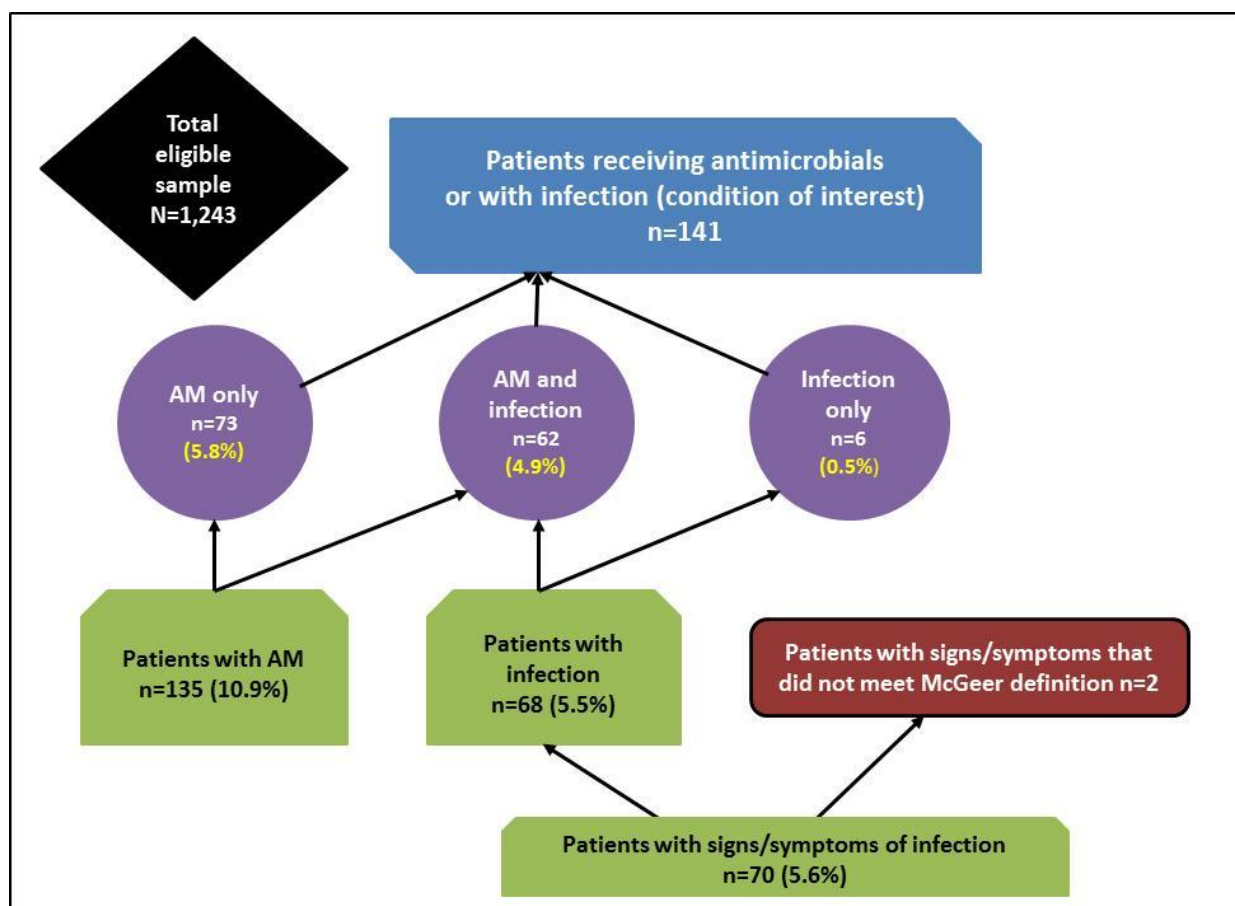


Figure 4 Characteristics of patients in Nursing homes with signs and symptoms of infection and/or receiving antimicrobial therapy

There were more females (68.5%) than males (31.5%) in the eligible Nursing home population. Patients with faecal and/or urinary incontinence, disorientation in time and/or in space and impaired mobility (wheelchair bound or bedridden) had significantly higher prevalence of the condition of interest compared to patients that did not have these risk factors. Prevalence of condition of interest increased significantly if patients had recorded risk factors, i.e. urinary catheterisation, surgery in the previous 30 days, pressure sores or other wounds [Table 3].

Table 3 *Prevalence of Condition of interest in Nursing homes according to patient characteristics*

	Number of patients (percentage of patients) *	Number with condition of interest*	Prevalence of condition of interest (95%CI)	Odds ratio (95% CI)	Chi-Square test
Gender					NS
Male	392 (31.5)	37	9.44 (6.93 – 12.74)	1.00	
Female	851 (68.5)	103	12.10(10.08 – 14.47)	1.32 (0.87 – 2.00)	
Age					NS
85 and under	667 (53.7)	61	9.15(7.19 – 11.57)	1.00	
>85	576 (46.3)	70	12.15(9.73 – 15.07)	1.37 (0.94 – 2.01)	
Incontinence					P<0.01
No	480 (38.6)	37	7.71(5.64 – 10.44)	1.00	
Yes	763 (61.4)	104	13.63(11.38 – 16.25)	1.89 (1.25 – 2.86)	
Disorientation					P<0.01
No	524 (42.2)	41	7.82(5.82 – 10.44)	1.00	
Yes	719 (57.8)	95	13.21(10.93 – 15.88)	1.79 (1.20 – 2.67)	
Impaired mobility					P<0.01
No	586 (47.1)	45	7.68(5.79 – 10.12)	1.00	
Yes	657 (52.9)	94	14.31(11.84 – 17.19)	2.44 (1.65 – 3.62)	
Urinary catheter					P<0.01
No	1173 (94.0)	124	10.57(8.94 – 12.46)	1.00	
Yes	74 (6.0)	16	21.62(13.77 – 32.27)	2.56 (1.37 – 4.73)	
Surgery <30 days					P<0.01
No	1233 (99.2)	136	11.03(9.40 – 12.90)	1.00	
Yes	10 (0.8)	5	50.00(23.66 – 76.34)	8.07 (2.00 – 32.54)	
Pressure sores					P<0.01
No	1201 (96.6)	124	10.32(8.73 – 12.17)	1.00	
Yes	42 (3.4)	14	33.33(21.01 – 48.45)	5.79 (3.36 – 9.96)	
Other wounds					P<0.01
No	1174 (94.4)	118	10.05(8.46 – 11.90)	1.00	
Yes	69 (5.6)	19	27.54(18.39 – 39.05)	3.40 (1.87 – 6.15)	

* Numbers may vary due to non-response. Base 1,243 patients, 141 with condition of interest

Summary point:

- 46% of patients were aged over 85 years
- 61% were incontinent
- 58% were disorientated
- 53% were either in a wheelchair or bedridden
- 6% had a urinary catheter in-situ
- 9% had a wound(3.4% pressure sores; 5.6% other wounds)
- 11.2% of patients had an infection and/or received antimicrobials
- Patients with a urinary catheter, surgery in the previous 30 days, pressure sores or other wounds were significantly more likely to have an infection and/or receiving antimicrobials
- 11 Trust-controlled Residential homes submitted data on 260 residents

3.3 Healthcare-Associated Infection (HCAI)

3.3.1 Prevalence of HCAI in Nursing homes and patient characteristics

There were 68 Nursing home patients with one or more healthcare-associated infections giving a prevalence of 5.47% (95%CI 4.3-6.9). In total, there were 75 infections in 68 patients; of these patients 61 (89.7%) had only one infection and 7 (8.4%) had two infections. HCAI prevalence in Nursing homes ranged from 0% to 25.0% of patients (median 4.0%) [Figure 5]. Six of the 31 Nursing homes (19.4%) recorded zero infections.

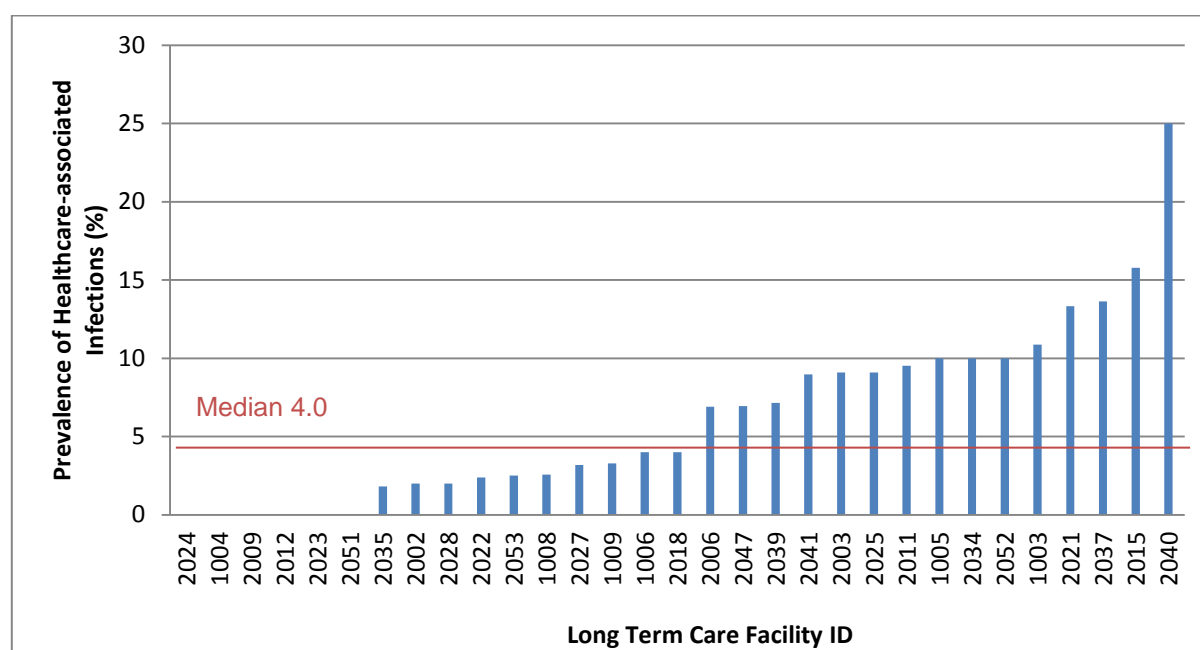


Figure 5 Prevalence of HCAI in Nursing homes

The HCAI prevalence was compared in patients with and without care load indicators (incontinence, disorientation, impaired mobility); patients with and without risk factors (urinary catheter, surgery in last 30 days, pressure sores and other wounds). Prevalence was also compared by age and gender [Table 4].

Table 4 *Prevalence of HCAI in Nursing homes according to patient characteristics with odds ratio*

	Number of patients (percentage patients)*	Number with HCAI*	Prevalence of HCAI (95%CI)	Odds ratio (95% CI)	Chi-Square test
Gender					NS
Male	392 (31.5)	19	4.85 (3.12 – 7.45)	1.00	
Female	851 (68.5)	49	5.76(4.38 – 7.53)	1.20 (0.68 - 2.14)	
Age*					P=0.04
85 and under	667 (53.7)	26	3.90(2.67 – 5.65)	1.00	
>85	576 (46.3)	37	6.42(4.70 – 8.73)	1.69 (0.98 - 2.92)	
Incontinence					P=0.03
No	480 (38.6)	18	3.75(2.39 – 5.85)	1.00	
Yes	763 (61.4)	50	6.55(5.01 – 8.54)	1.80 (1.01 – 3.25)	
Disorientation					P=0.02
No	524 (42.2)	19	3.63(2.33 – 5.59)	1.00	
Yes	719 (57.8)	47	6.54(4.95 – 8.58)	1.86 (1.05 – 3.33)	
Impaired mobility					P=0.02
No	586 (47.1)	23	3.92(2.63 – 5.82)	1.00	
Yes	657 (52.9)	45	6.85(5.16 – 9.04)	1.80 (1.05 - 3.11)	
Urinary catheter					P<0.01
No	1173 (94.0)	58	4.94(3.84 – 6.34)	1.00	
Yes	74 (6.0)	10	13.51(7.51 – 23.12)	3.16 (1.44 - 6.75)	
Surgery <30 days					P<0.01
No	1233 (99.2)	65	5.27(4.16 – 6.66)	1.00	
Yes	10 (0.8)	3	30.00(10.78 – 60.32)	7.70 (1.54 – 34.04)	
Pressure sores					P<0.01
No	1201 (96.6)	54	4.50(3.46 – 5.82)	1.00	
Yes	42 (3.4)	13	30.95(19.07 – 46.03)	9.52 (4.41 – 20.34)	
Other wounds*					P<0.01
No	1174 (94.4)	51	4.34(3.32 – 5.67)	1.00	
Yes	69 (5.6)	15	21.74(13.64 – 32.82)	6.12 (3.08 – 12.04)	

* Numbers may vary due to non-response. Base 1,243 patients, 68 patients with infection.

HCAI prevalence was significantly higher in Nursing home patients with:

- a urinary catheter HCAI prevalence 13.51%; patients without urinary catheter HCAI prevalence 4.94% (odds ratio of 3.2 95%CI 1.4 to 6.8);
- surgery in the previous 30 days HCAI prevalence 30% compared to patients with no surgery HCAI prevalence 5.27% (odds ratio 7.7 95%CI 1.5 to 34.0);
- pressure sores HCAI prevalence 30.95% compared to patients without pressure sores HCAI prevalence 4.5% (odds ratio 9.5 95%CI 4.4 to 20.3);
- wounds HCAI prevalence 21.7% compared to those without wounds HCAI prevalence 4.34% (odds ratio 6.1 95%CI 3.1 to 12.0)

3.3.2 Prevalence of HCAI in Residential homes

The number of infections recorded in Residential homes was 14; these were recorded in 13 patients (1 patient had 2 infections). The crude HCAI prevalence in Residential homes was 5.0% (13 of 260). HCAI prevalence in Residential homes ranged from 0.0% to 13.0% (median 4.5%) [Figure 6]. Three Residential homes recorded zero infections.

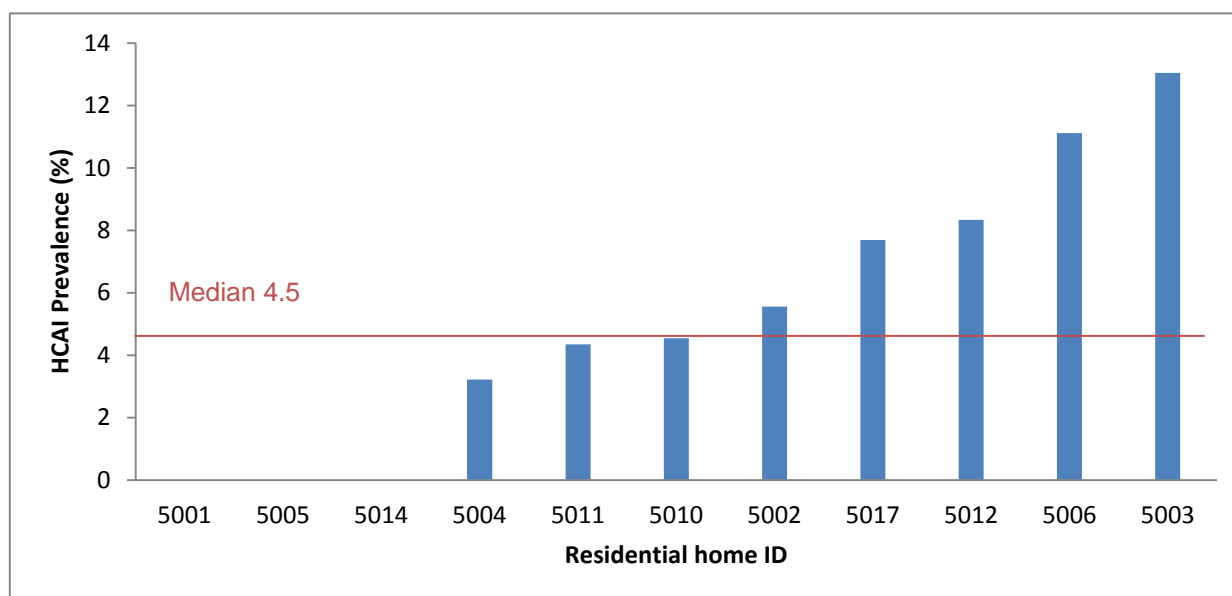


Figure 6 Prevalence of HCAI in Residential homes.

Summary point:

- 5.5% of Nursing home patients had an infection
- HCAI prevalence was significantly higher in Nursing home patients with:
 - Urinary catheter HCAI prevalence 13.5% compared to without urinary catheter (HCAI prevalence 4.9%)
 - Surgery in previous 30 days HCAI prevalence 30%; no surgery 5.3%
 - Pressure sores HCAI prevalence 31%; without pressure sores 4.5%
 - Wounds HCAI prevalence 21.7%; without wounds prevalence 4.3%.

Summary point:

- 5.0% of Residential home patients had an infection

3.3.3 Distribution of healthcare-associated infections in LTCFs

Urinary tract infections, respiratory tract infections and skin infections were the most commonly reported infections in both nursing and Residential homes [Figures 7 & 8]. There were no recorded cases of genital tract infections, unexplained fever or systemic infection.

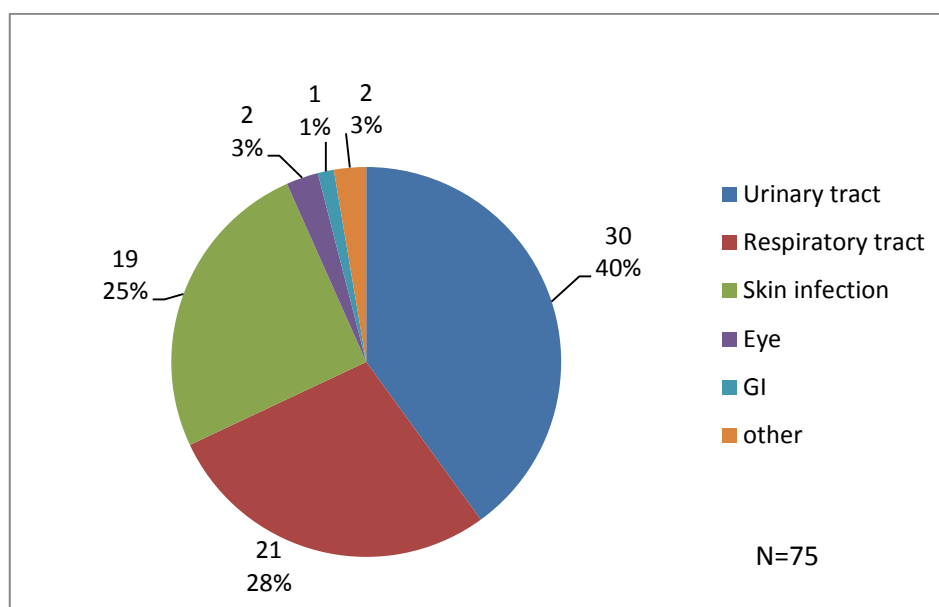


Figure 7 *Distribution of HCAI in Nursing homes*

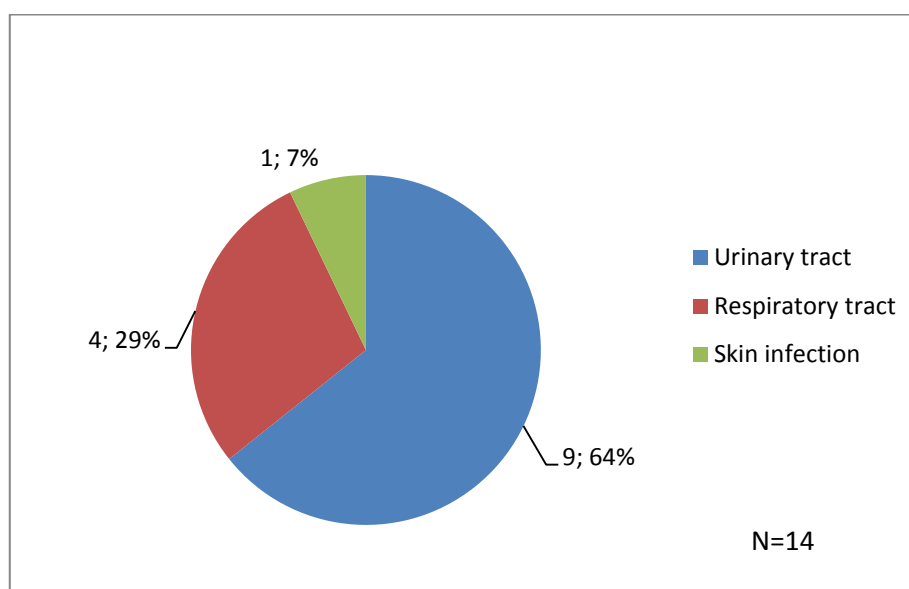


Figure 8 *Distribution of HCAI in Residential homes*

Summary point:

Urinary tract infections, respiratory tract infections and skin infections were the most commonly reported infections in both Nursing and Residential homes.

3.4 Antimicrobial use

3.4.1 Prevalence of antimicrobial use

Nursing homes

The prevalence of antimicrobial use in Nursing homes was 10.9% (135 patients received antimicrobials out of 1,243 patients) and ranged from 0.0% - 29.5% (median 9.5%)[Figure 9]. Six patients with infection were not receiving antimicrobials at the time of the survey and three patients received more than one antimicrobial. There were five Nursing homes where no-one was on antimicrobials.

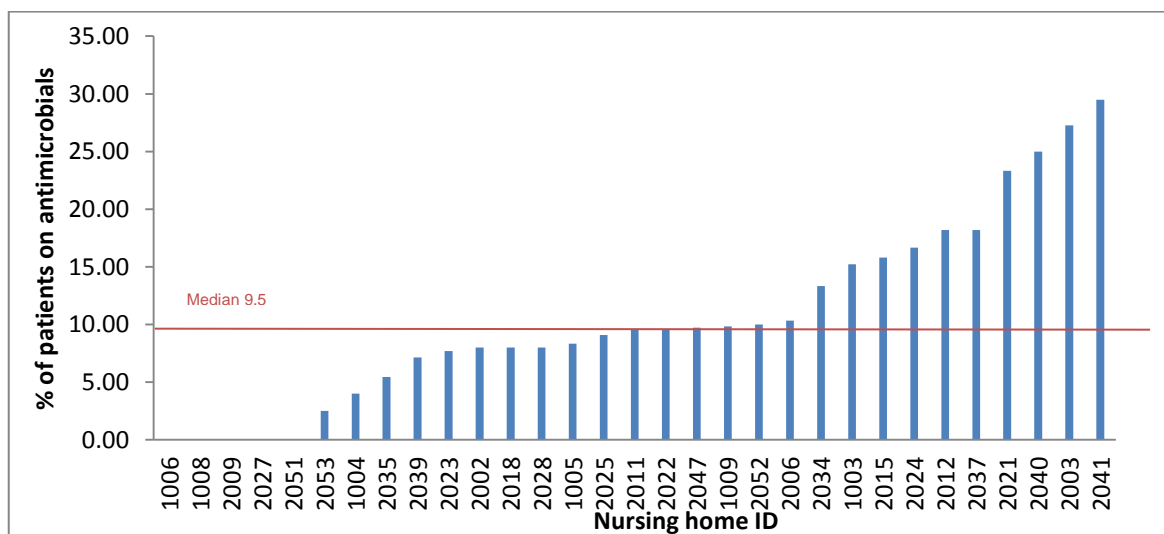


Figure 9 Prevalence (%) of antimicrobial use in Nursing homes

Residential homes

The prevalence of antimicrobial use in Residential homes was 7.7% (20 patients receiving antimicrobials/ 260 eligible patients) and ranged from 0.0% to 21.7% (median 8.3%) [Figure 10]. One patient was receiving two antimicrobials. In one home, no one was receiving antimicrobials.

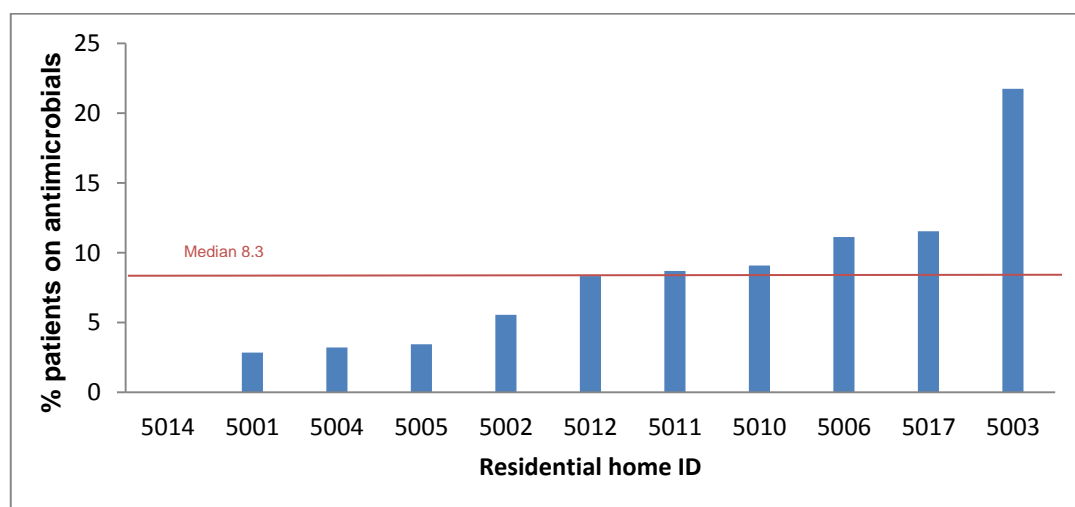


Figure 10 Prevalence of antimicrobial use in Residential homes

3.4.2 Antimicrobial prescribers and prescribing location

Nursing homes

The majority of antimicrobials in Nursing homes were prescribed by a GP (94.9%; 131/138) and most of these were prescribed within the Nursing home (78.3%, 108/138) [Table 5]. There were 23 prescriptions (16.7%) prescribed elsewhere (possibly in GP's surgery out of hours or at home – although this was not indicated). Five patients (3.6%) were prescribed antimicrobials in hospital [Table 5].

Table 5 Location and prescriber information for antimicrobial prescriptions

Who and where prescribed	Number	% of patients on antimicrobials
GP	131	94.9
Nursing home	108	78.3
Elsewhere (possibly GP surgery)	23	16.7
Specialist in the hospital	5	3.6
Unknown	2	1.4

Residential homes

In Residential homes, 15 out of 21 antimicrobials were prescribed by a GP (71.4%), Three (14%) were prescribed by another medical doctor and three (14%) were prescribed by a specialist in hospital.

3.4.3 Route of administration

Almost all antimicrobials in Nursing homes were administered orally (95%) and only two antimicrobials were delivered parenterally, i.e. intravenous received intravenous antimicrobials [Table 6]. One patient received antimicrobials via eye drops. All Residential home prescriptions were for oral antibiotics (21; 100%).

Table 6 Route of antimicrobial administration in Nursing homes

Route	Number prescriptions	% of all antimicrobials
Oral	131	94.9
Parenteral	2	1.4
Other	1	0.7
Unknown	4	2.9

Summary point:

- 10.9% of patients in Nursing homes were on antimicrobials;
 - 95% administered orally
 - 95% prescribed by a GP
- 7.7% of patients in Residential homes were on antimicrobials
 - 100% of antimicrobials in Residential homes were administered orally
 - 71% prescribed by a GP

3.4.4 Treated infection site

Nursing homes

Regardless of the type of treatment (prophylactic or therapeutic) antimicrobials were prescribed mainly as treatment for urinary tract infections (90 prescriptions; 65.2% of all prescribed antimicrobials), followed by respiratory tract (24 prescriptions; 17.4%) and skin or wounds (16 prescriptions; 11.6%) [Table 7]. Over half of prescriptions (51.5%; 70/136) were given as prophylaxis and 48.5% were prescribed for therapeutic reasons. Almost half of prescriptions (47.1%) were for uroprophylaxis.

Table 7 Number and prevalence of antimicrobials by site and by infection

Treated Site	Type of Treatment	
	Prophylaxis	Therapeutic
	(%)	(%)
UTI (n=90)	72.2	27.8
Respiratory (n=24)	16.6	83.3
Skin (n=16)	6.3	93.8
Gastrointestinal (n=1)	0.0	100.0
Oral, Ear, Nose and Mouth (n=2)	0.0	100.0
Eye (n=2)	0.0	100.0
Unknown (n=3)	-	-
TOTAL (n=138)	51.5	48.5

Residential homes

There were 21 antimicrobial prescriptions in Residential homes. 17 were prescribed for urinary reasons (11 therapeutic; 6 prophylaxis), 3 (therapeutic) for respiratory infection and one (therapeutic) for skin/wound. In Residential homes 29% (6 of 17) of antimicrobials were for uroprophylaxis, i.e. 2.3% of all residential home patients.

Summary point:

- Nursing homes
 - 72% of UTI prescriptions were for prophylaxis
 - 17% of prescriptions for respiratory tract were for prophylaxis

3.4.5 Review or end date for antimicrobials

Nursing homes

Participating Nursing homes were asked if antimicrobials had a review or end date. This information was recorded for 134 cases of the 138 antimicrobials. All therapeutic antimicrobials had an end/review date but only 12.9% of prophylactic antimicrobials had an end/review date. An end/review date was indicated for 11% of patients receiving uroprophylaxis (7/63) and only 25% of patients receiving prophylaxis for respiratory infections had an end/review date (1/4).

Residential homes

There was an end/review date for 13 of the 15 therapeutic prescriptions given in Residential homes (87%); however, none of the prophylaxis prescriptions had an end/review date (0/6).

3.4.6 Antimicrobial class administered in Nursing homes

The most frequently prescribed class of antimicrobials was sulfonamides and Trimethoprim (31%), followed by Beta-lactams (24%) and 'other' antibacterials (23%). The least prescribed groups were the quinolones (1.5%), tetracycline (1.5%), antifungals (1%), antiprotozoal (1%) and the amphenicols (1%) [Figure 11].

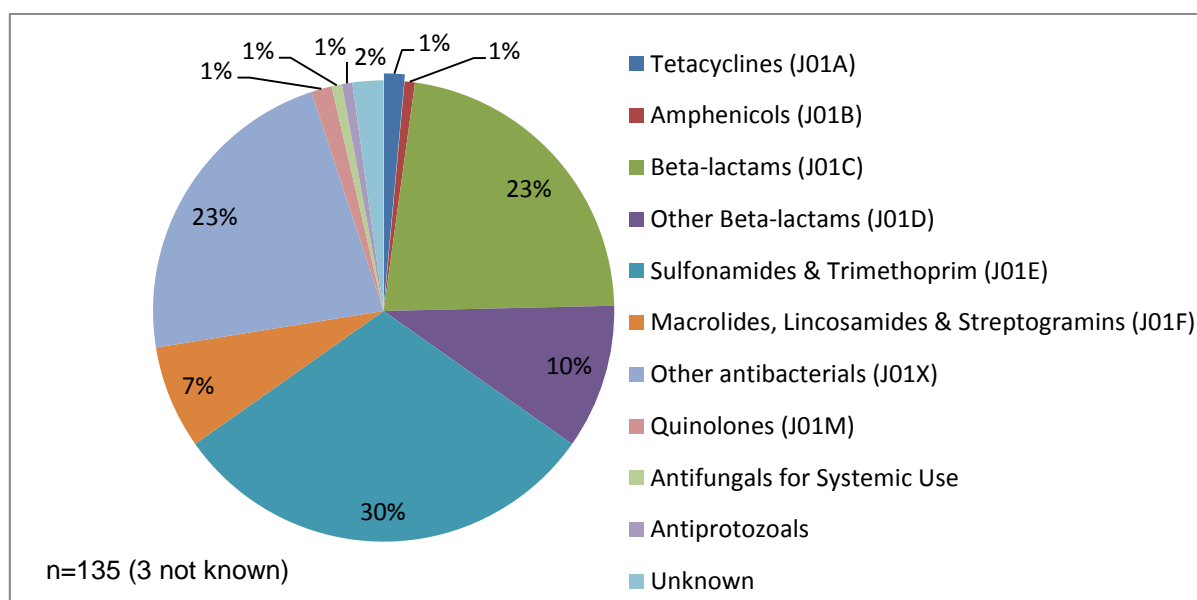


Figure 11 Classification of antimicrobials prescribed in Nursing homes

3.4.7 Antimicrobials prescribed in Nursing and Residential homes

Patients in Nursing homes were prescribed 17 different antimicrobial agents, whereas, only 6 different agents were used in Residential homes [Table 8]. The most commonly prescribed antimicrobial agents were trimethoprim (30.4% of all antimicrobials in Nursing homes; 35% in Residential homes) and nitrofurantoin (21.7% of all antimicrobials in Nursing homes; 7.1% of all antimicrobials in Residential homes). Two patients in Nursing homes were receiving IV antimicrobials.

Table 8 Antimicrobials prescribed in LTCFs

Antimicrobial	Nursing homes		Residential homes	
	Frequency	%	Frequency	%
Trimethoprim	42	30.4	7	35.0
Nitrofurantoin	30	21.7	5	7.1
Amoxicillin	14	10.1	2	2.9
Cefalexin	12	8.6	3	4.3
Flucloxacillin	9	6.5	1	1.4
Co-Amoxiclav	8	5.8	2	2.9
Clarithromycin	6	4.3	0	0
Ciprofloxacin	2	1.4	0	0
Doxycycline	2	1.4	0	0
Erythromycin	2	1.4	0	0
Azithromycin	2	1.4	0	0
Fluconazole	1	0.7	0	0
Metronidazole	1	0.7	0	0
Cefradine	1	0.7	0	0
Ceftriaxone (IV)	1	0.7	0	0
Chloramphenicol	1	0.7	0	0
Cubicin (IV)	1	0.7	0	0
Unknown Agent	3	2.2	0	0
Total	138	100.0	20	100.0

3.4.8 Microorganisms and antimicrobial resistance

Nursing homes

A culture sample was taken for 31.6% of patients receiving antimicrobials (42/133 patients). Of these, 27 (64.3%) were cultured for prophylactic reasons and 15 (35.7%) cultured for therapeutic reasons. Microbiology results were sent to GPs and were not routinely passed on to the Nursing homes. There were only 2 microbiology results available; *Staphylococcus aureus* - methicillin resistant (MRSA) from an eye infection and a parasite (*Giardia lamblia*) identified from a gastrointestinal infection.

Residential homes

In Residential homes, 52.4% (11/21) of patients on antimicrobials had a culture sample taken. Only 2 microbiology results were available (both *Escherichia coli*).

SECTION 4 COMMON CONDITIONS OF INTEREST

This section presents an in-depth analysis of the three most prevalent conditions of interest (patients with infection and/or receiving antimicrobials) in Nursing homes, i.e. urinary tract, respiratory tract and skin/wound infections.

4.1 Urinary tract

4.1.1 Urinary tract - condition of interest

There were 93 patients with a urinary tract infection and/or were receiving antimicrobials for urinary tract reasons on the day of the survey. Therefore the prevalence of urinary tract 'condition of interest' was 7.45/100 eligible patients.

4.1.2 Urinary tract – care load indicators and risk factors

Patients with a urinary tract infection or were receiving antimicrobials for a urinary tract indication infection were more likely to be female, have a urinary catheter in place, incontinent, disorientated, and had impaired mobility ($p < 0.05$, $p < 0.01$, $p < 0.01$, $p < 0.01$ and $p < 0.01$ respectively) [Table 9].

Table 9 Prevalence of Urinary tract condition of interest - patient characteristics with odds ratio

	Number of patients (percentage of total)*	Number with Urinary tract condition of interest*	Prevalence of Urinary tract condition of interest (95% CI)	Odds ratio (95% CI)	Chi-Square test
Gender					P<0.05
Male	392 (31.5)	19	4.85(3.12 – 7.45)	1.00	
Female	851 (68.5)	73	8.58(6.88 – 10.65)	1.84 (1.07 – 3.21)	
Age					NS
85 and under	667 (53.7)	43	6.45(4.82 – 8.57)	1.00	
>85	576 (46.3)	43	7.47(5.59 – 9.90)	1.17 (0.74 – 1.86)	
Incontinence					P<0.01
No	480 (38.6)	23	4.79(3.21 – 7.09)	1.00	
Yes	763 (61.4)	70	9.17(7.33 – 11.43)	2.00 (1.20 – 3.35)	
Disorientation*					P<0.01
No	524 (42.2)	25	4.77(3.25 – 6.95)	1.00	
Yes	719 (57.8)	64	8.90(7.03 – 11.21)	1.95 (1.18 – 3.23)	
Impaired mobility*					P<0.01
No	586 (47.1)	31	5.29(3.75 – 7.41)	1.00	
Yes	657 (52.9)	60	9.13(7.16 – 11.58)	1.80 (1.12 – 2.89)	
Urinary catheter*					P<0.01
No	1173 (94.0)	79	6.73 (5.44 – 8.31)	1.00	
Yes	74 (6.0)	13	17.57(10.56 – 27.77)	2.95 (1.47 – 5.81)	
Surgery <30 days					NS
No	1233 (99.2)	91	7.38(6.05 – 8.98)	1.00	
Yes	10 (0.8)	2	20.00(5.67 – 50.98)	3.14 (0.32 – 16.02)	
Pressure sores					P=0.03
No	1201 (96.6)	83	6.91(5.61 – 8.49)	1.00	
Yes	42 (3.4)	7	16.67(8.32 – 30.60)	2.69 (0.98-6.40)	
Other wounds					NS
No	1174 (94.4)	83	7.07(5.74 – 8.68)	1.00	
Yes	69 (5.6)	7	10.14(5.00 – 19.49)	1.48 (0.60 – 3.50)	

* Numbers may vary due to non-response. Base 1,243 patients - 93 with condition of interest

4.1.3 Urinary tract infections (UTIs)

Urinary tract infections were the most commonly reported HCAI accounting for 40% of all infections. There were 30 UTIs reported (Prevalence 2.4 per 100 eligible patients):

- 23.3% of UTIs were catheter related (urinary catheter *in situ*); n=7;
- 26.7% of UTIs had signs and symptoms and a urine culture positive, i.e. confirmed UTI (as defined by the definitions); n=8
- 73.3% of UTIs had signs and symptoms and urine culture not done, negative or results unknown i.e. probable UTI (as defined by the definitions); n=22.

4.1.4 UTI prescribing

89 (64.5% of all antimicrobials) antimicrobials were prescribed for urinary reasons [Figure 12]. 69 (77.5%) of these patients were female. Almost three quarters of prescriptions for urinary indication were for prophylaxis (65/89; 72%); therefore in the total Nursing home population (1,243) the prevalence of uroprophylaxis was 5.15 per 100 patients. 5.9% of all females and 3.3% of males in Nursing homes were receiving urinary prophylaxis (50/851 females; 13/392 males). Two antimicrobials accounted for 74% of all antimicrobials prescribed for the treatment for UTI: trimethoprim (9 prescriptions) and nitrofurantoin (8 prescriptions).

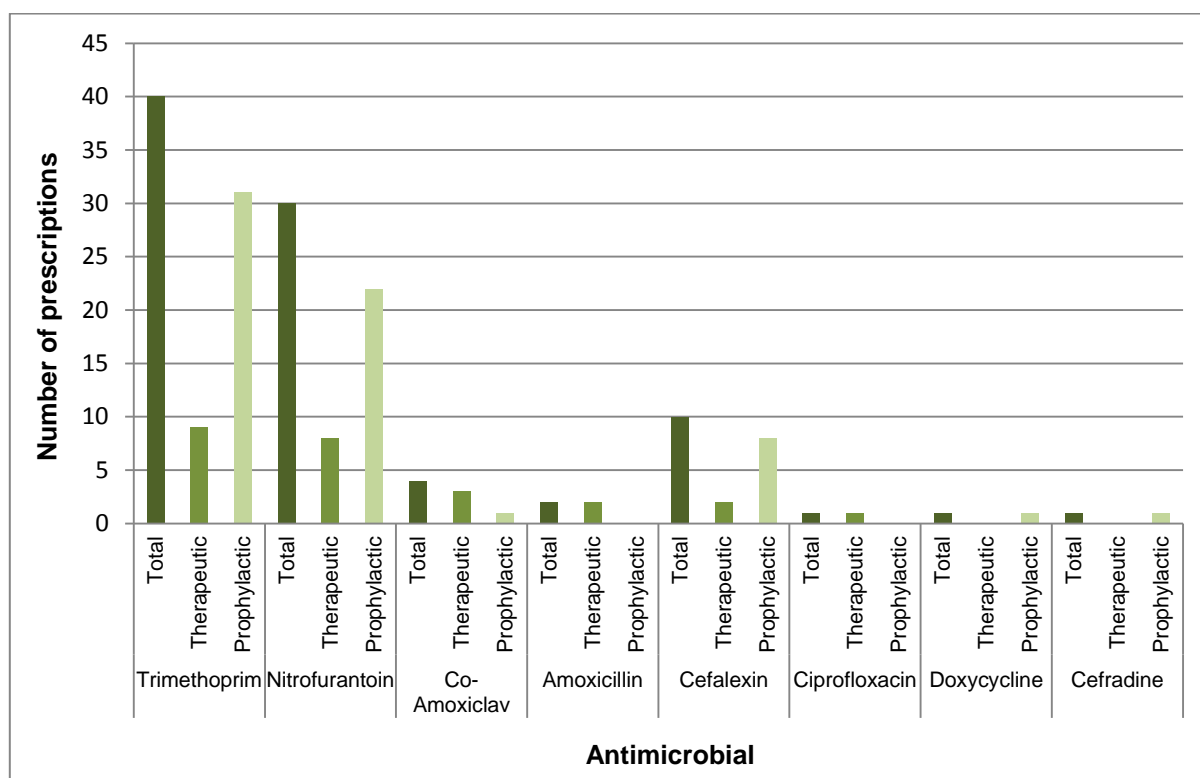


Figure 12 Antimicrobials for the treatment of urinary tract infections (prophylactic/therapeutic)

4.1.5 UTI - adherence to 2010 prescribing guidelines

In only 74% of cases was the choice of antimicrobial agent (Trimethoprim and Nitrofurantoin) in line with Northern Ireland Antimicrobial Guidelines for Primary Care 2010^[11], therefore 26% of patients receiving antimicrobials for urinary tract reasons were given antimicrobials not in line with guidance. It should be noted new guidelines^[12] have since been published and were not available during the survey period. The therapeutic use of co-amoxiclav; amoxicillin and cefalexin are not in line with 2010 guidelines. No other information was available to confirm if this use was supported by culture results.

No information on prophylactic use of antibiotics for UTIs was included in the 2010 guidelines, however, the updated 2013 guidelines^[12] include a recommendation of up to 6 months prophylactic use of Trimethoprim or Nitrofurantoin in specific circumstances; other agents given as prophylaxis are not in line with 2013 guidance, i.e. cefalexin, doxycycline and cefradine.

Summary point:

- The prevalence of urinary tract 'condition of interest' was 7.5%
- Patients with a 'condition of interest' were more likely to be female, have a urinary catheter, be incontinent, disorientated and have impaired mobility
- UTI was the most commonly reported HCAI (40%)
- 74% of antimicrobials prescribed for UTI were in line with current guidelines and just over 1 in 4 (26%) were not in line with the guidance

4.2 Respiratory Tract

4.2.1 Respiratory tract - condition of interest

There were 29 patients with a respiratory tract infection and/or were receiving antimicrobials for respiratory tract reasons on the day of the survey.

4.2.2 Care load indicators and risk factors – respiratory tract

Patients with a respiratory tract infection and/or were receiving antimicrobials for a respiratory tract indication were more likely to be incontinent ($p<0.05$), have impaired mobility ($p<0.01$) and had recent surgery ($p<0.05$); see Table 10.

Table 10 *Prevalence of Respiratory tract condition of interest - patient characteristics with odds ratio*

	Number of patients (percentage of total patients) *	Number with Respiratory tract condition of interest*	Prevalence of Respiratory tract condition of interest (95% CI)	Odds ratio (95% CI)	Chi-Square test
Gender					NS
Male	392 (31.5)	9	2.30(1.21 – 4.31)	1.00	
Female	851 (68.5)	20	2.35(1.53 – 3.60)	1.02 (0.44 – 2.45)	
Age					NS
85 and under	667 (53.7)	13	1.95(1.14 – 3.31)	1.00	
>85	576 (46.3)	14	2.43(1.45 – 4.04)	1.25 (0.55 – 2.86)	
Incontinence					P=0.05
No	480 (38.6)	6	1.25(0.57 – 2.70)	1.00	
Yes	763 (61.4)	23	3.01(2.02 – 4.48)	2.45 (0.96-7.39)	
Disorientation					NS
No	524 (42.2)	7	1.34(0.65 – 2.73)	1.00	
Yes	719 (57.8)	21	2.92(1.92 – 4.42)	2.22 (0.89 – 5.79)	
Impaired mobility					P<0.01
No	586 (47.1)	6	1.02(0.47 – 2.22)	1.00	
Yes	657 (52.9)	23	3.50(2.34 – 5.20)	3.51 (1.34 – 9.67)	
Urinary catheter					NS
No	1173 (94.0)	27	2.30(1.59 – 3.33)	1.00	
Yes	74 (6.0)	2	2.70(0.74 – 9.33)	1.18 (0.13 – 4.85)	
Surgery <30 days					P=0.02
No	1233 (99.2)	27	2.19(1.51 – 3.17)	1.00	
Yes	10 (0.8)	2	20.00(5.67 – 50.98)	11.17 (1.10 – 59.39)	
Pressure sores					NS
No	1201 (96.6)	25	2.08(1.41 – 3.05)	1.00	
Yes	42 (3.4)	3	7.14(2.46 – 19.01)	3.62 (0.83 – 13.33)	
Other wounds					NS
No	1174 (94.4)	24	2.04(1.38 – 3.02)	1.00	
Yes	69 (5.6)	4	5.80(2.28 – 13.98)	2.95 (0.84 – 9.31)	

* Numbers vary due to non-response. Base 1,243 - 29 with a respiratory tract condition of interest.

4.2.3 Respiratory tract infections

Respiratory tract infections were the second most commonly reported HCAI accounting for 28% of all infections in Nursing homes. There were 21 Respiratory tract infections:

- 66.7% 'lower RTIs', n=14
- 28.6% 'common cold/pharyngitis', n=6
- 4.8% 'Flu'; n=1*
- 0 pneumonia

*Normally, symptoms of flu should not be reported outside the flu season (as in this survey, May-June), however, since a flu infection was confirmed, it was not excluded.

4.2.4 Respiratory prescribing

Figure 13 shows the distribution of antimicrobials prescribed for treatment or prophylaxis of respiratory infections. The most frequently prescribed antimicrobial was amoxicillin (11 prescriptions) followed by clarithromycin (5 prescriptions). There was no common choice of prophylaxis for respiratory tract indications – clarithromycin, co-amoxiclav, azithromycin and trimethoprim were prescribed once during the survey.

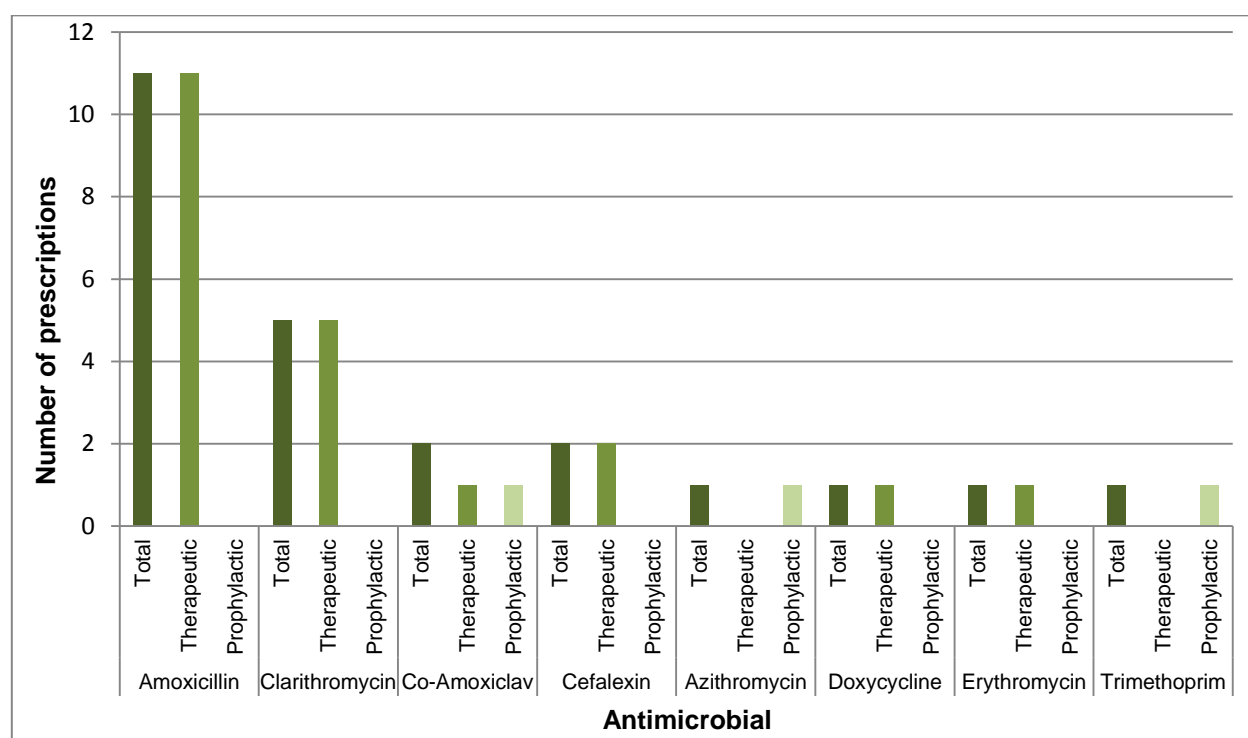


Figure 13 Antimicrobials for treatment of respiratory infection (prophylactic/therapeutic)

4.2.5 Respiratory tract – adherence to prescribing guidelines

The choices of the commonly prescribed antimicrobials for respiratory indications (amoxicillin and clarithromycin) are compliant with the 2010 guidelines [11]. Co-amoxiclav was in 2010 guidelines for treatment of chronic obstructive pulmonary disease (COPD) exacerbation. Cefalexin is not in 2010 guidelines for respiratory indications. These guidelines did not include recommendations for prophylaxis of respiratory tract infections. There is no information to determine if patients were prescribed prophylactic antimicrobials for respiratory tract infections on the recommendation of a respiratory physician.

Summary point:

- The prevalence of respiratory tract ‘condition of interest’ was 2.3%
- Respiratory tract infections were second most commonly reported HCAI (28%)
- Patients with a respiratory tract ‘condition of interest’ were more likely to be incontinent, have impaired mobility and to have had recent surgery

4.3 Skin/wound

4.3.1 Skin/wound - condition of interest

There were 18 patients with a skin/wound infection and/or were receiving antimicrobials for skin/wound reasons on the day of the survey. Therefore the prevalence of skin/wound 'condition of interest' was 1.45 per 100 eligible patients.

4.3.2 Care load indicators and risk factors – skin/wound

Patients with a skin/wound infection and/or were receiving antimicrobials for a skin/wound indication were more likely to have pressure sores ($p<0.01$) or other wounds ($p<0.01$) e.g. leg ulcers, traumatic or surgical wounds, insertion sites for gastrostomy, tracheostomy [Table 11].

Table 11 Prevalence of skin/wound condition of interest - patient characteristics with odds ratio

	Number of patients (percentage of total patients) *	Number with Skin condition of interest*	Prevalence of Skin condition of interest (95%CI)	Odds ratio (95% CI)	Chi-Square test
Gender					NS
Male	392 (31.5)	9	2.30(1.21 – 4.31)	2.20 (0.80 – 6.08)	
Female	851 (68.5)	9	1.06(0.56 – 2.00)	1.00	
Age					NS
85 and under	667 (53.7)	7	1.05(0.51 – 2.15)	1.00	
>85	576 (46.3)	10	1.74(0.95 – 3.17)	1.67 (0.58 – 4.88)	
Incontinence					NS
No	480 (38.6)	7	1.46(0.71 – 2.98)	1.01 (0.35 – 2.84)	
Yes	763 (61.4)	11	1.44(0.81 – 2.56)	1.00	
Disorientation					NS
No	524 (42.2)	8	1.53(0.78 – 2.98)	1.10 (0.39 – 3.04)	
Yes	719 (57.8)	10	1.39(0.76 – 2.54)	1.00	
Impaired mobility					NS
No	586 (47.1)	6	1.02(0.47 – 2.22)	1.00	
Yes	657 (52.9)	12	1.83(1.05 – 3.17)	1.80 (0.62 – 5.41)	
Urinary catheter					NS
No	1173 (94.0)	16	1.36(0.84 – 2.20)	0.50 (0.11 – 3.17)	
Yes	74 (6.0)	2	2.70(0.74 – 9.33)	1.00	
Surgery <30 days					NS
No	1233 (99.2)	18	1.46(0.93 – 2.30)		
Yes	10 (0.8)	0	0.00(0.00 – 29.17)	0 (0.00 – 38.66)	
Pressure sores					P<0.01
No	1201 (96.6)	13	1.08(0.63 – 1.84)	1.00	
Yes	42 (3.4)	5	11.90(5.19 – 25.00)	12.35 (3.63 – 39.85)	
Other wounds					P<0.01
No	1174 (94.4)	9	0.77(0.40 – 1.45)	1.00	
Yes	69 (5.6)	8	11.59(5.99 – 21.25)	16.98 (5.73 – 50.07)	

* Numbers may vary due to non-response. Base 1,243 - 18 with a skin/wound condition of interest.

4.2.3 Skin/wound infections

A quarter of all HCAI in Nursing homes were skin/wound infections. These infections were further sub-divided:

- 17 cellulitis/soft tissue/wound infections
- 1 fungal skin infection
- 1 herpes simplex or zoster infection

4.2.4 Skin infection prescribing

Figure 14 illustrates the distribution of antimicrobials prescribed for treatment and prophylaxis of skin/wound infections (agents=8; prescriptions=16). Flucloxacillin accounted for most of the prescriptions (8/16; 50%).

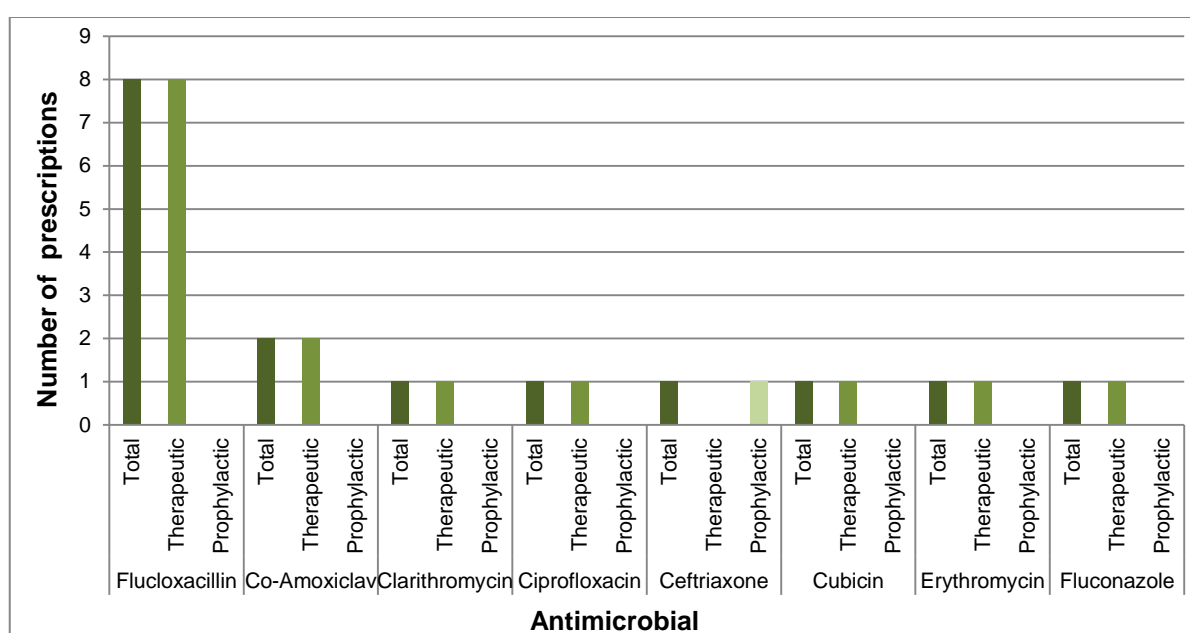


Figure 14 Antimicrobials for treatment of skin/wound infection (prophylactic/therapeutic)

4.2.5 Skin/wound – adherence to prescribing guidelines

Flucloxacillin, clarithromycin and erythromycin use for skin/wound infections is in line with 2010 guidelines. Co-amoxiclav is in line with the 2010 guidelines [11] only for treatment of bites (no information available on specific indication for prescribing). The 2010 guidelines did not include information on anti-fungal treatment. Ciprofloxacin use for skin/wound infections is not recommended in 2010 guidelines. Information on intravenous (IV) antimicrobials was not included in these guidelines, however, ceftriaxone and cubicin are both licenced for skin/soft tissue infections. Prophylactic use of ceftriaxone (IV) appears unusual.

Summary point:

- Prevalence of skin/wound infections in Nursing home patients was 1.5%

SECTION 5 FACILITY COORDINATION

This section deals with elements from the institutional questionnaire regarding medical care and coordination, infection control structure and antimicrobial policy.

5.1 Medical care and coordination

5.1.1 Nursing homes

Medical care was provided by personal General Practitioners (GPs), or group practices in all Nursing homes (100%). None of the homes surveyed had directly employed medical staff. Ten Nursing homes indicated coordination of medical activities (10/31; 32%); with 9 reporting that a physician from outside the home coordinated medical activities and one Nursing home indicating joint coordination between an internal physician and other external physicians. However, when the tasks performed by the coordinating physician were examined; three did not record any of the specified tasks; five indicated solely 'Medical resident care'; with only two Nursing homes recording tasks other than 'Medical resident care' only three Nursing homes indicated coordination of medical activities.

5.1.2 Residential homes

In common with Nursing homes, medical care was provided by GPs for 100% of patients in Trust-controlled Residential homes. Ten Residential homes (91%) reported that there was no internal or external coordinating physician. One home indicated that an external physician was responsible for coordinating 'Medical resident care'.

5.2 Infection prevention & control practice

5.2.1 Nursing homes

All Nursing homes, n=31, indicated the availability of a nurse with training in infection control and prevention. Most worked in the Nursing home (74.2%); in 7 Nursing homes (22.6%) there was access both to internal and external infection control expertise. One Nursing home indicated that they had access to an external person. No medical doctors with training in infection control and prevention were identified.

5.2.2 Residential homes

All Residential homes reported access to persons with training in infection control and prevention. The majority were external to the Residential home (n=9) but 2 Residential homes indicated that they had access to both an internal and external person with training in infection control and prevention.

5.3 Infection control committee

5.3.1 Nursing homes

Overall, 11 (35.5%) Nursing homes reported the existence of an infection control committee either internal or external, however, the majority 19 (61.3%) did not have an infection control committee and one home did not answer. Six Nursing homes reported four meetings in the last year; 1 reported three meetings; 2 two meetings and 2 homes reported one meeting. One home, with an infection control committee, reported that no meetings had taken place in the preceding year.

5.3.2 Residential homes

All eleven Residential homes (100%) indicated that they had an infection control committee. Seven of the Residential homes reported that they met at least once in the last year; four homes did not indicate the frequency of meetings.

5.4 Written protocols

5.4.1 Nursing homes

During the survey the availability of five written protocols was explored. Almost all Nursing homes had written protocols on: hand hygiene, MRSA, management of enteral feeding and management of urinary catheters (95%-100% of responses). Protocols on the management of vascular catheters were only available in 7 Nursing homes (22.6%); this result is not surprising given infrequent use in Nursing homes.

5.4.2 Residential homes

All Residential homes reported availability of written protocols for management of MRSA and for hand hygiene and ten out of eleven had guidelines on the management of urinary catheters. About half of Residential homes reported availability of guidance/protocols for management of venous catheters and management of enteral feeding (n=6; 55% for both).

5.5 Surveillance

Surveillance of healthcare-associated infections in Nursing homes was uncommon; only 32.3% (n=10) indicated that surveillance of HCAs was performed. None of the Residential homes indicated that surveillance was performed.

5.6 Hand hygiene

5.6.1 Nursing homes

The majority of Nursing homes had organised a hand hygiene training session in the preceding year, 87.1% (n=27). The categories of staff invited to the hand washing training session were: nursing and nurse aides, and cleaning staff. The modal products available for hand hygiene in Nursing homes were: liquid soap (n=30) and alcohol rub solution (n=29). Alcohol impregnated wipes were used in about half of the homes (n=16). A minority of homes reported use of bar soap in clinical areas (n=3; 10%). The most frequently used hand hygiene method was hand washing with water and antiseptic soap (n=21), followed by water and a non-antiseptic soap (n=8). The personal protective equipment most available to staff in homes were: gloves (n=30; 97%), gown - long sleeves (n=30; 97%) and aprons - no sleeves (n=30; 97%). The availability of masks was identified in about two thirds of homes (n=21; 68%) and protective goggles in around half of homes (n=16; 52%).

5.6.2 Residential homes

All Residential homes reported that formal training in hand hygiene had taken place in the preceding year, and that this had been attended by nursing staff in all facilities (n=11; 100%) and by domestic staff in approximately half (n=6; 55%).

5.7 Antimicrobial stewardship resources

Current antimicrobial stewardship resources were explored as they can optimise antimicrobial prescribing and slow down the spread of antimicrobial resistance.

5.7.1 Nursing homes

Only one Nursing home indicated use of a restrictive list of antimicrobials i.e. prescription requiring either the permission of a designated person, or not to be used for intravenously administered antibiotics. In terms of antimicrobial stewardship, a range of factors were identified as good practice [Figure 15]. Overall 14 (45.2%), said that none of the practices existed within their facilities. Of those that identified good practice in antimicrobial prescribing the most frequent items present were; a system to remind healthcare workers of the importance of microbiological samples to inform the best antimicrobial choice (n=7); written guidelines for appropriate antimicrobial prescribing (n=6), advice from a pharmacist for antimicrobial not included in the formulary and local/regional antimicrobial resistance profile summaries available in the home or in the GP surgeries who prescribe (n=5).

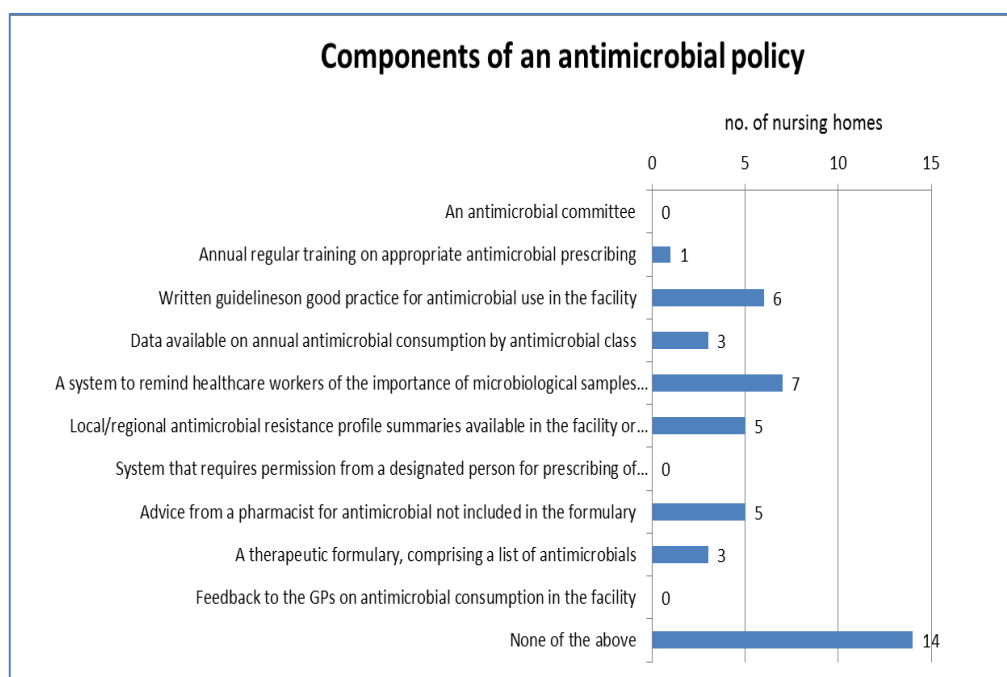


Figure 15 Antimicrobial policy in Nursing homes

5.7.2 Residential homes

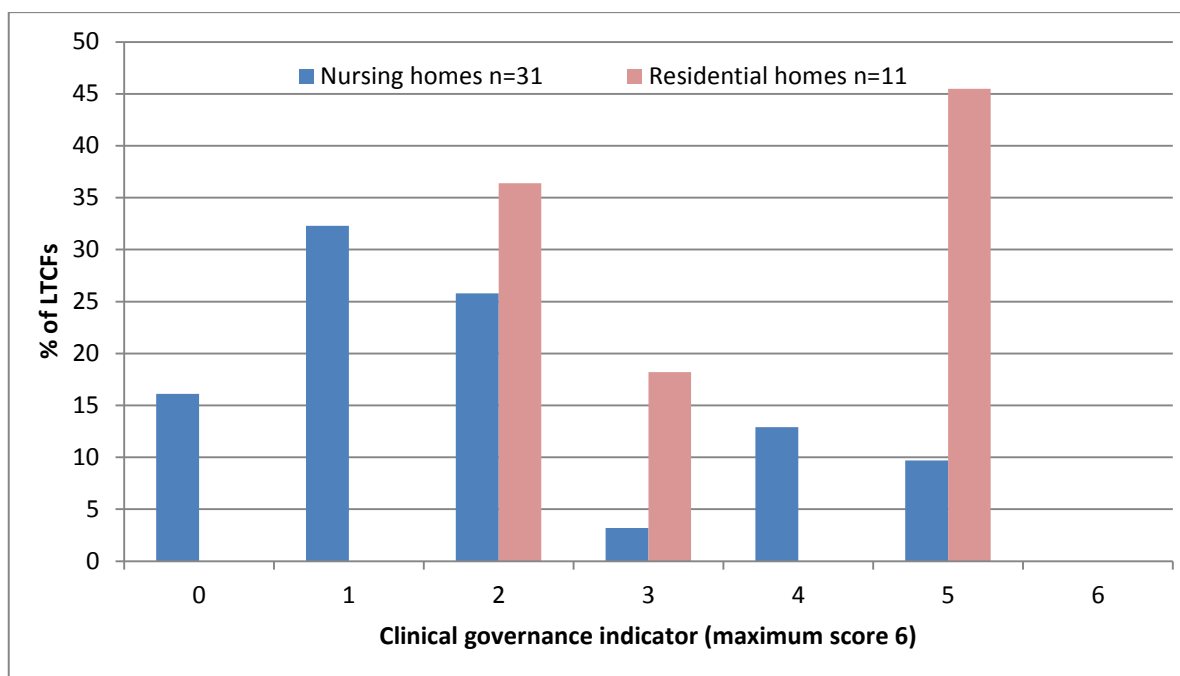
None of the Residential homes reported use of a restrictive list of antimicrobials. In terms of good antimicrobial stewardship practices, 5 (45.5%) Residential homes reported none of these formal activities, similar to the result for Nursing homes. The items identified most often were ‘a system to remind healthcare workers of the importance of microbiological samples’ (n=7), followed by ‘written guidelines on good practice for antimicrobial prescribing in the facility’ (n=6).

5.8 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 serves merely to get an overview of the status in the facilities. The system allowed us to measure the evolution of the infection control resources and antibiotic policy over time; in total, and by facility. Based on questions in the institutional questionnaire elements were grouped into categories (**Appendix 3**). Below you will find the seven categories of performance indicators, the elements that build up these categories and the score per answer. The analysis below describes the pattern of results obtained for each item for Nursing homes and Residential homes that took part in the survey.

5.8.1 Clinical governance

This included organisational factors concerning infection control resources, AB policy and patient care present in the facility. The maximum score was set at 6 points. For participating Nursing homes the average score was 1.94 (median 2). In comparison the mean value for the group of Residential homes was 3.5 (median 3).



Clinical governance

Total - 6 points

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

If 0 meetings/year

0 points

If 1 meeting/year

1 point

If 2 meetings/year

2 points

If 3 or more meetings/year

3 points

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

If 'an antibiotic committee' = 'Yes'

1 point

Can any of the following 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?' = 'Yes'

1 point

Figure 16 Clinical governance indicators

5.8.2 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. Average score for Nursing homes was 5.1 (median score 6); Residential homes averaged 5.4 (median 6).

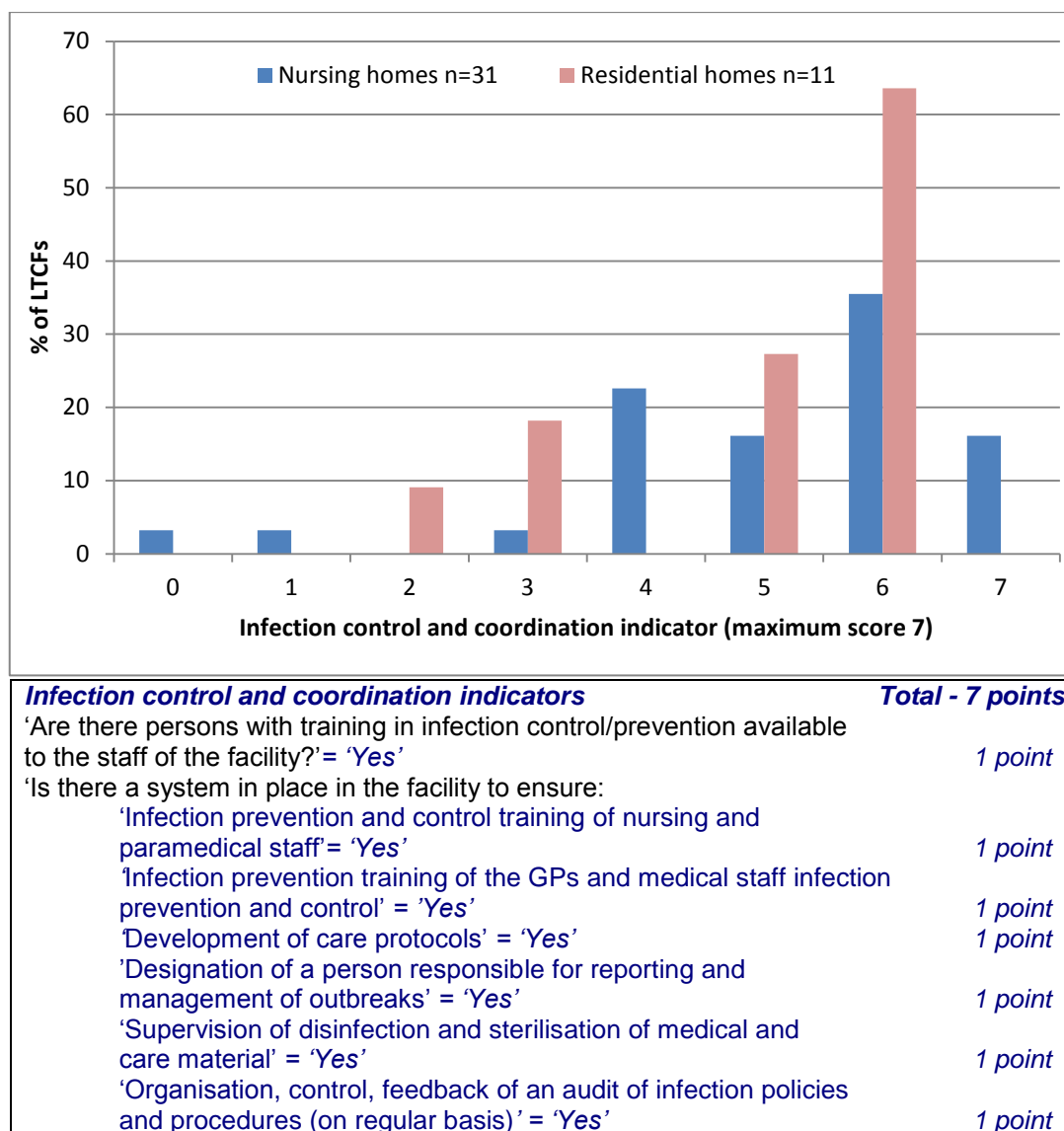


Figure 17 Infection control and coordination indicators

5.8.3 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 average score was 4.5 (median 5), the comparable score for Residential homes was 4.8 (median 5).

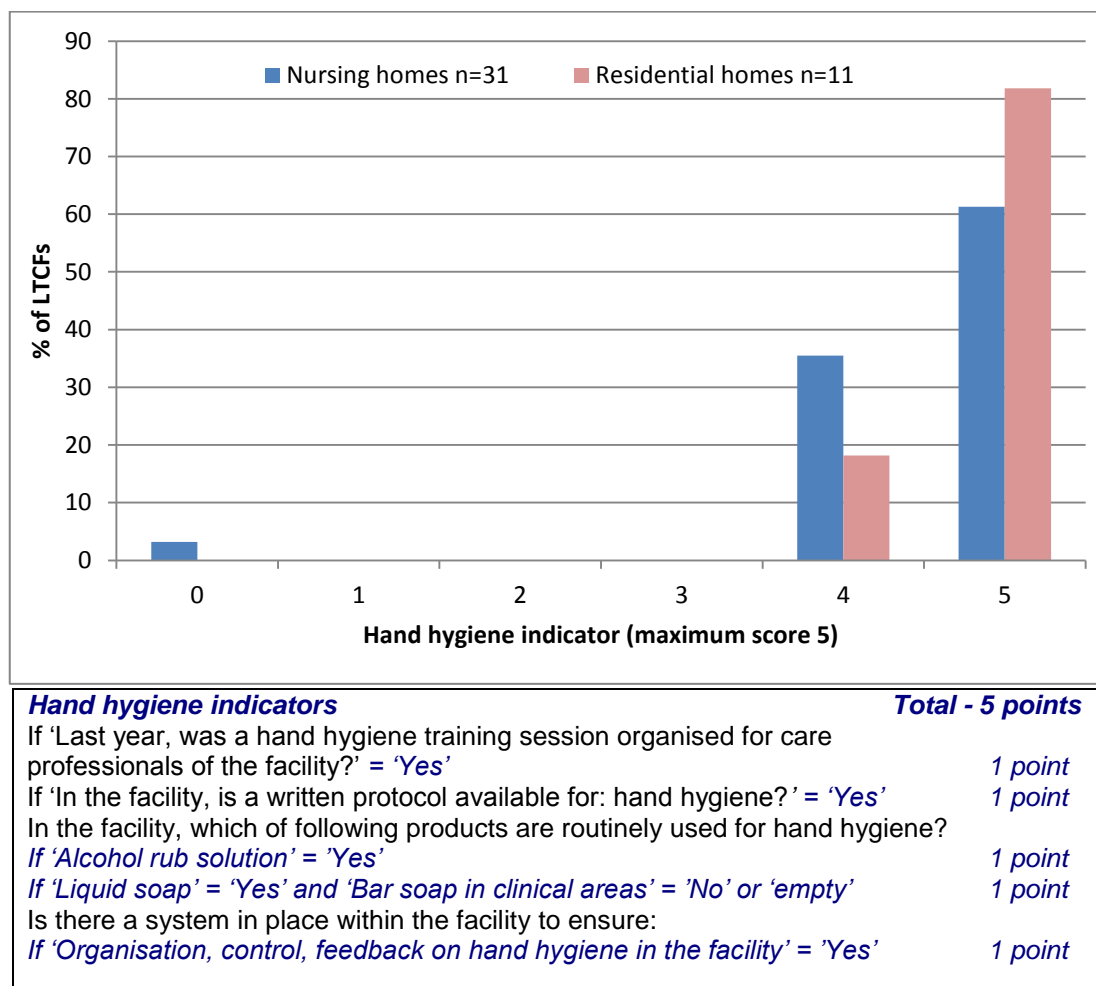


Figure 18 Hand hygiene indicators

5.8.4 Protocols for infection control and coordination

Protocols for infection control reflect the presence of written care protocols and guidelines with regard to infection prevention in the facility. The maximum possible score for this item was 6. Overall, participating Nursing homes had an average score of 4.9 (median 5) and the residential facilities scored an average of 4.8 (median 6).

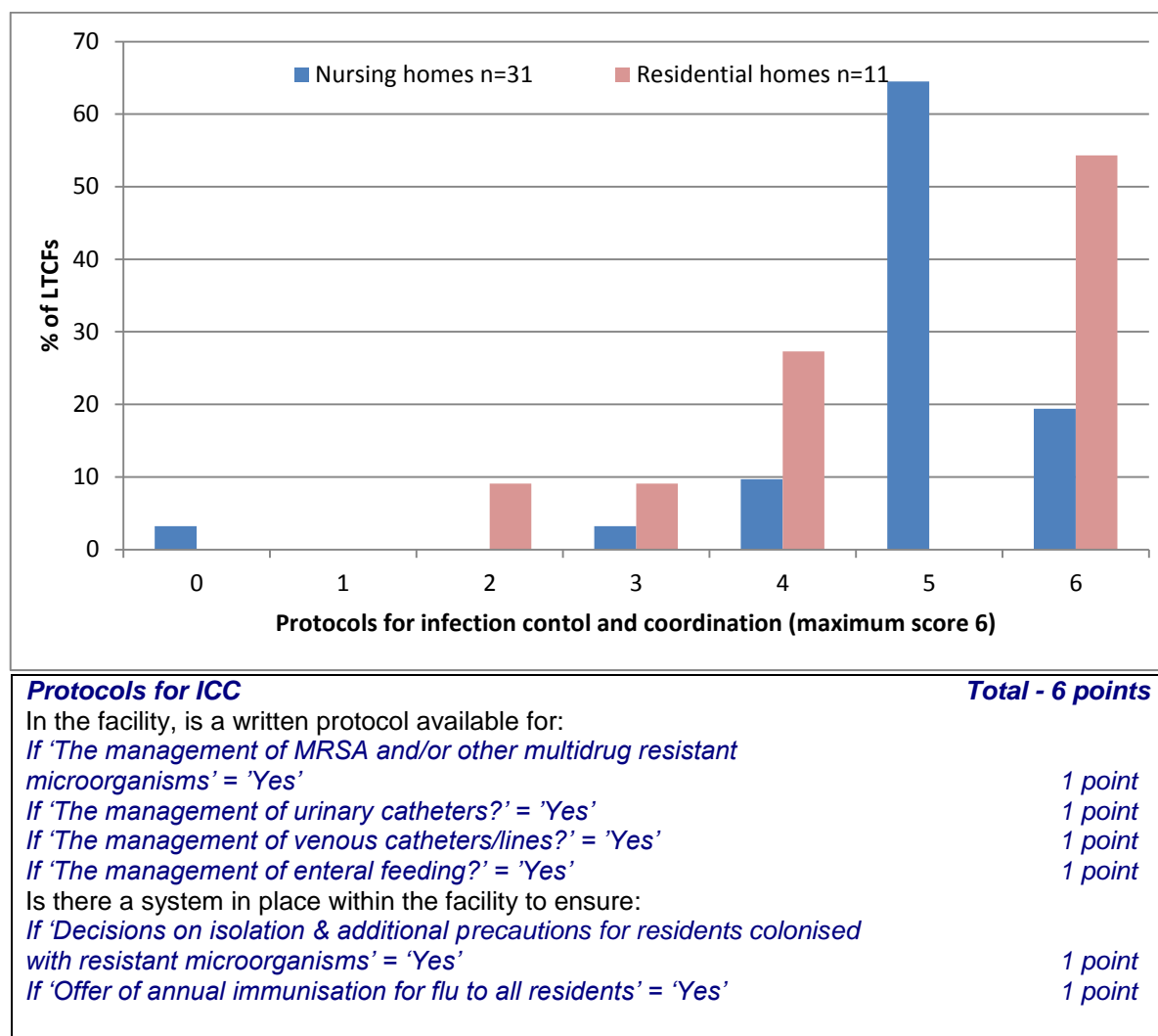
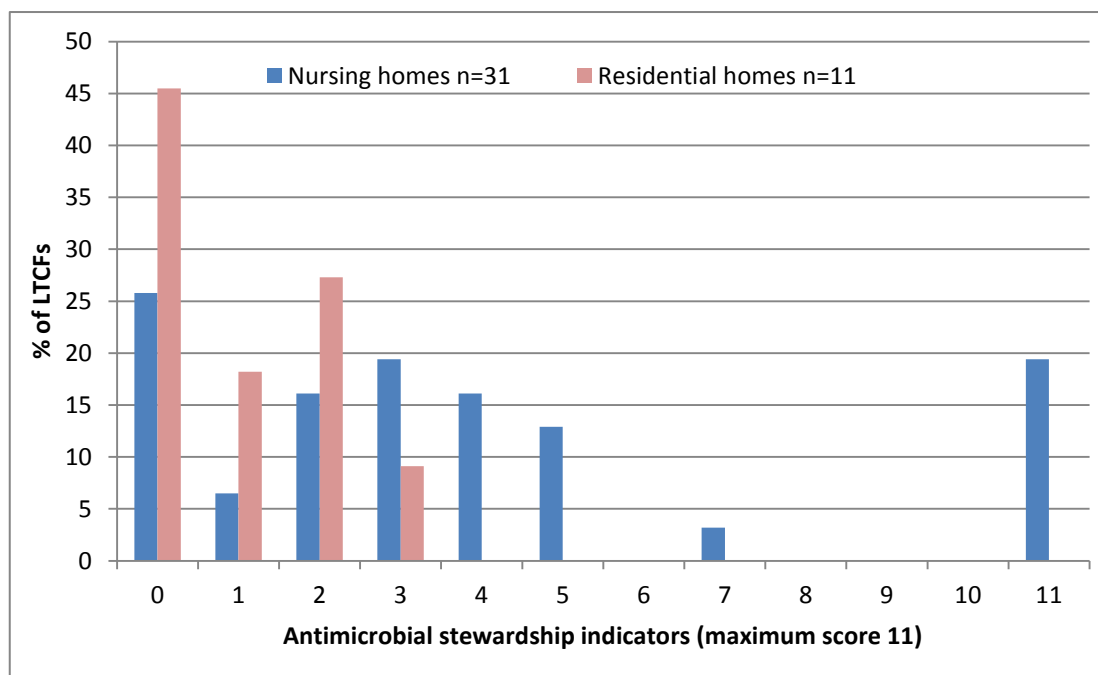


Figure 19 Protocols for infection control and coordination

5.8.5 Antimicrobial stewardship indicators

Antimicrobial stewardship indicators are related to the presence of activities to optimise rational antimicrobial use in the facilities. There were eleven elements to this item, providing a maximum score of 11. The average score for participating Nursing homes was 2.5 out of 11 (median 3), which compared to an average score for Residential homes of 1.0 out of 11 (median 1.0).



Antimicrobial stewardship indicators	Total - 11 points
Which of following elements are present in the facility?	
'Annual regular training on appropriate antimicrobial prescribing' = 'Yes'	1 point
'Written guidelines for appropriate antimicrobial use (good practice) in the facility' = 'Yes'	1 point
'Data available on annual antimicrobial consumption by antimicrobial class' = 'Yes'	1 point
'A system that requires permission from a designated person(s) for prescribing of restricted antimicrobials, not included in local formulary' = 'Yes'	1 point
If 'Advice from a pharmacist for antimicrobial not included in the formulary' = 'Yes'	1 point
'A therapeutic formulary, comprising a list of antibiotics' = 'Yes'	1 point
If written therapeutic guidelines are present in the facility, are they on:	
'Respiratory tract infections?' = 'Yes'	1 point
'Urinary tract infections?' = 'Yes'	1 point
'Wound and soft tissue infections?' = 'Yes'	1 point
If 'Is a programme for surveillance of antimicrobial consumption and feedback in place in the facility?' = 'Yes'	1 point
If 'Does the facility use a restrictive list of antimicrobials to be prescribed? (requiring permission of a designated person or not to be used)' = 'Yes'	1 point

Figure 20 Antimicrobial stewardship indicators

5.8.6 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 appropriate antimicrobial treatments. The maximum possible score was 4 points. The average score for Nursing homes was 1.97 (median 2), for Residential homes the average score was 0.9 (median 1).

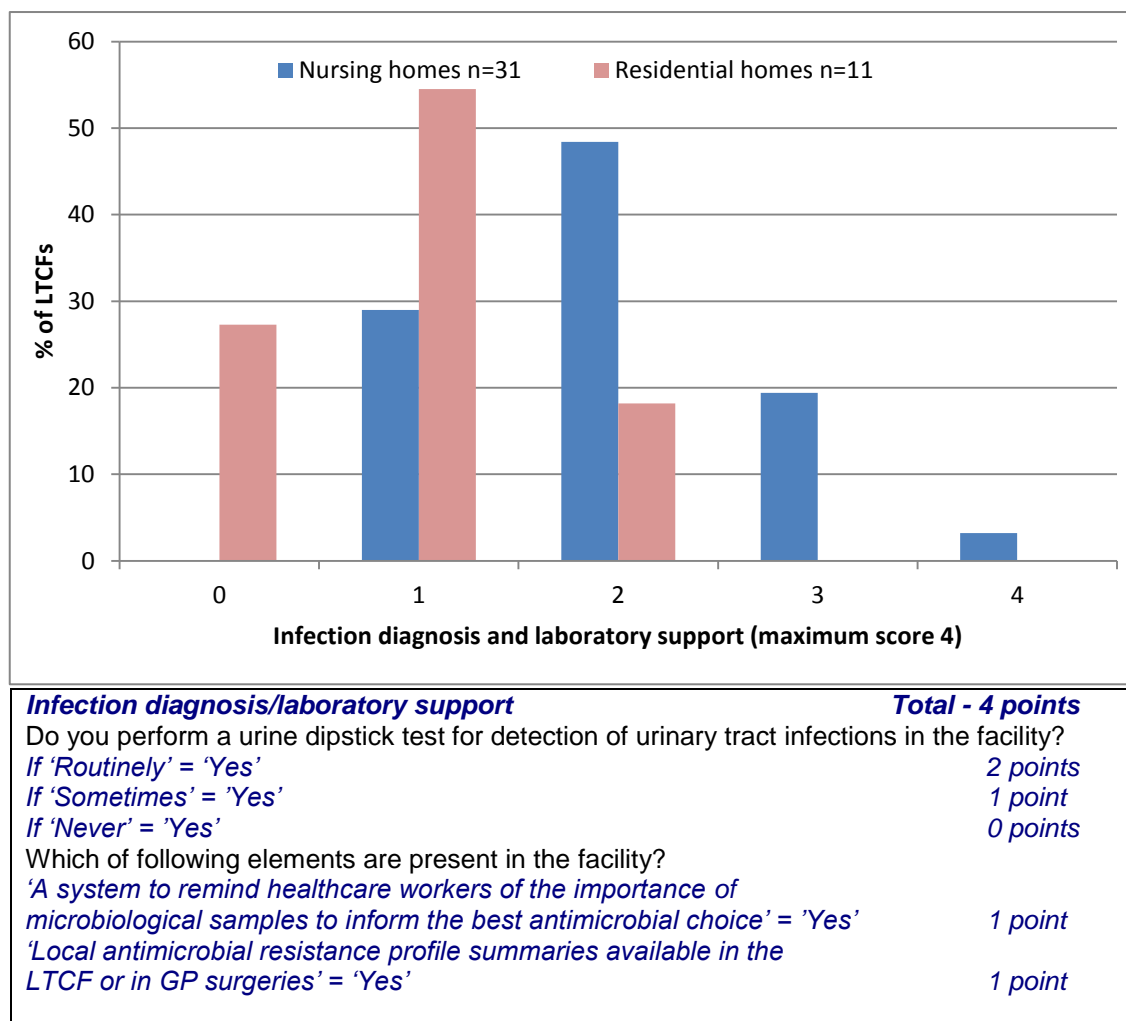


Figure 21 Infection diagnosis/laboratory support

5.8.7 Surveillance

Surveillance included the presence of certain surveillance activities with a maximum score of 3. The average score was 1.1 (median 1), comparable average score for Residential homes was 0.2 (median 0).

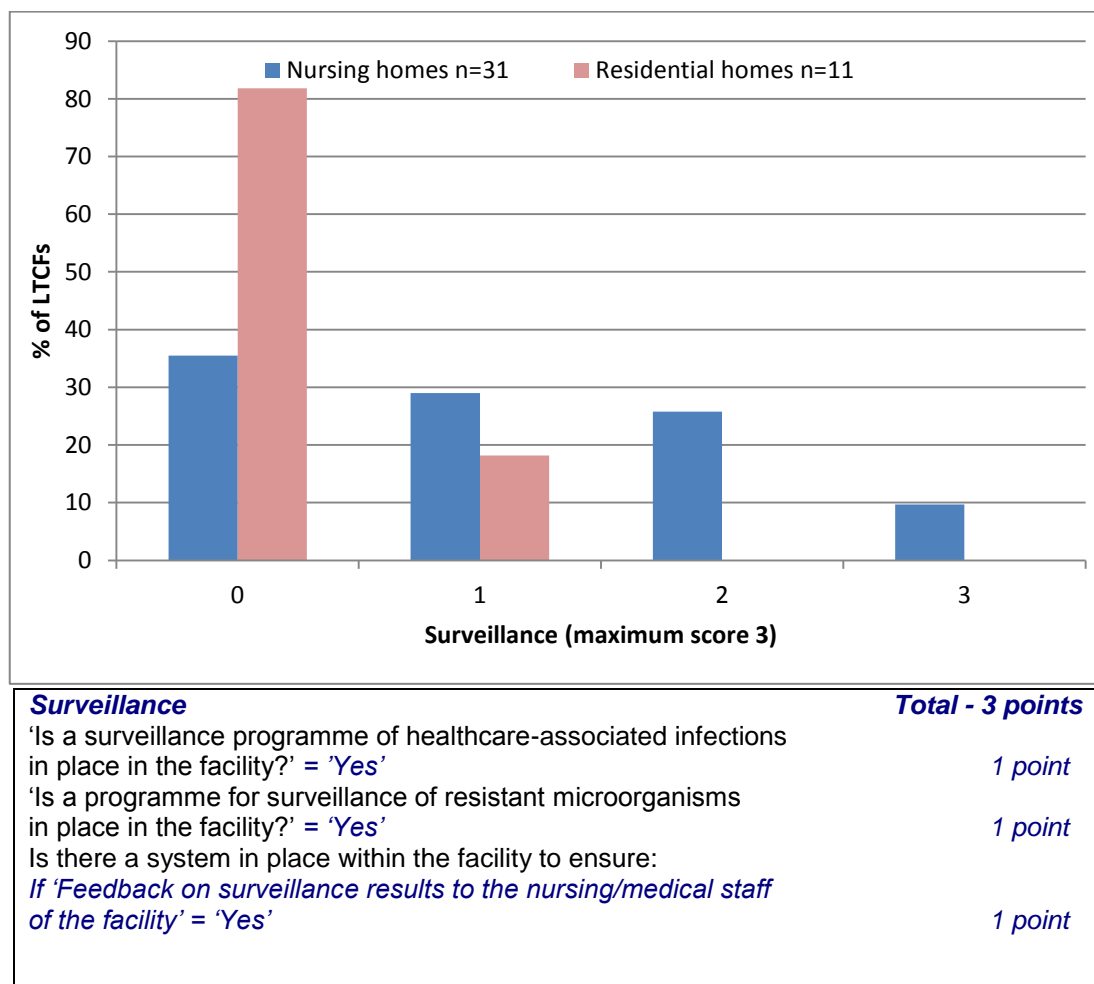


Figure 22 Surveillance programmes

5.8.8 Comparison of Nursing home scores in 2013 with 2010 survey

While the sample of Nursing homes that completed the survey in 2010 ^[13] was small, we examined the overall scores for the infection control and antimicrobial stewardship items in order to assess if there were any similarities or differences in the aggregate scores calculated. Generally, the distribution was similar between 2010 and 2013. As in 2010, average scores calculated for the 2013 data were higher for: hand hygiene, infection coordination and control, availability of protocols, but lower for clinical governance, infection diagnosis/laboratory support, antimicrobial stewardship and surveillance systems.

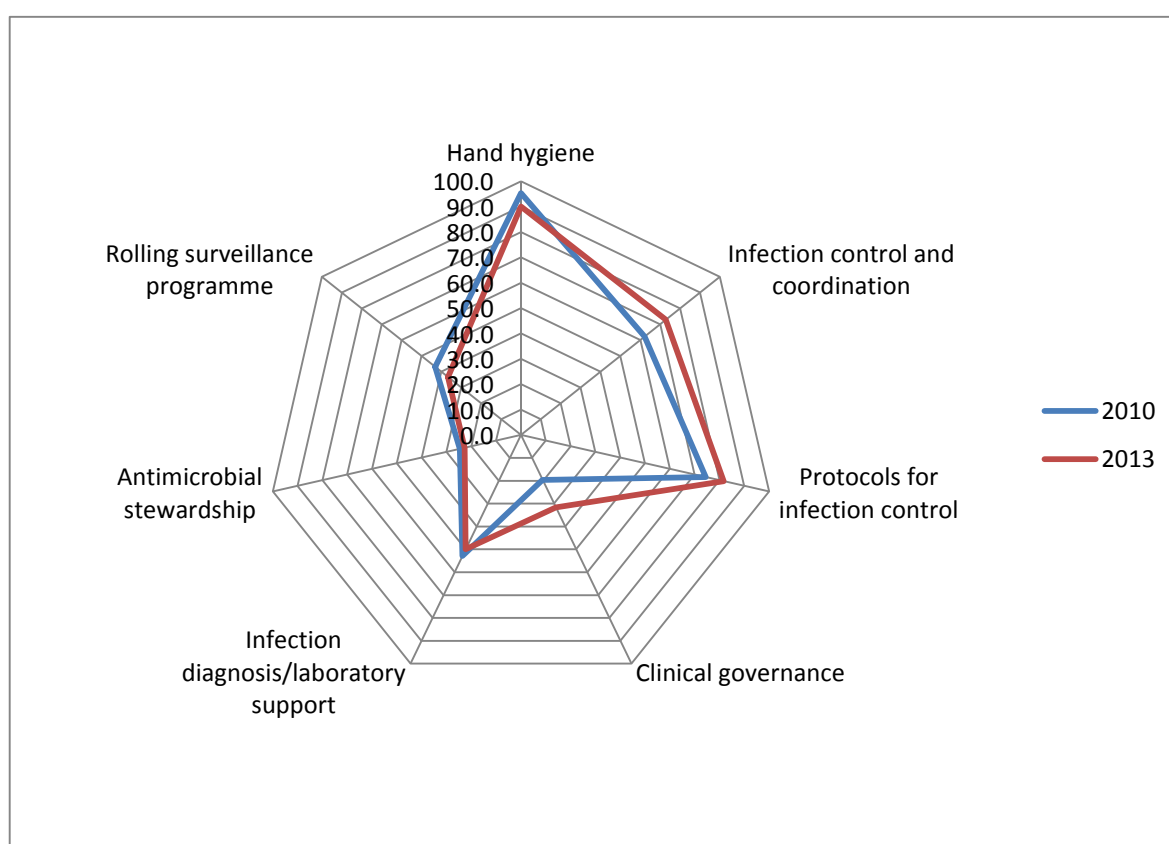


Figure 23 Comparison of infection control indicators between 2010 and 2013

SECTION 6 DISCUSSION

This report presents the prevalence of HCAI and antimicrobial prescribing in 42 Northern Ireland long-term care facilities (31 Nursing homes and 11 Trust-controlled Residential homes). In Northern Ireland, all Nursing homes that participated in the survey were privately run; mostly for profit (only one Nursing home was run on a non-profit basis). All patients had their own General Practitioner, so there was no common antibiotic stewardship in the facilities.

There are important caveats that must be acknowledged and the results should be interpreted with caution. Whilst prevalence surveys offer a fast, consistent and robust method for measuring HCAI in settings without resources for incidence surveillance, they measure a snapshot in time and are subject to variation.

6.1 Prevalence and distribution of HCAI

This survey was conducted during May/June 2013. On the day of survey, the prevalence of HCAI in Nursing homes was 5.5% and varied across homes from 0% to 25%. This result is higher than that reported for the 2010 HALT survey in 18 Nursing homes of 5.0%. However, caution should be used when comparing the 2013 and 2010 HALT results because of differences in protocols, definitions adopted and the Nursing homes taking part (only two Nursing homes took part in both studies).

In a prevalence survey performed in the acute care setting in 2012, the prevalence of infection in 'Care of the elderly' specialty' was 5.7%; which is similar to the 5.5% HCAI prevalence in Nursing homes and 5% HCAI prevalence in Residential homes in this survey^[14]. As the long-term care facility and hospital populations are dynamic with continual movement, the prevalence of HCAI in the acute setting may have an impact on infection rates within long-term care settings and vice versa. Older people living in long-term care homes are also encouraged to remain a part of the community and are therefore exposed to infections circulating within the community. For these reasons, it is not possible to determine whether the infections identified in this survey were community, hospital or care home associated infections.

This survey identified that incontinence, non-ambulant mobility, presence of urinary catheter and presence of pressure sores and other wounds were associated with an increased prevalence of HCAI.

Urinary tract infections (UTI) are a major challenge in both Nursing and Residential homes (UTIs accounted for 43.8% of all of the HCAs identified). The survey identified areas of concern around the frequency of uroprophylaxis and lack of end/review dates.

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

Patients of Nursing homes with pressure sores and other wounds (9% of the total population) were at greater risk of developing an infection than patients who did not. Approximately one in every four patients with either a pressure sore or other wound developed an infection compared to less than 1 in 25 patients without pressure sores/wounds who developed an infection.

A strategy for the prevention and control of HCAI in LTCFs should be developed to include antimicrobial stewardship and be implemented in conjunction with relevant PHA clinical care, quality and patient safety programmes, prescribers and LTCF staff. Clear roles and responsibilities should be outlined within the strategy.

6.2 Infection control provision in long term care facilities

Only one third of Nursing homes reported having an infection control committee and the frequency of meetings varied from 4 per year to zero meetings in the previous year. All Residential homes had an infection control committee. All Nursing homes indicated that they had access to staff with training in infection control, although, there was no indication as to the level of infection control expertise. In Residential homes 100% reported access to either the local Trust-based IPCT.

Written protocols for the management of: hand hygiene, MRSA carriers, management of urinary catheters and management of enteral feeding were reported in most Nursing homes and Residential homes. LTCFs should ensure that procedures are in place (e.g. care bundles) to prevent HCAI associated with risk factors including medical devices such as: urinary catheters, wounds and inappropriate antibiotic use. As relevant national guidelines are published, they should be implemented accordingly.

There is a need for an organised infection control structure within each LTCF. A person responsible for infection control (ideally a physician/nurse) should be identified in each LTCF. If there is external responsibility for infection control, e.g. individual in charge of infection control in several LTCFs, then the LTCF should have a 'reference person' working in close collaboration with the external infection control person. Those designated responsible for infection control should have training and responsibility for standard precautions, hand hygiene, management of additional precautions around antimicrobial resistance and antimicrobial stewardship.

Regional training courses specifically for those with responsibility for infection control staff in LTCFs should be organised on an annual basis.

6.3 Prevalence of antimicrobial use

The prevalence of antimicrobial use in Nursing homes was 7.3% (95% CI 6.6-8.1) and ranged from 0% to 27.8%. Prudent prescribing is a continuing challenge in the care home setting and it is important to highlight that in Northern Ireland long-term care facilities do not have the responsibility for prescribing; this responsibility lies with individual GPs who coordinate medical care for patients within these settings. This survey has shown that patients' medical care is predominately provided by external physicians, i.e. a patient's own general practitioner; unfortunately the numbers of GPs providing medical care was not collected in this survey.

LTCFs should have a protocol in place to manage requests for acute prescription items, including antimicrobials. This may include use of a standard template to relay information to a patient's GP, e.g. temperature, heart rate, respiratory rate, blood pressure, recent lab results, dipstick results, symptoms and duration of symptoms, recent antimicrobial treatment and other therapy and if patient has been seen by out-of-hours medical services or had recent hospital admission.

Results indicate that 89% of patients receiving urinary tract prophylaxis did not have an end/review date for the prophylaxis. All prescriptions for antimicrobials should have a stop or review date. Printing the stop/review date on prescriptions is good practice. Community pharmacies who prepare medication administration records or similar from prescriptions should ensure this information is transferred; they should also alert prescriber and Nursing home when this date is passed if a repeat prescription is requested. There is no evidence that prophylactic antimicrobials

prevent the onset of urinary tract infection in elderly patients therefore their use should be restricted only for specific circumstances as outlined in 2013 guidelines^[12].

In only 2 (3%) of the 70 infections identified in the survey were the results of microbiological tests available, i.e. in 68 infections neither the bacteria nor antibiogram was available. Urinary dipsticks should be used to help diagnose a UTI. A patient with a suspected UTI should have a specimen sent for culture before antibiotic therapy is commenced. Following review of microbiology results GPs should promptly inform staff in LTCFs of presence of HCAI or any other infections. Antibiotic therapy should be based on culture and susceptibility results.

6.4 Conclusions

Due to demographic changes, more and more elderly people in the coming years will depend on qualified nursing at home or in care facilities. This survey has provided an invaluable insight into the prevalence of HCAI and antimicrobial prescribing in such facilities in Northern Ireland. The methodology may be used in future to identify key infection types and antimicrobial practices for targeted interventions at a local and national level. Service providers are encouraged to use these data to target local HCAI prevention and control efforts appropriately.

This report has contributed to the understanding of antimicrobial prescribing practice within care home settings across Northern Ireland. Prudent antimicrobial prescribing in long term care home settings is essential to reduce the risk of *Clostridium difficile* infection and to slow the development of antimicrobial resistance.

This survey has highlighted a number of potential risk areas for infections, antimicrobial use and antimicrobial resistance at the institutional level and the patient level. Institutional risk factors identified included: infection and control expertise availability, empirical prescriptions based on microbiological sampling prior to prescription and numerous antimicrobial prescribers. Patient risk factors identified during the survey included, frailty (age), disabilities (mobility), incontinence (faecal/urinary) and wounds. The results of this survey provided evidence of the need to effectively implement Northern Ireland Management of Infection Guidelines for Primary Care 2013^[12].

This data can serve as a baseline for future surveillance studies in Ireland long-term care facilities, thus giving an opportunity for observation of trends.

Improvement in diagnosis & therapy of UTI could avoid a lot of unnecessary antimicrobial use. GPs rely on nurses' observations sometimes without examination of the patient before clinical decisions. Both nurses and GPs need clear definitions of UTIs, guidelines on diagnosis, prevention and treatment, and training on:

- value of positive dipstick/urine culture
- indications for prophylaxis
- management of recurrent UTIs
- indications for urinary catheter & management

Actions are required around prudent use of antibiotics and infection prevention & control in LTCFs in order to prevent healthcare-associated infections and avoid unnecessary antimicrobial therapy. There is a need to develop a framework plan for patient safety in LTCFs in Northern Ireland, including infection prevention & control and prudent use of antimicrobial agents.

All the Northern Ireland homes taking part in the survey will be supplied with the aggregate regional data as well as those relating to their particular home. The data will be discussed with the homes and the GPs in order to achieve further improvements in antibiotic therapy and restrictions for the use of invasive medical devices, which are well-known risk factors for HCAs.

Because of the standardised and harmonised methodology used in this survey, it will be possible to compare the data from various HALT surveys in other European countries (although we caution about the coverage and representativeness of the samples). Such comparisons can help to prevent infections and the increase in the prevalence of multidrug-resistant organisms.

The Public Health Agency will continue to work in partnership with Regulation and Quality Improvement Authority to facilitate, promote and sustain evidence based practice in infection prevention & control and use this practice to support regulatory activities to improve quality of care and safety for people living in care homes. A full EU-wide report containing Northern Ireland data is due to be published by ECDC in May 2014.

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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-2)

INSTITUTIONAL QUESTIONNAIRE

Remark: It is essential that each facility enrolled in HALT-2 completes this questionnaire as it collects vital data on structural & functional characteristics, denominators and antimicrobial and infection prevention & control policies in the participating settings. From our HALT-1 experience, we recommend that the person completing this questionnaire should be the one in charge of the facility. If s/he cannot answer some of the questions, s/he should please forward the questionnaire to other(s) who are able to answer those specific questions. This is especially relevant to the antimicrobial questions.

A – GENERAL INFORMATION

DATE OF THE SURVEY IN YOUR FACILITY _ _ _ _ 2 0 1 3

FACILITY STUDY NUMBER (allotted by your national HALT-2 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 RESIDENT ROOMS _ _ _ _ _ Rooms

Total number of SINGLE RESIDENT ROOMS _ _ _ _ _ Single rooms

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)	_ _ _ _ _
RESIDENTS ABSENT DUE TO HOSPITALISATION IN AN ACUTE CARE HOSPITAL	_ _ _ _ _
OCCUPIED BEDS	_ _ _ _ _
ELIGIBLE RESIDENTS, PRESENT (at 8 AM) IN THE FACILITY FOR AT LEAST THE PREVIOUS 24 h	_ _ _ _ _
RESIDENTS OVER 85 YEARS	_ _ _ _ _
MALE RESIDENTS	_ _ _ _ _
RESIDENTS RECEIVING ANY SYSTEMIC ANTIMICROBIAL THERAPY	_ _ _ _ _
RESIDENTS WITH SIGNS OR SYMPTOMS OF AN INFECTION	_ _ _ _ _
RESIDENTS WITH ANY URINARY CATHETER	_ _ _ _ _
RESIDENTS WITH ANY VASCULAR CATHETER	_ _ _ _ _
RESIDENTS WITH PRESSURE SORES	_ _ _ _ _
RESIDENTS WITH OTHER WOUNDS	_ _ _ _ _
RESIDENTS DISORIENTED IN TIME AND/OR SPACE	_ _ _ _ _
RESIDENTS USING A WHEELCHAIR OR BEDRIDDEN	_ _ _ _ _
RESIDENTS WITH SURGERY IN THE PREVIOUS 30 DAYS	_ _ _ _ _
RESIDENTS WITH URINARY AND/OR FAECAL INCONTINENCE	_ _ _ _ _

HALT-2 Institutional Questionnaire 2013

1

Institutional questionnaire collected general data (ownership, presence of a qualified nurse...), denominator data (total number of available and occupied beds, of hospitalised patients, of patients with signs/symptoms of infection, of AB users, of patients 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 in the LTCF.

Appendix 2 – Patient Questionnaire

Patient Questionnaire (Page 1)

RESIDENT STUDY NUMBER 		
<div style="display: flex; justify-content: space-between; align-items: center;"> <div> <p>Healthcare-associated infections and antimicrobial use in European long-term care facilities (HALT-2)</p> <p>RESIDENT QUESTIONNAIRE</p> </div> <div style="text-align: right;"> </div> </div>		
RESIDENT DATA		
GENDER	<i>Male</i>	<i>Female</i>
BIRTH YEAR	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 5px;"></div> (YYYY) </div>	
LENGTH OF STAY IN THE FACILITY	<i>Less than one year</i>	<i>One year or longer</i>
ADMISSION TO A HOSPITAL IN THE LAST 3 MONTHS	<i>Yes</i>	<i>No</i>
SURGERY IN THE PREVIOUS 30 DAYS	<i>Yes</i>	<i>No</i>
PRESENCE OF:		
URINARY CATHETER	<i>Yes</i>	<i>No</i>
VASCULAR CATHETER	<i>Yes</i>	<i>No</i>
INCONTINENCE (URINARY AND/OR FAECAL)	<i>Yes</i>	<i>No</i>
WOUNDS		
- PRESSURE SORE	<i>Yes</i>	<i>No</i>
- OTHER WOUNDS	<i>Yes</i>	<i>No</i>
DISORIENTATION (IN TIME AND/OR SPACE)	<i>Yes</i>	<i>No</i>
MOBILITY	<i>Ambulant</i>	<i>Wheelchair</i> <i>Bedridden</i>
<p>On the day of the survey, the resident:</p> <p><input type="checkbox"/> RECEIVES ANTIMICROBIAL THERAPY → COMPLETE PAGE 2 OF THIS QUESTIONNAIRE This includes: (i) Residents on prophylactic antimicrobials OR (ii) Residents on therapeutic antimicrobials (if commenced prior to admission, no signs/symptoms should be recorded)</p> <p><input type="checkbox"/> PRESENTS SIGNS/SYMPTOMS OF AN INFECTION → COMPLETE PAGE 3 TO 6 OF THIS QUESTIONNAIRE Signs/symptoms not present or incubating at admission AND patient not on antimicrobials</p> <p><input type="checkbox"/> BOTH: ANTIMICROBIAL USE AND SIGNS/SYMPTOMS (s/s) OF AN INFECTION → COMPLETE ALL PAGES This includes: (i) Residents with s/s AND on antimicrobials today (whether or not linked to same infection site) OR (ii) Residents whose s/s have resolved but who are still receiving antimicrobials for that infection</p>		
<p><small>Important remark: We strongly recommend you to write <u>the resident study number on each of following pages</u> (right top of each page), in order to keep data of one single resident together.</small></p>		
<div style="display: flex; justify-content: space-between;"> HALT-2 Resident questionnaire 2013 1 </div>		

Patient questionnaire was completed for each patient who had ‘Condition of interest’, i.e. **a]** antibiotic use on the day of the survey and/or **b]** 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]:

a) *Antibiotic use on the day of the survey:*

All oral, rectal, intramuscular (IM) and intravenous (IV) treatments with antibacterials and antimycotics for systemic use, drugs for the treatment of tuberculosis and AB treatment by inhalation (aerosol therapy) were included. Antiseptics, antivirals and antimicrobials for topical use were excluded from this survey. The use of local antibiotics was only explored (as a yes/no question) for patients with signs/symptoms of a skin or wound infection or of conjunctivitis. Questions were asked on isolated microorganisms:

- If a culture sample was taken before or at the time the antibiotic was prescribed.
- isolated microorganisms with regard to the treated infection
- antibiotic resistance pattern for eight microorganisms of interest , i.e.
Acinetobacter baumannii - carbapenem resistant, *Enterobacter* - 3rd generation cephalosporin R, *Enterococcus* - glycopeptides R, *Escherichia coli* - 3rd generation cephalosporin R, *Klebsiella pneumoniae* - 3rd generation cephalosporin R, *Proteus mirabilis* - 3rd generation cephalosporin R, *Pseudomonas aeruginosa* - carbapenem R

b) *Infected patient on the day of the survey*

Only infections not already present or in incubation at the time of (re)admission could be included. All signs/symptoms (s/s) of an infection presented by the patient on the day of the survey had to be indicated, as well as all signs/symptoms of an infection no longer present on the survey day but present in the preceding days in a patient who was still being treated with an antimicrobial on the survey day.

In order to confirm infections specific criteria were applied. These were based on the McGeer^[15] definitions for infection surveillance in LTCFs. Not all of the patients presenting with signs/symptoms of an infection met the criteria required in the definition. The signs/symptoms were not forwarded to the Public Health Agency. Infections recorded were urinary tract infections, skin infections (including cellulitis/soft tissue/wound infections, fungal skin infections, herpes simplex and herpes zoster infections and scabies), respiratory tract, gastrointestinal tract infections, eye/ear/nose/mouth infections, systemic infections (primary bloodstream infections), unexplained febrile episodes and other infections.

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) indicators
- III. Hand hygiene (HH) indicators
- IV. Protocols for ICC
- V. Antimicrobial stewardship indicators
- 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' | <i>1 point</i> |
|--------------------------------------|----------------|

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

- | | |
|--|----------------|
| If 'The nursing staff' = 'Yes' | <i>1 point</i> |
| If 'The physician in charge of medical coordination in the setting?' = 'Yes' | <i>1 point</i> |

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

*** * ***

