Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

Report of the findings of the Extended Point Prevalence Survey of Antimicrobial Use in HSE Older Persons Residential Care Facilities

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Table of Contents

Index of Tables and Figures

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- Professor Martin Cormican, AMRIC National Clinical Lead & Consultant Microbiologist
- Dr Nuala O'Connor, ICGP Lead for AMRIC & previous member of HALT 2016 Steering Group
- Dr Eimear Brannigan, Consultant in Infectious Diseases, AMRIC
- Marie Philbin, Chief Antimicrobial Pharmacist, AMRIC

1.0 EXECUTIVE SUMMARY

A baseline Point Prevalence Survey (PPS) of Antimicrobial Use was conducted in 70% of HSE Residential Care Facilities for Older Persons in Ireland from October to December 2020 in five of the nine Community Healthcare Organisations (CHOs) (86 facilities, 3082 residents). This survey was extended into the remaining 30% of HSE Residential Care Facilities for Older Persons in the remaining four CHOs from April to August 2021 (an additional 35 facilities, 1366 residents).

Data was collected in all cases by CHO-based antimicrobial pharmacists (AMPs). Appointment of CHO-based antimicrobial pharmacists to support a national community antimicrobial stewardship programme in Ireland was a new service development for the HSE in 2020, with support from the Department of Health. Senior antimicrobial pharmacists (AMPs) were in position in five CHOs in 2020 (CHO 1,3,4,5 & 8) with positions in the other four CHOs filled in 2021 (CHO 2,6,7 & 9).

This consolidated report includes the findings of both the 2020 and 2021 surveys whereby data from the two study periods have been merged, with data presented for a total of 4448 residents, representing 100% of all HSE Older Persons Residential Care Facilities (RCFs) in Ireland. A limitation to merging the two study periods is seasonal variation which can influence antimicrobial prescribing rates.

Forty two percent of the facilities had previously participated in a European-wide point prevalence survey, of 'Healthcare-Associated Infection and Antimicrobial Use in Long-Term Care Facilities' (known as the HALT study) in 2016.[1] In the HALT study, residents in Irish residential care settings were found to be twice as likely to be on antimicrobial therapy as the European average (9.8% vs 4.9%).[1,2] For CHO-based AMPs, re-assessment of prevalence and quality of antimicrobial use in long-term care facilities including supporting systems and structures was considered a priority to identify any changes in practice from 2016, inform targets for improvement and provide a baseline from which to measure improvement. This report includes broad comparisons to findings of the HALT Study 2016 and the PPS 2020. Limitations to making comparison to HALT 2016 findings include differences in the quantity and types of facilities surveyed and that this survey was conducted during the COVID-19 pandemic which may have influenced findings and seasonal variation.

Data collection was conducted in person by an AMP with the survey focussed solely on antimicrobial use. However, in addition to certain data fields collected in HALT 2016, this PPS included additional information regarding antimicrobial use including a 30-day review of antimicrobials to give a richer dataset, assessment of adherence of active antimicrobial prescriptions to national community antimicrobial prescribing guidelines (www.antibioticprescribing.ie), duration of antimicrobial therapy and quality indicators of antimicrobial use (such as documentation of allergy, indication and stop date).

Summary of findings:

Quantity of antimicrobial use:

- Prevalence of total antimicrobial use was higher than the previously measured Irish or European average with 12% of residents on antimicrobials on the day of survey over the two study periods (Irish prevalence was 9.8% and European average prevalence was 4.9% for long term care facilities (LTCFs) in the HALT study 2016).[1,2]
- Prevalence of antimicrobial use for prophylaxis of infection was also higher than the previously measured European average, accounting for 50% of total antimicrobial use, with 6.3% of all residents being on prophylactic therapy. (European average prevalence 29% of total antimicrobial use, with approximately 1.5% of residents on prophylaxis).[2]

Quality of antimicrobial prescribing:

- Documentation of allergy status was 97%, penicillin allergy was documented for 10.3% of residents. Anecdotally, the nature of allergy was not well defined for penicillin allergy.
- Adherence with choice of antimicrobial agent as per national community antimicrobial prescribing guidelines was 69% and adherence of dosing regimen as per guidelines was 72%.
- Duration of antimicrobial therapy was specified in 45% of antimicrobial prescriptions (n=253). Therapeutic prescriptions had a documented stop/review date in 81% of cases. Prophylactic prescriptions only had a documented stop/review date in 9% of cases, which was less than ideal.
- Adherence with duration of antimicrobial therapy as per national community antimicrobial prescribing guidelines was only 37%.
- Indication for antimicrobial prescription was documented in 58% of cases.
- Some of the main themes identified for non-adherence with guidelines regarding choice of antimicrobial agent(s) included use of nitrofurantoin in renal impairment (where use was contraindicated), use of broad spectrum agents in the absence of clear rationale and the identification of antimicrobial resistance to the prescribed antimicrobial in recent microbiology culture and susceptibility results. (Examples of non-adherence provided in Appendix 1)
- Adherence to guidelines was considered non-assessable for 25% of prescriptions due to absence of guidelines or insufficient clinical information. A list of infections where absence of community antimicrobial prescribing guidelines was identified was collated and this information has been submitted to the www.antibioticprescribing.ie website working group for review and development if deemed appropriate. (Appendix 2)
- A number of complex cases in relation to prolonged suppressive antimicrobial therapy were identified, often associated with an underlying infected bone, joint or prosthesis, where surgical intervention was not an option to address the source of infection.
- Approximately 50% of assessable residents had normal renal function, and approximately 50% had some degree of renal impairment which reflects one of several challenges for antimicrobial stewardship, and prescribing in general, in this vulnerable population (in addition to polypharmacy, dysphagia and presence of antimicrobial

resistance). Renal function is an important aspect to consider when prescribing antimicrobials to minimise antimicrobial-related harm.

Types of antimicrobials in use:

- There was high usage of 'green' (preferred) antimicrobials in comparison to 'red' (reserved) antimicrobials (65% vs 30%); a simple categorisation used in community settings to differentiate agents which are less associated with adverse effects and development of antimicrobial resistance versus those which are more associated with adverse effects and development of antimicrobial resistance.[3] (Appendix 3)
- Although remaining the most common agent used for treatment of infection, the use of co-amoxiclav (a 'red' antimicrobial) had reduced from 38% of therapeutic prescriptions as seen in HALT 2016[1] to 19% of therapeutic prescriptions in this PPS.
- The use of clarithromycin (a 'red' antimicrobial) had reduced, dropping out of the top five agents used for treatment of infection in HALT 2016[1], to position seven, with use of nitrofurantoin, a 'green' agent now taking its place in the top five agents used.

Focus on prophylaxis:

- The most common indication for prophylactic antimicrobial therapy was urinary tract infection (UTI) prophylaxis, which accounted for the majority of all prophylactic prescriptions (78%), and 5% of all residents. This was a high prevalence in this cohort of residents, with HALT 2016 reporting a prevalence of 3.4% prophylactic prescriptions for UTI across all facility types surveyed.[1]
- Co-amoxiclav was amongst the top five agents used for prophylaxis in this PPS, a new finding compared to previous studies. This is a concern due to its broad spectrum of activity and propensity for adverse effects such as development of *Clostridioides difficile* infection, *Candida spp*. infections and development of antimicrobial resistance.
- For the first time in residential care facility settings, duration of prophylaxis was assessed and this study found that 66% of prophylactic prescriptions had been prescribed for a duration in excess of six months, and 57% of prophylactic prescriptions had been prescribed for a duration in excess of twelve months which is longer than recommended.[9,10] It is recommended that a trial of urinary tract prophylaxis should not exceed six months, and azithromycin prophylaxis for Chronic Obstructive Pulmonary Disease should not exceed one year without review.

Systems and Structures to support Antimicrobial Stewardship:

- Influenza vaccination was offered seasonally in 100% of facilities to all long-term care residents which is a very positive finding, and uptake amongst residents was in excess of 95%.
- Record keeping in relation to pneumococcal vaccination uptake had scope for improvement with only 39% of facilities tracking records of pneumococcal vaccination status in their residents (recommended as a single dose in people over 65 years of age).[12]

- There was a reduced incidence of facilities using dipstick urinalysis routinely to support diagnosis of urinary tract infection (UTI) when compared to HALT 2016 (reduced from 69% to 42%) which is positive.[1] However, the routine use of dipstick urinalysis to support diagnosis of UTI in asymptomatic residents remains high as this practice is not recommended.[9] The remaining facilities (with the exception of 2 facilities in CHO 7) used dipstick urinalysis to support UTI diagnosis when accompanied by signs and symptoms of infection. The use of dipstick urinalysis in this context is not a useful guide to management and is not recommended. This is echoed by the recent publication of 'Position statements for the use of dipstick urinalysis in assessing evidence of UTI in adults' (October 2021, hosted on www.antibioticprescribing.ie).
- A significant number of facilities were recording antimicrobial use locally (64%) to monitor antimicrobial consumption which is positive, however methods and details recorded were variable and no analysis or feedback to prescribers was identified. At the time of writing, a process for collection of a standardised monthly minimum dataset to monitor ongoing prevalence of healthcare associated infection/antimicrobial resistance (HCAI/AMR) and antimicrobial consumption has been developed and made available to all HSE RCFs for Older Persons to facilitate ongoing national, regional and local surveillance, with analysis, reporting and feedback.
- Approximately one third of facilities surveyed did not have onsite electronic access to laboratory results for biochemistry (e.g. infection markers, renal assessment) and microbiology (e.g. culture and susceptibility data). This impacts timeliness of decision-making and access to the appropriate information to guide those clinical decisions e.g. markers of infection, presence of resistant organisms and selection of appropriate antimicrobial(s). It also negatively impacted assessment of antimicrobial therapy by AMPs.
- Awareness of the national community antimicrobial prescribing guidelines amongst medical staff who prescribe antimicrobials was not assessed as part of this PPS. Awareness was low amongst nursing staff (7%)
- Access to AMS education was reported as being limited (4%), similar to finding from HALT 2016.
- Across all CHO regions, there was no access amongst facilities surveyed to local antimicrobial resistance trends for the population served.

The results of the survey show that improvements are necessary to ensure that antimicrobial use in HSE Older Persons facilities is optimised. This in turn, will reduce the harm associated with antimicrobial use, improve the safety of residents in terms of minimising adverse effects, *Clostridioides difficile* infection and development of antimicrobial resistance.

The key recommendations from this survey are detailed overleaf, and a quality improvement plan has been developed and is in progress. The results for every facility surveyed in the PPS has been provided to each individual facility, with direct engagement from the AMP to provide feedback, support and education and to facilitate quality improvement where necessary. Each CHO has received a CHO-level report of findings for facilities within their organisation.

2.0 KEY RECOMMENDATIONS

KEY RECOMMENDATIONS

- The extent and duration of antimicrobial prescriptions for prophylaxis of urinary tract infection should be addressed. Every resident on urinary prophylaxis in excess of six months should be reviewed with a view to deprescribing.

- The practice of routine use of dipstick urinalysis for asymptomatic residents (every resident on admission and/or every few months) to support diagnosis of a urinary tract infection should cease.

- Pneumococcal vaccination status should be determined, and appropriately documented, for any new or existing residents in HSE Older Persons facilities, with vaccination provided as necessary for residents aged greater than 65 years in line with National Immunisation Guidelines.

- Electronic access to relevant laboratory results should be available in all HSE Older Persons facilities, to support timely and well-informed decision-making and optimal use of antimicrobials.

- All clinical staff involved in prescribing, dispensing and administering antimicrobials in HSE Older Persons facilities should be aware of and refer to www.antibioticprescribing.ie which contains the national antimicrobial prescribing guidelines for community. New guidelines/content should be developed as appropriate at national level where absence of guidelines has been identified.

3.0 INTRODUCTION

A Point Prevalence Survey (PPS) of Antimicrobial Use was conducted in HSE Older Persons Residential Care Facilities (RCFs) in the period October to December 2020 in five of nine Community Healthcare Organisations (CHOs) in Ireland (Study Period 1), and this was extended to the remaining four CHOs between April and August 2021 (Study Period 2).

In 2020, the Department of Health provided significant funding to support the implementation of Ireland's National Action Plan on Antimicrobial Resistance (iNAP) 2017-2020, which enabled the recruitment of an antimicrobial pharmacist (AMP) in each of the nine CHOs in Ireland. Senior antimicrobial pharmacists (AMPs) were in position in five CHOs in 2020 with positions in the remaining four CHOs filled in 2021. This survey was conducted in those CHOs with newly appointed senior antimicrobial pharmacists.

This report outlines the consolidated findings of point prevalence surveys of antimicrobial use conducted in 119 (100%) HSE Older Persons RCFs in the nine Community Healthcare Organisations. Study period 1 represented approximately 70% of all HSE Older Persons Residential Care Facilities (RCFs) in Ireland, and Study Period 2 represented the remaining 30% of all HSE Older Persons RCFs in Ireland.

In a European-wide Point Prevalence Survey of Healthcare-Associated Infection and Antimicrobial Use in Long-Term Care Facilities (HALT) 2016, residents in Irish RCFs were found to be twice as likely to be on antimicrobial therapy as the European average (9.8% vs 4.9%).[1,2] For CHO-based AMPs, re-assessment of prevalence and quality of antimicrobial use in long-term care facilities including supporting systems and structures was considered a priority to identify any changes in practice from 2016, establish a baseline from which to measure improvement, and inform targets for improvement. This report includes broad comparisons to findings of the HALT Study 2016. Limitations to making comparison to HALT 2016 findings include differences in the quantity and types of facilities surveyed, seasonal variation (summer versus winter) and that this survey was conducted during the COVID-19 pandemic which may have influenced findings. In 2016, 224 Irish long term care facilities took part in the HALT study, a combination of HSE (n=136, 61%), private (n=54, 24%) and voluntary (n=34, 15%), and included a variety of settings, with the majority from older persons facilities but also included intellectual disability (n=31), mental health (n=23) and palliative care (n=7) facilities. This PPS was conducted in HSE facilities for Older Persons only.

In contrast to previous HALT studies, where data collection was conducted by local data collectors within a facility, in this instance, data collection was conducted in person by the AMP. Data on healthcare-associated infection was not gathered and the survey focussed solely on antimicrobial use. However, in addition to antimicrobial data fields collected by HALT, this PPS included additional information namely adherence of antimicrobial prescribing to antimicrobial prescribing guidelines, rate of antimicrobial use over 30 days and duration of antimicrobial therapies. It is worth noting that non-adherence should not necessarily be interpreted as poor practice, but simply that it deviates from the specified guidelines. It is recognised that clinical judgement applies to the use of all antimicrobial agents. Adherence was assessed to provide intelligence and examine where supports may be required or guidelines may need to be enhanced or developed. To provide an example; for treatment of

an uncomplicated urinary tract infection (UTI), cefalexin is an option recommended in the national guidelines at a dose of 500mg twice daily, however, in the PPS, 23 instances were identified where a dose of 500mg three times daily was prescribed. Whilst this dose is safe and effective, it was classified as non-adherent regarding dosing regimen when assessed against guidelines as it represents an opportunity for reducing antimicrobial exposure when a twice daily dose is considered adequate.

4.0 PPS OBJECTIVES

i. To assess the quantity of antimicrobial use in HSE RCFs for Older Persons
ii. To assess the quality and type of antimicrobial use against relevant antimicrobial guidelines (www.antibioticprescribing.ie or local guideline)
iii. To examine systems and structures in place to support antimicrobial stewardship in HSE Residential Care Facilities (RCFs) for Older Persons
iv. To provide CHO-based Antimicrobial Pharmacists (AMPs), Health Service Executive (HSE), Department of Health, the managers, doctors, nurses and pharmacists caring for residents in all of the participating facilities with information for action to influence positive antimicrobial stewardship practice
v. To provide a benchmark of antimicrobial use in HSE RCFs for Older Persons against which future antimicrobial stewardship initiatives can be measured

5.0 METHODOLOGY

The Point Prevalence Survey of Antimicrobial Use was conducted across all HSE residential care facilities for older persons in five of nine CHO's (n=86) from October to December 2020, and extended to the remaining four CHOs (n=35) from April to August 2021. Due to differing prescribers and arrangements within single facilities (e.g. rehabilitation service, off-site unit), a number of facilities requested separate examination and results for different services in their facility, similar to the HALT 2016, and this was facilitated (Total facilities/services n=135).

The survey was conducted by CHO-based AMPs, facilitated by Residential Care Facility Managers and Staff and was led and co-ordinated by the Chief Antimicrobial Pharmacist in Quality & Patient Safety, HSE Community Healthcare. The National Antimicrobial Resistance and Infection Control (AMRIC) team and the previous HALT study coordinator Dr Karen Burns were consulted on design, findings and recommendations.

Data collection forms, survey protocol and data entry tools were designed with reference to the previous HALT study in 2016. All HSE RCFs for Older Persons were identified within the participating CHOs and the Director of Nursing (DON) in each facility was contacted by the AMP in advance of the survey to arrange a suitable day and time for data collection. Generally, smaller sites were surveyed on one day; some larger sites took more than one day. Appropriate infection prevention and control precautions were taken to mitigate the risk of contracting and transmitting COVID-19.

On the day of the PPS, all eligible residents (i.e. those present at 8am who normally resided in the facility) were surveyed for demographic details, antimicrobials currently prescribed and

antimicrobials prescribed over the previous 30 days. As per HALT study methodology, antivirals and topical antimicrobial agents were excluded.[1]

On the day of the site visit, where possible, available nursing staff were also provided with education by the AMP regarding access to national community antimicrobial prescribing guidelines. Feedback was also provided by the AMP on any issues with antimicrobial use that were identified during the PPS.

Data were collected on paper forms and subsequently entered electronically to Microsoft Excel for analysis, with use of a HSE shared drive to facilitate national collation and analysis. All data were checked for errors, omissions and inconsistent answers before analysis.

The output of this PPS includes this consolidated National report, an earlier National report detailing the findings of the first study period in 2020,[13] local PPS reports, and CHO-level reports provided by AMP's to each of the participating facilities and CHO managers (total individual reports 135, CHO reports 9).

PPS findings are presented next in tables and graphs in Section 6.0 .

6.0 FINDINGS:

Findings of the extended Point Prevalence Survey are presented in this section in a series of tables and figures. Study findings are explained in more detail in the discussion section that follows.

6.1 OVERVIEW OF FACILITY AND DEMOGRAPHIC DATA:

Table 1: Facility & Demographic data

		CHO 1	CHO 2	CHO 3	CHO 4	CHO 5	CHO 6	CHO 7	CHO 8	CHO 9	National
Facility Demographics											
Number of facilities/ services surveyed		22	20	13	28	21	3	7	15	6	**135**
Bed capacity		812	821	474	1195	761	228	480	642	286	**5699**
% bed occupancy		74%	68%	80%	81%	77%	82%	83%	85%	77%	**78%**
Number of residents surveyed		602	558	378	965	589	188	398	548	220	**4446**
Type of beds surveyed	Long term	79% *(n=476)*	83% *(n=465)*	85% *(n=322)*	89% *(n=858)*	80% *(n=471)*	100% *(n=188)*	99% *(n=392)*	99% *(n=540)*	99% *(n=218)*	**88% *(n=3930)***
	Rehab	6% *(n=35)*	4% *(n=22)*	13% *(n=49)*	4% *(n=42)*	10% *(n=57)*	0%	0%	0%	0%	**5% *(n=205)***
	Palliative	1% *(n=8)*	0% *(n=1)*	1% *(n=3)*	0% *(n=1)*	1% *(n=8)*	0%	0%	0% *(n=2)*	0%	**1% *(n=23)***
	Short-stay	8% *(n=48)*	13% *(n=70)*	1% *(n=3)*	5% *(n=52)*	6% *(n=38)*	0%	0%	1% *(n=5)*	0%	**5% *(n=216)***
	Respite	1% *(n=6)*	0% *(n=2)*	1% *(n=2)*	1% *(n=12)*	3% *(n=15)*	0%	0% *(n=1)*	0% *(n=1)*	1% *(n=2)*	**1% *(n=41)***
	Other	6% *(n=34)*	0%	0%	0%	0%	0%	1% *(n=5)*	0%	0%	**1% *(n=39)***
Resident Demographics											
% Male		45%	41%	38%	40%	44%	41%	36%	40%	33%	**40%**
Age (yrs)	<65	6%	7%	3%	7%	5%	3%	7%	6%	2%	**6%**
	65-75	13%	17%	13%	14%	17%	15%	14%	16%	11%	**15%**
	75-85	37%	34%	37%	36%	42%	36%	42%	36%	42%	**38%**
	>85	44%	42%	46%	44%	36%	46%	37%	42%	45%	**42%**

6.2 PRESENCE OF DEVICES:

Table 2: Prevalence of indwelling urinary catheters and intravascular devices

	CHO 1	CHO 2	CHO 3	CHO 4	CHO 5	CHO 6	CHO 7	CHO 8	CHO 9	National
Presence of devices										
Residents with Urinary Catheter	9% *(n=54)*	10% *(n=55)*	10% *(n=37)*	7% *(n=69)*	8% *(n=47)*	5% *(n=10)*	5% *(n=19)*	7% *(n=41)*	6% *(n=13)*	**8% *(n=345)***
Residents with a IV line (PVC (n=6)/CVC/PICC (n=5))	0.3% *(n=2)*	0%	0.3% *(n=1)*	0.2% *(n=2)*	0%	0%	0%	0%	2.8% *(n=6)*	**0.2% *(n=11)***

6.3 QUANTITY OF ANTIMICROBIAL (AM) USE:

Table 3: Quantity of antimicrobial use on the day of survey

	CHO 1	CHO 2	CHO 3	CHO 4	CHO 5	CHO 6	CHO 7	CHO 8	CHO 9	National
Prevalence of antimicrobial (AM) use on day of survey										
Prevalence of Residents on active AM	14% *(n=87)*	13% *(n=74)*	14% *(n=52)*	12% *(n=112)*	15% *(n=90)*	5% *(n=9)*	7% *(n=28)*	11% *(n=61)*	7% *(n=15)*	**12% *(n=528)***
% residents on therapeutic AM	7.5%	4.1%	8.5%	6.3%	5.4%	3.7%	3.3%	4.7%	4.1%	**5.9%**
% residents on prophylactic AM	7.0%	9.1%	5.3%	5.3%	9.8%	1.1%	3.8%	6.4%	2.7%	**6.3%**
Number of active AM prescriptions	99	78	54	119	95	9	29	66	15	**564**

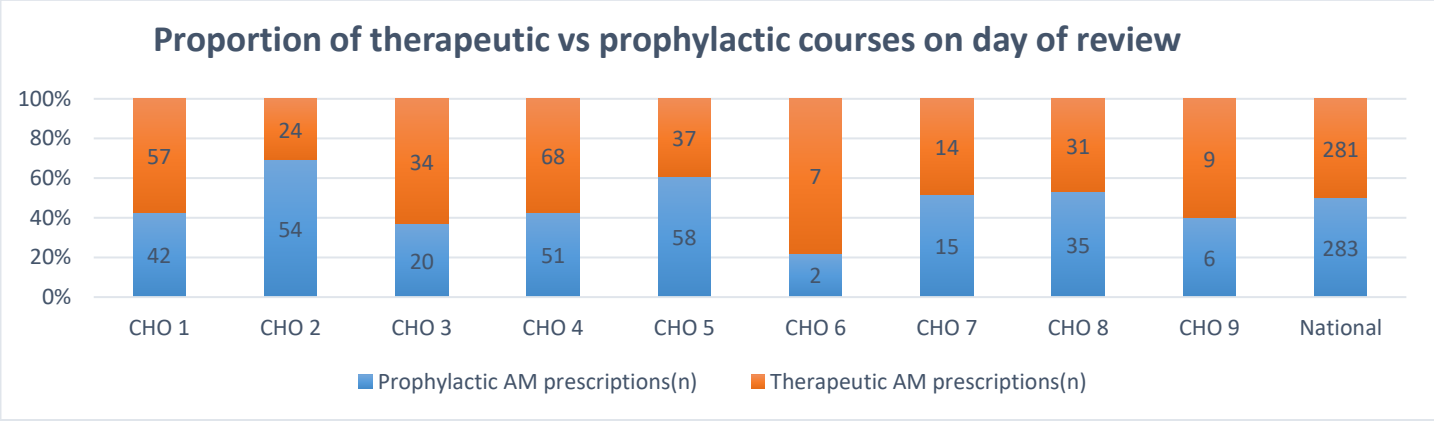


Figure 1: Proportion of therapeutic vs prophylactic antimicrobial use in each CHO on day of survey

There were 564 active AM prescriptions on day of survey. 50% were for treatment (5.9% of all residents), 50% were for prophylaxis (6.3% of all residents).

Table 4: Quantity of Antimicrobial Use over 30 days

	CHO 1	CHO 2	CHO 3	CHO 4	CHO 5	CHO 6	CHO 7	CHO 8	CHO 9	National
Prevalence of antimicrobial use over 30 days										
% Residents on AM therapy in the last 30 days	30% *(n=183)*	26% *(n=146)*	29% *(n=111)*	27% *(n=262)*	33% *(n=192)*	19% *(n=35)*	21% *(n=83)*	26% *(n=145)*	19% *(n=41)*	**27% *(n=1198)***
Number of AM agents prescribed over 30 days	250	186	141	334	247	40	111	209	56	**1574**
Rate of AM days per 1000 resident days	140	152	117	113	172	53	86	122	63	**123**

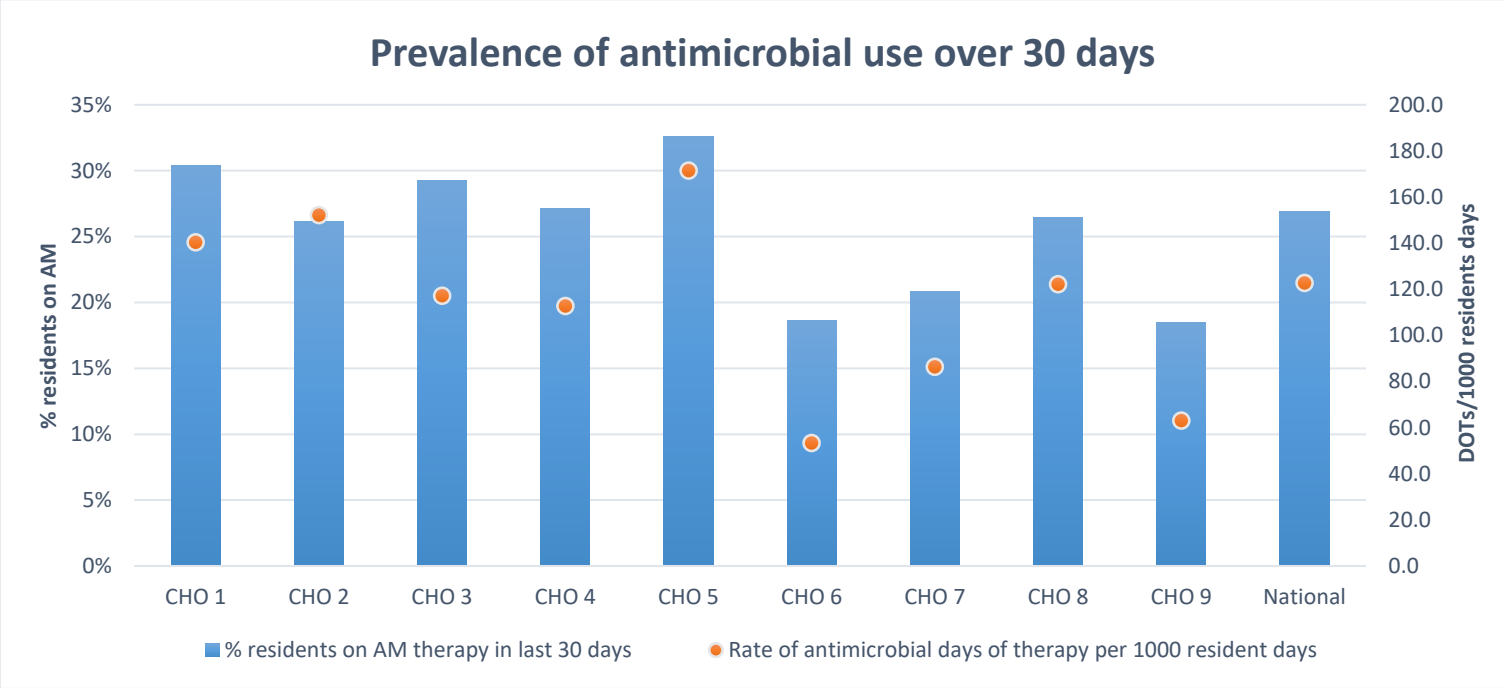


Figure 2: Prevalence of antimicrobial use in each CHO over a 30-day period

The Days Of antibiotic Therapy (DOTs) per 1000 resident days was calculated and shown on Figure 2; a reliable standardised measure of assessing prevalence of antimicrobial use which can be used as a benchmark.

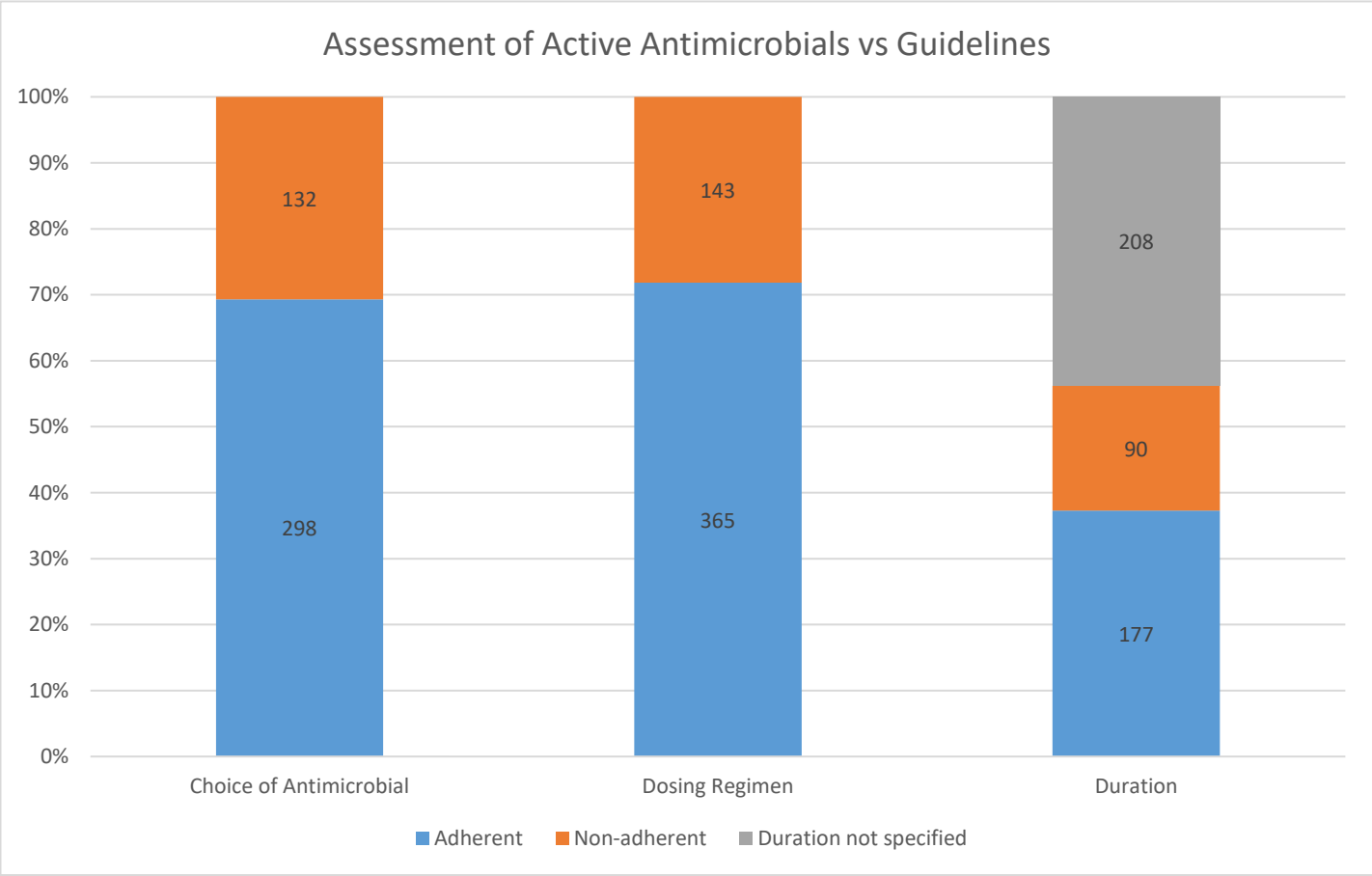
6.4 QUALITY OF ANTIMICROBIAL USE:

A series of indicators were assessed for antimicrobial prescriptions on the day of survey based on good practice for antimicrobial stewardship and medication safety.

Table 5: Quality indicators of antimicrobial use

	CHO 1	CHO 2	CHO 3	CHO 4	CHO 5	CHO 6	CHO 7	CHO 8	CHO 9	National
Allergy status documented[$]	97% *(n=582)*	96% *(n=535)*	97% *(n=367)*	99% *(n=954)*	97% *(n=573)*	97% *(n=182)*	91% *(n=364)*	97% *(n=532)*	99% *(n=217)*	**97% *(n=4306)***
Documentation of indication	64%	59%	65%	50%	55%	78%	66%	52%	87%	**58%**
Documentation of stop/review date	46%	32%	44%	48%	42%	78%	59%	41%	67%	**45%**
Urine specimens sent to laboratory prior to antimicrobial prescribing for therapeutic UTI										
Specimen sent	42% *(n=10)*	36% *(n=4)*	69% *(n=11)*	60% *(n=18)*	73% *(n=8)*	75% *(n=3)*	40% *(n=2)*	62% *(n=8)*	*NA*	**56%** *(n=64)*
Unknown if specimen sent	17% *(n=4)*	0%	25% *(n=4)*	20% *(n=6)*	0%	0%	20% *(n=1)*	15% *(n=2)*	*NA*	**15%** *(n=17)*
Assessment of Renal Function of residents on Antimicrobials *(within 6 months)*										
CrCl >50ml/min	23%	41%	38%	36%	44%	33%	32%	30%	40%	**35%**
CrCl 30-50ml/min	22%	26%	33%	16%	40%	22%	18%	23%	20%	**25%**
CrCl 10-30ml/min	3%	7%	12%	7%	10%	0%	11%	8%	13%	**8%**
CrCl <10ml/min	1%	0%	2%	1%	0%	0%	0%	2%	0%	**1%**
Unknown	51%	27%	15%	40%	6%	44%	39%	38%	27%	**31%**
Assessment as per prescribing guidelines (www.antibioticprescribing.ie or local) *(*non-assessable if insufficient information available or guideline not available)*										
Adherence with choice of agent*	76% *(n=62)*	56% *(n=27)*	69% *(n=29)*	82% *(n=75)*	60% *(n=45)*	43% *(n=3)*	65% *(n=13)*	67% *(n=36)*	73% *(n=8)*	**69% *(n=298)***
Adherence with dosing regimen^	69% *(n=66)*	79% *(n=62)*	78% *(n=36)*	71% *(n=76)*	60% *(n=50)*	57% *(n=4)*	79% *(n=19)*	81% *(n=43)*	64% *(n=9)*	**72% *(n=365)***
Adherence with duration	37% *(n=33)*	38% *(n=22)*	24% *(n=11)*	42% *(n=42)*	34% *(n=30)*	57% *(n=4)*	35% *(n=7)*	38% *(n=20)*	62% *(n=8)*	**37% *(n=177)***

^ In the absence of laboratory results and/or documented recent (within 6 months) measure of renal function, renal function was assumed to be normal and dosing regimen assessed accordingly.



Examples of non-adherence and commentary are detailed in Appendix 1

Absence of community guidelines or insufficient information resulted in 25% (n=130) prescriptions being non-assessable for adherence. See Appendix 2

Figure 3: Adherence of antimicrobial use (Choice, Dosing & Duration) versus Antimicrobial Prescribing Guidelines

6.4 TYPES OF ANTIMICROBIAL USE

Table 6: Categorisation of red/green usage

	CHO 1	CHO 2	CHO 3	CHO 4	CHO 5	CHO 6	CHO 7	CHO 8	CHO 9	National
Category of antimicrobials prescribed over 30 days										
A "green/red" antibiotic list of is a simple tool which has been developed to assist community prescribers in choosing an antibiotic which is preferred (Green; has fewer side effects and less likely to lead to resistant infections vs Red; more associated with adverse drug reactions and antibiotic resistance and should be reserved).[3] (Appendix 3)										
% Red Agents	24%	38%	43%	23%	23%	33%	39%	28%	41%	**30%** (Range 0-100%)
% Green Agents	68%	55%	52%	71%	73%	68%	50%	70%	48%	**65%** (Range 0-100%)
% Other*	8%	7%	5%	6%	4%	0%	11%	1%	11%	**6%**

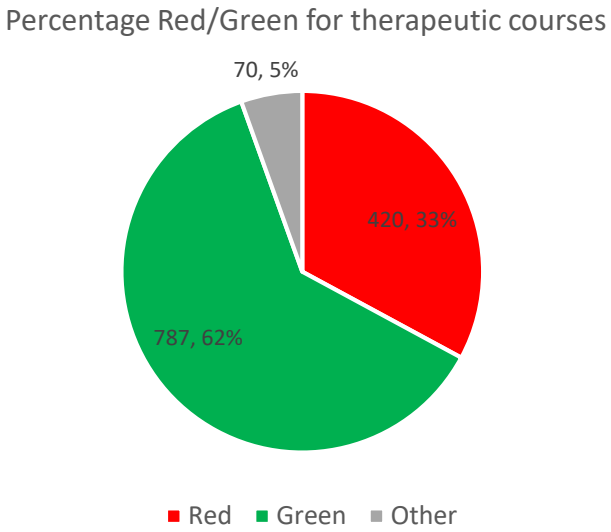


Figure 4: Percentage of red/green agent usage for therapeutic courses

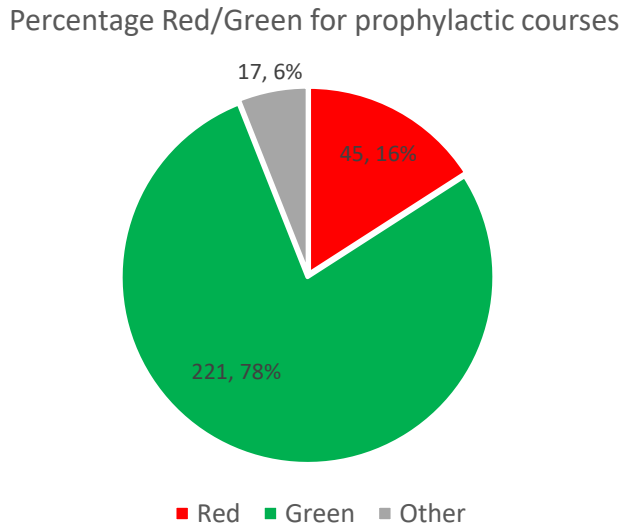


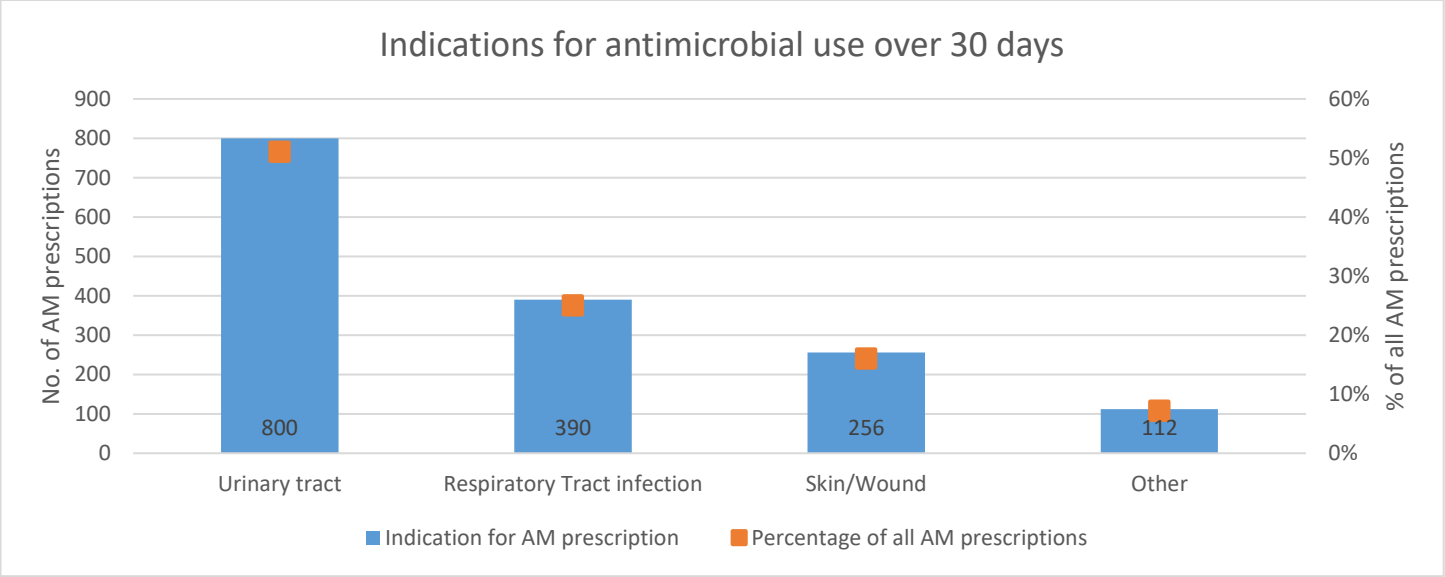
Figure 5: Percentage of red/green agent usage for prophylactic courses

*Antibiotics encountered not covered by the red/green classification were classified as 'Other': co-trimoxazole (x16), metronidazole (x22), piperacillin/tazobactam (x10), gentamicin (x3), methanamine (x3) vancomycin (x2) and meropenem (x1). Fluconazole & Tuberculosis therapy were also categorised as 'Other'

TYPES OF ANTIMICROBIALS cont'd

Table 7: Route & Indication for antimicrobial use

	CHO 1	CHO 2	CHO 3	CHO 4	CHO 5	CHO 6	CHO 7	CHO 8	CHO 9	National
Route of Antimicrobial Therapy over 30 days										
Oral	95% *(n=238)*	96% *(n=178)*	94% *(n=133)*	97% *(n=323)*	100% *(n=247)*	100% *(n=40)*	91% *(n=101)*	99% *(n=207)*	88% *(n=49)*	**96% *(n=1516)***
Parenteral	5% *(n=12)*	4% *(n=8)*	6% *(n=8)*	3% *(n=10)*	0% *(n=0)*	0% *(n=0)*	9% *(n=10)*	1% *(n=2)*	13% *(n=7)*	**4% *(n=57)***
IV (n)	*6*	*1*	*2*	*8*	*0*	*0*	*2*	*1*	7	**27**
IM (n)	*6*	*7*	*6*	*2*	*0*	*0*	*8*	*1*	0	**30**
Neb (n)	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	0	**1**
Indication for Antimicrobial Therapy over 30 days										



Infection of the urinary tract (51%), respiratory tract (25%) or skin/wound (16%) accounted for the majority (92%) of antimicrobial prescriptions.

Figure 6: Most common indications for antimicrobial use

TYPES OF ANTIMICROBIALS cont'd

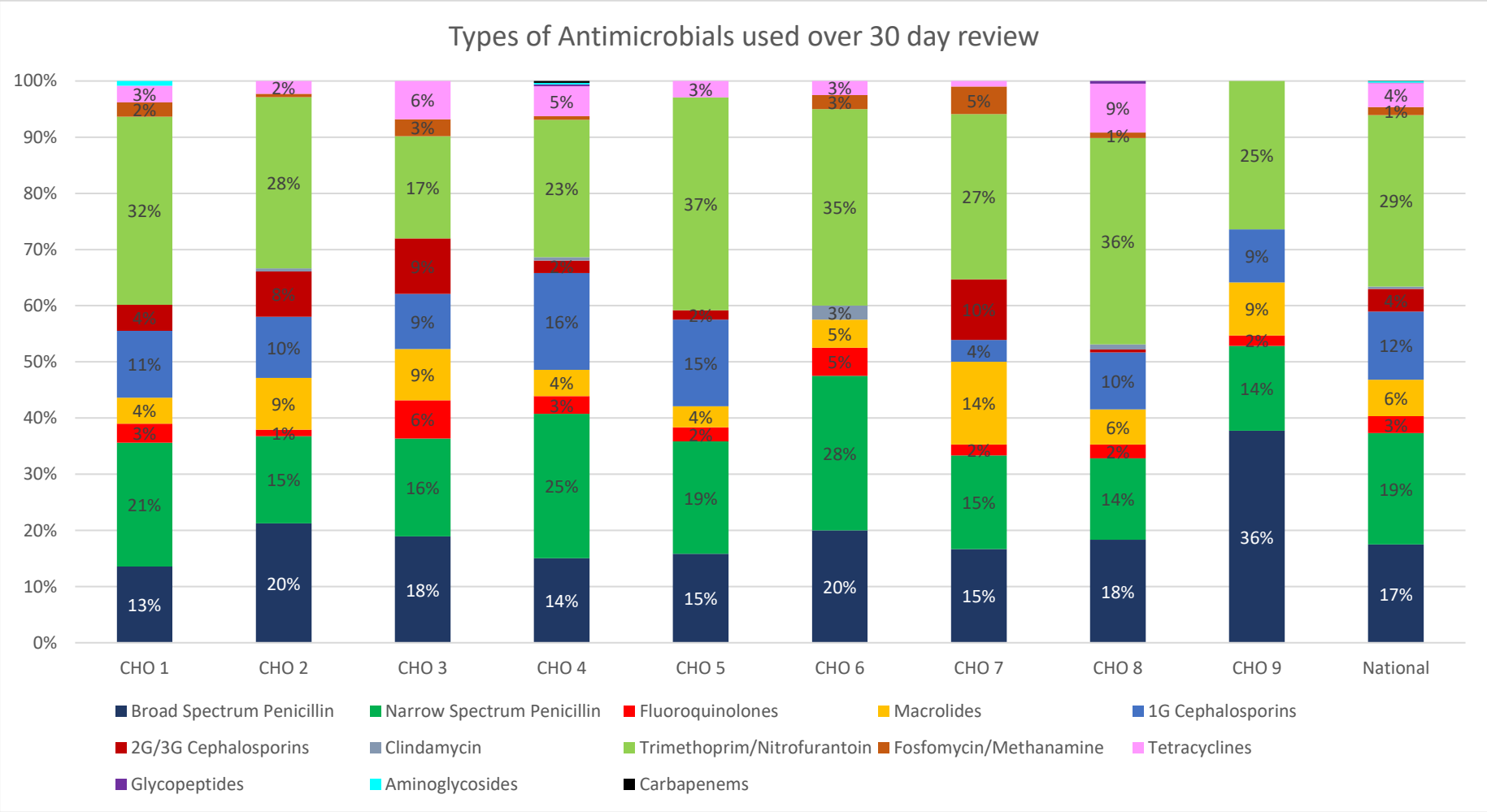
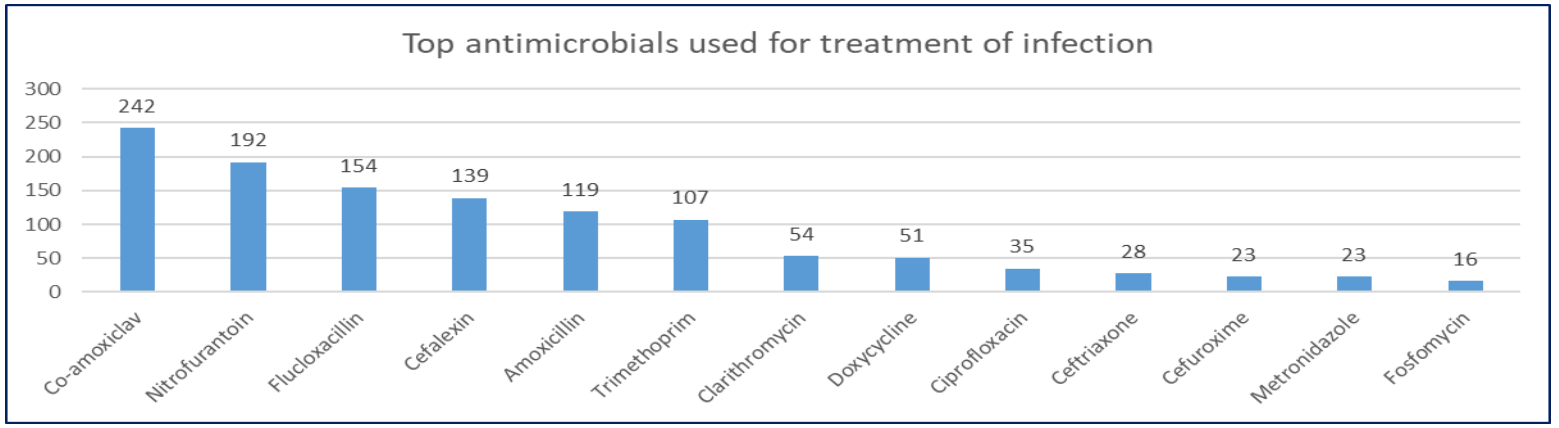


Figure 7: Specific types of antimicrobials in use over a 30-day review

TYPES OF ANTIMICROBIALS cont'd

Top 10 Antimicrobial Agents used for Treatment of infections



Median course duration was 7 days across all CHOs and was the most common course length for UTI, RTI & Skin/Wound

Figure 8: Top 10 antimicrobials used for treatment of infection over a 30-day review

Top ten antimicrobial agents used per active infection type over 30 days

Table 8: Top ten antimicrobial agents used per active infection type

Urinary tract infection *(n=579)**	**Respiratory tract infection *(n=358)***	**Skin/Wound Infection *(n=240)***
1. Nitrofurantoin *(n=191)*	1. Co-amoxiclav *(n=125)*	1. Flucloxacillin *(n=142)*
2. Cefalexin *(n=127)*	2. Amoxicillin *(n=77)*	2. Co-amoxiclav *(n=22)*
3. Trimethoprim *(n=106)*	3. Clarithromycin *(n=44)*	3. Doxycycline *(n=17)*
4. Co-amoxiclav *(n=70)*	4. Doxycycline *(n=30)*	4. Phenoxymethylpenicillin *(n=12)*
5. Ciprofloxacin *(n=23)*	5. Ceftriaxone *(n=17)*	5. Metronidazole *(n=8)*
6. Amoxicillin *(n=22)*	6. Cefuroxime *(n=10)*	6. Amoxicillin *(n=5)*
7. Fosfomycin *(n=16)*	7. Cefalexin *(n=8)*	7. Clarithromycin *(n=5)*
8. Ceftriaxone *(n=6)*	8. Piperacillin-tazobactam *(n=7)*	8. Erythromycin *(n=5)*
9. Cefuroxime *(n=5)*	9. Azithromycin *(n=7)*	9. Ciprofloxacin *(n=4)*
10. Co-trimoxazole *(n=5)*	10. Levofloxacin *(n=7)*	10. Clindamycin *(n=4)*

**As a representative sample, 22% (n=25) of 114 active prescriptions (on the day of PPS) for treatment of Urinary Tract Infections were for urinary catheter-associated infections.*

6.5 FOCUS ON PROPHYLAXIS

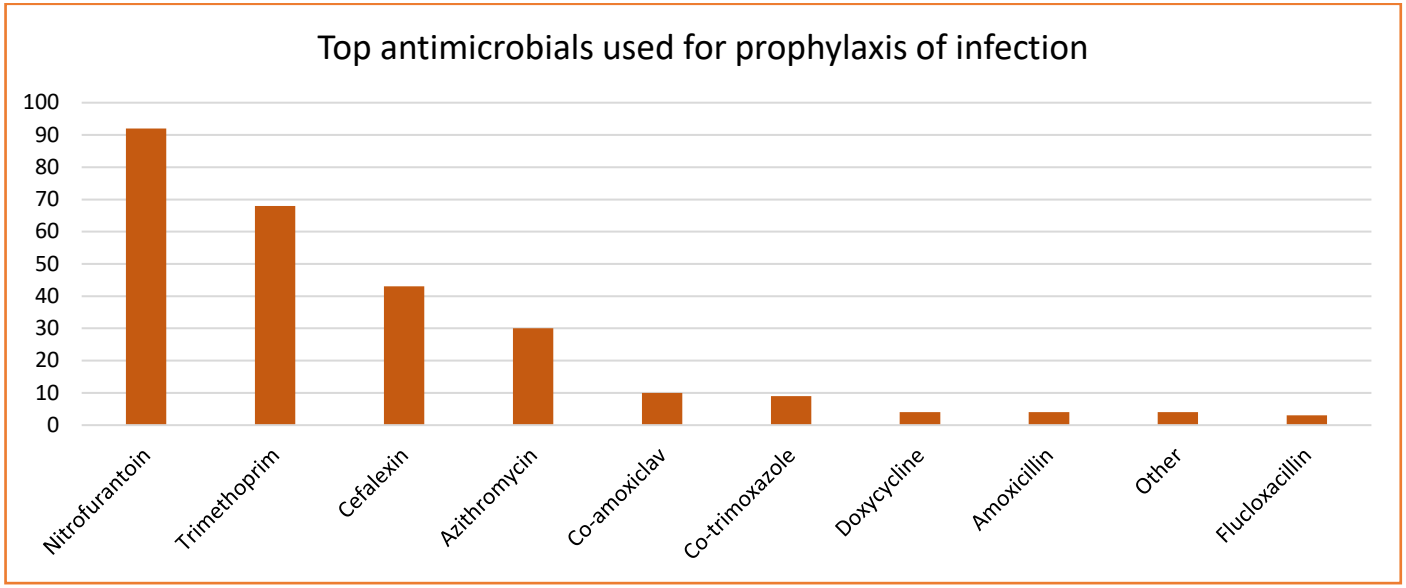


Figure 9: Top 10 antimicrobials used for prophylactic antimicrobial therapy

Table 9: Indication for prophylactic antimicrobial use

	CHO 1	CHO 2	CHO 3	CHO 4	CHO 5	CHO 6	CHO 7	CHO 8	CHO 9	National
Indication for prophylaxis as a proportion of all prophylaxis										
Urinary tract	90% *(n=38)*	57% *(n=31)*	75% *(n=15)*	80% *(n=41)*	90% *(n=52)*	0%	73% *(n=11)*	89% *(n=31)*	33% *(n=2)*	**78%** *(n=221)*
% all residents on urinary prophylaxis	*6.3%*	*5.6%*	*4.0%*	*4.2%*	*8.8%*	*0%*	*2.8%*	*5.7%*	*0.9%*	***5.0%***
Respiratory Tract	2% *(n=1)*	22% *(n=12)*	10% *(n=2)*	12% *(n=6)*	7% *(n=4)*	50% *(n=1)*	13% *(n=2)*	3% *(n=1)*	50% *(n=3)*	**11%** *(n=32)*
Skin/Wound	2% *(n=1)*	15% *(n=8)*	5% *(n=1)*	6% *(n=3)*	2% *(n=1)*	50% *(n=1)*	0%	3% *(n=1)*	0%	**6%** *(n=16)*
Other	5% *(n=2)*	6% *(n=3)*	10% *(n=2)*	2% *(n=1)*	2% *(n=1)*	0%	13% *(n=2)*	6% *(n=2)*	17% *(n=1)*	**5%** *(n=14)*

6.5 FOCUS ON PROPHYLAXIS cont'd

Table 10: Focus on prophylactic antimicrobial use

	CHO 1	CHO 2	CHO 3	CHO 4	CHO 5	CHO 6	CHO 7	CHO 8	CHO 9	National
Duration of prophylaxis										
Less than 6 months	12% *(n=5)*	24% *(n=13)*	5% *(n=1)*	31% *(n=16)*	29% *(n=17)*	0%	33% *(n=5)*	34% *(n=12)*	17% *(n=1)*	**25%** *(n=70)*
6-12 months	0%	11% *(n=6)*	0%	8% *(n=4)*	16% *(n=9)*	0%	13% *(n=2)*	9% *(n=3)*	33% *(n=2)*	**9%** *(n=26)*
More than 1 year	74% *(n=31)*	59% *(n=32)*	80% *(n=16)*	51% *(n=26)*	48% *(n=28)*	100% *(n=2)*	47% *(n=7)*	46% *(n=16)*	33% *(n=2)*	**57%** *(n=160)*
Unknown	14% *(n=6)*	6% *(n=3)*	15% *(n=3)*	10% *(n=5)*	7% *(n=4)*	0%	7% *(n=2)*	11% *(n=4)*	17% *(n=1)*	**10%** *(n=27)*
Where was prophylactic prescription initiated?										
Residential facility	48% *(n=20)*	54% *(n=29)*	55% *(n=11)*	57% *(n=29)*	47% *(n=27)*	0%	73% *(n=11)*	69% *(n=24)*	17% *(n=1)*	**54%** *(n=152)*
Hospital	12% *(n=5)*	24% *(n=13)*	20% *(n=4)*	0%	7% *(n=4)*	50% *(n=1)*	20% *(n=3)*	9% *(n=3)*	50% *(n=3)*	**13%** *(n=36)*
Other	24% *(n=10)*	0%	10% *(n=2)*	18% *(n=9)*	16% *(n=9)*	0%	0%	0%	0%	**11%** *(n=30)*
Unknown	17% *(n=7)*	22% *(n=12)*	15% *(n=3)*	25% *(n=13)*	31% *(n=18)*	50% *(n=1)*	7% *(n=1)*	23% *(n=18)*	33% *(n=2)*	**23%** *(n=65)*
Residents prescribed Urinary Tract Infection prophylaxis										
% with urinary catheter	21% *(n=8)*	23% *(n=7)*	40% *(n=6)*	14% *(n=5*)*	13% *(n=7)*	NA	9% *(n=1)*	19% *(n=6)*	0%	**18%** *(n=40)*
% Male	34% *(n=13)*	26% *(n=8)*	27% *(n=4)*	17% *(n=7)*	21% *(n=11)*	NA	27% *(n=3)*	32% *(n=10)*	0%	**25%** *(n=56)*

**Potential underestimate: Data on presence of urinary catheter not available for five residents on urinary tract infection prophylaxis*

6.6 SYSTEMS & STRUCTURES IN PLACE TO SUPPORT ANTIMICROBIAL STEWARDSHIP

Table 11: Systems & Structures in place to support antimicrobial stewardship

	CHO 1	CHO 2	CHO 3	CHO 4	CHO 5	CHO 6	CHO 7	CHO 8	CHO 9	National
GOVERNANCE										
Is there a governance committee where antimicrobial stewardship (AMS) is discussed? (AMS, HCAI/AMR, IPCC or Drugs & Therapeutics)										
% facilities with committee where AMS discussed	27%	15%	100%	7%	24%	33%	43%	100%	83%	**43%**
Is there a named person onsite with responsibility for AMS?										
% facilities with named person for AMS	23%	10%	0%	4%	0%	33%	29%	20%	0%	**10%**
LABORATORY/DIAGNOSTICS										
Is there access electronically to lab reports on site?										
Electronic access to laboratory results on site	55%	45%	92%	46%	90%	67%	71%	60%	100%	**64%**
Is dipstick urinalysis performed for detection of UTIs triggering C&S?										
Routinely Every resident on admission and/or every resident periodically (e.g. three monthly)	59% *(n=13)*	80% *(n=16)*	0%	50% *(n=14)*	5% *(n=1)*	67% *(n=2)*	29% *(n=2)*	60% *(n=9)*	0%	**42%** *(n=57)*
Sometimes *When resident has signs and symptoms of infection*	41% *(n=9)*	20% *(n=4)*	100% *(n=13)*	50% *(n=14)*	95% *(n=20)*	33% *(n=1)*	43% *(n=3)*	40% *(n=6)*	100% *(n=6)*	**56%** *(n=76)*
Rarely	0%	0%	0%	0%	0%	0%	29% *(n=2)*	0%	0%	**1.5%** *(n=2)*

6.6 SYSTEMS & STRUCTURES IN PLACE TO SUPPORT ANTIMICROBIAL STEWARDSHIP cont'd

	CHO 1	CHO 2	CHO 3	CHO 4	CHO 5	CHO 6	CHO 7	CHO 8	CHO 9	National
ANTIMICROBIAL GUIDELINES										
Which antimicrobial guidelines are accessed by nursing staff onsite?										
www.antibioticprescribing.ie	14%	10%	0%	11%	5%	0%	14%	0%	0%	**7%**
Acute hospital guidelines	9%	0%	31%	11%	24%	0%	0	0%	50%	**13%**
Local guidelines	9%	0%	69%	0%	0%	0%	14%	7%	33%	**11%**
None	67%	90%	0%	79%	71%	100%	72%	93%	17%	**69%**
EDUCATION ON ANTIMICROBIAL USE AND STEWARDSHIP (AMS)										
Is there any training on antimicrobial use for staff?										
% facilities reporting access to education on AMS	14%	15%	0%	4%	0%	0%	14%	0%	33%	**5%**
MEDICAL CARE										
Who provides medical care?										
Directly employed MO	68%	30%	46%	93%	48%	100%	100%	73%	67%	**65%**
Personal GP/practice	18%	65%	23%	0%	24%	0%	0%	27%	0%	**21%**
Both MOs and GPs	5%	0%	0%	0%	29%	0%	0%	0%	0%	**5%**
Acute Consultant & Team	9%	5%	31%	7%	0%	0%	0%	0%	33%	**8%**
Nurse prescribers who can prescribe antimicrobials										
Facilities with nurse prescribers for AM	5%	15%	8%	18%	43%	33%	29%	20%	67%	**21%**

	CHO 1	CHO 2	CHO 3	CHO 4	CHO 5	CHO 6	CHO 7	CHO 8	CHO 9	National
ICT SUPPORT FOR AMS										
Access to electronic healthcare record (EHR)										
Proportion of facilities with EHR	18%**	20%	0%*	4%*	0%*	0%	0%	47%*	17%	**13%**
% of facilities with ePrescribing/ medications on EHR	No data	0%	No data	No data	No data	0%	0%	No data	17%	**1%**

*Data gathered retrospectively by IPC/AMS team personnel in conjunction with National IPC/AMS team, QPS, HSE Community Operations.
**Data gathered retrospectively as above and potential underestimate, reflective of data for Cavan/Monaghan only

ANTIMICROBIAL SUPPLY										
Where are antimicrobials supplied from?										
Single Community Pharmacy	50%	65%	38%	68%	43%	0%	29%	33%	100%	**52%** *(n=70)*
Several Community Pharmacies	18%	15%	0%	7%	0%	0%	0%	7%	0%	**7%** *(n=10)*
Onsite pharmacy (from wholesale)	0%	10%	62%	7%	0%	67%	43%	20%	0%	**15%** *(n=20)*
Onsite pharmacy (from hospital)	0%	0%	0%	7%	0%	0%	29%	0%	0%	**3%** *(n=4)*
Hospital direct to unit/resident stock	32%	10%	0%	11%	57%	33%	0%	40%	0%	**23%** *(n=31)*
Is there an emergency stock of antimicrobials held onsite?										
Emergency stock of AM held onsite#	86%	75%	69%	89%	95%	100%	86%	93%	100%	**87%**
Is there a restricted antimicrobial policy in place?										
Restricted AM policy in place	5%	0%	8%	7%	0%	0%	0%	0%	0%	**3%**

SYSTEMS AND STRUCTURES TO SUPPORT ANTIMICROBIAL STEWARDSHIP cont'd

ANTIMICROBIAL CONSUMPTION AND SURVEILLANCE

	CHO 1	CHO 2	CHO 3	CHO 4	CHO 5	CHO 6	CHO 7	CHO 8	CHO 9	Overall
Collection of local antimicrobial consumption data										
% facilities who collect local AM consumption	86%	30%	100%	57%	52%	33%	86%	73%	67%	**64%**
Feedback to prescribers on antimicrobial consumption in facility										
% facilities providing AM consumption feedback	9%	0%	0%	0%	0%	0%	0%	0%	0%	**1%**
Local antimicrobial resistance patterns available										
% facilities with AM resistance surveillance	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**

VACCINATION

Influenza vaccination										
% facilities who offer seasonal influenza vaccine to all LTC residents	100%	100%	100%	100%	100%	100%	100%	100%	100%	**100%**
Pneumococcal vaccination										
% facilities reporting record-keeping for pneumococcal vaccination for LTC	33%	39%	22%	63%	0%	100%	43%	60%	33%	**39%**

7.0 DISCUSSION:

Facility and demographic data:

A PPS of antimicrobial use was conducted in 100% (n=135) of HSE Older Persons residential care facilities in CHOs 1,3,4,5 and 8 between October and December 2020, and CHO 2,6,7 and 9 between April and August 2021, with data collected by CHO-based antimicrobial pharmacists. Forty two percent (n=57) of facilities had previously participated in the HALT 2016 study.[1]

With a bed occupancy rate of 78% (91% in HSE facilities HALT 2016)[1], a total of 4446 residents were eligible for inclusion and assessed on the day of survey. The majority of bed types were long-term care, accounting for 88% (n=3930) of residents surveyed. Rehabilitation beds accounted for 5% (n=205), with short-stay/transition beds accounting for 5% (n=216).

Female residents predominated (60%), similar to HALT 2016 with 40% of residents included being male (42% in HSE facilities in HALT 2016).[1] Ninety four percent of residents were over 65 years of age, with 42% of residents over 85 years of age (38% in HSE facilities in HALT 2016)[1].

It was identified that 8% (n=345) of residents had a urinary catheter in-situ (7% in HSE facilities in HALT 2016)[1], with 0.2% (n=11) of residents having an intravenous access device in-situ on the day of survey (0% in HSE facilities in HALT 2016)[1].

Quantity of antimicrobial use

Overall prevalence of residents on antimicrobials, on the day of survey was 12% (ranging from 5% in CHO 6 to 15% in CHO 5). This compares to a crude prevalence of 9.8% in Irish facilities in the HALT study 2016[1] (consistent with previous HALT studies also, 2010, 2011, 2013 at ~10%) and is therefore higher, however seasonal variation and the COVID pandemic may have influenced this prevalence. The European average prevalence for residents in long term care residential facilities (LTCFs) on antimicrobials in the 2016 HALT study was 4.9%,[2] therefore there is every indication that the rate of antimicrobial use in LTCFs in Ireland remains twice as high as the European average if not more. In a UK HALT-style PPS of LTCF conducted in November/ December 2017, the mean percentage of residents in LTCFs on antimicrobials on the day of survey was as follows: 6.3% England, 7.6% Northern Ireland, 8.6% Wales and 9.6% Scotland.[4] The Australian Aged Care National Antimicrobial Prescribing Survey (2019: conducted July-August) reported a prevalence of 8.2% although that study also included use of topical agents which accounted for one third of antimicrobial use.[5]

This survey found, on a 30-day review of all residents, approximately one third (27%, n=1198) of residents were identified as having had antimicrobial therapy within the previous month. The days of therapy (DOTs) per 1000 resident days was also calculated; a standardised measure of assessing prevalence of antimicrobial use which can be used as a benchmark.[6] Comparator data internationally is not currently available for this figure, but data from this study provides a benchmark for HSE Older Persons facilities and provides useful information to community AMPs, and is a measure to track future activities. This calculated measure was

123 DOTs per 1000 resident days overall, and ranged from 53 to 172 DOTs per 1000 resident days across CHOs.

A large proportion of antimicrobial use was for prophylaxis of infection (50%) versus treatment of infection (50%); similar to previous Irish studies. In HALT 2016, 59% of antimicrobials were prescribed for treatment, 41% for prophylaxis in Irish LTCFs, with the European prevalence reporting treatment responsible for 69.5% and prophylaxis for 29.4%.[1,2] Overall 6.3% of all residents were on prophylactic antimicrobials (ranging from 1.1% in CHO 6, to 9.8% in CHO 5). Prevalence of prophylactic therapy in HALT 2016 was 4.1% so a marked increase in prophylactic prescribing has been observed.[1] 5.9% of residents were on treatment courses (ranging from 3.3% in CHO 7 to 8.5% in CHO 3) in this study compared to 6.1% in HALT 2016[1] therefore the figure is slightly decreased.

Quality of antimicrobial use

A series of quality indicators were assessed for antimicrobial prescriptions on the day of survey based on good practice for antimicrobial stewardship and medication safety.

Documentation of allergy status:

Documentation of allergy status (on the medication chart) for all residents assessed was good, with completion in 97% of residents, similar in each CHO. Overall incidence of penicillin allergy was 10.3%. Although not measured, anecdotally, nature of allergy was not well documented which would influence whether or not a resident with a penicillin allergy would be tolerant of an agent with cross-reactivity such as a cephalosporin.[9] Documentation of allergy status is recommended for all prescriptions.[7]

Documentation of Indication:

Indication for the antimicrobial was documented in the medical notes and/or medication chart for 58% of antimicrobial prescriptions (74% for therapeutic prescriptions, 47% for prophylactic prescriptions). The reason for prescribing an antimicrobial should be clearly documented in all cases, and shared with relevant people involved in the person's care to allow better management during follow-up care and/or transfer of care to another healthcare or community setting.[8] Similar to the acute setting, there is potential to standardise medication charts in residential settings to incorporate indication as a field on antimicrobial prescriptions. This information would then be easily accessible to all staff involved in prescribing, dispensing and administering antimicrobial agents.

Microbiological specimens for urinary tract infection:

As per national guidelines for diagnosis and management of urinary tract infections in long term care residents over 65 years, sending a urine specimen to a laboratory for culture and susceptibility is recommended for symptomatic urinary tract infection.[9] Urinary tract infections are the most prevalent type of infection in residential care facilities and antimicrobial resistance is frequently encountered. Urine culture and susceptibility results should be used to guide initial treatment or direct treatment options, should the resident fail to respond to empiric choice. For treatment courses of antimicrobials for urinary tract

infection (n=114) on the day of the survey, it was identified that a urine specimen had been sent to a laboratory for culture and susceptibility in 56% of cases. Due to limitations on electronic laboratory result access, in a proportion of cases, it was unknown whether urine specimens had been sent or not (15%, n=17).

Renal function:

Several commonly prescribed antimicrobials require dose adjustment in moderate to severe renal impairment to avoid over-exposure and increased risk of adverse effects. Furthermore, nitrofurantoin, a common antimicrobial used for treatment and prophylaxis of urinary tract infection is contraindicated for even short courses if creatinine clearance (CrCl) is less than 30 millilitres/minute (mL/min), and for longer courses (greater than seven days) if CrCl is less than 45 mL/min.[9] The antibacterial efficacy of nitrofurantoin depends on the renal secretion into the urinary tract (site of action). In residents with renal impairment, renal secretion of nitrofurantoin is reduced. This may reduce the antibacterial efficacy, which may result in treatment failures and also increases the risk of adverse effects (with systemic accumulation). Renal impairment is common in the elderly population and therefore information about renal function was included in the data collected for residents on active antimicrobial therapy on the day of survey. This informed assessment of appropriateness of antimicrobial agent(s) and dosage regimens. It was found that approximately one third of all residents on active antimicrobial therapy had laboratory test results indicative of normal renal function (>50mL/min), one third had either mild, moderate or severe impairment (25%, 8% and 1% respectively), and for one third of residents, information about renal function was not assessable due to lack of access to electronic laboratory results and/or absence of recent renal function test results (within six months). The prevalence of renal impairment in this population highlights one of several challenges regarding prescribing in this vulnerable population, along with polypharmacy, drug interactions and dysphagia. Renal function is an important aspect to assess and consider when prescribing antimicrobials to minimise antimicrobial-related harm.

Adherence with guidelines:

Adherence with national community antimicrobial prescribing guidelines, www.antibioticprescribing.ie (or local guidelines where available), was assessed to identify opportunities to improve antimicrobial use, identify any gaps in guidelines and/or to identify where additional supports and education are required. As discussed in the introduction, non-adherence should not necessarily be interpreted as poor practice, but rather that it is in not in line with the stated guideline and may represent an opportunity to optimise antimicrobial use. It is recognised that clinical judgement applies to the use of all antimicrobial agents. This is the first time adherence with community antimicrobial prescribing guidelines has been assessed on this scale in the Irish residential care facility setting.

It was observed that for the 528 active antimicrobial prescriptions on the day of survey, adherence to guidelines of 25% (n=130) of these could not be assessed by the AMP due to insufficient clinical information or absence of guidelines. A list of infections where absence of

community guidelines was identified are detailed in Appendix 2. It is worth noting that some complex cases were identified where there were prolonged antimicrobial courses for suppression of infection, often in association with a bone or joint infection unsuitable for surgical intervention to address the source of infection. These were classified as 'non-assessable'. Prolonged suppressive antimicrobial therapy may not always be the best course of action for these cases however regular review (every six months) with multidisciplinary input, including an infection specialist, from acute and community settings is recommended to ensure optimal management.

The choice of antimicrobial agent was identified as adherent with guidelines (first-line agent, alternative option or directed appropriately as per relevant culture result) in 69% of assessable prescriptions. The dosing regimen was considered adherent in 72% of assessable prescriptions. Examples of non-adherence are further detailed with commentary in Appendix 1, but the main themes of non-adherence in terms of choice of agent, which represent opportunities for improvement, were as follows:

- Nitrofurantoin for prophylaxis or treatment of urinary tract infection where its use is contraindicated due to presence and extent of renal impairment: CrCl <45mL/min for prophylaxis (n=48), CrCl <30mL/min for treatment (n=3).
- Use of broad spectrum agents (such as fluoroquinolone, 2nd or 3rd generation cephalosporin, co-amoxiclav or co-trimoxazole) first line in preference to narrower spectrum options in guidelines for treatment and prophylaxis of infection (in the absence of clear rationale such as allergy, culture to direct, or failure of first-line agents) (n=42)
- Use of an antimicrobial agent for treatment or prophylaxis of urinary tract infection where resistance to the same agent has been identified in recent cultures (within 12 weeks) (n=12)

Duration of therapy was considered adherent in only 37% of instances. This was significantly impacted by antimicrobial prescriptions which did not have a duration specified in the first study period and by UTI prophylaxis in excess of six months in the second study period. All antimicrobial prescriptions should have a review date or stop date documented at time of initiation.[8] This survey found that only 45% of total antimicrobial prescriptions had a documented stop/review date on the medication chart or medical notes (81% for therapeutic prescriptions, 9% for prophylactic prescriptions). The most commonly encountered course length for treatment of infection was seven days, across all common indications, and this was the median course length in every CHO. Of note, the recommended duration of treatment courses for respiratory tract infection (now five days) and uncomplicated urinary tract infection in females (now three days) changed in the national community antimicrobial prescribing guidelines in November 2020 (mid-PPS) upon review and update. A new guideline was also developed and launched in November 2020 regarding deprescribing UTI prophylaxis. For the purposes of consistency of data capture and analysis, either duration (pre- and post-guideline update) was assessed as adherent with guidelines during the first study period (Oct-Dec 2020). During the second study period (Apr-Aug 2021), adherence against the updated published guidelines was assessed.

Types of antimicrobial use

Red/Green antibiotic use:

A "green/red" list of antibiotics (see Appendix 3) is a simple tool which has been developed by the National AMRIC Team and the HSE Medicines Management Programme to assist community prescribers in choosing an antibiotic, when indicated, which is preferred over one which should be reserved.[3] Green agents are either associated with fewer adverse effects or are less likely to lead to widespread development of resistance due to their narrow spectrum of activity. Red agents are either more associated with adverse effects or widespread development of resistance due to their broad spectrum of activity. Antimicrobial agents used over a 30-day period in facilities were assessed for their red/green classification. It was not expected, nor would it be appropriate, to find 100% green agents as there are infection types or clinical scenarios where a red agent would be the recommended treatment option. In Quarter 4 2020, the average red/green breakdown nationally in primary care for people on the General Medical Services (GMS) Scheme was 62% green and 38% red with variation around the country. In comparison, this survey found a similar prevalence of green agents used in HSE Older Persons facilities, with 65% green, 30% red. For treatment of infection, 62% of agents used were green, with 33% of agents used being red. For prophylactic antimicrobials, 78% of agents used were green, 16% of agents were red. There was variation noted from one CHO to the next; for treatment of infection, proportion of red agents varied from 25% to 48% in CHOs; for prophylaxis of infection, proportion of red agents varied from 5% to 50%. There were only a small proportion of antimicrobial agents encountered which were not covered by the red/green classification such as metronidazole, co-trimoxazole, and a small number of parenteral agents including piperacillin-tazobactam and meropenem.

Route of antimicrobial therapy:

The predominant route of antimicrobial therapy was oral across all CHOs, with parenteral use accounting for only 4% of antimicrobial prescriptions over a 30-day period. Of total parenteral use (n=57), 47% was intravenous and 53% of use was intramuscular. A total of 25 facilities (19%) had use of parenteral agents over 30 days (range 0% in CHO 5 and CHO 6, to 40% in CHO 9 and 43% in CHO 7). Where parenteral use is utilised in residential care settings, it is recommended that this practice has supporting structures in place in terms of ensuring safe parenteral administration, safe injection practice and care of devices, parenteral-to-oral switch criteria and therapeutic drug monitoring (as applicable to aminoglycoside and glycopeptide administration). The availability of these supporting structures was not assessed as part of this survey. To minimise discomfort caused to residents by the use of the intramuscular route, it should only be used when other administration routes are not feasible. Its use should be reviewed daily with a view to changing to an alternative route. Anecdotally, use of liquid formulations instead of tablets were utilised where suitable and available for residents who experienced dysphagia.

Indication for antimicrobial use:

The most common infection types for which antimicrobials were prescribed included urinary tract (51%), respiratory tract (25%) and skin and wound (16%). This is a similar finding to HALT 2016, where infections of these types predominated and this was similar across Europe.[1,2]

Specific types of antimicrobials in use:

Overall, the breakdown of specific antimicrobial types was for the most part similar across the CHOs with variation on the proportion of different antibiotic classes used. The most common antimicrobial encountered over the 30-day period was nitrofurantoin (n=284). Nitrofurantoin or trimethoprim accounted for approximately one third of prescriptions (29%). Narrow spectrum penicillins accounted for 19% of prescriptions and broad spectrum penicillins accounted for 17% of prescriptions. First generation cephalosporins accounted for 12% of prescriptions and use of tetracyclines and macrolides each accounted for approximately 5% of prescriptions. Use of fluoroquinolones was responsible for 4% of prescriptions, and use of broader cephalosporins (second or third generation) was responsible for 4% of prescriptions encountered. Clindamycin (n=6), meropenem (n=1), gentamicin (n=3) and vancomycin (n=2) collectively accounted for <1% of prescriptions.

The data above provides useful baseline information for AMPs to target and measure effect of future AMS activities. Although the data includes a high number of prophylactic prescriptions in addition to treatment prescriptions, it is encouraging to see relatively low usage of agents that are associated with a high risk of *Clostridioides difficile* infection (fluoroquinolones, clindamycin and broader cephalosporins). There were a small number of prescriptions for vancomycin and gentamicin identified. Whilst these antimicrobials are useful due to their narrow spectrum, both of these agents require regular blood tests for therapeutic drug monitoring (due to their narrow therapeutic index) and dose adjustment where indicated, to ensure their safe use and minimise associated nephrotoxicity and ototoxicity.

For treatment of infection, the top five antimicrobial agents, in order of frequency, were co-amoxiclav, nitrofurantoin, flucloxacillin, cefalexin and amoxicillin. In HALT 2016, a similar trend was identified with co-amoxiclav the most frequently prescribed agent for treatment of infection, followed by flucloxacillin, amoxicillin, clarithromycin and trimethoprim.[1]

In HALT 2016, co-amoxiclav (a ‘red’ agent) accounted for 38% of all therapeutic prescriptions, whereas in this survey, this reduced to 17% of therapeutic prescriptions which is a positive finding.[1] Given clarithromycin is a ‘red’ agent due to adverse effects and significant drug interactions (particularly in the context of polypharmacy often encountered in elderly residents), it is a positive finding that this has dropped out of the top five agents to seventh position. It remains the third most popular agent used for treatment of respiratory tract infections, with doxycycline the fourth. Doxycycline, as a green agent, would be a preferred option where possible and although unlicensed, a dispersible tablet is available and reimbursable for people with dysphagia.

Focus on prophylaxis

The use of antimicrobials to prevent infection (prophylaxis) is not uncommon in long term care facilities across Europe.[2] However, it is acknowledged that the evidence for this practice is limited.

For prophylaxis of infection in this survey, which was a significant proportion of antimicrobial prescriptions (50%), the top five agents used were nitrofurantoin, trimethoprim, cefalexin, azithromycin and co-amoxiclav. In HALT 2016, a similar pattern was identified, with doxycycline in the top five instead of co-amoxiclav.[1] The appearance of co-amoxiclav in the top five agents used for prophylaxis is a concern due to its broad spectrum of activity, its safety in terms of development of *Clostridioides difficile* infection and *Candida spp*. infections, and the implications on development of antimicrobial resistance in a wide range of pathogens.

The most common reason for prophylaxis was for urinary tract infection (78% of all prophylactic prescriptions). Although the most common reason for prophylaxis in HALT 2016 was also urinary tract infection (68% of all prophylactic prescriptions[1]), the prevalence of this was found to be increased in this survey. In HALT 2016, 3.4% of all residents were prescribed urinary tract infection prophylaxis whereas this survey found that 5% of all residents were on urinary prophylaxis which is a concerning trend.[1] It was noted that approximately half of all prophylactic prescriptions had been initiated within the facility (54%), with the remaining proportion initiated external to the facility (13% in the acute setting).

Antimicrobial prophylaxis for urinary tract infections (UTIs) may be considered in people for whom the number of UTIs are of such frequency or severity that they chronically impinge on function and well-being, but the decision to prescribe should not be taken lightly and non-antimicrobial measures, and other potential causes of symptoms should be fully investigated.[9] Recurrent UTI in adults is defined as two or more symptomatic UTIs in the previous six months or three or more symptomatic UTIs in the previous twelve months.[9] Urinary growth of bacteria in an asymptomatic individual (asymptomatic bacteriuria) is common, particularly in older people. Recurrent growth of bacteria in urine in an asymptomatic resident is not classified as a recurrent UTI and does not warrant treatment or prophylaxis.

Upon initiation of any antimicrobial prophylaxis, the resident must be fully informed of potential risks associated with antimicrobial exposure, including increased susceptibility to *Clostridioides difficile* infection, *Candida spp.* infections and other adverse effects (dependent on the antimicrobial selected). The increased likelihood of infection with antimicrobial resistant organisms which may have limited treatment options is also important and should be fully discussed, and that the agent used for prophylaxis may be lost as a future potential therapeutic agent. It is recommended that a trial of urinary tract prophylaxis should not exceed six months, and azithromycin prophylaxis for Chronic Obstructive Pulmonary Disease should not exceed one year without review.[9,10]

This survey examined the duration of all prophylactic prescriptions, which was not examined in HALT 2016, and it found that 57% of prophylactic prescriptions had been prescribed and

administered for over one year (n=160), which was the point at which further review to determine date of initiation was considered irrelevant. Despite this, anecdotal reports of prophylaxis for a duration of three years, four years and seven years were reported. Of particular concern was that in 46 instances, the antimicrobial agent prescribed in excess of one year duration was nitrofurantoin. Chronic pulmonary reactions and chronic active hepatitis, occasionally leading to hepatic necrosis, can occur in people treated with nitrofurantoin. These adverse effects are generally associated with long-term therapy (usually after six months), and are more common in the elderly, and in those with renal impairment. Any urinary prophylactic prescription in excess of six months should be reviewed with a view to stopping.[9] Further advice on deprescribing UTI prophylaxis is available online at: https://www.hse.ie/eng/services/list/2/gp/antibiotic-prescribing/conditions-and-treatments/urinary/deprescribing-uti-prophylaxis/

Antimicrobial prophylaxis is generally not recommended and rarely required for the prevention of symptomatic UTI in people who are catheterised.[9] It is therefore of concern that 18% (n=40) of residents prescribed UTI prophylaxis were catheterised (similar to 17% in HALT 2016). These were classified as 'non-assessable' due to insufficient clinical information, however it is likely that a proportion of them would be non-adherent.

Due to a longer urethra in males compared to females, urinary tract infections are relatively uncommon in men, however incidence can increase in older people. The reason for this is generally associated with incomplete bladder emptying (such as prostatic enlargement), abnormalities of the urinary tract (including surgery) and/or immunocompromise. Men with recurrent UTI should be referred to an urologist for further investigation as it is likely to be secondary to associated conditions. Of note, this survey found that 25% (n=56) of residents on urinary prophylaxis were male, 28 of these were catheterised, 35 of the 56 had been initiated within the facility.

Systems and Structures to support antimicrobial stewardship

Governance:

Overall, 43% of facilities surveyed reported having a governance committee within their CHO where Antimicrobial Stewardship was discussed. Types of committees included an overarching IPC/AMS committee, an Infection Prevention & Control Committee (IPCC), or a Drugs and Therapeutics Committee (DTC). An IPC/AMS committee, as recommended by the National AMRIC Team (with Terms of Reference) was in development in the vast majority of participating CHOs. Availability of appropriate expertise to discuss, advise and support AMS has been required for establishment of these committees but is now available from the CHO AMP. Ten percent of facilities reported having a named person responsible for AMS in the facility.

Access to laboratory:

Electronic access to laboratory reports onsite (for biochemistry or microbiology results for example) was found to be 64%, with a range from 45% in CHO 2 and 46% in CHO 4 to 92% in CHO 3, and 100% in CHO 9. In the absence of electronic laboratory report access, facilities relied on paper reports being mailed from laboratories and filed appropriately in medical notes. This can lead to delays in treatment decisions and hence increase the risk of inappropriate antimicrobial prescribing e.g. need/choice of agent based on culture and susceptibility findings. It also impacted assessment of antimicrobial use by the AMP due to insufficient information being available in all cases.

Practices around dipstick urinalysis prior to initiating antimicrobial therapy for UTIs:

Information was sought regarding the frequency with which dipstick urinalysis was used to support UTI diagnosis. Forty two percent of facilities surveyed reported routine use of dipstick urinalysis to support diagnosis of UTI or to out rule UTI. Routine use was defined as dipstick urinalysis performed on every resident either on admission or at regular intervals (e.g. 2-3months) regardless of symptoms. The majority of remaining facilities (56%) reported use of dipstick urinalysis 'sometimes' which was defined as dipstick urinalysis performed on residents with signs or symptoms of UTI (HALT 2016 reported this as 39%)[1]. Only two facilities in CHO 7 reported 'rare' use of dipstick urinalysis to assess for evidence of UTI as per best-practice outlined in 'Position statements for the use of dipstick urinalysis for assessing evidence of UTI in Adults' issued in October 2021 (hosted on www.antibioticprescribing.ie).

Although it is a positive finding that the use of routine dipstick urinalysis on asymptomatic residents had reduced from HALT 2013 (98%)[11], 2016 (61%)[1] and now in this PPS (42%), the routine use of dipstick urinalysis results to guide initiation of antimicrobial therapy in asymptomatic residents is unacceptably high as this practice is not recommended.[9] Urinary growth of bacteria in an asymptomatic individual (asymptomatic bacteriuria) is common, particularly in older people. Since growth of bacteria is likely on culture, dipstick urinalysis results will most likely be positive. In the absence of specific symptoms of a UTI, this does not indicate a urinary tract infection but rather colonisation. Residents do not require treatment unless signs and symptoms of a urinary tract infection are present. Dipstick urinalysis results are unreliable in the older population (>65 years) to support diagnosis of UTI, do not add anything to the clinical picture and are not a useful guide to management. This finding impacts 98% of facilities surveyed.

Access to guidelines:

Although the national community antimicrobial prescribing guidelines (www.antibioticprescribing.ie) have been available for a number of years and are recommended for use in RCFs, knowledge and awareness of the guidelines amongst nursing staff surveyed across all facilities was low with only 7% of facilities reporting the national guidelines as the guidelines in use within the facility. 13% reported use of acute hospital guidelines, and 11% reported some local guidance. Where local guidance was reported, this was quite often the HPSC Diagnosis and Management of UTI guideline- anecdotally this was pre-printed in a number of medication charts accessed but this guidance has been updated and replaced by guidelines on www.antibioticprescribing.ie and therefore pre-printed

documentation needs review. The remaining proportion of facilities (69%) reported no access to antimicrobial prescribing guidelines. Given the encouraging rate of adherence with prescribing guidelines, this is not expected to be the case amongst medical prescribers although this was not specifically assessed. However, all staff who prescribe (including nurse prescribers), dispense and administer antimicrobials in residential care settings should also be aware and cognisant of guideline advice to ensure best use of antimicrobials.

Education on Antimicrobial Stewardship:

In the vast majority of facilities (95%), nursing staff reported no access to education on use of antimicrobials and antimicrobial stewardship, replicating the findings of HALT 2016.[1] As part of this PPS, the newly-appointed antimicrobial pharmacists provided informal education to available staff members during PPS facility visits, raising awareness of the guidelines and some key messaging relating to use of antimicrobials and will continue to provide this support to all staff. AMPs also provide AMS education and support to the IPC Link Practitioner Programme which was launched in March 2020. Staff onsite were very willing to participate in impromptu and informal AMS education sessions. In addition to face-to-face sessions and direct engagement by AMPs, a suite of IPC and AMS eLearning modules are now available on HSELanD. This includes a module on 'Antimicrobial Stewardship in Practice' and another on 'Prevention and Management of Urinary Tract infection'. These modules in particular are recommended and available for any healthcare staff involved in prescribing, dispensing or administering antimicrobials. All staff should be encouraged to complete these modules, and uptake amongst staff should be assessed.

Access to medical care:

Medical care for the HSE Older Persons residential care facilities was, for the most part, provided by directly employed medical officers (65%), with the exception of CHO 2 where 65% of medical care was provided by the residents' personal General Practitioner (GP) or GP practice. Nationally, only 21% of facilities were having medical care provided by the residents' personal GP or GP practice therefore CHO 2 is an outlier in this regard. 5% of facilities used a combination of medical officers and GPs, and in 8% of facilities, medical care was being provided by the acute setting (Consultant and team). This represents a change from that found in HALT 2016, where GP-led care accounted for 33% of medical care in HSE facilities, and 28% used a combination of GP and medical officer.[1] In addition, 21% of facilities reported having nurse prescribers who could prescribe antimicrobials.

Antimicrobial supply:

An examination of where antimicrobials were supplied from was undertaken and it was identified that 52% of facilities utilise a single community pharmacy, with 7% using the residents' own pharmacy. The remaining 41% had either onsite pharmacies within the facility (15%) or were being supplied directly from acute hospital pharmacies (26%). This is relevant nationally in the context of antimicrobial consumption monitoring. The current consumption data for community incorporates wholesale supply to community pharmacies. The current consumption data for acute hospitals incorporates dispensed antimicrobials to acute beds

only (excludes supply to non-acute settings). Antimicrobial consumption in 41% of HSE Older Persons residential care settings is therefore currently not captured or monitored nationally (on wholesale community pharmacy data or acute data) which highlights a gap.

The majority of facilities (87%) reported keeping an emergency stock of antimicrobials onsite for access out-of-hours. For the vast majority, there was no restriction policy in place (97%) for agents which could or could not be stocked/ prescribed and available out-of-hours. Although uncommonly encountered, stock held which was flagged as a concern included moxifloxacin, cefixime and erythromycin. 'Augmentin Duo® Liquid' was commonly stocked but unfortunately this formulation is designed to provide amoxicillin 800mg/clavulanic acid 114mg (914mg) twice daily rather than the more commonly recommended regimen of 500/125mg (625mg) three times daily. Use of the Augmentin Duo® liquid to obtain a 500/125mg dosing regimen is not possible and would lead to suboptimal dosing which was encountered on active prescriptions during the survey. Facilities are advised to stock Augmentin Paediatric® suspension, where necessary, as a preferred alternative where 20mls of paediatric suspension equate 500/125mg exactly.

Antimicrobial consumption and surveillance:

A significant number of facilities (64%) kept some form of local antimicrobial consumption tracking record (e.g. lists of what residents were on antimicrobial therapy). Methods for this, for the most part, varied from facility to facility with lack of consistency in what details were recorded. One good example was provided from CHO 3 where all facilities within the CHO completed a Microsoft Excel database tracking how many residents were on antimicrobial therapy in a given month, with specific antimicrobial agent, dosing regimen and indication recorded. This was submitted locally to the Infection Prevention & Control Team (IPCT). For the vast majority of facilities in all CHOs (99%), locally kept records were not examined further to reveal trends or patterns in antimicrobial consumption, were not communicated to prescribers or governance committees and their correlation to antimicrobial resistance trends could not be determined as 100% of facilities surveyed did not have access to antimicrobial resistance summaries for their setting. At the time of writing, a process for collection of a standardised monthly minimum dataset to monitor ongoing prevalence of healthcare associated infection/antimicrobial resistance and antimicrobial consumption has been developed and made available to all HSE RCFs for Older Persons to facilitate ongoing national, regional and local surveillance, with analysis, reporting and feedback.

Vaccination:

Seasonal influenza vaccination should be offered to all residents and staff of Irish LTCF, throughout the season, with up-to-date records maintained of resident and staff immunisation status. This survey assessed whether long-term care residents were being offered and availing of the seasonal influenza vaccine and found that 100% of long-term care residents in HSE Older Person residential care facilities were being offered the vaccine with uptake in excess of 95%.

In addition to annual seasonal influenza vaccination, all residents over 65 years of age should be offered pneumococcal vaccine if not previously vaccinated over the age of 65 years.[12] Up-to-date and accessible vaccination records should be maintained for every resident. This survey assessed whether record-keeping was in place for pneumococcal vaccination status of long-term care residents and found that only 39% of facilities had this information regarding their residents which leaves significant room for improvement.

8.0 CONCLUSION:

This survey found a high prevalence of antimicrobial use in HSE Older Persons facilities, in comparison to previous national and international studies with 12% of residents on antimicrobials on the day of survey (European average prevalence for LTCFs in 2016 was 4.9%[2]) although seasonal variation, and the COVID-19 pandemic may have had an influence on findings.

The main reasons for all antimicrobials were for treatment or prophylaxis of three main indications, infections of the urinary tract, respiratory tract or skin/wound infections. This replicated findings from previous studies, and European patterns.[2]

Approximately half of antimicrobial use was for prophylaxis of infection, with 6.3% of all residents being on prophylactic therapy. Although not significantly different from that identified in HALT 2016, this is a much higher prevalence than the European average (approximately 1.5%).[1,2]

The main indication for prophylactic antimicrobial therapy was for urinary tract infection prophylaxis (78% all prophylactic prescriptions), and accounted for 5% of all residents. This is a very high prevalence in this cohort of residents, with HALT 2016 reporting a prevalence of 3.4% across all facility types surveyed.[1]

Regarding the quality and types of antimicrobial use, a number of positive findings were identified and a number of findings were identified for improvement as follows:

- Documentation of allergy status was excellent (97%)
- There was high usage of ‘green’ (preferred) antimicrobials in comparison to ‘red’ (reserved) antimicrobials.
- The use of co-amoxiclav (a ‘red’ antimicrobial) reduced from 38% of therapeutic prescriptions in HALT 2016 to 17% of therapeutic prescriptions.
- The use of clarithromycin (a ‘red’ antimicrobial) was reduced, dropping out of the top 5 agents used for treatment of infection in HALT 2016, to position 7, with use of nitrofurantoin, a ‘green’ agent now taking its place in the top 5.
- Relatively high adherence, albeit with scope for further improvement, for choice of antimicrobial agent (69%) versus national community antimicrobial prescribing guidelines and dosing regimen (72%).
- Quality indicators requiring more significant improvement include documentation of indication (58%), documentation of a stop date or review date for every antimicrobial

prescription (45%) and duration of antimicrobial therapy which was adherent to guidelines in only 37% of prescriptions.

- Co-amoxiclav was found amongst the top 5 agents used for prophylaxis, which was new. This is a concern due to its broad spectrum of activity and propensity for adverse effects such as development of *Clostridioides difficile* infection, candida infections and development of resistance.
- For the first time, duration of prophylaxis was assessed and this study found that duration was not specified for a significant number of assessable prescriptions. In addition, 66% of prophylactic prescriptions had been prescribed in excess of six months, with 57% in excess of one year duration which is longer than recommended.
- Some of the main themes identified for non-adherence of choice of therapy included use of nitrofurantoin in renal impairment (where use was contraindicated), use of broader spectrum agents than necessary in absence of clear rationale and presence of resistance identified in recent cultures to the prescribed antimicrobial.
- Where assessable, approximately 50% of residents had normal renal function, and approximately 50% had some degree of renal impairment. Due to lack of access to electronic laboratory data onsite in one third of facilities (for biochemistry and microbiology), a number of assumptions were made which are limitations of this study. Assessment of renal function, to ensure optimal dosing and safety of antimicrobials, was not possible in a third of residents and was assumed to be normal.
- Culture and sensitivity data could only be confirmed on electronic laboratory systems for 37% of active antimicrobial prescriptions, paper-based reports filed in medical notes were used as a guide to therapy by the AMP in 51% of prescriptions and where neither were available (11%), therapy was measured against empiric antimicrobial guideline choices. Absence of onsite electronic access to laboratory data compromises timeliness of decisions and appropriate information to guide those decisions, and this should be addressed.

Systems and structures to support antimicrobial stewardship in HSE Older Persons are in development and progressing within CHOs e.g. governance which is aided by the presence of the AMP to provide expertise for AMS, and establishment of multidisciplinary IPC/AMS teams following significant investment by the Department of Health. As with the quality of antimicrobial use, a number of positive findings were determined and some with room for improvement.

- Influenza vaccination was offered seasonally in 100% of facilities to all long-term care residents which is excellent, and uptake amongst residents was very high, in excess of 95%.
- Recording of pneumococcal vaccination status has scope for improvement, with only 39% of facilities tracking records of pneumococcal vaccination status in their residents.
- An increasing number of facilities are tracking antimicrobial use locally within the facility (64%) in an attempt to monitor antimicrobial consumption, however methods and details recorded were variable and no analysis or feedback to prescribers was identified, nor correlation or availability of resistance data summaries. At the time of

writing, a standardised national minimum dataset for monthly monitoring of HCAI/AMR and antimicrobial consumption has been developed and introduced into HSE RCFs for Older Persons to facilitate ongoing national, regional and local surveillance.

- There was reduced incidence of facilities using urinary dipsticks routinely to support diagnosis of a UTI when compared to previous HALT studies. However, the routine use of urinary dipsticks to support diagnosis of UTIs in asymptomatic residents remains unacceptably high as this practice is not recommended and leads to overuse and unnecessary use of antimicrobials. Any use of urinary dipsticks (routine or otherwise) to assess for evidence of UTI are unreliable in the older population (>65 years) and are of limited use, outlined by the recent publication of 'Position statements for the use of dipstick urinalysis to assess for evidence of urinary tract infection in adults'.[9]

Access to AMS education was limited amongst nursing staff and awareness of the national community antimicrobial prescribing guidelines was low amongst nursing staff but has been improved and addressed by the CHO-AMPs. AMS education has also been developed and is also accessible via HSELanD modules for IPC and AMS including 'Antimicrobial Stewardship in Practice' and 'Prevention and Management of Urinary Tract Infections' which are particularly relevant to this report. In addition, the HSE Infection Prevention and Control Link Practitioner foundation education programme also includes AMS education.

Next Steps:

The results for every facility surveyed have been provided to each individual facility, with direct engagement from the AMP to provide feedback, support and education where necessary. Each CHO have also received a CHO-level report of findings for facilities within their organisation. The results of the survey show that some improvements are necessary to make sure that antimicrobial use in HSE Older Persons facilities is optimised. This in turn, will reduce the harm associated with antimicrobial use, improve the safety of residents in terms of adverse effects, *Clostridioides difficile* infection and minimise development of antimicrobial resistant pathogens. The key recommendations have been determined (section 2.0) and a quality improvement plan has been developed and in progress.

9.0 REFERENCES:

1. Health Protection Surveillance Centre, Point Prevalence Survey of Healthcare-Associated Infections & Antimicrobial Use In Long-Term Care Facilities: May 2016 – Ireland National Report: March 2017. Available online at: https://www.hpsc.ie/a-z/microbiologyantimicrobialresistance/infectioncontrolandhai/surveillance/hcaiinlongtermcarefacilities/haltreports/2016report/File,16218,en.pdf
2. Ricchizzi E et al. Antimicrobial use in European long-term care facilities: results from the third point prevalence survey of healthcare-associated infections and antimicrobial use, 2016 to 2017. *Surveillance and outbreak report. Eurosurveillance*, Volume 23, Issue 46, 15/Nov/2018. Available online at: https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2018.23.46.1800394
3. Preferred antibiotic use in the Community Green Red table. Antibiotic Campaigns, National Community Antimicrobial Prescribing Guidelines. Available online at: https://www.hse.ie/eng/services/list/2/gp/antibiotic-prescribing/antibicrobial-stewardship-audit-tools/antibiotic-campaigns.html
4. Thornley T, Ashiru-Oredope D, Beech E, et al. Antimicrobial use in UK long-term care facilities: results of a point prevalence survey. *J Antimicrob Chemother*. 2019;74(7):2083-2090. doi:10.1093/jac/dkz135
5. Australian Commission on Safety & Quality in Healthcare. 2019 Aged Care National Antimicrobial Prescribing Survey Report (AC NAPS). Available online at: https://www.safetyandquality.gov.au/publications-and-resources/resource-library/2019-aged-care-national-antimicrobial-prescribing-survey-report-ac-naps
6. British Society for Antimicrobial Chemotherapy. (Editor-in-Chief, Nathwani D) Antimicrobial Stewardship: From Principles to Practice. 2018. Available online at: http://www.bsac.org.uk/antimicrobialstewardshipebook/BSAC-AntimicrobialStewardship-FromPrinciplestoPractice-eBook.pdf
7. HIQA. Medicines Management Guidance. 2015. Available online at: https://www.hiqa.ie/reports-and-publications/guides/medicines-management-guidance
8. HIQA. National Standards for infection prevention and control (IPC) in community services. 2018. Available online at: https://www.hiqa.ie/reports-and-publications/standard/national-standards-infection-prevention-and-control-community
9. HSE National Community Antimicrobial Prescribing Guidelines. Accessed October-December 2020. Available online at: www.antibioticprescribing.ie
10. Smith D, Du Rand I, Addy CL*, et al.* British Thoracic Society guideline for the use of long-term macrolides in adults with respiratory disease. *Thorax* 2020; **75:**370-404.
11. Health Protection Surveillance Centre. Point Prevalence Survey of Healthcare Associated Infections & Antimicrobial Use in Long-term Care Facilities: May 2013. Republic Of Ireland National Report: March 2014. Available online at: https://www.hpsc.ie/a-z/microbiologyantimicrobialresistance/infectioncontrolandhai/surveillance/hcaiinlongtermcarefacilities/haltreports/2013report/national2013haltreport/File,14540,en.pdf
12. National Immunisation Advisory Committee. Immunisation Guidelines. Chapter 16: Pneumococcal Infection Jul 2018. Available online at: https://www.hse.ie/eng/health/immunisation/hcpinfo/guidelines/immunisationguidelines.html
13. Report of the findings of the Point Prevalence Survey of Antimicrobial Use in HSE Older Persons Residential Care Facilities, Oct-Dec 2020 https://www.hse.ie/eng/services/list/2/gp/antibiotic-prescribing/prescribing-ltcf/final-national-report-pps-of-antimicrobial-use-in-hse-rcfs-for-older-persons-april-2021.pdf

10.0 LIST OF ABBREVIATIONS (IN ALPHABETICAL ORDER)

ADR	Adverse Drug Reaction
AM	Antimicrobial
AMRIC	Antimicrobial Resistance and Infection Control
AMR	Antimicrobial Resistance
AMS	Antimicrobial Stewardship
AMP	Antimicrobial Pharmacist
CHO	Community Health Organisation
COPD	Chronic Obstructive Pulmonary Disease
CrCl	Creatinine Clearance
C&S	Culture & Sensitivity
DON	Director Of Nursing
DTC	Drugs & Therapeutics Committee
GP	General Practitioner
HALT	Healthcare-associated infection and Antimicrobial use in Long-Term care facilities
HCAI	Healthcare-associated infection
HSE	Health Service Executive
iNAP	Irelands National Action Plan on Antimicrobial Resistance
IM	Intramuscular
IPC	Infection Prevention & Control
IPCC	Infection Prevention and Control Committee
IPCT	Infection Prevention and Control Team
IV	Intravenous
LTC	Long-Term Care
LTCF	Long-term care facility
MO	Medical Officer
PPS	Point Prevalence Survey
RCF	Residential care facility
RTI	Respiratory Tract Infection
UTI	Urinary Tract Infection
1G	1st generation
2G	2nd generation
3G	3rd generation

11.0 APPENDICES

Appendix 1: Examples of non-adherence and commentary

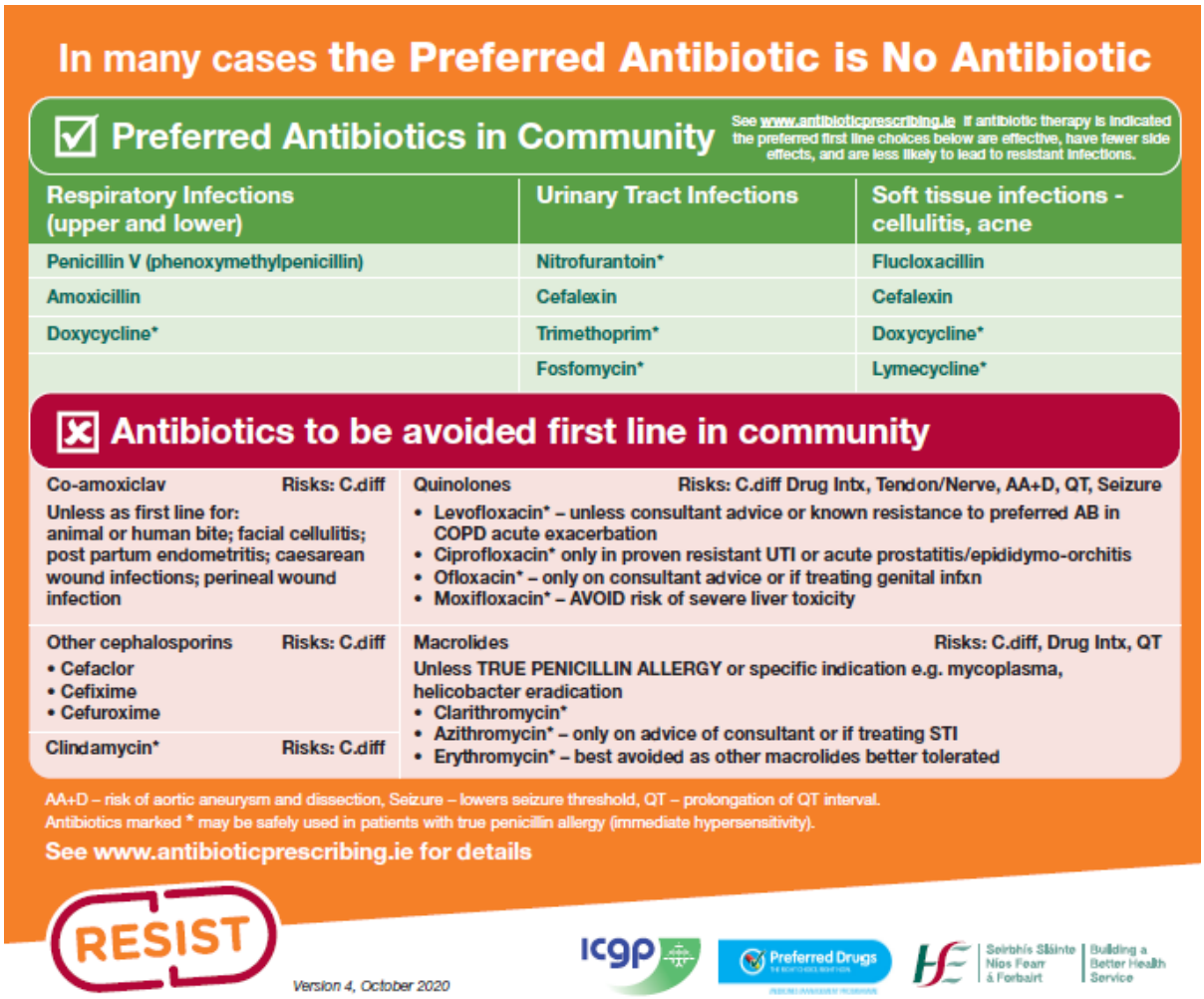
Case report of non-adherence	Commentary
Following 3 sequential antimicrobial courses for treatment of UTI, an MSU was sent to check for clearance of bacteria despite resident being asymptomatic of UTI with resolution of symptoms. The MSU grew *Pseudomonas aeruginosa*, and a course of ciprofloxacin was prescribed to eradicate the *pseudomonas*.	Antimicrobial not indicated for treatment of asymptomatic UTI, culture for clearance not necessary. Growth represents colonisation in absence of symptoms of a UTI. Unnecessary exposure to fluoroquinolone, which is associated with *C.diff* infection and serious adverse effects.
Male resident commenced on trimethoprim 100mg nocte for urinary tract infection prophylaxis on 21/07/20. MSU from six weeks previous (09/06/20) had grown E.coli resistant to trimethoprim. Resident had a subsequent UTI on 13/11/20 which was treated with nitrofurantoin and then resident was recommenced on trimethoprim.	All males with recurrent UTI should be investigated by urology. Resistance to the antimicrobial agent in recent MSU (within 12 weeks) means trimethoprim is not a suitable choice for treatment or prophylaxis. If a breakthrough infection occurs on urinary tract infection prophylaxis, the prophylactic agent should be reviewed with a view to stopping (antibiotic without benefit)
Nitrofurantoin 100mg nocte prescribed for UTI prophylaxis for 8months. Resident has severe renal impairment, CrCl <10mL/min.	Prolonged courses of nitrofurantoin are contra-indicated when CrCl <45mL/min. Any trial of UTI prophylaxis should be reviewed with a view to stopping at 3-6months.
Resident on cephalexin 250mg nocte for over 1 year for UTI prophylaxis, and was also on trimethoprim for treatment of UTI on day of survey.	If breakthrough infection occurs on urinary tract infection prophylaxis, the prophylactic agent should be reviewed with a view to stopping (antibiotic without benefit) and all UTI prophylaxis should be reviewed at 3-6mths.
Resident on 'antibiotic cycling', trimethoprim and amoxicillin alternative months for UTI prophylaxis for over 1 year.	Antibiotic cycling is not recommended as it results in potential loss of 2 future therapeutic options. Resistance to amoxicillin amongst urinary pathogens is high and therefore amoxicillin not usually advised empirically to treatment or prophylaxis of UTI without proven sensitivity. All UTI prophylaxis should be reviewed at 3-6mths with a view to stopping.
Resident on combination of flucloxacillin QDS and phenoxymethylpenicillin TDS for treatment of cellulitis.	Flucloxacillin single agent recommended for cellulitis empirically. No requirement for addition of phenoxymethylpenicillin, which is recommended at a dosing interval of 6hrs (and to be taken on an empty stomach) as it is a time dependent antibiotic.
Macrobid® (Nitrofurantoin prolonged release) prescribed but Macrodantin® (Nitrofurantoin immediate release) being administered.	Immediate release nitrofurantoin has activity for only 6 hours, and requires QDS dosing. Risk of treatment failure with twice daily administration. Prolonged release formulation has activity for 12 hours.

Appendix 2: A list of infections encountered where absence of community antimicrobial prescribing guidelines were identified (as hosted on www.antibioticprescribing.ie)

The following list has been submitted to the www.antibioticprescribing.ie editorial group and website working group for their review and consideration. It is acknowledged that the infections listed below may not be appropriate or necessary for community antimicrobial prescribing guidelines, as their management may always be guided from the acute setting.

List of infections for consideration:
Urinary tract:
Catheter-associated UTI: Current guidelines state prophylaxis 'generally not appropriate' for catheterised patients. Consider providing enhanced detail in guideline. 18% (n=32) of residents on UTI prophylaxis had catheter in situ.
Catheter change: Current guidelines state "Antibiotic prophylaxis is not appropriate for urinary catheter changes unless there is a definite history of UTIs due to catheter change". Consider enhanced detail regarding choice (led by culture) and particularly duration of antibiotic prophylaxis where it is appropriate. Short treatment courses encountered when catheter change is being carried out – e.g. co-amoxiclav 625mg TDS 4/7, gentamicin 80mg IM BD
Recurrent UTIs: Consider dosing regimen recommended for cephalexin as an option for UTI prophylaxis. 125mg once daily currently recommended which is considered adequate however this is only available as a liquid preparation. Lowest strength capsule available is 250mg, which was identified as prescribed dose in 29 residents.
Nitrofurantoin: Consider enhancing detail regarding prolonged release vs immediate release preparations.
Respiratory tract:
Pneumonia/LRTI: Consider guideline development specifically for pneumonia in residential settings, with provision of guidance around hospital-acquired pneumonia, and healthcare-associated pneumonia (criteria for use for co-amoxiclav, and potential use of IM agents (Ceftriaxone IM and Cefuroxime IM encountered for same.)
Aspiration pneumonia: No current guideline
TB: No current guideline
Azithromycin for COPD prophylaxis: No current guideline
Skin/Wound:
Cellulitis: Consider addition of appropriate option for cellulitis for patient colonised with MRSA
Diabetic Foot infections: No current guideline
Prolonged suppressive therapy for underlying bone/joint/prosthetic joint infection: 3 cases identified on prolonged treatment courses for underlying infections. Doxycycline (for 4years) post THR with discharging sinus, Doxycycline (for >1yr) for infected toe, Flucloxacillin QDS for >1yr for recurrent hip infection post THR.
Other:
Splenectomy prophylaxis: no current guideline
Parenteral-Oral Switch: Consider guidance on criteria for parenteral-oral switch for residential settings where parenteral use is being utilised

Appendix 3: Red/Green preferred antibiotics in community settings



In many cases the Preferred Antibiotic is No Antibiotic

☑ Preferred Antibiotics in Community

See www.antibioticprescribing.ie If antibiotic therapy is indicated the preferred first line choices below are effective, have fewer side effects, and are less likely to lead to resistant infections.

Respiratory Infections (upper and lower)	Urinary Tract Infections	Soft tissue infections - cellulitis, acne
Penicillin V (phenoxymethylpenicillin)	Nitrofurantoin*	Flucloxacillin
Amoxicillin	Cefalexin	Cefalexin
Doxycycline*	Trimethoprim*	Doxycycline*
	Fosfomycin*	Lymecycline*

☒ Antibiotics to be avoided first line in community

Co-amoxiclav — Risks: C.diff

Unless as first line for: animal or human bite; facial cellulitis; post partum endometritis; caesarean wound infections; perineal wound infection

Other cephalosporins — Risks: C.diff

- Cefaclor
- Cefixime
- Cefuroxime

Clindamycin* — Risks: C.diff

Quinolones — Risks: C.diff Drug Intx, Tendon/Nerve, AA+D, QT, Seizure

- Levofloxacin* – unless consultant advice or known resistance to preferred AB in COPD acute exacerbation
- Ciprofloxacin* only in proven resistant UTI or acute prostatitis/epididymo-orchitis
- Ofloxacin* – only on consultant advice or if treating genital infxn
- Moxifloxacin* – AVOID risk of severe liver toxicity

Macrolides — Risks: C.diff, Drug Intx, QT

Unless TRUE PENICILLIN ALLERGY or specific indication e.g. mycoplasma, helicobacter eradication

- Clarithromycin*
- Azithromycin* – only on advice of consultant or if treating STI
- Erythromycin* – best avoided as other macrolides better tolerated

AA+D – risk of aortic aneurysm and dissection, Seizure – lowers seizure threshold, QT – prolongation of QT interval.
Antibiotics marked * may be safely used in patients with true penicillin allergy (immediate hypersensitivity).

See www.antibioticprescribing.ie for details

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