Antimicrobial susceptibility of Long term Care Facility and General Practice urine samples in the greater Cork region.

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Background

•Urinary tract infections (UTI) are one the leading causes of infection and antimicrobial prescribing in the long term care facility (LTCF) setting.

•Antimicrobial Stewardship is an multidisciplinary team effort and strategies for surveillance & feedback of antimicrobial resistance are recommended.

•The Guidelines for the Diagnosis and Management of UTI in Long-Term Care patients >65 years recommend the following:

- Trimethoprim or Nitrofurantoin as first line agents (treat uncomplicated UTI)
- Cephalexin or Co-amoxiclav recommended depending on local resistance rates,
- Ciprofloxacin and Co-amoxiclav recommended for acute pyelonephritis.

Objectives

1.To investigate recent patterns of antimicrobial susceptibility in urine samples submitted to the Microbiology Laboratory at Cork University Hospital (CUH) from LTCFs in the greater Cork region.

2.To compare the antimicrobial susceptibilities of LTCF urine samples to those of patients >65 years sent to CUH by General Practitioners (GPs).

This was a multidisciplinary project involving Pharmacists, a Microbiology Medical Scientist and a Microbiologist, to monitor antimicrobial susceptibility.

Methods

•We conducted a retrospective analysis of the antimicrobial susceptibilities of urine samples submitted to the microbiology laboratory at CUH in quarter one (Q1) of 2011 to 2014.

•Ethical approval was obtained from the Clinical Research Ethics Committee of the Cork Teaching Hospitals

•Eligibility criteria: Patients >65years with Mid-stream urine (MSU) or Catheter stream urine (CSU) samples, MSUs as a pure growth of 100,000 colony forming units per ml (cfu/ml), regardless of White Blood Cell (WBC) count.

•A pure growth of >10,000 cfu/ml in the presence of WBC count >100cells/mm^3 was used to define infection.

•For CSU samples, infection was defined as a WBC count >100 cells/mm^3 with a pure growth of 100,000 cfu/ml.

•Only the first positive sample per person was included where multiple samples were submitted and were positive for the same microorganism.

•Clinical and Laboratory Standards Institute (CLSI) guidelines were used for disk diffusion on agar plates.

• Microsoft Excel 2010 & STATA v12 were used for statistical analysis. Chi square statistics were used to compare categorical data.

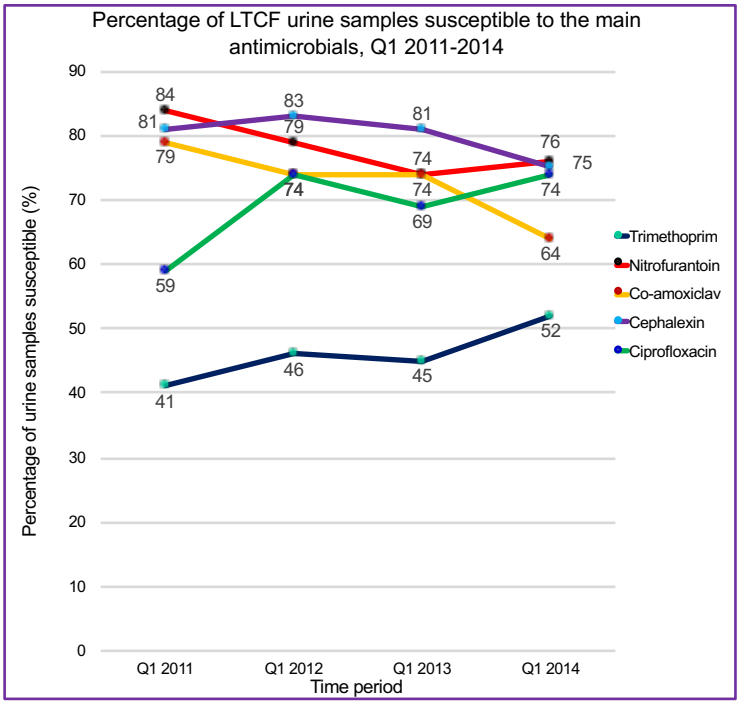

Figure 1. Antimicrobial susceptibilities of the main bacterial groups (Enterobacteriaceae & Enterococcus) in urine samples from LTCFs in Quarter 1 2011-2014.

Antimicrobials		Q1 2011	Q1 2012	Q1 2013	Q1 2014	p values -overall trend 2011 to 2014 -2011 versus 2014
First line Antimicrobials	**%**	%	%	%	%	
Trimethoprim	**LTCF**	41**	46**	45**	52**	0.358 Chi^2 = 3.22 2011 v 2014: p = 0.074
	GP	59	58	58	61	0.571 Chi^2 = 2.0 2011 v 2014: p =0.440
Nitrofurantoin	**LTCF**	84	79**	74**	76**	0.184 Chi^2 = 4.83 2011 v 2014: p = 0.084
	GP	89	90	87	86	0.014* Chi^2 = 10.5 2011 v 2014: p = 0.046*
Second line Antimicrobials	%	%	%	%	%	
Co-amoxiclav	**LTCF**	79	74**	74**	64**	0.044* Chi^2 =8.12 2011 v 2014: p = 0.005*
	GP	83	82	84	79	0.014* Chi^2 = 10.5 2011 v 2014: p = 0.01*
Cephalexin	**LTCF**	81	83	81	75**	0.451 Chi^2 = 2.61 2011 v 2014: p = 0.01*
	GP	82	86	81	85	0.005* Chi^2 = 13.02 2011 v 2014: p = 0.064
Ciprofloxacin	**LTCF**	59**	74**	69**	74**	0.024* Chi^2 = 9.4 2011 v 2014: p = 0.013*
	GP	84	82	79	87	<0.001* Chi^2 = 18.2 2011 v 2014: p = 0.061

Table 1. Comparison of LTCF and GP antimicrobial susceptibilities.
*** = Statistically significant p<0.05.**
**** = Statistically significant difference found: LTCF samples less susceptible than GP samples in this quarter.**
(First line and second line antimicrobials as per Guidelines for management of UTI in Long term care patients)

Results

- 4,256 samples (29,439 individual antimicrobial tests) were included. (496 LTCF, 3760 GP).
- The most common bacterial family groups identified were Enterobacteriaceae (including *E.coli*, *Proteus, Citrobacter koseri, Enterobacter cloacae, Enterobacter aerogenes, Klebsiella pneumonia*) and Enterococcus (*Enterococcus faecalis* and *Enterococcus faecium).*
- Figure 1 outlines the changes in antimicrobial susceptibility trends in LTCF urine samples.
- Significantly fewer LTCF urine samples compared to GP urine samples were susceptible to recommended antimicrobials in many of the quarters as outlined in Table 1(**).
- When antimicrobials were collated as First-line (trimethoprim & nitrofurantoin) and Second-line (co-amoxiclav, cephalexin, ciprofloxacin), in Q1 2011-2013 significantly fewer LTCF urine samples were susceptible to First-line antimicrobials (p<0.001) in each year.
- There were fewer CSU (168) than MSU (4,088) samples. From 2011 to 2014 there was no significant trend in antimicrobial susceptibility in the CSU samples or no significant differences found between the LTCF and GP population CSU samples.

Conclusion

- LTCF urine samples were consistently less susceptible to the main antimicrobials than the GP population.
- The increasing prevalence of antimicrobial resistance in LTCF must be considered by prescribers, pharmacists, microbiologists & nurses working in this setting.
- The multi-disciplinary nature of this project enhances the interpretation of the findings and translation of the microbiology data into clinically important findings.
- These findings must be considered when developing antimicrobial prescribing guidelines and implementing antimicrobial stewardship strategies in the LTCF setting at local & national level.

The full publication is available in the European Journal of Public Health: http://eurpub.oxfordjournals.org/lookup/doi/10.1093/eurpub/ckw138/
References are available on request: a.fleming@ucc.ie.
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