GUIDELINES AND AUDIT IMPLEMENTATION NETWORK

The Regulation and Quality Improvement Authority

Audit to Determine the Adherence to Regional Guidelines for the Treatment of Urinary Tract Infections (Including Uncomplicated, Complicated, Urosepsis and Catheter-Associated UTIs)

Report completion date: 02 December 2015

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EXECUTIVE SUMMARY

Aim

To determine the adherence to regional guidelines for the treatment of urinary tract infections (UTIs), including uncomplicated, complicated, urosepsis and catheter-associated UTIs.

Standards

A target of 95% compliance with guidelines was set for each trust.

Sample

Target set of 60 adult patients per trust over three months from February to April 2012 across medical, surgical and elderly care wards.

Data sources

In the audit, data sources used included secondary care patients' medical notes, kardexs and the laboratory system for blood and bacteriology results.

Results

- Each compliance level was below the target set (Northern 80%, Southern 85%, Western 66% and South Eastern 81%) and this was found to be significantly different when analysed using a two sample paired t-test.
- Allergy status was adequately completed in each trust (>90% completion)
- Indication was well documented however intended duration was not as well documented
- Sepsis was not always identified (15% of lower UTI cases) or sepsis was treated with no signs or symptoms (41% of urosepsis cases) showing work needs carried out in the appropriate identification of sepsis.
- UTIs are often to be diagnosed and treated without any signs or symptoms.

Recommendations

- Compliance is below target showing further work needs to be carried out to promote guideline use within each trust
- Documentation needs to be improved across all trusts
- An awareness need to be increased of how to recognise UTIs and when it is appropriate to treat. Work is also needed to improve the appropriate recognition of sepsis.

Clinical audit report

Background/rationale

Guideline Development

Changing the Culture 2010 is a strategic regional action plan for the prevention and control of healthcare-associated infections in Northern Ireland. It sets out the aims and objectives for the Northern Ireland health service to reduce the incidence of healthcare-associated infections. First launched in 2006, a range of interventions have already been implemented to improve the quality of health services.

In 2008, antibiotic prescribing guidelines were introduced for primary care; within one year the proportion of guideline antibiotics prescribed increased from 68% to 77% (STAR 2012-2017). In secondary care, the development of empirical antimicrobial guidelines guides the clinician's choice in treatment of UTIs. These guidelines were first introduced in December 2009. The emergence of antibiotic-resistant organisms emphasises the importance of the guidelines in reducing the use of antibiotics which have demonstrated high levels of resistance.

Resistance to Antimicrobials

Antimicrobial Resistance can be inherent or acquired. Inherent (or intrinsic) resistance is a natural resistance within the bacteria. This is often seen in Gram-negative bacteria (e.g. *Pseudomonas aeruginosa* which exhibits a high degree of resistance to multiple antibiotics).

Acquired resistance is due to the development of resistance of bacteria to an antibiotic to which it was once sensitive. Resistance can develop during the course of treatment or develop slowly over months or years. Acquired resistance may arise from the overuse of broad spectrum antibiotics.

Increased cephalosporin use can be linked to (from Owens et al. (2008)):

- Vancomycin resistant enterococci (VRE)
- Extended spectrum beta-lactamase (ESBL) producing *Klebsiella pneumoniae*
- *Clostridium difficile*

Increased quinolone use is linked to:

- Increased MRSA infection rates
- Increased quinolone resistance with gram-negative organisms e.g. *Pseudomonas aeruginosa*
- Increased risk of *Clostridium difficile*

Resistance development highlights the importance of antimicrobial stewardship, which includes reduction in the use of broad spectrum antibiotics. First launched in 2002, the Antimicrobial Resistance Action Plan (AMRAP) focuses on six priority action areas to be addressed:

1. Prudent antimicrobial use in humans in the community

2. Prudent antimicrobial use in humans in hospitals
3. Prudent antimicrobial use in animals
4. Infection control
5. Education, information dissemination and research
6. Surveillance

Since the launch of Changing the Culture in 2006, figures from the Public Health Agency show reductions in the number of cases of *C. difficile* and MRSA, namely 68.1% in C. diff and 61.3% in MRSA infections. Changing the Culture was updated in 2010. The overall purpose has not changed, with the core aim being to 'eliminate the occurrence of preventable healthcare-associated infections in all health and social care settings, and promote, strengthen and maintain public confidence and understanding'. One of its objectives is to renew the focus on antimicrobial resistance and antibiotic prescribing. This includes a region-wide antibiotic prescribing policy for hospitals and for each trust to have an antimicrobial stewardship programme in place.

Antimicrobial stewardship involves selecting the most appropriate drug at its optimal dose and duration (Fishman 2006). One of the best approaches for tackling inappropriate prescribing in hospitals is the introduction of antibiotic policies. The development of guidelines should involve medical, microbiological, pharmacy and infection control staff. It is important that these guidelines are reviewed and updated in line with the most prevalent organisms and emerging resistance patterns.

Once guidelines are in place, it is important that they are audited to ensure adherence. Non-compliance may lead to further resistance and inappropriate prescribing.

Aim

To determine the adherence to regional guidelines for the treatment of Urinary Tract Infections (including uncomplicated, complicated, urosepsis and catheter-associated UTIs)

Objectives

Collect data on antimicrobials prescribed for UTIs and assess adherence to guidelines in Northern, South Eastern, Southern and Western Trusts

Additional parameters measured included

- Allergy status completion
- Documentation
- Sepsis criteria

Standards/guidelines/evidence base

Comparison has been made to a previous audit to assess first-line compliance

- GAIN Audit of the Regional Guidelines for First-Line Empirical Antibiotic Therapy in Adults (May 2011)

Methodology

Proforma Development

In order to assess inpatient prescribing for adherence to guidelines a data collection form needed to be created. A previous pilot audit had been carried out by Belfast Trust to assess guideline compliance in the preceding 6 months; the data collection proforma template for this audit was adapted from the BHSCT's pilot form (Appendix 1). Following discussions with the antimicrobial pharmacist network amendments were made to the data collection form and a final version was agreed.

Sample

Patients admitted to hospital from February to April 2012 diagnosed with a UTI (urinary tract infection). Only adult patients on medical, surgical and elderly care wards were included.

The Belfast trust had completed a pilot audit within the preceding 6 months therefore could not participate in the regional audit as it would not have been feasible to undertake data collection again at the same time as the other trusts.

The aim was for each trust to audit 20 patients per month for the three month period, leading to a prospective total of 240 patients. In total, 203 patients were included in the audit, spread across Northern, South Eastern, Southern and Western trusts.

Patients were identified on wards through antimicrobial ward rounds and from ward-based clinical pharmacists.

Data Collection

Using the data collection form in Appendix 1, data was collected both prospectively and retrospectively from patients' medical notes and drug kardex. The hospital laboratory system was used to gather blood and bacteriology data.

Data collection was carried out by antimicrobial pharmacists in Northern, Southern and Western trusts, and by both antimicrobial pharmacists and a clinical pharmacist in South Eastern trust.

Data Analysis and Report Writing

Data was entered into SPSS by the clinical audit and effectiveness department at the Northern HSCT.

Findings

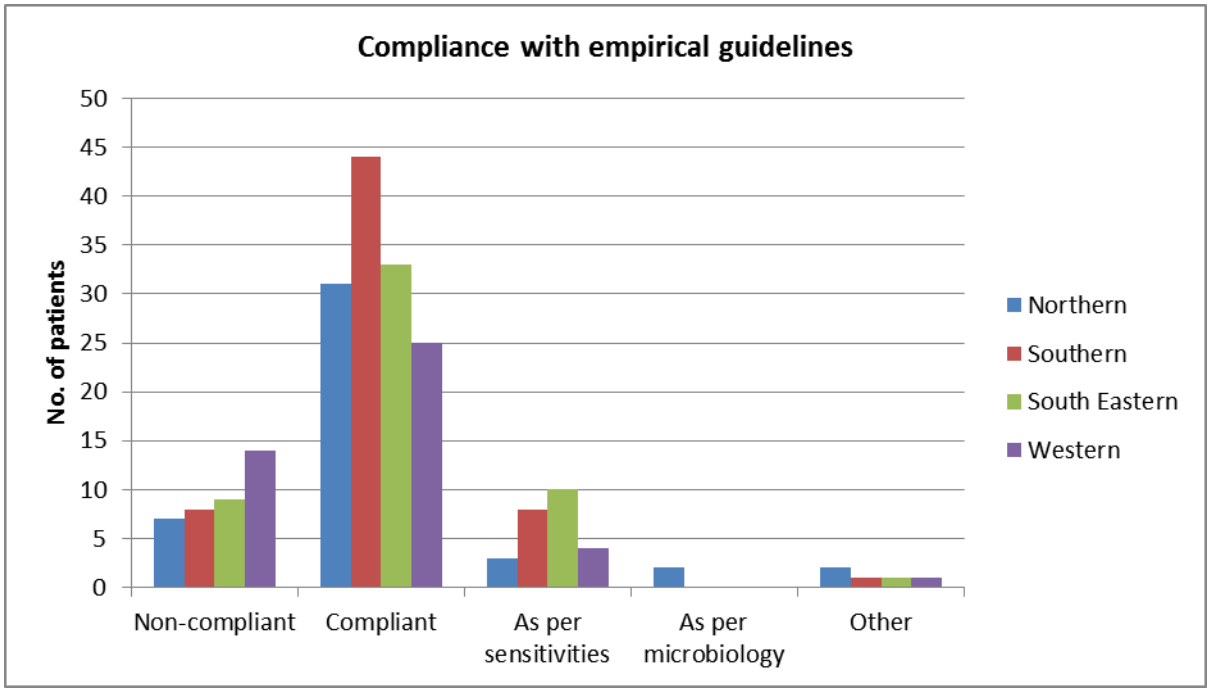
Table 1: Distribution of indications

Indication	Northern	Southern	Western	South Eastern
Uncomplicated Lower UTI	20	28	28	25
Complicated Upper UTI	6	7	4	6
Catheter-associated UTI	5	17	4	13
Urinary sepsis	10	8	5	9
Other	2		2	
Catheter-associated/sepsis	2			
ESBL urosepsis		1		
Upper/catheter UTI			1	
Total	**45 (22%)**	**61 (30%)**	**44 (22%)**	**53 (26%)**

(N=203)

Table 1 shows the distribution of diagnoses in each trust with uncomplicated lower UTIs most common, followed by catheter-associated UTI.

Standard 1: Empirical antimicrobials prescribed should be as per guidelines (Target 95%)



Trust	Adherence	
	N per trust	(%)
Northern	45	38 (84%)
Southern	61	53 (87%)
Western	44	30 (68%)
South Eastern	53	44 (83%)

(N = 203)

Compliance: On average 81% of prescribing as per guidelines. This was a reduction on the previous GAIN audit which showed 85% compliance. Each trust failed to reach the required compliance rate.

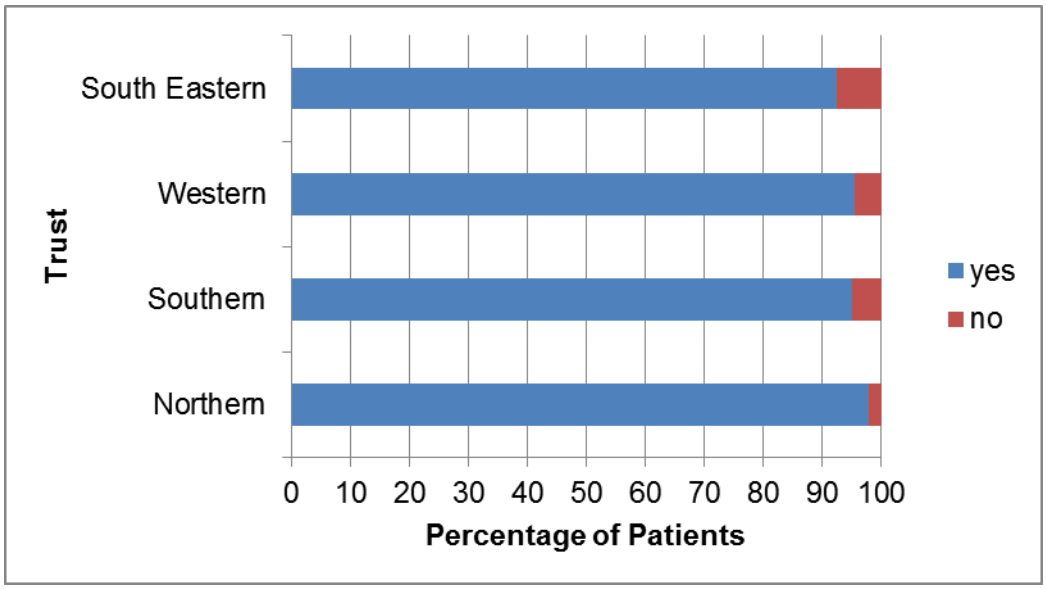
Standard 2: Duration of therapy for uncomplicated UTIs should follow guidelines (Target 95%)

Uncomplicated UTIs (N)	Intended Duration (days)	Range of Treatment (days)	Appropriate (%)
Female (82)	3	2-21	(27) 32.9%
Male (19)	7	2-8	(14) 73.7%

(N = 101)

Compliance: There was very poor compliance to this standard for both male and female patients

Standard 3: Kardexes should have allergy status completed (Target 95%)



Trust	Adherence	
	N per trust	(%)
Northern	45	44 (97.8%)
Southern	61	58 (95.1%)
Western	44	42 (95.5%)
South Eastern	53	49 (92.5%)

(N = 203)

Compliance: On average 95% compliance with this standard was reached

Non-compliance: South Eastern Trust was the only trust to fall below the required standard

Standard 4: Drug choice and intended duration of therapy should be documented in the medical notes at time of prescribing (Target 95%)

Trust		Drug documentation	Duration documentation
	N per trust	%	%
Northern	45	(40) 88.9%	(20) 44.4%
Southern	61	(59) 96.7%	(30) 49.2%
Western	44	(40) 90.9%	(20) 45.5%
South Eastern	53	(46) 86.8%	(5) 9.4%

(N = 203)

Compliance: Overall compliance with standard 4 was not reached by any trust. Greater compliance was seen with drug choice documentation than with duration documentation, the Southern trust did comply with the target of 95% for drug documentation.

Standard 5: Where sepsis criteria was met, this should be recognised and treated accordingly (Target 100%)

	Uncomplicated UTI		Sepsis	
Trust	Total cases	Sepsis criteria met	Total cases	Sepsis criteria not met
Northern	20	6 (30%)	10	4 (40%)
Southern	28	3 (11%)	8	1(13%)
Western	28	2 (7%)	5	2 (40%)
South Eastern	25	4 (16%)	9	6 (67%)
	(N = 101)		(N = 32)	

Compliance: All trusts displayed cases where the sepsis criteria wasn't met but was treated as urosepsis and likewise there were a number of cases where sepsis criteria was met but treated as uncomplicated UTI.

Observations

As shown in standard 1 when we include those antimicrobials prescribed as per microbiology are included, as per sensitivities or that had another justifiable explanation for deviation from policy as compliant, each trust demonstrates the following overall compliance levels:

- Northern Trust- 84%
- Southern Trust- 87%
- Western Trust- 68%
- South Eastern Trust- 83%
- Average- 81%

Guideline compliance of 95% was the target for this audit.

When the two sample paired t-test was applied to these values, after use of the t distribution (at 5% significance, one-tailed test, 4-1 degrees of freedom), a critical value of 2.353 or greater will cause the null hypothesis to be rejected. As a value of 4.10 was achieved, this indicates that there is a statistical difference between the observed compliance achieved by each trust and the expected level of 95%. When compared to the previous respiratory audit completed, this achieved a compliance level of 85% showing a decline in compliance rates.

Only the duration of therapy for uncomplicated UTIs is documented on all trusts' antimicrobial guidelines, therefore this type of UTI was the only one audited regarding duration of therapy. This showed low compliance with guidelines in female patients with only 32.9% receiving the recommended 3 days therapy. This could be linked to poor documentation of intended duration, incorrect diagnosis on initiation of therapy or unawareness of guidelines. This shows a sharp drop in comparison to the previous respiratory audit that achieved 99% compliance with guideline duration. The respiratory audit was a point prevalence study whereas the UTI audit followed treatment through to completion to assess actual duration of treatment, which may have contributed to this difference.

Documentation of intended duration of therapy should be recorded in the patients' medical notes at initiation of therapy to prompt a review of treatment to avoid excessive courses or to guide other medical staff as to treatment intent.

Sepsis criteria is deemed to be met if there is a clinical impression of infection + 2; Temp >38°C or < 36°C, pulse > 90bpm, resp. rate > 20/min, WCC >12 or <4 x 10^9/l. When each case was assessed, 15% of cases diagnosed and treated as uncomplicated UTIs met the above sepsis criteria. This could lead to patients being undertreated and requiring further courses of antimicrobial therapy when they do not respond to simple therapies. 41% of cases treated as urinary sepsis were identified as not meeting sepsis criteria indicating a number of patients may have been treated with unnecessary intravenous antibiotics and prolonged hospital stays.

Areas of good practice

- Allergy status was adequately completed across all four trusts.
- Documentation of antimicrobial indication was documented in 91% of cases.

Areas for improvement

- Although overall compliance was 81% with empirical guidelines, this is a reduction from previous audits and needs improvement as it did not reach the required 95% compliance rate.
- Intended duration was only documented in 37% of cases; similar to the previous respiratory audit result of 38% therefore this still needs improvement.
- Sepsis is not always recognised indicating some patients may be undertreated initially and require additional treatment.

Presentation/Discussion

- The audit was presented as a poster at the GAIN Audit Conference 2014
- The results were disseminated to each trust for local discussion

Recommendations

- Promote existence of guidelines especially to junior medical staff and encourage prescribing according to guidelines
- Documentation would also need to be improved, both at initiation of therapy and throughout the patient journey. A future audit could be carried out to fully investigate the quality of documentation by all professions in the medical notes to ascertain reasons for poor documentation and methods, in order to improve this.
- Reinforce importance of when not to treat in asymptomatic patients even in the presence of a positive urine sample.
- Provide further education on sepsis recognition to avoid over and under treatment in patients diagnosed incorrectly.

Learning points

The target of 60 patients per trust was only achieved by one of the four trusts. Perhaps this was an ambitious target as the auditors were gathering data along with carrying out their usual daily work activities. In future, it may be advisable to seek additional help during data collection by utilising the clinical pharmacists working across the hospital wards.

The complexity of the audit proforma made data collection time-consuming. Prior to re-audit, it would be advisable to simplify the audit proforma. Collection of data on drug choice and duration alone can be used to assess compliance in the future.

References

1. Antimicrobial Resistance Action Plan (AMRAP) 2002-2005

2. Changing The Culture 2010 (Strategic regional action plan for the prevention and control of healthcare-associated infections in Northern Ireland) Jan 2010 DHSSPS

3. Fishman, N. (2006) Antimicrobial Stewardship. Am J Med. 119(6):S53-S61

4. GAIN Audit of the Regional Guidelines for First-Line Empirical Antibiotic Therapy in Adults (May 2011)

5. Owens, R.C., Donskey, C.J., Gaynes, R.P., Loo, V.G., Muto, C.A. (2008) Antimicrobial-Associated Risk factors for *Clostridium difficile* Infection. Clin Infect Dis. 46(suppl 1):S19-31

6. Strategy for Tackling Antimicrobial Resistance (STAR) 2012-2017

Appendix 1 – Data Collection Proforma

Adherence to Trust Urinary Tract Infection Guideline Audit Form

Date completed: _____ Completed by: _____ Time Taken: _____

Patient Details

Patient Initials	**Hospital Number**
Patient Age	**Patient Gender** M ❑ F ❑
Trust	**Hospital**
Ward	**Speciality**

Allergies

Allergy status completed on drug chart?	Yes ❑ No ❑ Details _____

Admission and onset details

Indication for antibiotics

❑ uncomplicated (lower) UTI ❑ complicated (upper) UTI
❑ catheter associated UTI ❑ urinary sepsis ❑ proven ESBL
Other _____

Antimicrobial **indication** documented in **medical notes?** Yes ❑ No ❑ (Documented as_____)
Antimicrobial **indication** written on **drug chart?** Yes ❑ No ❑
Antimicrobial **duration or review date** written on **drug chart?** Yes ❑ No ❑
Antimicrobial **duration or review date** written in **medical notes?** Yes ❑ No ❑

*Please LIST **ALL ANTIBIOTIC(S)** that have been used to treat this INFECTION*:

Date initiated					
Antimicrobial					
Total duration					
Dose					
Route					
If iv therapy >48 hours is therapy justified? Y/N/NA					
Total missed doses/total amount of doses due to be given					
Antibiotic therapy:					
1. Non-compliant with guidelines					
2. As per guidelines					
3. As per sensitivities					
4. As per microbiology					
5. Other (please comment) **Eg: clinical decision**					
Is gentamicin recommended by Trust guideline for this indication but not prescribed: Y/N/n/a					
If gentamicin indicated but not prescribed, please state reason: 1, 2 or 3 (see below)					
1: renal impairment 2:need for gentamicin TDM 3:clinical decision 4: not documented					

Comments Box

Evidence of Infection: Investigations and Severity

INVESTIGATION DOCUMENTED	**Result**
Sepsis: SEPSIS Criteria: Clinical impression of infection **+ 2**; Temp **>38°C** or **< 36°C** , pulse **> 90bpm**, resp rate **> 20/min**, WCC >**12** or **<4 x 109/l.**	Yes ❑/No ❑/Unknown ❑
Pyrexia: >38°C or < 36°C	Yes ❑/No ❑/Unknown ❑
CRP : 10.0-50.0mg/L ❑ CRP: >50.0mg/L ❑ (state actual figure):	Yes ❑/No ❑/Unknown ❑
Symptoms of UTI: Pain or burning during urination❑ Pain in the bladder region❑ Difficulty urinating or urinary incontinence❑ Dysuria or loin pain over the affected kidney❑ Acute confusion❑ Fever, chills &/or general malaise❑ Frequency/urgency ❑ Haematuria ❑	
Renal impairment: eGFR <30ml/min (if yes, please state Creatinine):	Yes ❑/No ❑/Unknown ❑
Elevated White Cell Count: > $12x10^9$/L? Yes ❑/No ❑/Unknown ❑	White cell count documented (state if known): Yes ❑/No ❑

Urinalysis			
MSSU/CSU taken	Yes ❑ No ❑ N/A ❑	Before antibiotics started?	Yes ❑ No ❑ Unknown ❑
Urinalysis dipstick performed/documented:	Yes ❑ No ❑	Positive for Leucocytes/nitrites	Yes ❑ No ❑ Unknown ❑
Blood cultures requested	Yes ❑ No ❑ N/A ❑	Before antibiotics started:	Yes ❑ No ❑ Unknown ❑
Culture results recorded in Medical notes?	Yes ❑ No ❑ N/A ❑ (n/a if no samples sent)		
Catheter insitu Yes ❑/No ❑	**Co-morbidity** Yes ❑/No ❑		**Diabetic** Yes ❑/No ❑
Is there evidence of a Urinary Tract Infection? Yes ❑ No ❑ Unsure ❑			

Please answer the following question(s) for any patient with samples sent for culturing– a Yes or No response may render subsequent questions 'Not applicable'

Culture results	**Yes**	**No**	**N/A**	
1: a: Was there a positive culture of a clinically relevant organism?				*SPECIFY SAMPLE TYPE & ORGANISM*
b: If positive, was the organism sensitive to the empirical antibiotic regimen prescribed?				
c: If it was not sensitive, was the empirical antibiotic regimen changed?				
d: If not changed, was a reason documented for not changing the antibiotic *(e.g. clinical improvement)*				*SPECIFY REASON IF ANY RECORDED*
2: a: Was there an opportunity to change to a narrower spectrum antibiotic such as amoxicillin, Trimethoprim, nitrofurantoin? *(i.e. de-escalation)*				*SPECIFY WHAT NARROWER SPECTRUM ANTIBIOTICS, THE ORGANISM WAS SENSITIVE TO*
b: If Yes, was a change made to a narrower spectrum antibiotic?				
c: If No, was a reason for not de-escalating recorded?				*SPECIFY REASON IF ANY RECORDED*

This form is now: Complete ❑ Needs to be reviewed further

Comments Box

Appendix 2 – Clinical Audit Action Plan

Clinical Audit Action Plan

Audit to determine the adherence to regional guidelines for the treatment of UTI's

Action plan lead: Professor Scott, Head of Pharmacy and Medicines Management, Antrim Hospital, NHSCT

Recommendation	Actions Required	Action by Date	Person(s) Responsible	Comments/Action Status
1. Promote existence of guidelines especially to junior medical staff and encourage prescribing according to guidelines	Promote awareness of guidelines and measure compliance	N/A	Professor Scott and Antimicrobial Pharmacists	The results are no longer current due to the length of time that has passed since the audit to the completion of the report. The regional antimicrobial pharmacy group plan to repeat the audit of compliance with UTI treatment in spring 2016 and any actions required taken from these results.
2. Documentation would also need to be improved, both at initiation of therapy and throughout the patient journey	Promote importance of documentation.	**N/A**	Professor Scott and Antimicrobial Pharmacists	
3. Reinforce importance of not treating asymptomatic patients even in the presence of a positive urine sample.	Education on diagnosis of UTI and differentiation between asymptomatic and symptomatic patients	N/A	Professor Scott and Antimicrobial Pharmacists	
4. Provide further education on sepsis recognition to avoid over and under treatment in patients diagnosed incorrectly	Education on recognition of sepsis and appropriate management	N/A	Professor Scott and Antimicrobial Pharmacists	