

# Improving prescribing for urinary tract infections: Strategy, impact and consequences

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# Background

## Mid and South Nottinghamshire

- 6 CCGs with population of 700,000:
  - Acute Trust, 2x District Generals, 2x Community, 2x MHU
  - 149 GP practices
- Nottinghamshire Area Prescribing Committee
  - County-wide guidelines
- Nottinghamshire Antimicrobial Stewardship Group
- Community Infection Doctor for South Notts

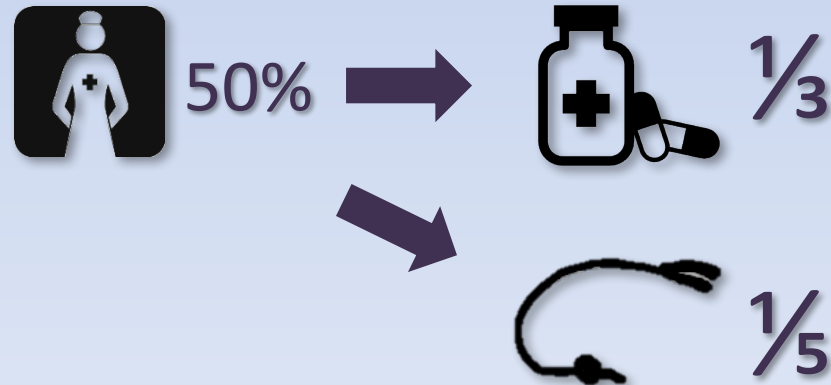


# England: GNBSIs and *E. coli*

➤ Where to focus efforts?

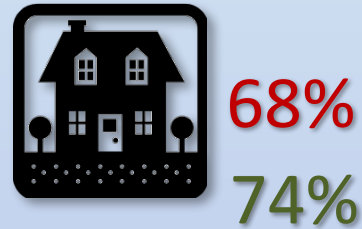


➤ Are these preventable?



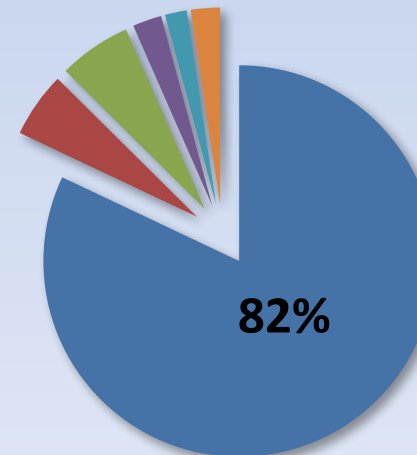
# Nottingham: GNBSIs and *E. coli*

## ➤ Where to focus efforts?



## ➤ Are these preventable? (*possibly preventable*)

- No identifiable preventable factor
- Urine sampling / testing
- Urinary catheters
- Neutropaenic prophylaxis
- Delay in surgical source control
- Other

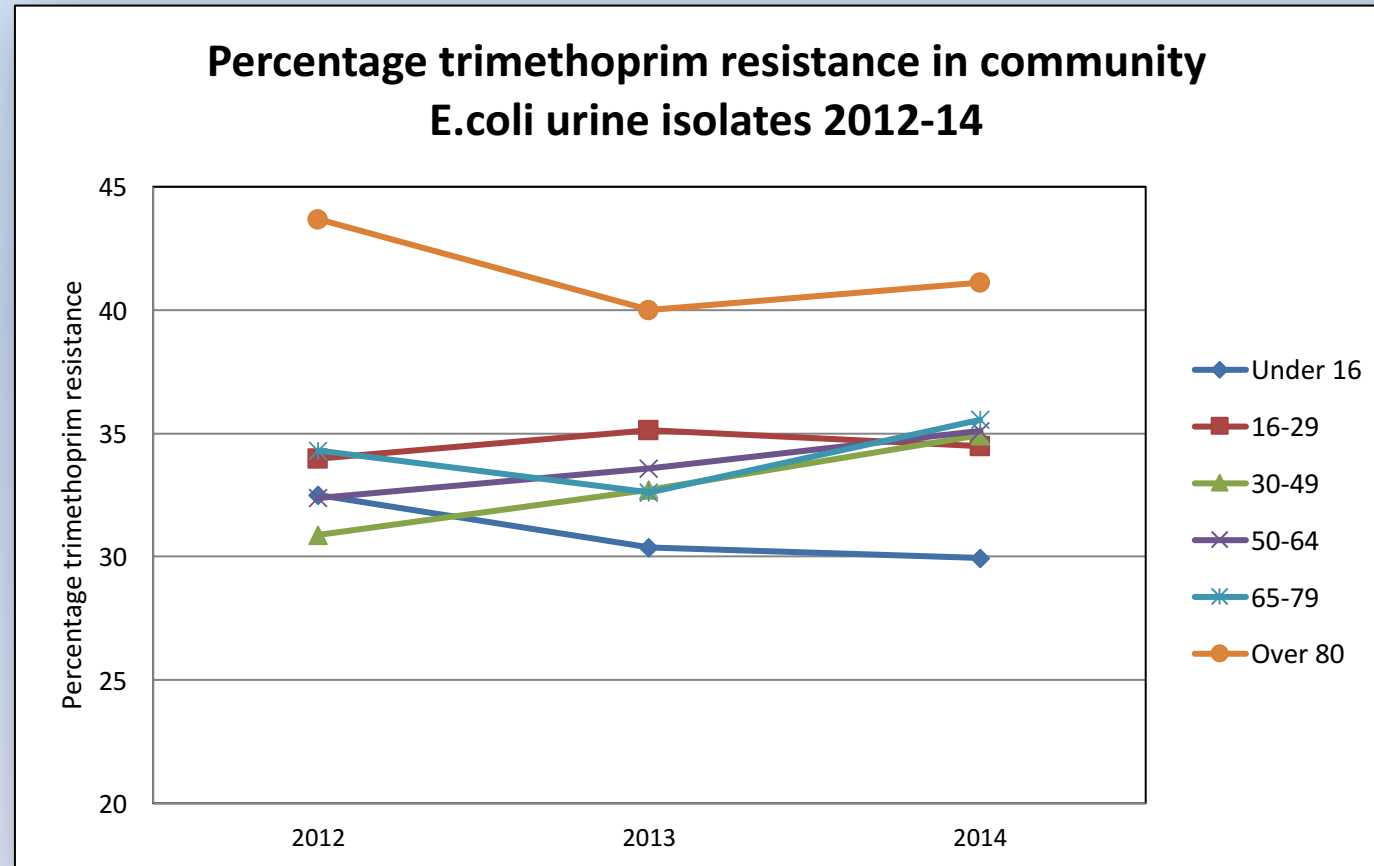


Multi-disciplinary  
mini-root cause analysis  
of 167 cases

Source: Boswell T, unpublished data, 2013

# UTIs: Where were we?

## ➤ Local resistance rates\*



\* not sentinel surveillance

# UTIs: Where were we?

Community antibiotic guidelines for UTIs across six Nottinghamshire CCGS (FY14/15):

- First-line: Trimethoprim *or* nitrofurantoin
  - T:N proportion was 67%  
vs. England average of 65%
- Second-line: Co-amoxiclav
  - Proportion of broad-spectrum antibiotics 11%  
vs. England average 11%

# UTIs: Where were we?

*E. coli* BSI rates per 100,000 population in the top 20% in England across Nottinghamshire CCGs (FY14/15)

- Some CCGs >100 cases per 100,000 population
- Mandatory surveillance starting

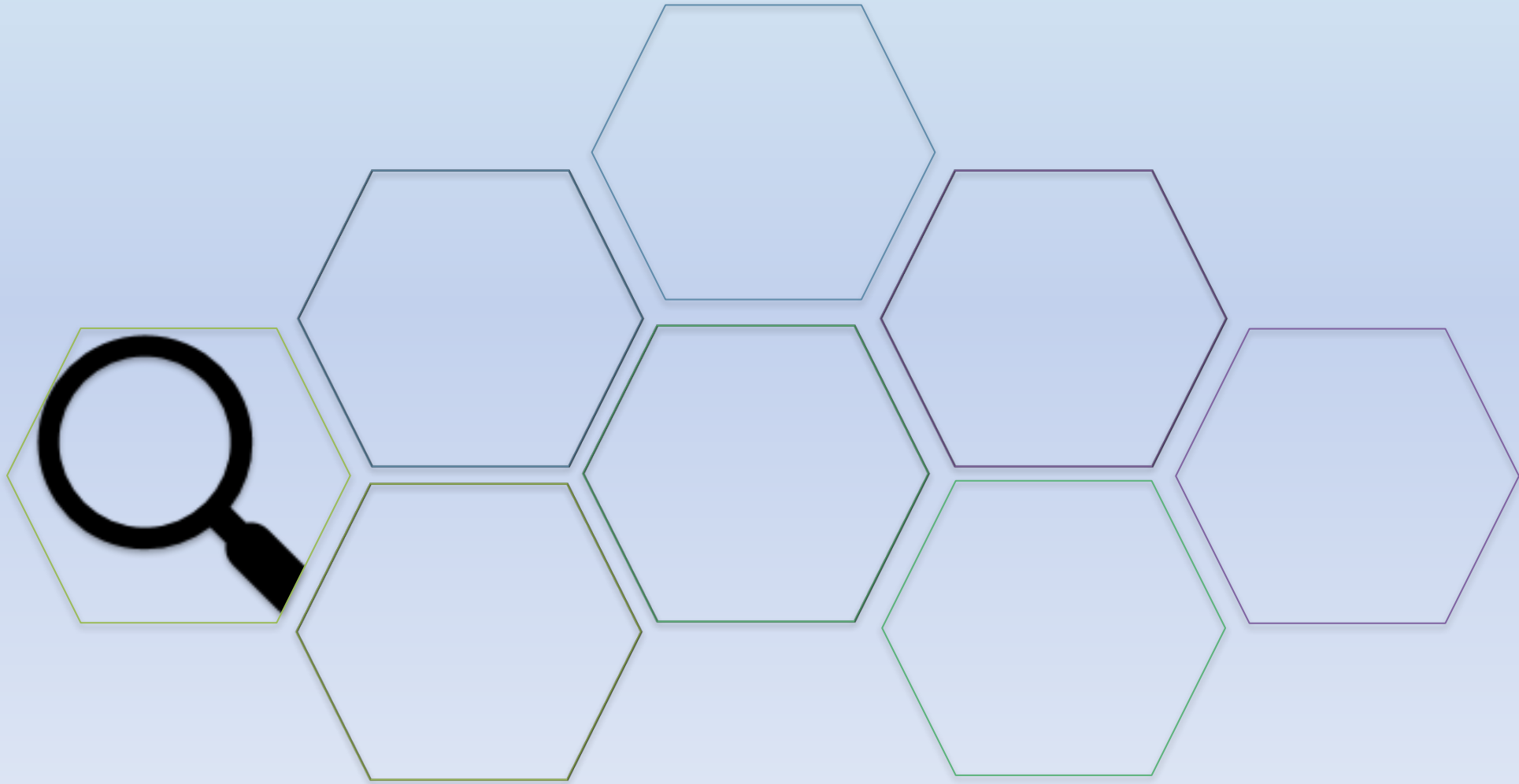
High hospital standardised mortality rates for UTI

- Audit suggested misdiagnosis and overtreatment, plus hospital coding



Focus area for improvement

# UTIs: What did we do?





# UTIs: What did we do?



# UTIs: What did we do?



Agar plate-based culture and sensitivity method

⌚ ID & sens ~ 48h



Semi-automated commercial  
microtitre based method

⌚ ID & sens ~ 24h

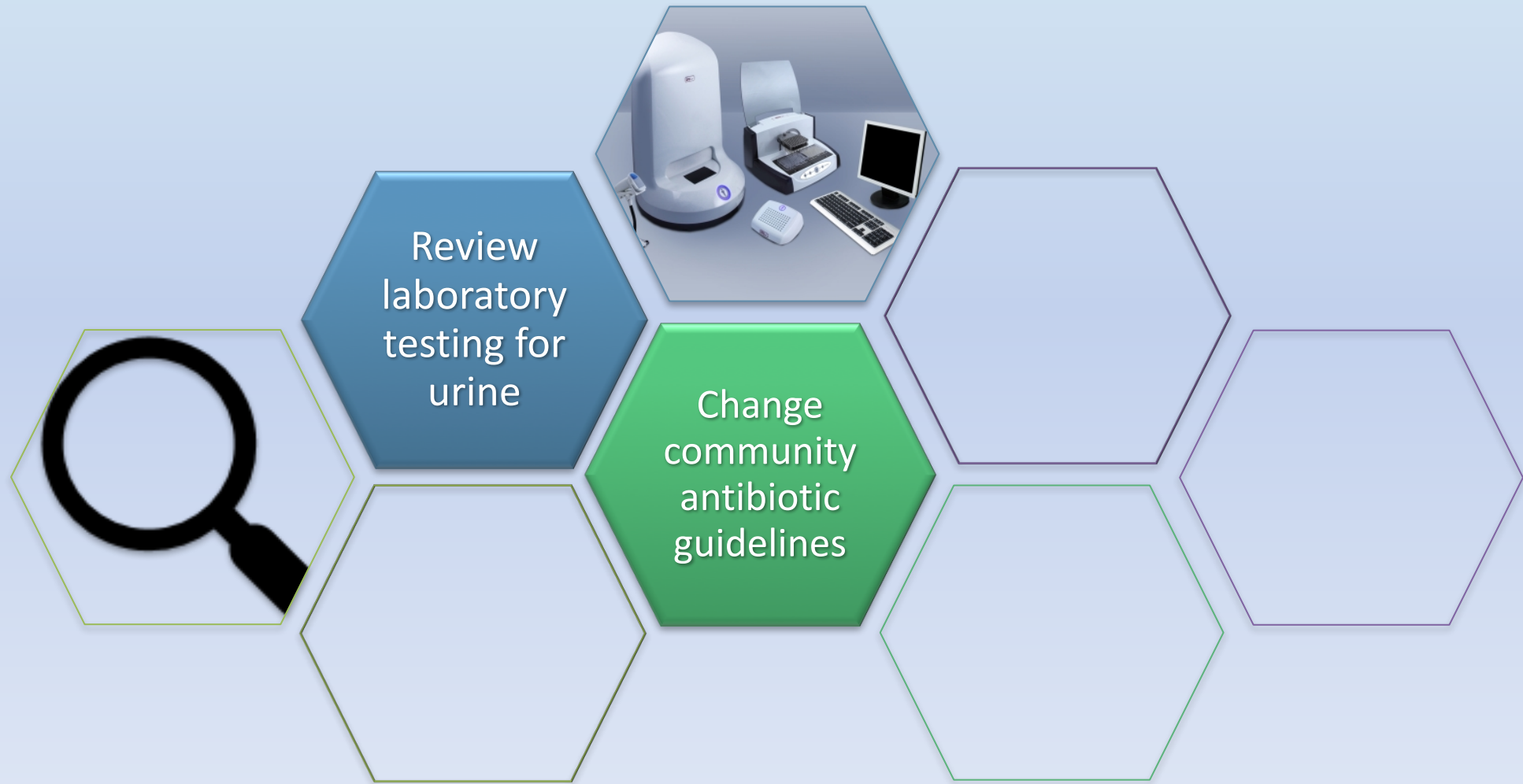


Replaced amoxicillin testing with pivmecillinam

# UTIs: What did we do?



# UTIs: What did we do?



# UTIs: What did we do?

Recommended change to community guidelines:

- First-line: Nitrofurantoin
  
- Second-line: Choice dependant on risk factors for resistance
  - ❖  $\geq 65$  yrs or any risk factor for resistance: Pivmecillinam
  - ❖  $< 65$  yrs with no risk factors for resistance: Trimethoprim

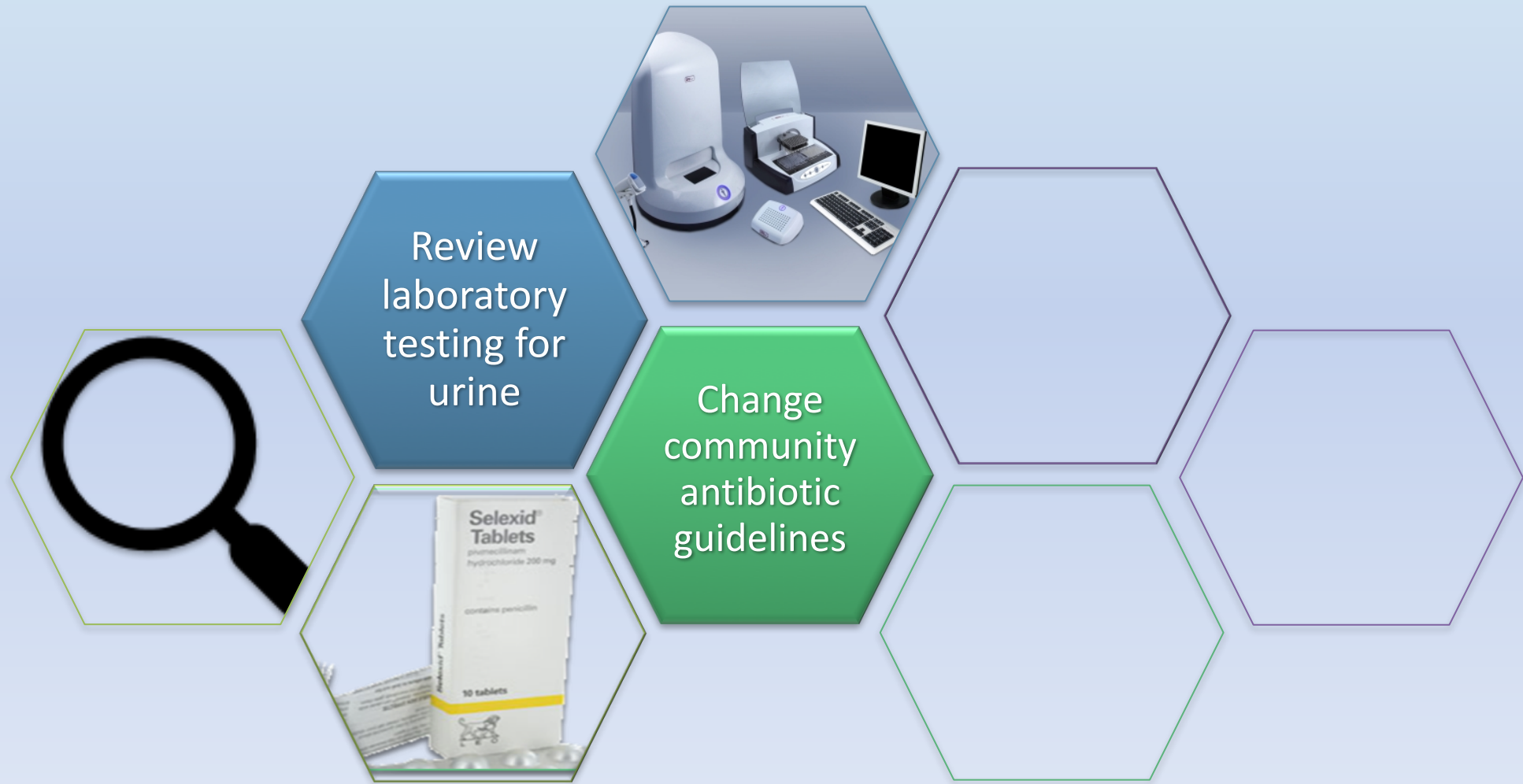
# UTIs: What did we do?

Before prescribing, consider risk factors for resistance:

- Treatment failure or recurrent UTI
- Previous resistant organism in urine
- Care home resident
- Hospital stay in last 6 months
- Travel to country with increased antimicrobial resistance

If risk factors present, send a pre-treatment urine sample for culture.

# UTIs: What did we do?



# UTIs: What did we do?





# UTIs: What did we do?

## **Support community guideline update:**

Launch events at GP protected learning

Sessions for CCG Pharmacists & Advisers

Review community pharmacy PGDs

Newsletter, hints&tips



## **Wider educational programme:**

Non-medical prescribers

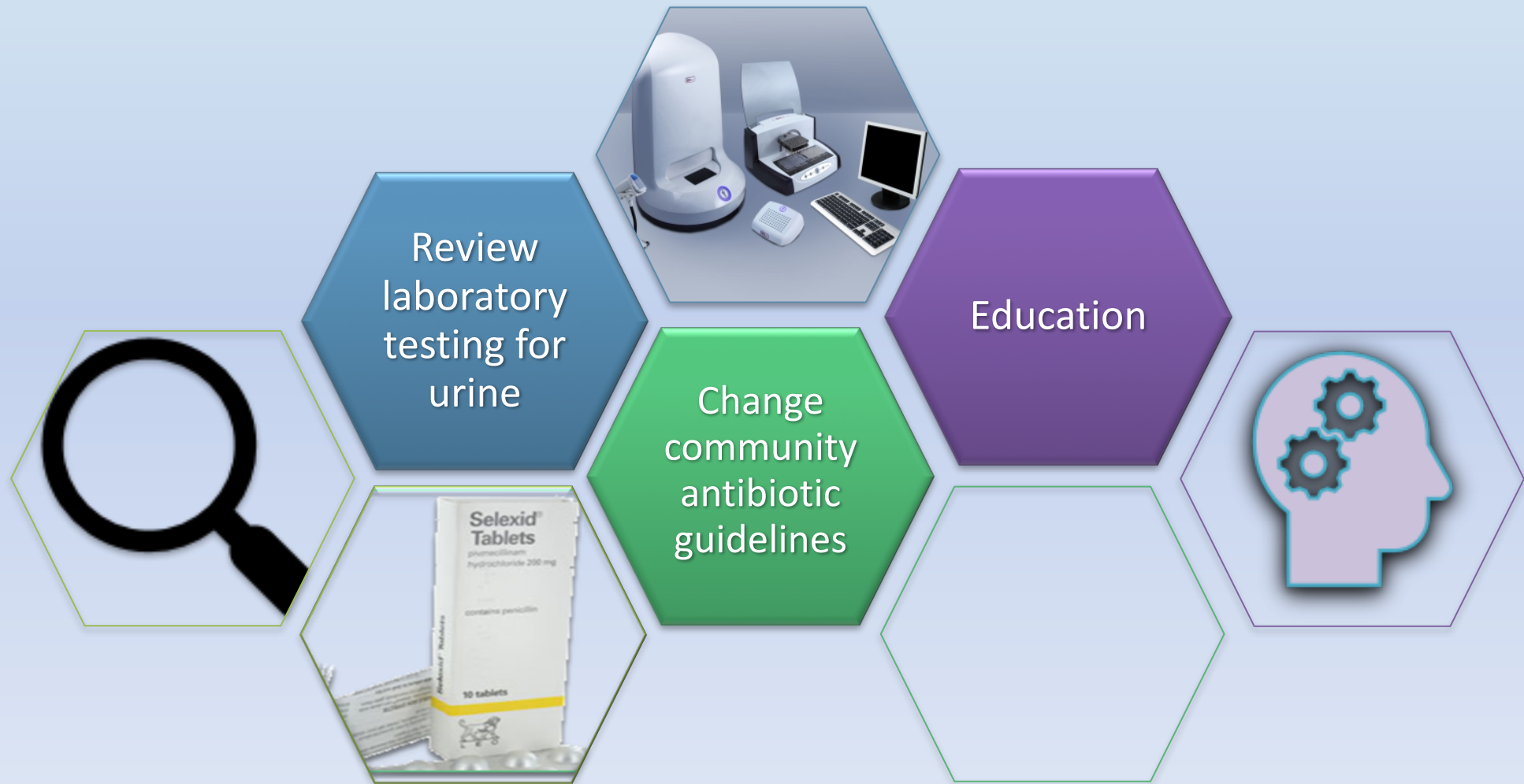
Community nurses e.g. matrons, DNs

GP registrars

Continence advisers

Nurse Practitioners

# UTIs: What did we do?



# UTIs: Where are we now?

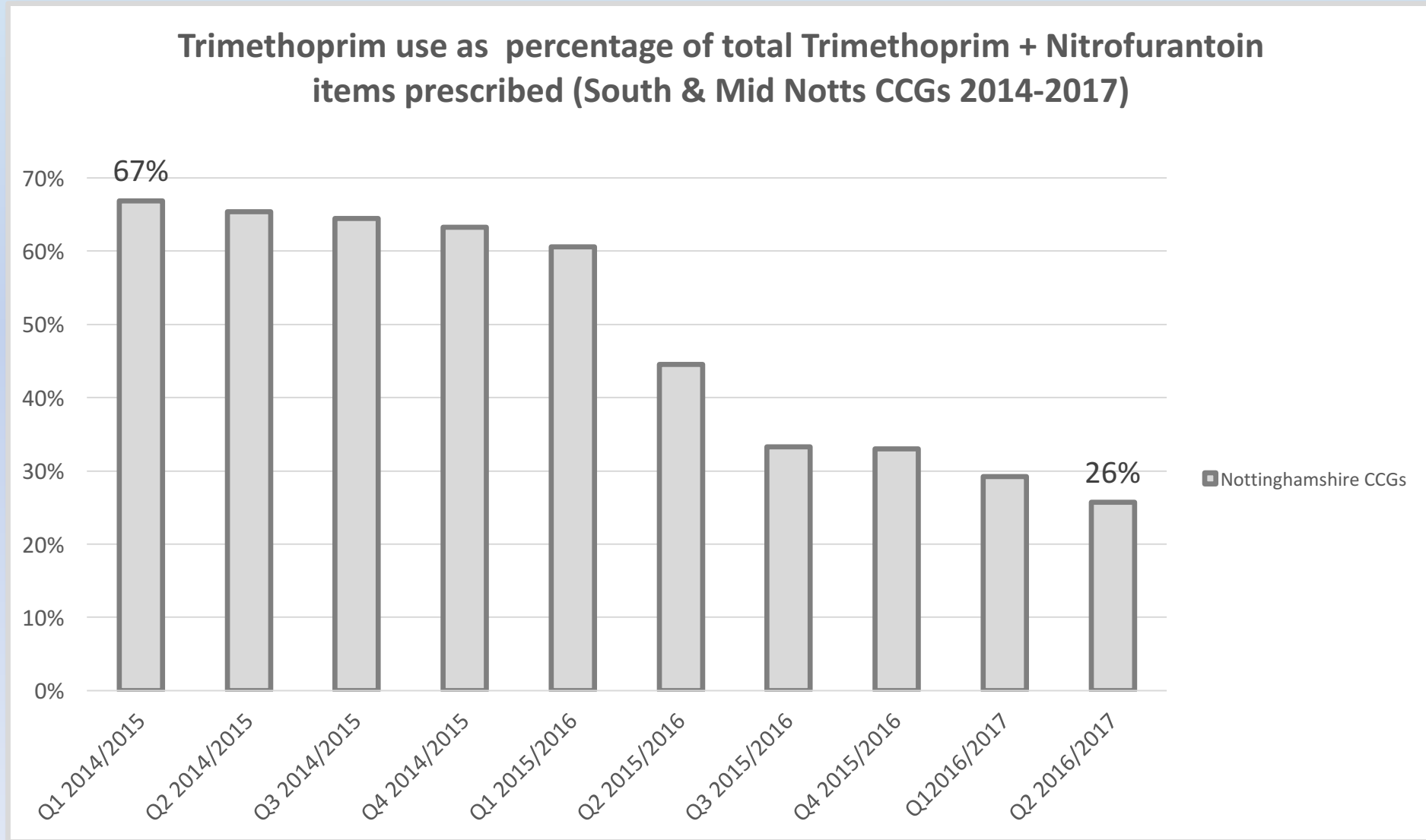
## Potential benefits?

- Impact on prescribing
  - Quality Premium indicators
- Antibiotic resistance trends
- *E. coli* BSIs
- Hospital admissions for UTI

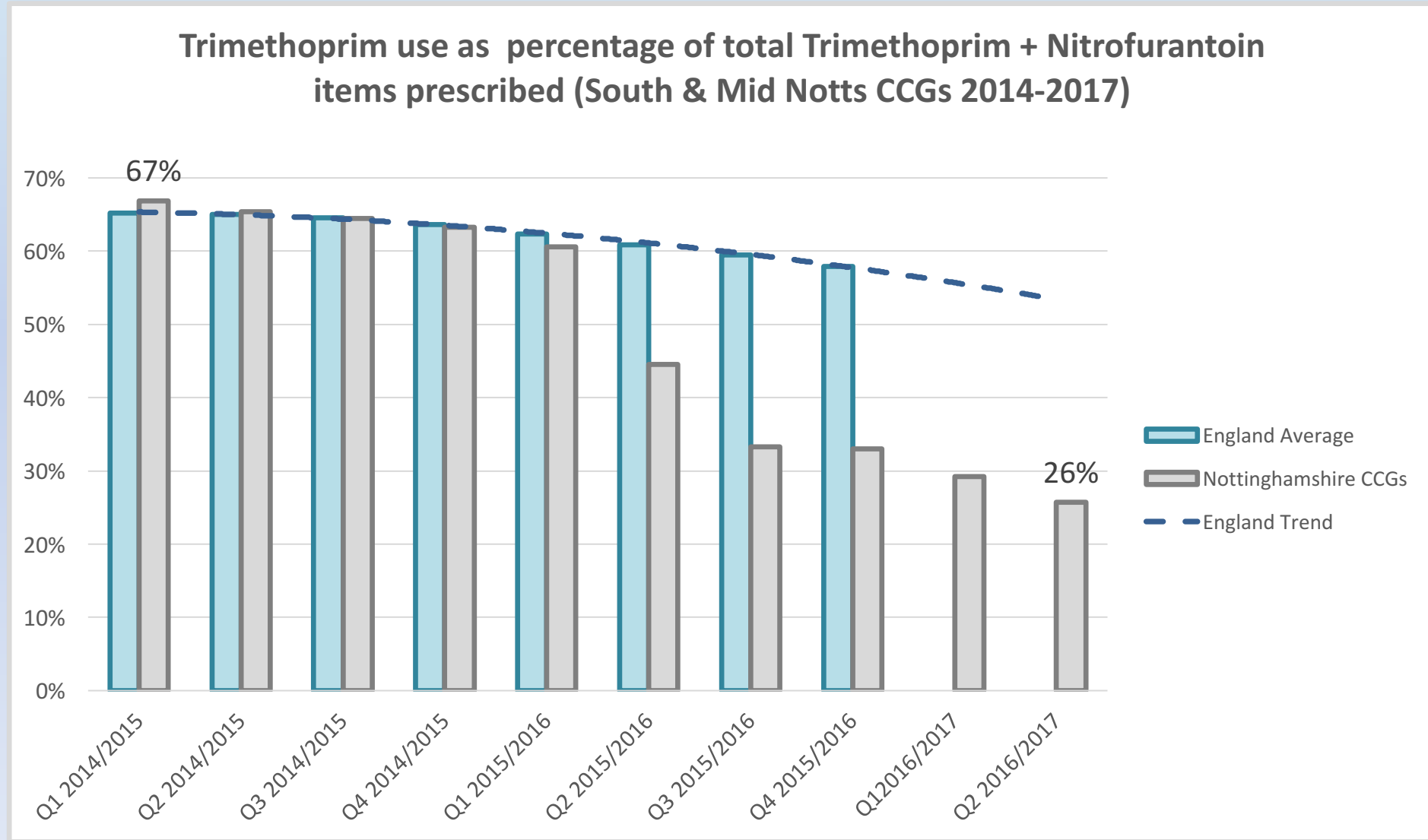
## Potential harm?

- Widespread use of nitrofurantoin
- Cost

# UTIs: Antibiotic Prescribing



# UTIs: Antibiotic Prescribing



# How low is too low?

NHS Islington CCG	6,161	35.9	
NHS Leeds West CCG	12,693	35.8	
NHS Lewisham CCG	7,748	33.0	
NHS Newark & Sherwood CCG	4,575	32.4	
NHS Mansfield And Ashfield CCG	7,205	31.9	
NHS Nottingham West CCG	2,300	27.5	
NHS Nottingham City CCG	8,735	27.2	
NHS Nottingham North And South CCG	3,807	25.8	
NHS Hillingdon CCG	5,402	24.8	
NHS Rushcliffe CCG	2,918	24.1	

Table showing the proportion of Nitrofurantoin classes prescribed antibiotic classes in England, by region. The table is sorted by the proportion of Nitrofurantoin classes prescribed antibiotic classes in England, in descending order.

Region	Class	Proportion	Lower ID	Upper ID
England		0.000000	1	1
North East		0.000000	2	2
North East		0.000000	3	3
North East		0.000000	4	4
North East		0.000000	5	5
North East		0.000000	6	6
North East		0.000000	7	7
North East		0.000000	8	8
North East		0.000000	9	9
North East		0.000000	10	10
North East		0.000000	11	11
North East		0.000000	12	12
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North East		0.000000	14	14
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North East		0.000000	96	96
North East		0.000000	97	97
North East		0.000000	98	98
North East		0.000000	99	99
North East		0.000000	100	100

# How low is too low?

Nottinghamshire CCGs have lowest T:N prescribing proportion in England.

Nitrofurantoin is an effective agent for uncomplicated lower UTI, however;

- ⬇ Very low levels in serum and renal parenchyma
- ☒ Will not treat systemically unwell or pyelonephritis
- 💣 Risk of under-treatment; treatment failures or GNBSI

# Safe nitrofurantoin use

- Low resistance rates in *E. coli*, higher in other coliforms
- Risk of treatment failure
  - Systemically unwell, or features of early pyelonephritis
  - Difficult to assess patient groups (elderly, confused, unknown renal function)
- Improve educational messages
  - Use of case scenarios in teaching sessions to highlight the issue
  - Prescribing updates
  - Improve wording in guidance



# How low is too low?

Nitrofurantoin is an effective agent for uncomplicated lower UTI, however;

- ⬇ Very low levels in serum and renal parenchyma
- ☒ Will not treat systemic unwell or pyelonephritis
- 💣 Risk of under-treatment; treatment failures or GNBSI
- ☑ **Safe use of nitrofurantoin is a key message**

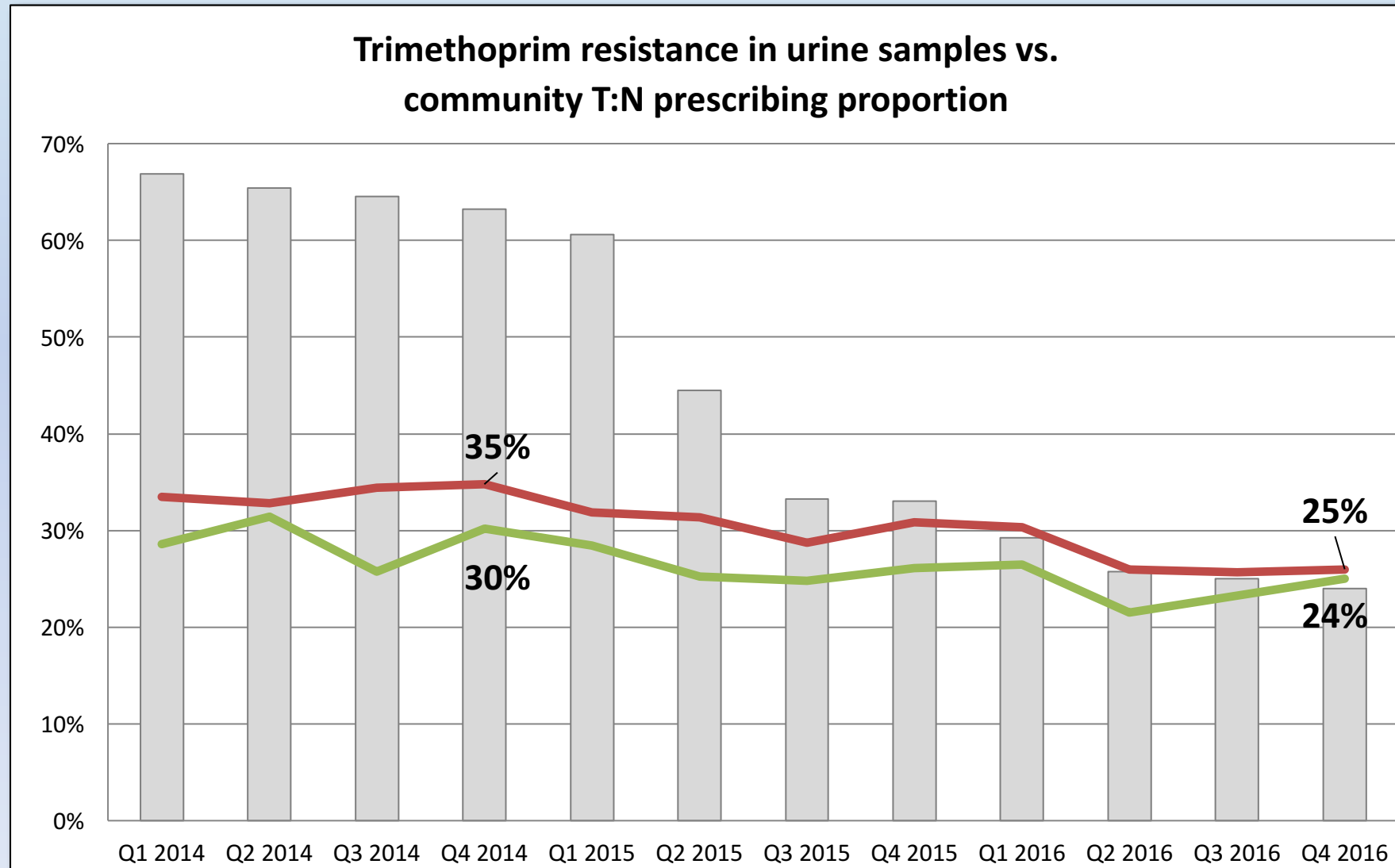


Cost pressure of high volume nitrofurantoin prescribing



What has been the wider impact of the change?

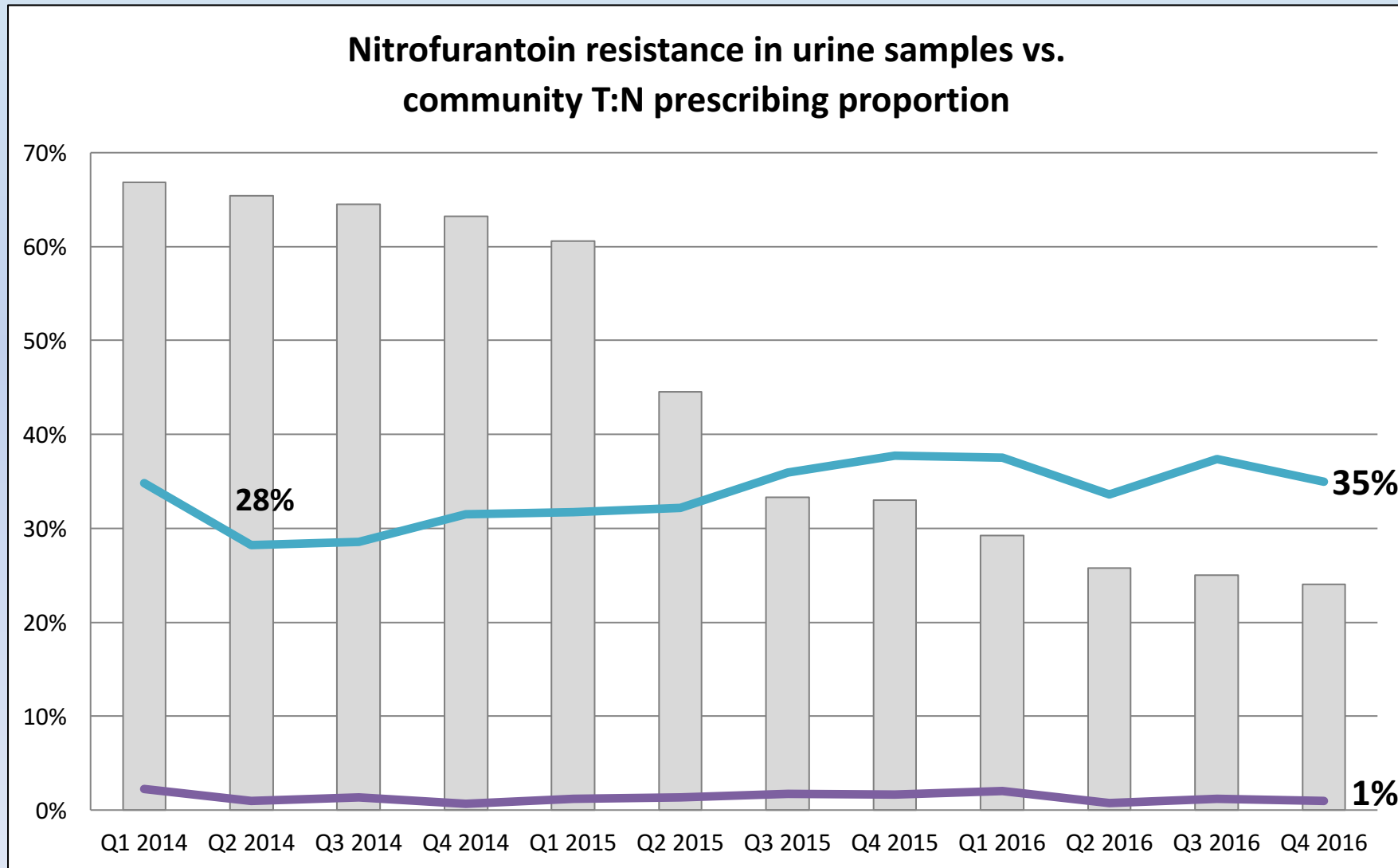
# UTIs: Resistance Rates



***E. coli***  
 $p < 0.0001$

**Coliforms**  
 $p = 0.003$

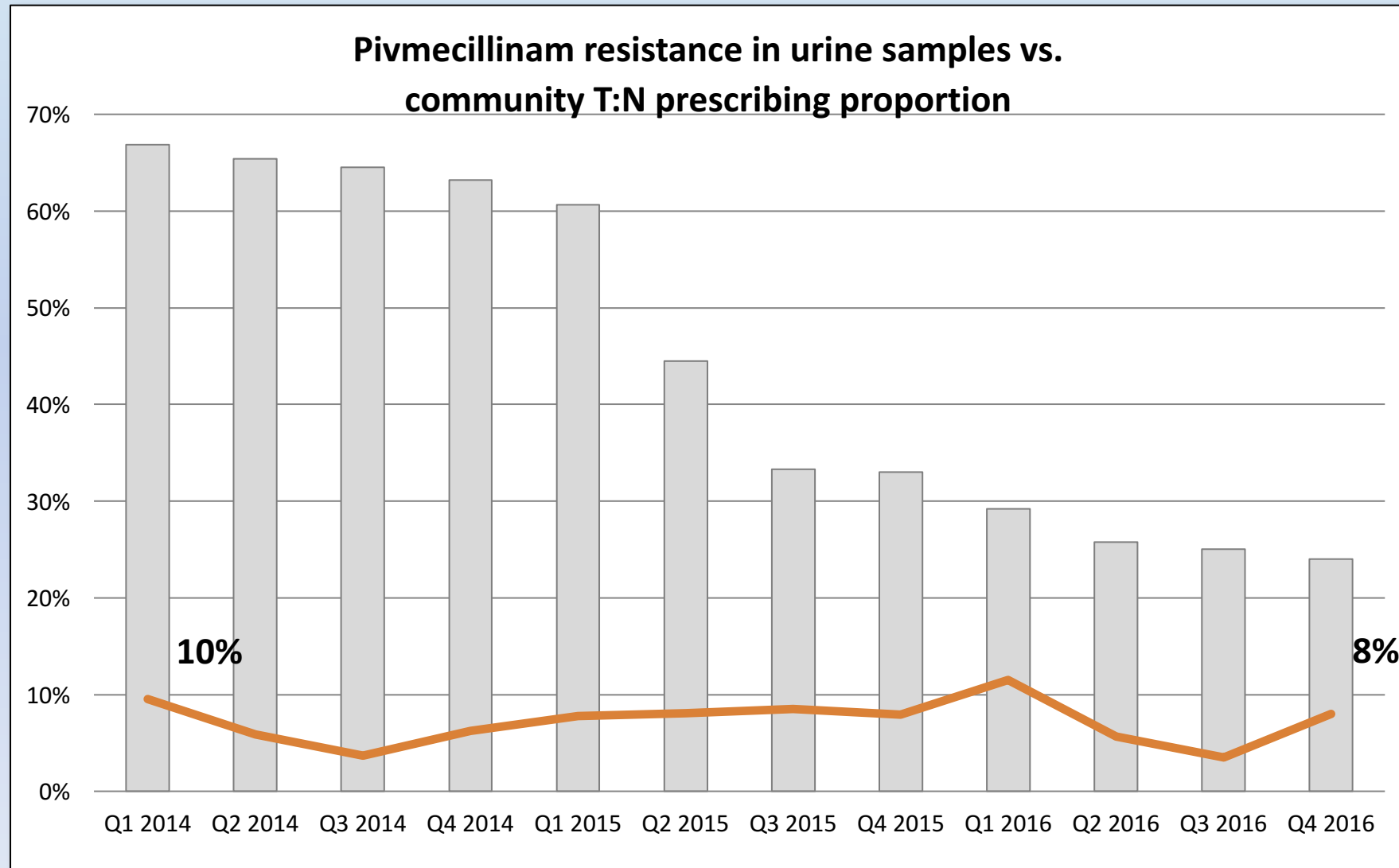
# UTIs: Resistance Rates



**Coliforms**  
P=0.0004

***E. coli***  
p=0.15

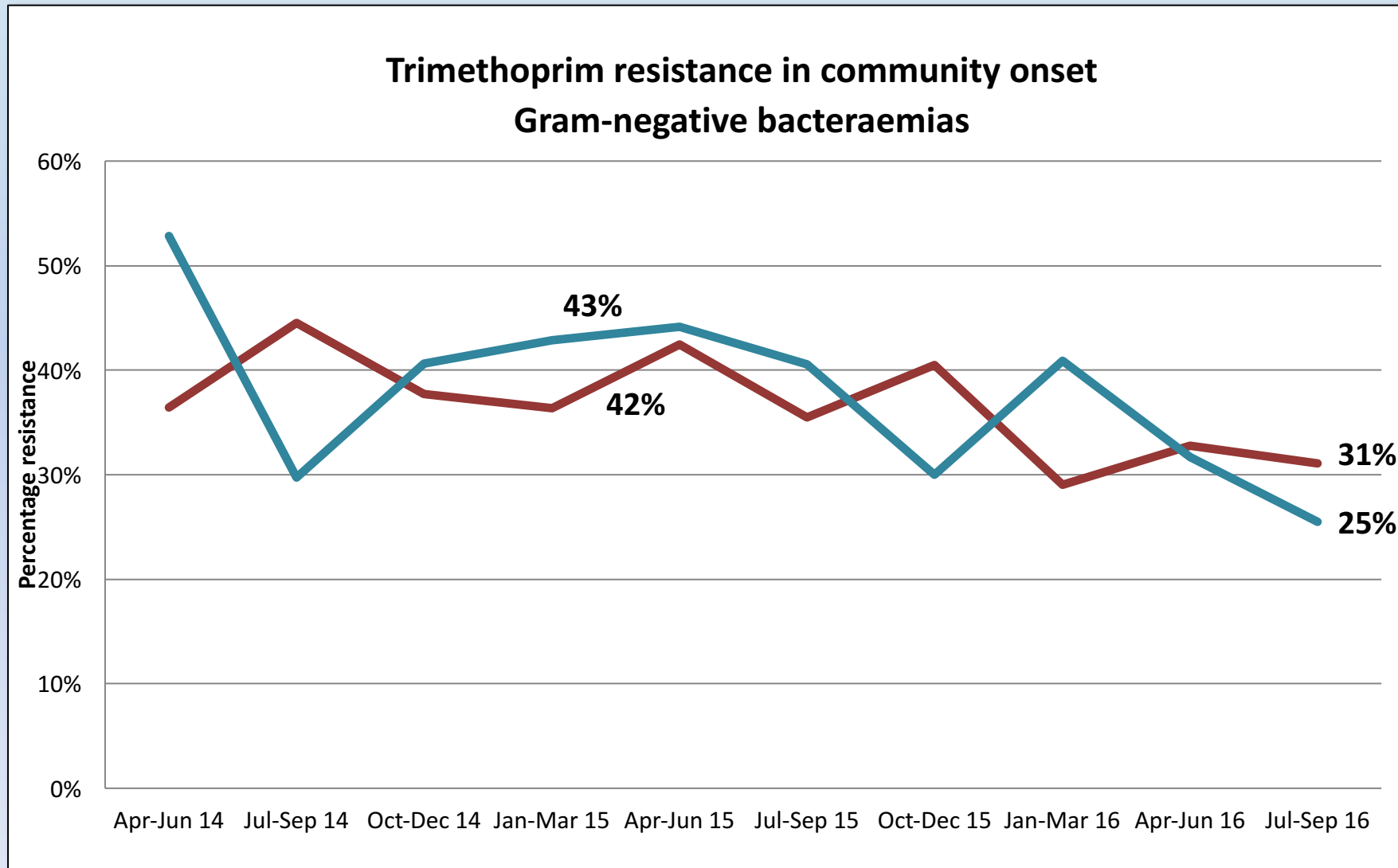
# UTIs: Resistance Rates



**Pivmecillinam**

**p=0.52**

# *E. coli* BSIs: Resistance Rates



***E. coli***

P=0.031

**Coliforms**

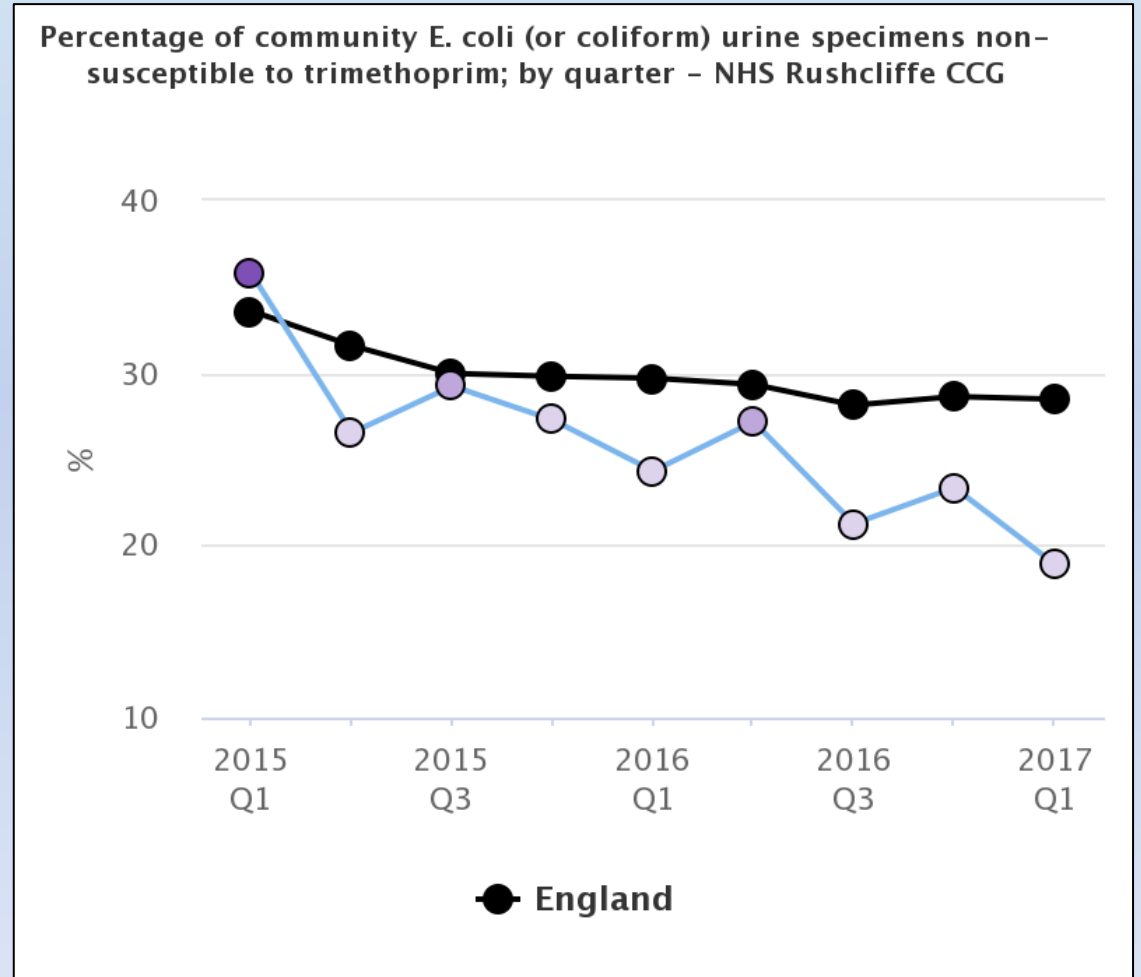
P=0.0254

# UTIs: Resistance Rates

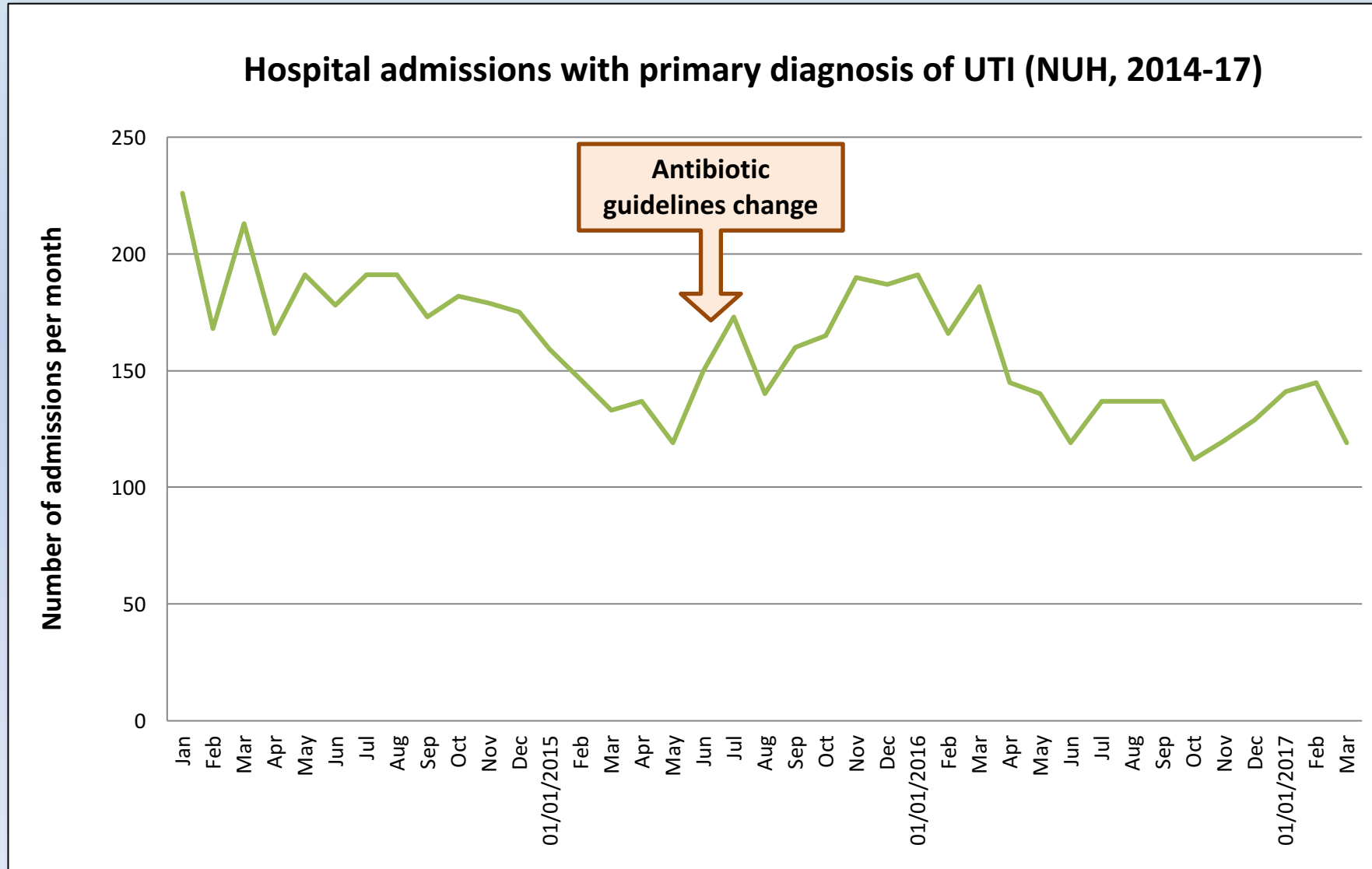
**Rushcliffe CCG:**

**T:N ratio fallen from  
65% to 22.5%**

**Trimethoprim  
resistance fallen from  
36% to 18%**

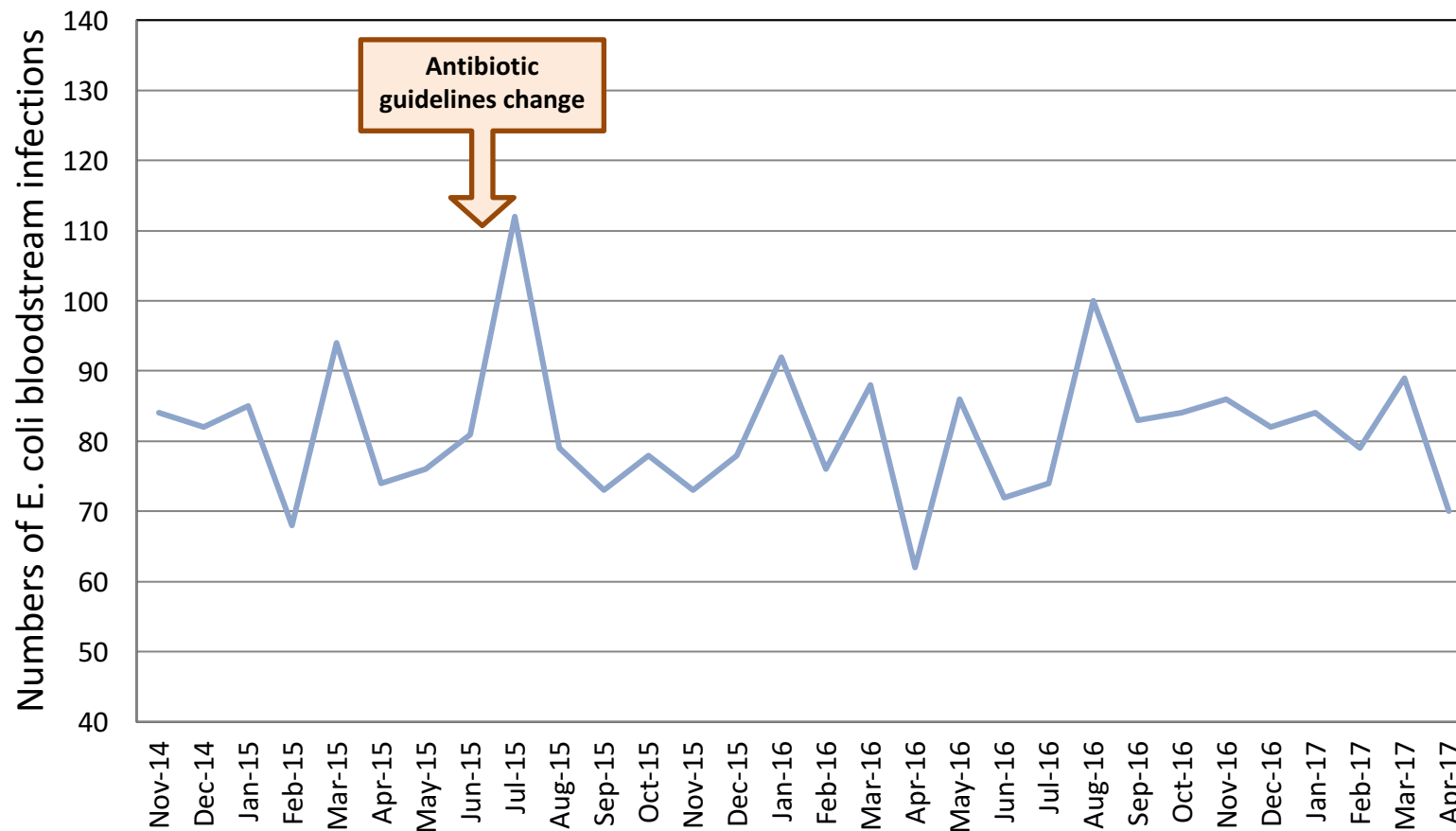


# UTIs: Admissions to hospital



# *E. coli* BSIs

***E. coli* bloodstream infection counts  
Nottinghamshire CCGs 2014-2017**

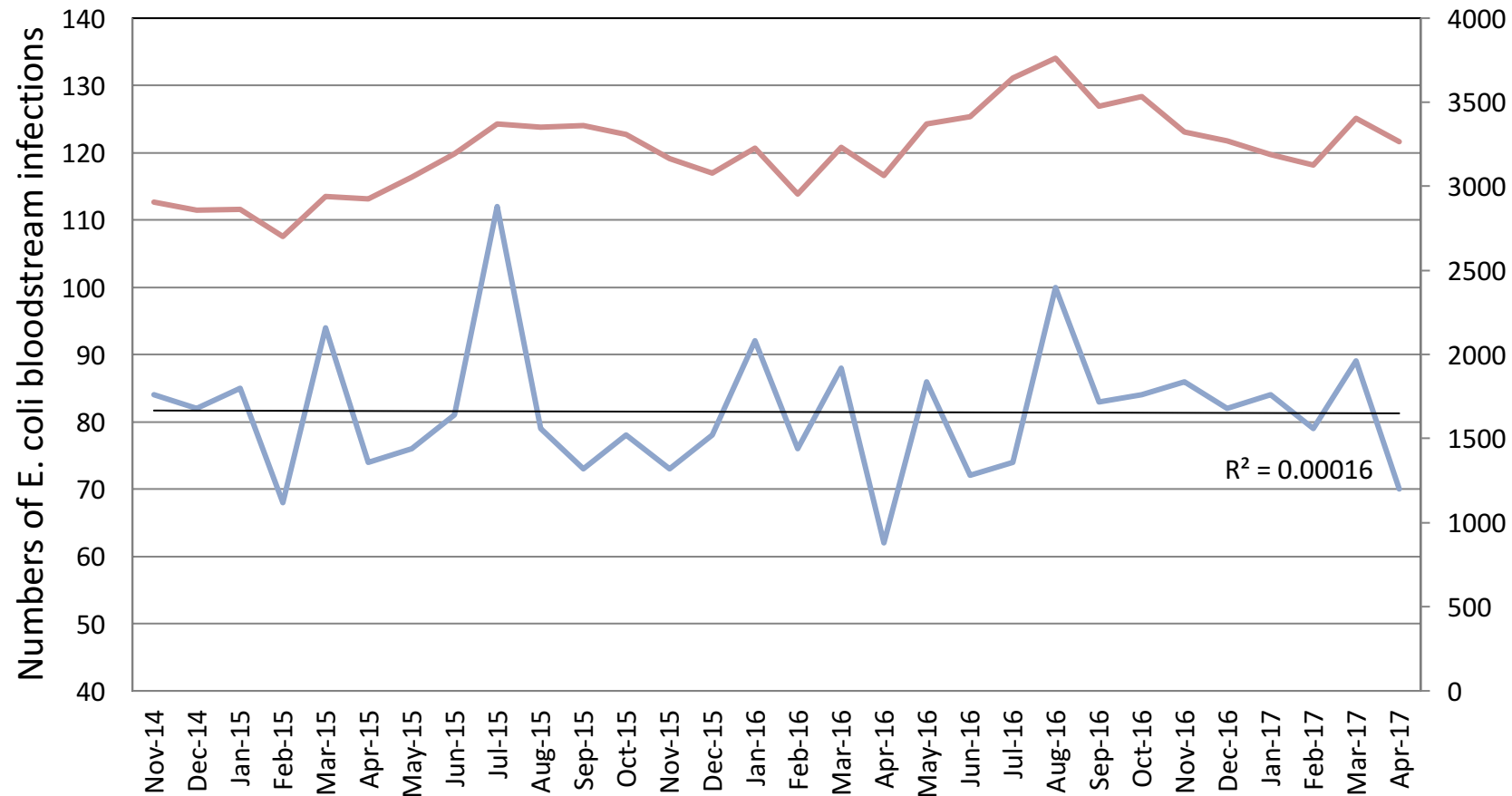


Mid and South  
Nottinghamshire



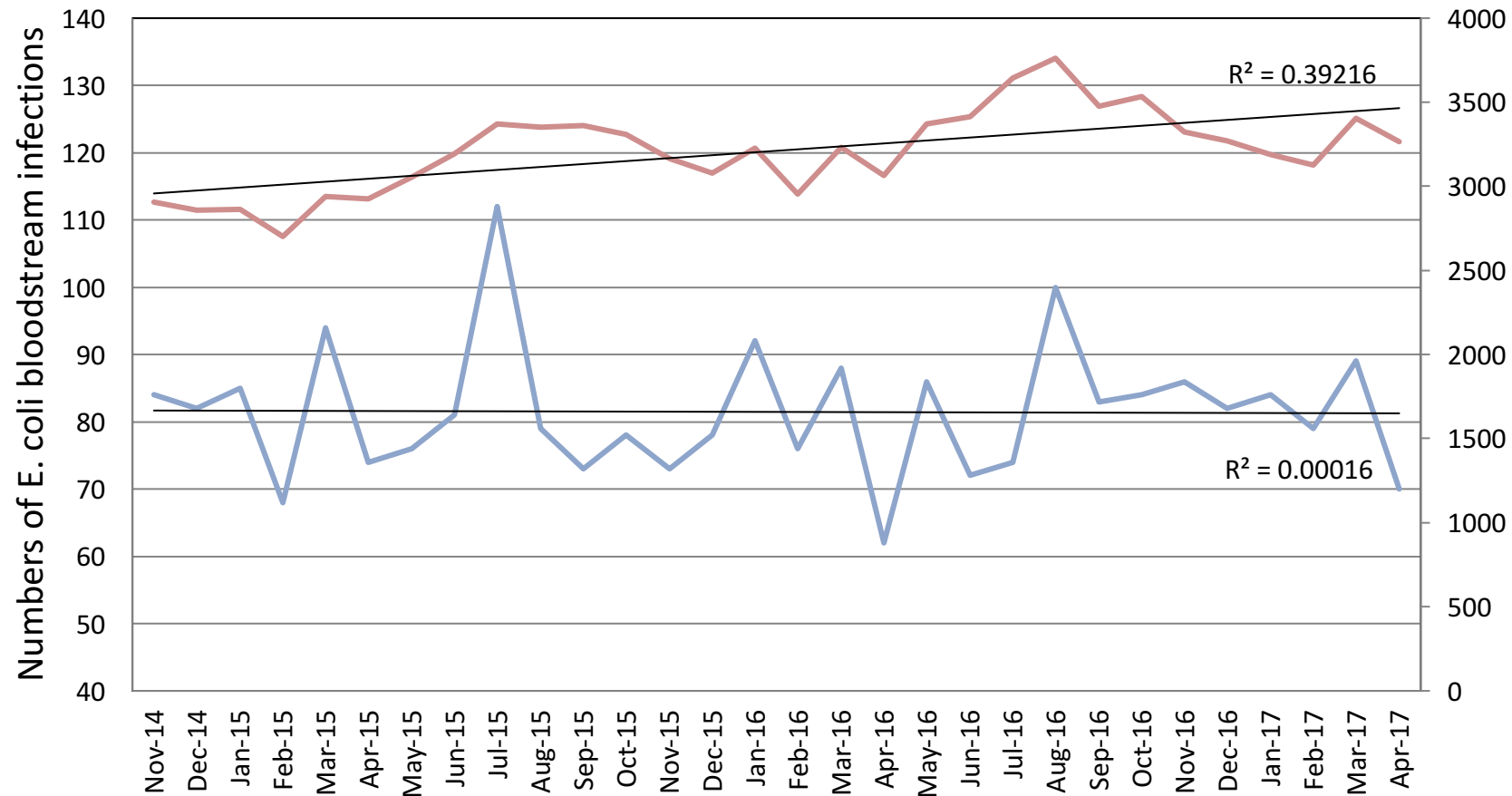
# *E. coli* BSIs

***E. coli* bloodstream infection counts  
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# *E. coli* BSIs

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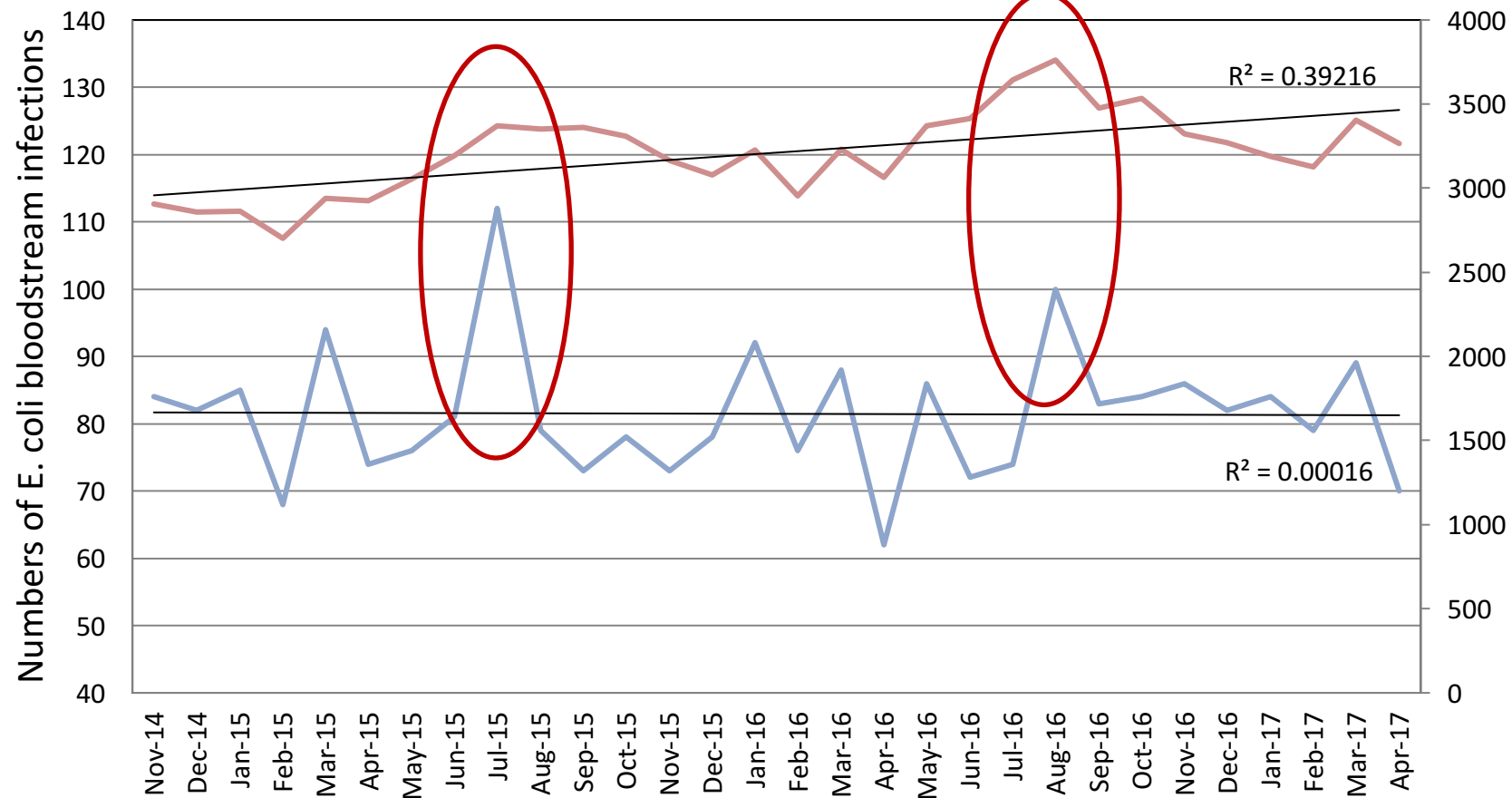


England

Mid and South  
Nottinghamshire

# *E. coli* BSIs

***E. coli* bloodstream infection counts  
Nottinghamshire CCGs and England 2014-2017**



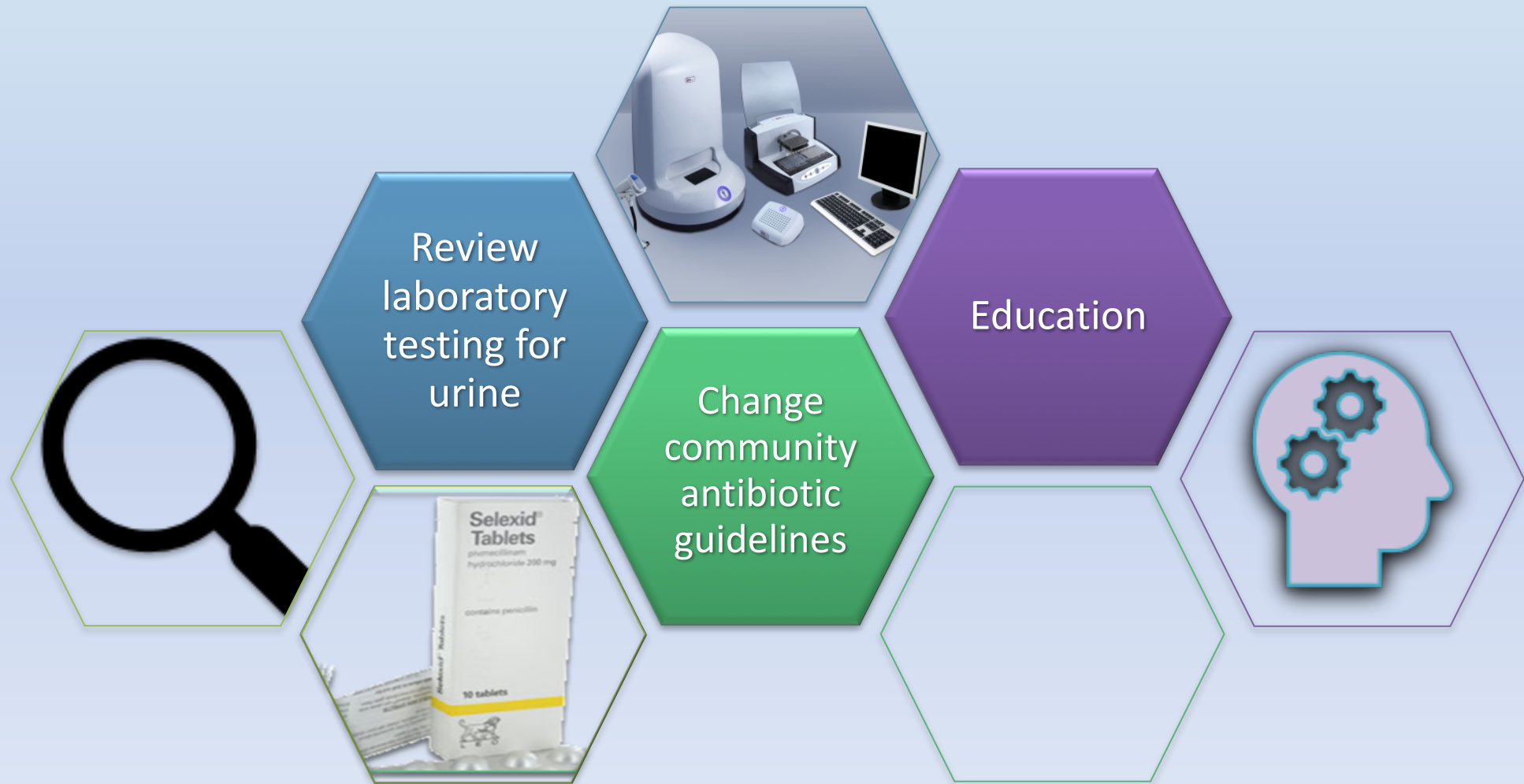
England

Mid and South  
Nottinghamshire

# Summary of impact

- Reduced trimethoprim use
- Replaced with nitrofurantoin and pivmecillinam
- Resistance appears to have fallen since this change; also reflected in BSI resistance rates
- *E. coli* BSI numbers have remained stable locally
- Risk of unintended consequences of increasing nitrofurantoin use

# Where next?



# Where next?



# Where next?



# UTIs: What have we learnt in Nottinghamshire?

- Large-scale change in antibiotic prescribing is achievable
- Engagement with local laboratory
- Potential consequences of guideline changes
  - How and what to measure
  - How best to support prescribers
- Resistance rates may possibly be influenced on a local scale
  - Guidelines should aim to be responsive to local context
  - Education only does so much...active support would be better



# Acknowledgements

- Dr Vivienne Weston, Consultant Microbiologist and Infection Control Doctor for South Nottinghamshire
- The Nottinghamshire Antimicrobial Stewardship Group
- Shared Medicines Management Team for Nottinghamshire
- Nottinghamshire Area Prescribing Committee
- Health Education England for funding the Community Microbiology & Antimicrobial Stewardship Fellowship