



Public Health
England



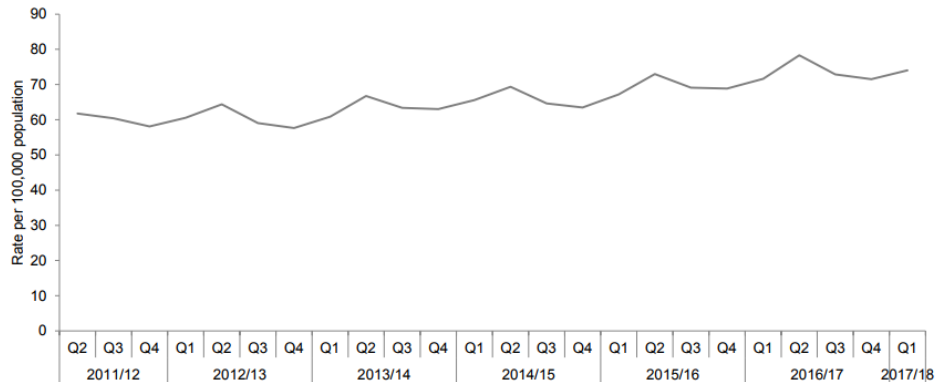
Linkage of patient-level antibiotic prescriptions to positive urine microbiology data, England: a pilot study

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Background

Incidence of *Escherichia coli* bacteraemia is still increasing



E. coli bacteraemia rate, England, 2011/12-Q2 2017/18
(PHE mandatory surveillance)

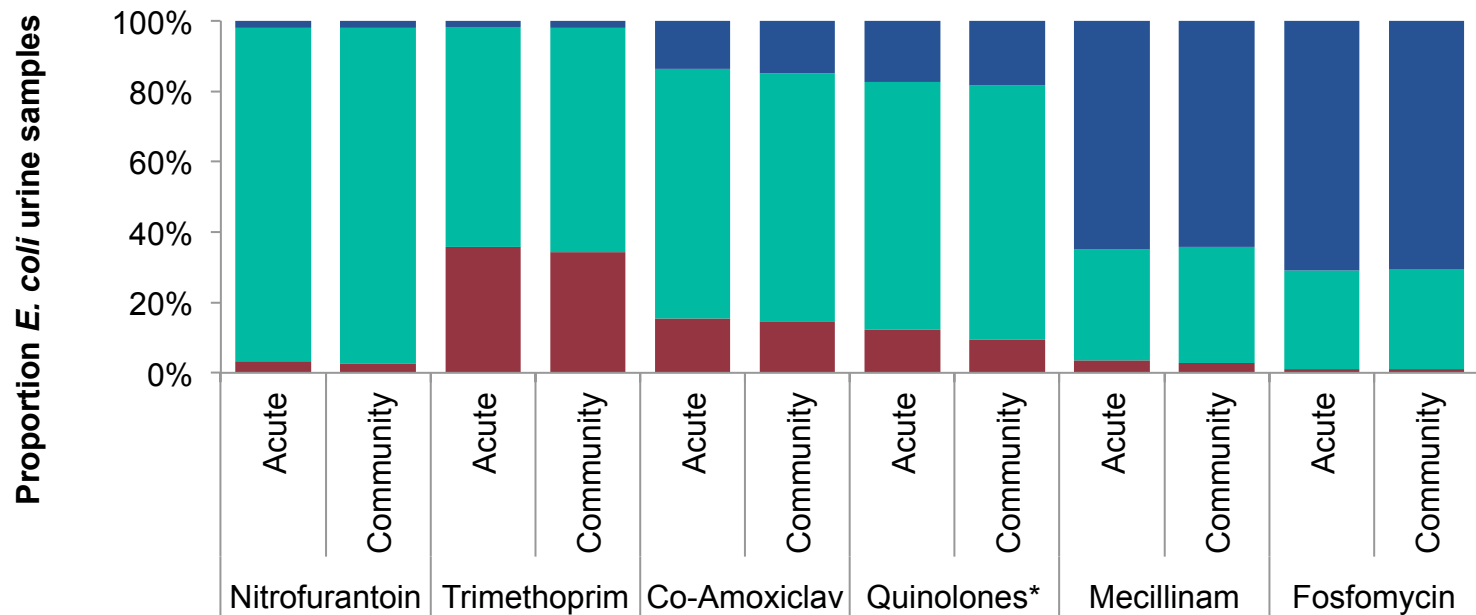
For reports including risk factor data, about 50% of patients had a UTI reported as underlying source of infection



Need to investigate prescribing and resistance pattern in the community



E. coli urine isolates susceptible or resistant to recommended UTI treatment options, England 2016 (ESPAUR Report 2017)



*99% ciprofloxacin

■ Not tested

■ Susceptible

■ Non-susceptible



How appropriate are antibiotic prescriptions for UTI in the community?



Protecting and improving the nation's health

Management and treatment of common infections

Antibiotic guidance for primary care: For consultation and local adaptation

| URINARY TRACT INFECTIONS | | | |
|---|---|--|---|
| <p>Note: As antibiotic resistance and <i>Escherichia coli</i> bacteraemia in the community is increasing, use nitrofurantoin first line,^{1D} always give safety net and self-care advice, and consider risks for resistance.^{2D} Give TARGET UTI leaflet,^{3D} and refer to the PHE UTI guidance for diagnostic information.^{1D}</p> | | | |
| <p>UTI in adults (lower) PHE UTI Diagnosis</p> <p>TARGET UTI</p> <p>RCGP UTI</p> <p>SIGN UTI</p> <p>NHS Scotland UTI</p> | <p>All patients first line antibiotic: nitrofurantoin if GFR >45mls/min.^{3A+,4A+} If GFR 30-45, only use if no alternative.^{4A+,5D} Treat women with severe/≥3 symptoms.^{1D,2B-} Women <65 years (mild/≤2 symptoms):^{1D} pain relief,^{5A-,7A-,8B-} and consider delayed antibiotic.^{9B-,10A+} If urine not cloudy, 97% NPV of no UTI.^{11A-} If urine cloudy, use dipstick to guide treatment:^{1D,11A-} nitrite, leukocytes, blood all negative 76% NPV; nitrite plus blood or leukocytes 92% PPV of UTI.^{11A-} Men <65 years: consider prostatitis and send MSU,^{1D,12D} or if symptoms mild or non-specific, use negative dipstick to exclude UTI.^{12D} >65 years:^{13A-} treat if fever ≥38°C, or 1.5°C above base twice in 12 hours, and >1 other symptom.^{14B-} If treatment failure: always perform culture.^{1D}</p> | <p>First line: nitrofurantoin^{15A-} If low risk of resistance:^{16B+} trimethoprim^{17D,18A+} If first line unsuitable or GFR<45mls/min:^{4A+} pivmecillinam^{19B+,20D,21A+} If organism susceptible: amoxicillin^{22A+,23A+} If high resistance risk: fosfomycin^{18B+,24A+,25B-,26B-}</p> | <p>100mg m/r BD, OR 50mg i/r QDS^{27A-} (BD dose increases compliance)^{28D} 200mg BD^{23A+}</p> <p>400mg stat then 200mg TDS^{29B+,30B+} (400mg if high resistance risk)^{29B+} 500mg TDS^{23A+}</p> <p>Women and men: 3g stat^{26B-} Men: 3g stat 3 days later (unlicensed)^{26B-}</p> <p>Women: 3 days^{23A+,31B-,32B-,33B+,34B+,35A-,36A+} Men: 7 days^{37B+,38A-}</p> <p>Low risk of resistance: younger women with acute UTI and no risk.^{31B-,38C} Risk factors for increased resistance include: care-home resident;^{13A-,14B-} recurrent UTI; hospitalisation for >7 days in the last 6 months; unresolving urinary symptoms; recent travel to a country with increased resistance;^{39C,40B+,41D} previous UTI resistant to trimethoprim, cephalosporins, or quinolones.^{26B-} If risk of resistance: send urine for culture and susceptibilities; safety net.</p> |

Produced: 1999 – Latest Review: September 2017
Next Full Review: September 2020

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BRITISH SOCIETY FOR ANTIMICROBIAL CHEMOTHERAPY



Royal College of General Practitioners



Royal College of Nursing



Linkage of patient-level antibiotic prescribing data to laboratory records

Electronic prescribing system (EPS) only
– captures about 20% of all prescriptions

*(does **not** include FP10 (green) forms
that capture about 70% of all prescriptions)*

PHE laboratory surveillance data

All NHS numbers, all samples
(e.g. urine, blood, sputum etc.)

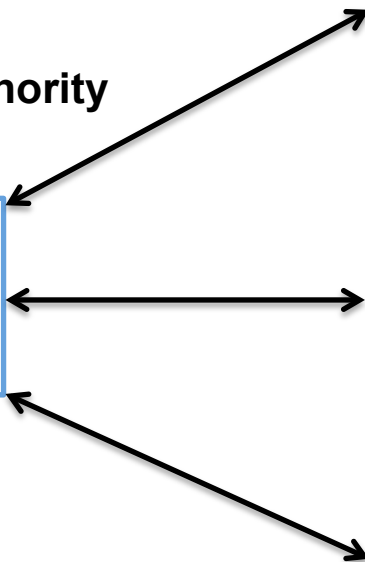
NHS Business Services Authority Prescribing data

3 months
1 Feb – Apr 30
2014

6 months before
1 Aug 2013 –
31 Jan 2014

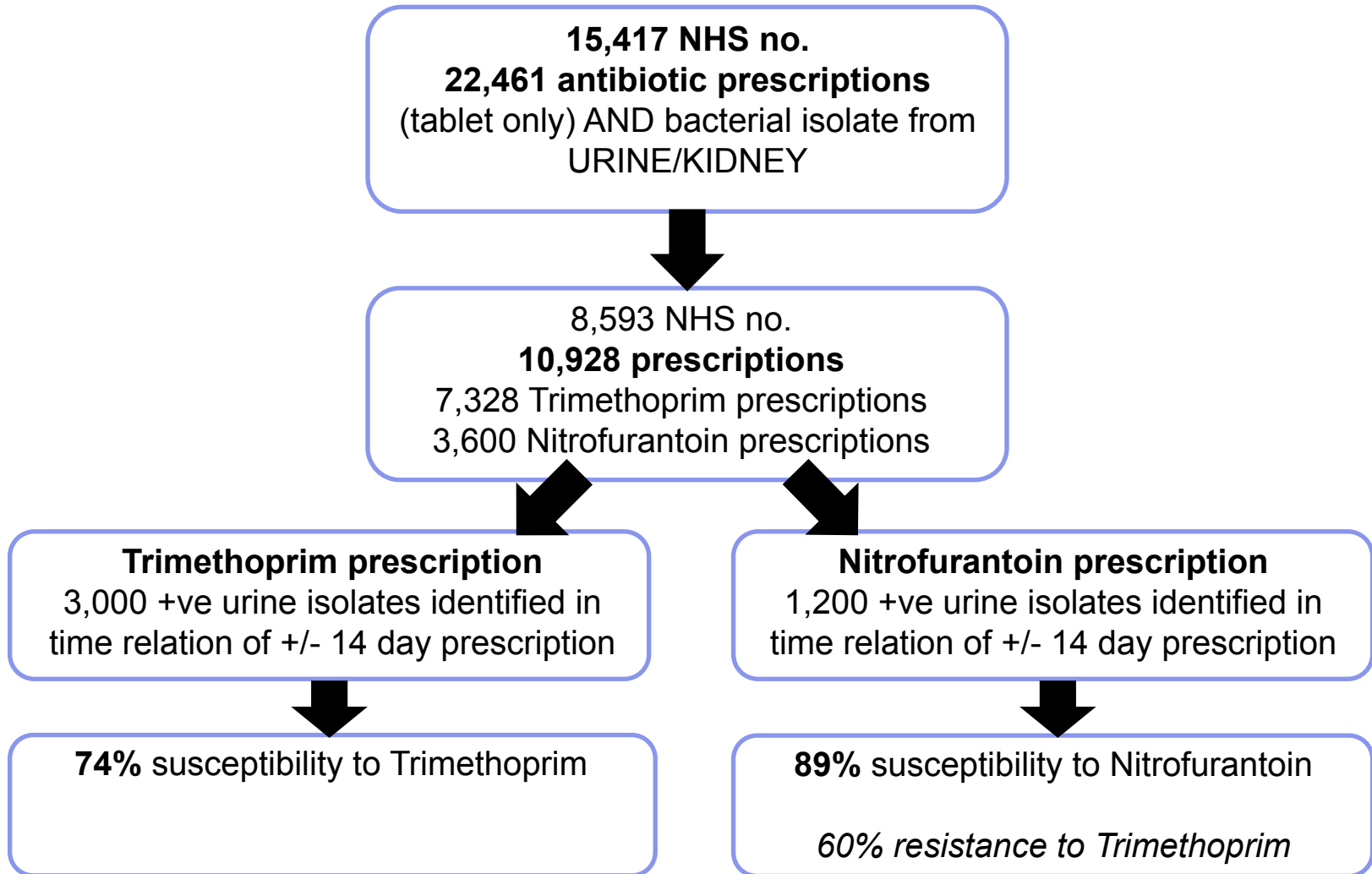
3 months
1 Feb – Apr 30
2014

6 months after
1 May – 31 Oct
2014





Linkage results



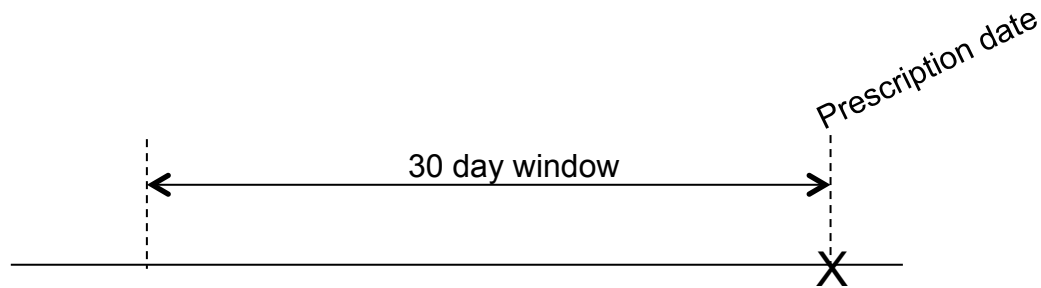
Repeat prescriptions & no. of trim/nitro switches, Feb-Apr 2014

| Switch? | Antibiotic combination | No. patients per combination | No. prescriptions per combination |
|----------|------------------------|------------------------------|-----------------------------------|
| No | TT | 525 | 1050 |
| | TTT | 139 | 417 |
| | TTTT | 22 | 88 |
| | TTTTT | 3 | 15 |
| | TTTTTT | 1 | 6 |
| | TTTTTTTTTTTT | 1 | 11 |
| | TTTTTTTTTTTTTT | 2 | 24 |
| | Subtotal | 693 | 1611 |
| No | NN | 333 | 666 |
| | NNN | 102 | 306 |
| | NNNN | 16 | 64 |
| | NNNNN | 3 | 15 |
| | NNNNNNNNNN | 1 | 10 |
| | Subtotal | 455 | 1061 |
| 1 switch | TN | 258 | 516 |
| | TNN | 29 | 87 |
| | TNNN | 5 | 20 |
| | TNNNN | 2 | 10 |
| | TTN | 23 | 69 |
| | TTTN | 1 | 4 |
| | TTTTN | 1 | 5 |
| | TTTTTTN | 1 | 9 |
| | Subtotal | 320 | 720 |
| 1 switch | NT | 111 | 222 |
| | NTT | 17 | 51 |
| | NTTT | 3 | 12 |
| | NNT | 8 | 24 |
| | NNTT | 5 | 20 |
| | NNNT | 1 | 4 |
| | NNNTT | 1 | 5 |
| | Subtotal | 146 | 338 |

| | | | |
|--------------|--------------|--------------|-----|
| 2 switches | TNT | 24 | 72 |
| | TNNT | 4 | 16 |
| | TNTT | 4 | 16 |
| | TNTTT | 1 | 5 |
| | TTNNT | 1 | 5 |
| | TTNT | 4 | 16 |
| | TTTNT | 1 | 5 |
| | Subtotal | 39 | 135 |
| 2 switches | NTN | 15 | 45 |
| | NTNN | 5 | 20 |
| | NTTN | 1 | 4 |
| | NTTTN | 1 | 5 |
| | NNTN | 4 | 16 |
| | NNTTN | 1 | 5 |
| Subtotal | 27 | 95 | |
| 3 switches | TNTN | 1 | 4 |
| | TNTNN | 3 | 15 |
| | TNTTN | 2 | 10 |
| | Subtotal | 6 | 29 |
| 3 switches | NTNT | 3 | 12 |
| | NTNTT | 1 | 5 |
| | NTNNTT | 1 | 6 |
| | NNNNTNT | 1 | 7 |
| | Subtotal | 6 | 30 |
| 4 switches | TNTNT | 2 | 10 |
| | Subtotal | 2 | 10 |
| Total | 1,694 | 4,029 | |



Antibiotic susceptibility test result available prior to prescription



1,742 antibiotic prescriptions had a positive antibiotic susceptibility test
in the **30 days prior** to the prescription date

- **1,002 trimethoprim** prescriptions:
 - **57%** of isolates were **susceptible** to trimethoprim
 - **43%** of isolates were **resistant** to trimethoprim
- **740 nitrofurantoin** prescriptions:
 - **81%** of isolates were **susceptible** to nitrofurantoin
 - **19%** of isolates were **resistant** to nitrofurantoin



Summary

- Successful pilot linking national, patient-level antibiotic prescribing data from the community to laboratory reports
- 1/3rd of antibiotic prescriptions for UTIs were repeat prescriptions; >50% of those did not switch to a different antibiotic
- 43% trimethoprim prescriptions linked to a trimethoprim resistant bacterial isolate from urine
- 19% nitrofurantoin prescriptions linked to a nitrofurantoin resistant bacterial isolate from urine

Next step:

- Further exploration of prescribing patterns
- Determine the proportion of UTI inappropriately treated in the community setting that lead to a hospital admission



Thank you to:

- NHS Business Services Authority
- National Cancer Registration and Analysis Service

