Greater East Midlands Commissioning Support Unit in association with
Lincolnshire Clinical Commissioning Groups, Lincolnshire Community Health Services,
United Lincolnshire Hospitals Trust and Lincolnshire Partnership Foundation Trust

Prescribing and Clinical Effectiveness Bulletin

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REDUCING INAPPROPRIATE CEPHALOSPORIN AND QUINOLONE USE

- **Emerging patterns of bacterial resistance to antibiotics with *Clostridium difficile*, meticillin resistant *Staphylococcus aureus* (MRSA), extended spectrum beta lactamase producing organisms (ESBLs) and other multi-resistant organisms (such as enterobacter, *Klebsiella*) remain significant problems within the NHS across both primary and secondary care. Particular concerns have been raised by local microbiologists around the inappropriate use of broad spectrum antibiotics and the increased risk of *C.difficile* and ESBLs.**
- **Preventing healthcare associated infections (HCAI) is a priority for the Lincolnshire Clinical Commissioning Groups (CCGs); it is included as one of four national targets in the CCG Quality Premium.**
- **Practices are urged to review their performance in comparison to their peers and national average against a range of antibiotic prescribing indicators. Specific indicators are available measuring overall antibiotic prescribing volume, volume of co-amoxiclav, cephalosporin and quinolone use and percentage of all antibiotics prescribed as cephalosporins or quinolones.**
- **Consider 'no antibiotic' or 'delayed antibiotic' strategies for a wide range of commonly occurring infections including sore throat, acute otitis media, sinusitis and acute bronchitis.**

Recommended strategies

Clostridium difficile associated disease (CDAD)

- **Antimicrobial use is a major trigger factor for *C.difficile* associated disease (CDAD); antimicrobials can disrupt the normal microflora of the colon and allow colonisation of the pathogen. The over-frequent use of broad-spectrum antibiotics has contributed significantly to the prominence of antibiotic associated diarrhoea in both primary and secondary care.**
- **Wherever possible, the use of broad spectrum antimicrobials (e.g. amoxicillin, co-amoxiclav, co-fluampicil, cephalosporins and quinolones) should be avoided, especially in patients with risk factors for *C.difficile* infection (e.g. the elderly, debilitated and immunocompromised).**

Meticillin Resistant Staphylococcus aureus (MRSA)

- **Meticillin-resistant *Staphylococcus aureus* (MRSA) is responsible for several difficult-to-treat infections. About 75 percent of community-associated MRSA infections are localized to skin and soft tissue. Particular groups of patients at risk include: the immunocompromised, diabetics, intravenous drug users, young children, the elderly and recent users of quinolone antibiotics. It is thought that quinolones increase the risk of MRSA infection as they are excreted through the skin. Minimizing the use of quinolones can help to reduce the risk of MRSA.**
- **The role of quinolones in primary care is extremely limited. The only indications identified in Public Health England guidance (previously known as Health Protection**

Agency guidance) are: (1) acute prostatitis; (2) acute pyelonephritis; (3) pelvic inflammatory disease (PID) and (4) traveller's diarrhoea (private prescription only). Other potential roles include acute diverticulitis and epididymo-orchitis. Even in the treatment of acute prostatitis and PID, national guidance identifies alternative options to quinolones.

- **In local guidance on the treatment of commonly occurring infections, quinolones do not feature at all, even in sections relating to the treatment of respiratory tract and urinary tract infections.**
- **Sometimes, long-term quinolone therapy is initiated by urologists in patients susceptible to recurrent urinary tract infections. Frequently, these patients are suffering from non-infective urethritis or have other non-infective causes for their symptoms. Where doubts exist around the appropriateness of long-term antibiotic therapy, prescribers are advised to seek advice from their local microbiologist.**

Respiratory Tract Infections

- **In the treatment of upper respiratory tract infections, antibiotics have marginal benefits in otherwise healthy adults. Where antibiotic therapy is considered necessary, first line use of amoxicillin 500mg capsules three times daily for 5 days or doxycycline 200mg stat followed by 100mg daily for 5 days is preferred.**

Extended spectrum beta lactamase producing organisms (ESBLs)

- **Specifically ESBLs are enzymes produced by resistant bacteria that hydrolyze extended spectrum cephalosporins. Prior exposure to cephalosporins is linked to increasing risk of ESBL related infections. In Lincolnshire, infection rates with ESBLs remain a problem with antibiotic treatment options limited to IV carbapenems or nitrofurantoin. ESBL producing *Escherichia coli* is increasingly linked to resistant urinary tract infections (UTIs). Other causative organisms for UTI such as *Klebsiella* and *Pseudomonas aeruginosa* are also linked to the production of ESBLs.**
- **Ensure that first line treatment preferences for uncomplicated UTIs in men and women (who are not pregnant) are for trimethoprim 200mg tablets or nitrofurantoin 100mg MR capsules. Many prescribers seem reluctant to use nitrofurantoin within this context; prescribing guidance is provided and appropriate use as an alternative to cephalosporins is encouraged.**
- **Ensure that first line treatment preferences for UTI in pregnancy are either co-amoxiclav 625mg tablets three times daily for 7 days or amoxicillin 500mg capsules three times daily for 7 days (if known to be susceptible). Cefalexin 500mg tablets or capsules twice daily for 7 days should only be considered as a second line option.**

Introduction

Emerging patterns of bacterial resistance to antibiotics with *Clostridium difficile*, meticillin resistant *Staphylococcus aureus* (MRSA), extended spectrum beta lactamase producing organisms (ESBLs) and other multi-resistant organisms (such as enterobacter, *Klebsiella*) remain significant problems within the NHS across both primary and secondary care. Particular concerns have been raised by local microbiologists around the inappropriate use of broad spectrum antibiotics and the increased risk of *C.difficile* and ESBLs.

Specifically, the over-frequent use of broad-spectrum penicillins (amoxicillin, ampicillin, co-amoxiclav and co-fluampicil), cephalosporins (particularly second and third generation agents), clarithromycin, quinolones (ciprofloxacin, levofloxacin, moxifloxacin, norfloxacin and ofloxacin) and clindamycin have contributed to the rising incidence of antibiotic associated diarrhoea nationally. Microbiologists fear a return to levels of mortality to common infections not seen since before the introduction of penicillin as existing antibiotics become increasingly ineffective as treatments.

It is the purpose of this special edition of the *PACE Bulletin* to highlight the priorities of the Lincolnshire CCGs and United Lincolnshire Hospitals Trust in relation to these issues and to provide advice on improving the stewardship of antibiotics to preserve this increasingly threatened and precious resource.

Preventing healthcare associated infections in primary care

Preventing healthcare associated infections (HCAI) is a priority for the Lincolnshire Clinical Commissioning Groups (CCGs); it is included as one of four national targets in the CCG Quality Premium. The Quality Premium is intended to reward CCGs for improvements in the quality of services that they commission and for the associated improvements in health outcomes and reduced health inequalities. The premium paid to CCGs in 2014/ 15, reflecting the performance in 2013 /14 will be based on 4 national measures and three local measures and a number of pre-qualifying criteria including management of resources.

A CCG will earn this portion of the quality premium if there are no cases of MRSA bacteraemia for the CCG's population and *C. difficile* cases are at or below the defined plan for CCGs. In addition to this three of the four Lincolnshire CCGs have opted to include use of antibiotics as a local target.

CCG	**Quality Premium – local target**
Lincolnshire East	To reduce the use of quinolones to a planned rate of 22.5 Average Daily Quantities / 1000 STAR-PU
Lincolnshire West	To reduce the proportion of antibiotics prescribed as cephalosporins and quinolones from 8.3% to 6.8% in 2013/ 14 and to National average (6.3%) by 2014/15.
South Lincolnshire	To reduce the use of quinolones from 27.2 to 18.6 Average Daily Quantities / 1000 STARPU

Use of broad spectrum antibiotics in Lincolnshire CCGs

The most up to date figures available on antibiotic use in Lincolnshire primary care relate to the March 2013 Quarter:

CCG March 2013 Qtr.	Total Antibacterial	Co-amoxiclav	Cephalosporins	Quinolones	% antibiotics as cephalosporins & quinolones
	Items / 100 STAR-PU	ADQ / 1000 STAR-PU			
Lincolnshire East	39.25	31.50	41.64	24.63	7.93%
Lincolnshire West	34.77	31.95	31.26	20.76	6.82%
South Lincolnshire	37.39	29.96	27.98	25.22	6.78%
South West Lincolnshire	33.89	25.43	25.84	20.23	6.63%
National	33.80	27.59	22.69	17.68	5.24%

From a comparison of these figures with figures derived from March 2012 Qtr, it is possible to draw the following conclusions:

- Antibacterial prescribing volume remains above national average for all four Lincolnshire CCGs with little evidence of change year-on-year.
- All four Lincolnshire CCGs have higher cephalosporin use than national average, although volume in all CCGs is falling year-on-year.
- All four Lincolnshire CCGs have higher quinolone use than national average, although volume in most CCGs is falling year-on-year.
- All four Lincolnshire CCGs have higher than national average performance against the percentage of all antibiotics prescribed as cephalosporins and quinolones indicator, although performance is improving in most CCGs year-on-year.

PACEF Comment:
All four Lincolnshire CCGs have potential for improvement against most or all of these indicators. Practices are urged to review their own performance against these indicators in comparison with their peers. Comparative graphs specific to each CCG for each indicator are available from your locality Prescribing Adviser on request. Practical strategies are detailed in this *Bulletin* to enable reduction in overall antibiotic prescribing volume, reduction in use of co-amoxiclav, cephalosporins or quinolones or improvement in performance against the percentage cephalosporins and quinolones indicator. It is acknowledged that some practices performing well against these indicators will simply need to maintain their current performance.

Clostridium difficile

Despite our best efforts, *Clostridium difficile* infection originating in both secondary and primary care in Lincolnshire continues to be a problem, although incidence is no longer increasing. *C. difficile* is an anaerobic, gram-positive bacterium found in the large intestine. There are a large number of asymptomatic long-term *C. difficile* carriers in the community; it has been estimated that as many as 50% of all care home residents are carriers. Antimicrobial use is a major trigger factor for *C.difficile* associated disease (CDAD); antimicrobials can disrupt the normal microflora of the colon and allow colonisation of the pathogen. People most at risk of *C.difficile* infection are the elderly, immunosuppressed and debilitated. *C. difficile* infection is a leading cause of iatrogenic outbreaks of diarrhoea with associated increases in mortality and healthcare costs.

Possible cases of *C.difficile* infection can be identified where symptoms of diarrhoea occur while a patient is taking antibiotics or shortly after the completion of a course of antibiotics (up to 12 weeks afterwards). Stools are usually watery, foul-smelling and may contain blood and mucus; abdominal pain and fever may also occur. If *C. difficile* infection is suspected, current treatment should be reviewed. If the patient is taking an antibiotic or a proton pump inhibitor (PPI), these drugs should be discontinued, where possible. If the diarrhoea does not settle after 48 hours or is moderate to severe, metronidazole 400mg three times a day for 10 -14 days should be started. Oral vancomycin is a potential alternative for (1) the third or subsequent episode of infection; (2) for severe infection or (3) for patients insufficiently responsive or intolerant to metronidazole. Earlier this year, Public Health England (formerly the Health Protection Agency) endorsed fidaxomicin (*Diflicir*) as an initial treatment option for severe cases of *Clostridium difficile* in patients at high risk of recurrence and as the preferred treatment for recurrent *C. difficile* infection. Fidaxomicin (*Dificlir*) is currently designated RED and should only be initiated on the advice of a microbiologist; a full course should be provided from the initiating hospital (see *PACE Bulletin* Vol 7 No 2 (January 2013)).

Broad-spectrum antimicrobials are most strongly implicated in the causation of CDAD, particularly cephalosporins, amoxicillin, ampicillin, co-amoxiclav, co-fluampicil, quinolones and clindamycin. Wherever possible, the use of broad spectrum antimicrobials should be avoided, especially in patients with risk factors for *C.difficile* infection. The risk of CDAD is increased further by long or repeated courses and the use of multiple antimicrobial therapy. The over-frequent use of broad-spectrum antibiotics has contributed significantly to the prominence of antibiotic associated diarrhoea in both primary and secondary care.

*Clostridium difficil*e infection is usually spread on the hands of people who come into contact with infected patients or with infected surfaces contaminated with the bacteria or its spores (e.g. floors, bedpans, toilets). Spores are produced when *C.difficile* bacteria encounter unfavourable conditions (i.e. outside the body). These spores are very hardy and can survive on clothes and surfaces for long periods. Alcohol gel alone will not destroy *C difficile.*

PACEF Recommendation
Wherever possible, the use of broad spectrum antimicrobials (e.g. amoxicillin, co-amoxiclav, co-fluampicil, cephalosporins and quinolones) should be avoided, especially in patients with risk factors for *C.difficile* infection (e.g. the elderly, debilitated and immunocompromised). The over-frequent use of broad-spectrum antibiotics has contributed significantly to the prominence of antibiotic associated diarrhoea in both primary and secondary care. 'No antibiotic' or 'delayed antibiotic' strategies should be considered for a wide range of

commonly occurring infections including sore throat, acute otitis media, sinusitis and acute bronchitis (see below).

Meticillin resistant Staphylococcus aureus (MRSA)

Meticillin-resistant *Staphylococcus aureus* (MRSA) is responsible for several difficult-to-treat infections in humans. MRSA is any strain of *Staph aureus* that has developed through natural selection a resistance to beta lactam antibiotics including penicillins and cephalosporins. The evolution of such resistance does not cause the organism to be more intrinsically virulent than other strains of *Staph aureus* that have no antibiotic resistance, but resistance does make MRSA infection more difficult to treat with standard types of antibiotics and thus more dangerous. About 75 percent of community-associated MRSA infections are localized to skin and soft tissue. Particular groups of patients at risk include: the immunocompromised, diabetics, IV drug users, young children, the elderly and recent users of quinolone antibiotics. It is thought that quinolones increase the risk of MRSA infection as they are excreted through the skin; minimizing the use of quinolones can help to reduce the risk of MRSA.

PACEF Recommendation: Quinolones
The role of quinolones in primary care is extremely limited. The only indications identified in Public Health England guidance (formerly known as Health Protection Agency guidance) are: (1) acute prostatitis; (2) acute pyelonephritis; (3) pelvic inflammatory disease (PID) and (4) traveller's diarrhoea (private prescription only). Other potential roles include acute diverticulitis and epididymo-orchitis. Even in the treatment of acute prostatitis and PID, national guidance identifies alternative options to quinolones.
In local guidance on the treatment of commonly occurring infections, quinolones do not feature at all, even in sections relating to the treatment of respiratory tract and urinary tract infections. In upper respiratory tract infection, antibiotics have marginal benefits in otherwise healthy adults. Where antibiotic therapy is considered necessary first line use of amoxicillin 500mg capsules three times daily for 5 days or doxycycline 200mg stat followed by 100mg daily for 5 days is preferred.
For recommendations relating to urinary tract infections (UTIs) see below. Sometimes, long-term quinolone therapy is initiated by a urologist in patients susceptible to recurrent UTIs. Frequently, these patients are suffering from non-infective urethritis or have other non-infective causes for their symptoms. Where doubts exist around the appropriateness of long-term antibiotic therapy, prescribers are advised to seek advice from their local microbiologist.

Extended spectrum beta lactamase producing organisms (ESBLs)

Specifically ESBLs are enzymes produced by resistant bacteria that hydrolyze extended spectrum cephalosporins. Prior exposure to cephalosporins is linked to increasing risk of ESBL related infections. In Lincolnshire, infection rates with ESBLs remain a problem with antibiotic treatment options limited to IV carbapenems or nitrofurantoin. ESBL producing *Escherichia coli* is increasingly linked to resistant urinary tract infections (UTIs). Other causative organisms for UTI such as *Klebsiella* and *Pseudomonas aeruginosa* are also linked to the production of ESBLs.

PACEF Recommendation: Uncomplicated UTIs in Men or Women (not pregnant)
Prescribers are reminded that in the treatment of uncomplicated UTIs in men or women (not pregnant) first line treatments are either trimethoprim tablets 200mg twice daily or nitrofurantoin modified release capsules 100mg twice daily (see Appendix for updated local guidelines). Public Health England guidance recommends 3 day courses for women and 7 day courses for men. Data comparing practices suggests that there is a wide variation in nitrofurantoin use across the county; use of the twice daily MR formulation can help to reduce the inconvenience of the four times daily standard release tablet. One strategy to reduce the inappropriate use of cephalosporins in UTI is to ensure that first line treatment preferences for uncomplicated UTIs in men and women (who are not pregnant) are for trimethoprim 200mg tablets or nitrofurantoin 100mg MR capsules.

PACEF Recommendation: UTIs in pregnancy

For UTIs in pregnancy, a mid-stream urine needs to be sent for culture and sensitivities. Routine sensitivities released by microbiology are for trimethoprim, nitrofurantoin, and co-amoxiclav. In pregnancy, there is a teratogenic risk with trimethoprim in the first trimester even with folic acid cover; nitrofurantoin should be avoided at term as it may produce neonatal haemolysis. As a result of this, first line treatment options in pregnancy are either co-amoxiclav 625mg tablets three times daily for 7 days or amoxicillin 500mg capsules three times daily for 7 days (if known to be susceptible). Cefalexin 500mg tablets or capsules twice daily for 7 days should only be considered as a second line option; microbiology are likely to release cefalexin sensitivities if the patient is pregnant or if there is resistance to other agents. Nitrofurantoin MR capsules 100mg twice daily for 7 days may be an appropriate third line option, but should be avoided in late pregnancy (see above).

Prescribing nitrofurantoin modified release 100mg capsules

Nitrofurantoin MR 100mg capsules should be prescribed twice daily with food to increase absorption and to reduce gastrointestinal side effects. **Public Health England guidance recommends 3 day courses for women (who are not pregnant) and 7 day courses for men.**

Nitrofurantoin should not be used:

- if eGFR < 60mL/min/1.73m^2 as concentration in the urine is insufficient if renal function is poor; accumulation with resultant toxicity can also occur.
- for upper UTI as it does not achieve effective concentrations in the blood.
- in G6PD deficiency and acute porphyria.

Nitrofurantoin may:

- discolour urine yellow or brown.
- cause dizziness or drowsiness (less than 10% of patients).

Nitrofurantoin should be used with caution if the patient has peripheral neuropathy or risk factors for peripheral neuropathy.

Additional precautions are not usually necessary when taking nitrofurantoin concurrently with the contraceptive pill as nitrofurantoin is not an enzyme inducer.

GUIDELINES FOR THE TREATMENT OF COMMONLY OCCURRING INFECTIONS IN LINCOLNSHIRE PRIMARY CARE: SUMMER 2013/14 UPDATE

Infection	Recommended Agents	Notes
Pharyngitis / sore throat / tonsillitis Average length of illness is 1 week	**Most sore throats are viral Antibiotics unnecessary in many cases** as 90% resolve in 7 days **Phenoxymethylpenicillin** 500mg four times a day for 10 days If allergic to penicillin: **Clarithromycin** 250 – 500mg twice daily for 5 days (as recommended in BNF)	Consider a **'no antibiotic'** or **'delayed antibiotic strategy'** and ensure that the patient knows that the average length of the illness is 1 week. Patients with 3 of 4 Centor criteria (presence of tonsillar exudate, tender anterior cervical lympadenopathy or lymphadenitis, presence of fever and an absence of cough) may benefit from antibiotics. Consider two or three day delayed or immediate antibiotics. **Numbers Needed to Treat** Antibiotics to prevent 1 case of quinsy >4000 Antibiotics to prevent 1 case of AOM 200

Infection	Recommended Agents	Notes
Acute Otitis Media (AOM) Antibiotics should not be routinely prescribed for AOM Average length of illness 4 days	**Antibiotics are unnecessary in many cases; AOM resolves in 60% of patients within 24 hours**. Antibiotics do not prevent deafness. First Line **Amoxicillin** 40mg/kg/day in 3 divided doses for 5 days Maximum 1.5g daily If allergic to penicillin: **Erythromycin or Clarithromycin (5 days)**	Depending on severity, consider prescribing antibiotics for children < 2 years with bilateral AOM and for children with otorrhoea, or children with CF or immune suppression. Children who do not meet these criteria should not be given antibiotics. Use a **'no antibiotic'** or **'delayed antibiotic'** strategy. Reassure patients/carers that antibiotics are not needed immediately because they will make little difference to symptoms and may have side effects (e.g. diarrhoea, vomiting and rash). Use analgesia for symptom relief.
Acute Rhinosinusitis Antibiotics should not be routinely prescribed for sinusitis The average duration of symptoms is 2½ weeks	**Antibiotics are unnecessary in many cases as 80% resolve in 14 days.** First Line (7 days) **Amoxicillin** 500mg three times daily (1g if severe) or **Doxycycline** 200mg stat followed by 100mg daily or **Phenoxymethylpenicillin** 500mg four times daily For persistent symptoms **Co-amoxiclav** 625mg three times a day for 7 days	**Many cases of sinusitis are of viral origin.** NICE CG 69 Respiratory Tract Infections recommends using a '**no antibiotic prescribing strategy'** or '**delayed antibiotic prescribing strategy'.** Patients with acute sinusitis who are likely to be at risk of developing complications should be offered an immediate antibiotic prescription in the following situations: (1) if the patient is systemically very unwell; (2) if the patient has symptoms and signs suggestive of serious illness and/or complications (3) if the patient is at high-risk of serious complications due to pre-existing co-morbidity (e.g. significant heart, lung, renal, liver or neuromuscular disease, immunosuppression, cystic fibrosis and young children born prematurely). Use adequate analgesia. Consider a 7 day delayed or immediate antibiotic when there is a purulent nasal discharge.
Acute cough / bronchitis Average duration of cough is 3 weeks. If > 3 weeks, consider pertussis	**In primary care antibiotics have marginal benefits in otherwise healthy adults. Consider seven day delayed antibiotic with advice.** First Line **Amoxicillin** 500mg three times a day for 5 days or **Doxycycline** 200mg stat followed by 100mg daily for 5 days.	**Routine antibiotic treatment of uncomplicated acute bronchitis is not recommended regardless of duration of cough.** Antibiotics should be prescribed for patients > 65 years with acute cough and 2 or more of the following, or older than 80 years with one or more of the following: - hospitalisation in previous year - type 1 or type 2 diabetes mellitus - history of congestive heart failure - current use of oral steroids Antibiotics should be prescribed for patients who are - systemically very unwell, - have symptoms or signs suggestive of serious illness and/or complications (particularly pneumonia), - are at high risk of serious complications because of pre-existing co-morbidity. This includes patients with significant heart, lung, renal, liver or neuromuscular

Infection	Recommended Agents	Notes
		disease, immunosuppression, cystic fibrosis and young children born prematurely.
Community acquired pneumonia	If CRB65 =0 **Amoxicillin** 500mg three times daily for 7 days or **Doxycycline** 200mg stat/100mg daily for 7 days or **Clarithromycin** 500mg twice daily for 7 days If CRB65 = 1 and at home **Amoxicillin** 500mg three times daily for 7 - 10 days **and Clarithromycin** 500mg twice daily for 7 - 10 days **or Doxycycline** alone 200mg stat, 100mg daily for 7 – 10 days	**Start antibiotics immediately** Use CRB-65 to assess risk. Each scores 1: **C**onfusion(AMT<8); **R**espiratory rate >30/min; age>**65**; **B**P systolic < 90 or diastolic ≤ 60. Score 0: suitable for home treatment. Score 1-2: hospital assessment or admission. Score 3-4: urgent hospital admission. If no response in 48 hrs add clarithromycin first line, or tetracycline to cover Mycoplasma infection (rare in >65y)
Acute exacerbation of COPD	Treat exacerbations promptly with antibiotics if purulent sputum and increased shortness of breath and/or increased sputum volume. First Line **Doxycycline 200mg stat followed by 100mg daily for 5 days** **or Amoxicillin 500mg three times a day for 5 days** If the patient is allergic to penicillin and a tetracycline is contraindicated, use **Clarithromycin 500mg twice daily for 5 days** Second Line If there is a clinical failure or suspected resistance to first line antibiotics use: **Co-amoxiclav 625mg tablets three times daily for 5 days.** Risk factors for antibiotic resistant organisms include co-morbid disease, severe COPD, frequent exacerbations, antibiotics in last 3 mths.	
Uncomplicated UTI in men or women (no fever or flank pain)	**Severe: In women with 3 or more symptoms of UTI (dysuria, urgency, frequency, polyuria, suprapubic tenderness, haematuria) - treat** **Mild: In women with 2 or less symptoms - use dipstick and presence of cloudy urine to guide treatment.** In men – consider prostatitis and send pre-treatment MSU or, if symptoms are mild or non-specific, use a negative dipstick test to exclude UTI. NB a negative dipstick result can help to rule out UTI, but false positive dipsticks are very common and should not automatically lead to antibiotic treatment. **First Line** **Trimethoprim** 200mg tablets twice daily or **Nitrofurantoin** MR capsules 100mg twice daily. Treatment length **3 days in women** and **7 days in men**. **Second Line** Dependent upon sensitivities. Amoxicillin resistance is common; only use if susceptible. Community multi-resistant Extended-spectrum Beta-lactamase *E.coli* are increasing: microbiologist advice must be sought.	
UTI in pregnancy	Send MSU for culture and sensitivities and start empirical antibiotics. First Line **Co-amoxiclav 625mg tablets three times per day for 7 days** **or Amoxicillin 500mg capsules three times daily for 7 days (if known to be susceptible)** Second Line Cefalexin 500mg twice daily for 7 days Third line Nitrofurantoin MR capsules 100mg twice daily for 7 days (avoid nitrofurantoin in late pregnancy) Trimethoprim is not recommended in early pregnancy even with folic acid cover.	

Reference:
Health Protection Agency, *Management of Infection Guidance for Primary Care* (February 2013). Accessible via the Public Health England website www.gov.uk/government/organisations/public-health-england

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