Tees, Esk and Wear Valleys
NHS Foundation Trust

Antibiotic Prescribing Procedure

Ref PHARM-0019-v5.3

Status: Approved
Document type: Procedure

Contents

1 Introduction

This Trust document has been developed in response to NICE guidance NG15 Antimicrobial stewardship: systems and processes for effective antimicrobial medicine use which covers the effective use of antimicrobials (including antibiotics) in children, young people and adults. It aims to change prescribing practice to help slow the emergence of antimicrobial resistance and ensure that antimicrobials remain an effective treatment for infection.

2 Why we need this procedure

This procedure forms part of the quality improvement strategy for patient safety, to help reduce inappropriate prescribing and optimise antibiotic use. Antibiotic resistance is linked to the extent and the way in which antibiotics are used. Inappropriate use of antibiotics is the main driver of antibiotic resistance.

2.1 Purpose

The aim of this procedure is to:

- promote prudent prescribing and antimicrobial stewardship to improve patient care;
- minimise the emergence of bacterial resistance in the community for the future.

2.2 Objectives

- To encourage the rational and cost effective use of antibiotics;
- To minimise the emergence of bacterial resistance;
- To provide a simple, best guess approach to the treatment of common infections.

3 Scope

This guidance does not cover all eventualities regarding antibiotic prescribing but provides direction towards ensuring that best practice in antimicrobial prescribing becoming routine practice. A **start smart - then focus** approach is recommended for all antibiotic prescriptions.

3.1 Who this procedure applies to

- All medical and non-medical prescribers
- Nursing staff
- Pharmacy staff

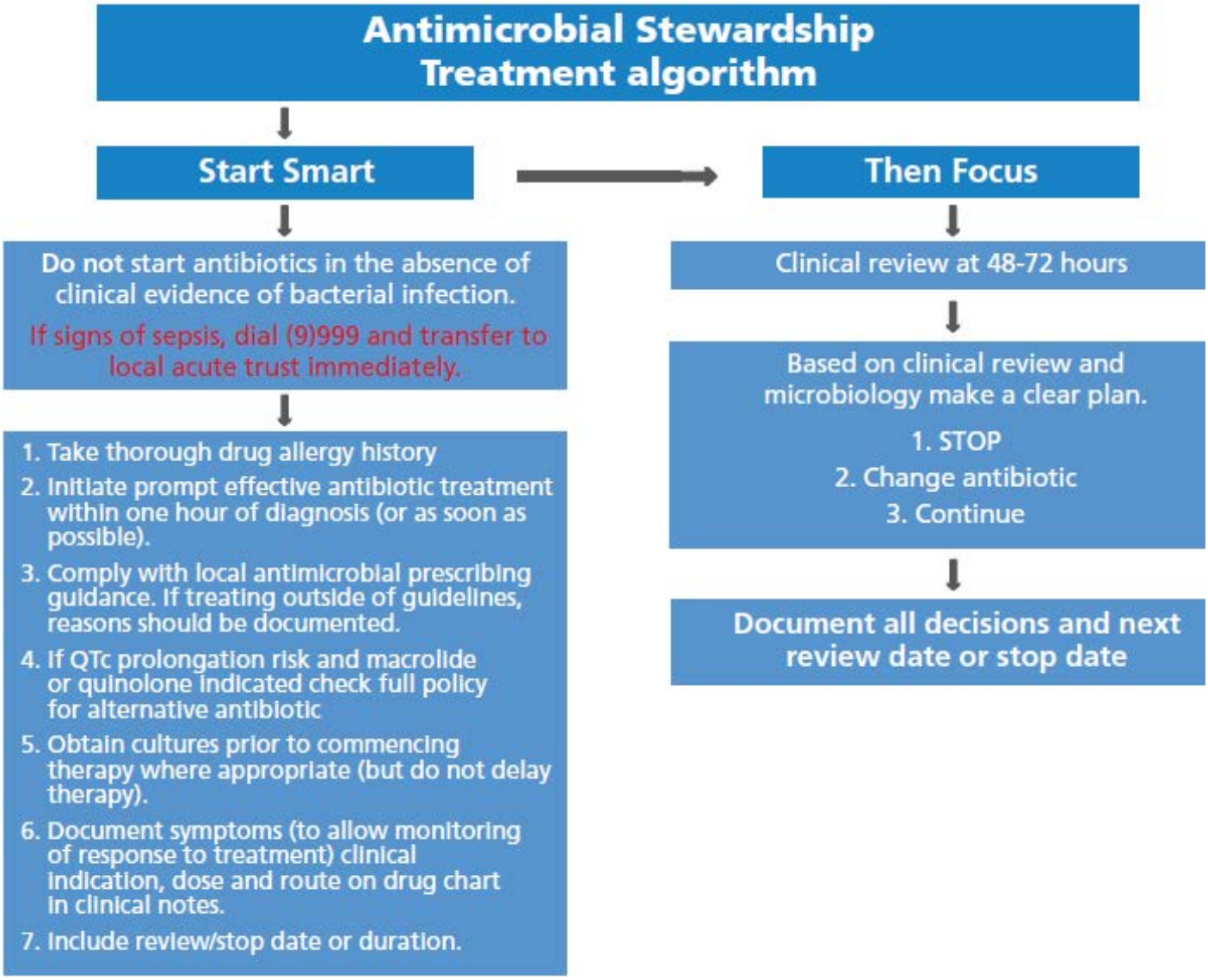
3.2 Roles and responsibilities

Role	Responsibility
Medical Director and Consultants	• To ensure compliance with the procedure.
All other staff with authority to prescribe	• To comply with the principles of treatment including documentation so that every member of each clinical team knows why the patient is prescribed antibiotics, when the treatment will be reviewed and stopped

Microbiologist	• Consultant Microbiologists play a leading role in the development of policies or formularies, and in some hospitals or Trusts are responsible for monitoring or controlling these policies. The role of the Microbiologist in the use of antibiotics is a high-profile one, and covers a number of areas:
	  • advising on the use of antibiotics
	  • monitoring antibiotic efficacy against infecting organisms
	  • surveillance of sensitivity patterns in the environment
	  • reviewing the accuracy and relevance of antibiotic sensitivity testing

4 Procedure

4.1 Principles of Treatment



Documentation needed on initiation of antibiotics

Drug chart - clinical indication*, duration or review date, route, dose and frequency

PARIS - symptoms **and** clinical indication*, duration or review date, drug, dose and frequency. If treating outside of guidelines, reasons should be documented.

*Clinical indication should be specific - e.g. bronchitis or pneumonia rather than chest infection

The review and subsequent decision must be documented clearly in the medical notes

4.2 Treatment algorithm

Sepsis

- Assess using Guidance and if signs present arrange urgent transfer to local acute trust

Start smart

- Do not start antibiotics in the absence of clinical evidence of bacterial infection;
  - Many upper respiratory tract infections do not require antibiotics check local guidelines risk stratification guidance of when to treat.
    - If primary care advice suggests delayed antibiotics see below for leaflets that provides safety net advice, so if condition worsens need for review can be quickly identified.
  - For UTIs see flow charts in appendix 1
- If there is evidence / suspicion of bacterial infection use clinical guidelines to initiate prompt effective antibiotic treatment within an hour of diagnosis;
  - Check allergy status and clarify nature of allergy/ADR if needed
    - For further advice on prescribing in penicillin allergy see below
  - Check previous antibiotic use – resistance risk more than doubled if recently used
    - If resistance to first line drugs suspected contact microbiology
  - Prescribing guidelines for TEWV prescribers in **Durham & Darlington** and **Tees** localities, and in **Forensics** services are available on the NICE website here
  - Prescribing guidelines for TEWV prescribers in **North Yorkshire** and **York** locality are available here
  - Macrolides and Quinolones can cause QT prolongation if one of these medications are indicated check if patient is in risk category. See QT section below.
  - Check for interactions with concurrent medication – some common interactions with psychotropic medication is listed below
- Where appropriate obtain cultures first (but do not delay prescribing in unwell patients). Knowing susceptibility can lead to narrowing of broad spectrum therapy, changing therapy to treat resistant pathogens and stopping antibiotics when cultures suggest infection is unlikely;
  - For UTIs see sampling and interpretation advice
- Document on drug chart and in the medical notes:
  - clinical indication, duration or review date, route, dose and frequency.
  - Symptoms should also be documented in notes as this will help clinicians change or stop therapy where appropriate;
  - If treating outside of guidelines, reasons should be documented

Then Focus

- Review the clinical diagnosis and continuing need for antibiotics by **72 hours** and make a clear plan of action
- Antimicrobial prescribing decisions
  - Stop antibiotics if there is no evidence of infection;
  - Change antibiotics
    - based on sensitivities if empirical choice was not effective/ organism not sensitive
  - Continue and document if further review needed
    - If there was a delay obtaining medication review the stop date

5 Definitions

Term	Definition
BNF	British National Formulary
PHE	Public Health England

6 Related documents

Medicines Overarching Framework

Infection Prevention and Control Procedure

7 How this procedure will be implemented

- This procedure will be published on the Trust's intranet.
- Directorates to implement via the Clinical Governance groups.
- Medical staff training to be implemented by the Medical Education.
- Non medical prescriber training to be implemented by Lead Nurse Medicines Management
- Pharmacist to check prescribing follows recommendations.

8 How this procedure will be audited

Snap shot of antibiotic prescribing on inpatient wards to be audited in annually by the Pharmacy Service.

9 References

- NICE guideline [NG15] Antimicrobial stewardship: systems and processes for effective antimicrobial medicine use Published date: August 2015
- Management of infection guidance for primary care for consultation and local adaptation – Public health England May 2016
- Start Smart - Then Focus Antimicrobial Stewardship Toolkit for English Hospitals: Public health England Updated March 2015
- North East and Cumbria antimicrobial prescribing guideline for primary care Version 2.1 valid from June 2016
- North Yorkshire antibiotic prescribing guideline for primary care Review date: September 2017
- Urinary tract infection: diagnosis guide for primary care; Public health England, latest update Sept 2014

10 Document control

Date of approval:	24 January 2019	
Next review date:	1 February 2022	
This document replaces:	Antibiotic Prescribing Procedure PHARM/0019/v5.2	
Lead:	Name	Title
	Richard Mellor	Lead Pharmacist - York
This document has been agreed and accepted by: (Director)	Name	Title
	Ruth Hill	Chief Operating Officer
This document was approved by:	Name of committee/group	Date
	Infection Prevention and Control Committee Drug and Therapeutics Committee	18th January 2019 January 2019
This document was ratified by:	Name of committee/group	Date
	N/A	
An equality analysis was completed on this document on:	General pharmacy EA	
Amendment details:		

Change record

Version	Date	Amendment details	Status
5.2	26 Jan 2017	Update of UTI flow charts Update of Sepsis guidance Updated QTc advice Simplified interaction advice	Withdrawn
5.3	4 Nov 2019	Update of hyperlink to prescribing guidelines for TEWV prescribers in NYY locality (link to webpage instead of document)	Published

11 APPENDICES

11.1 Appendix 1 – Flow charts for diagnosing and treating urinary tract infections

11.1.1 Flowchart for infants/children under 16 years) with suspected UTI

Consider UTI in any sick child and every young child with unexplained fever

Check temperature and symptoms in all infants/children

- unexplained fever 38°C or more OR
- loin pain/ tenderness suggesting pyelonephritis

YES → **Consider referral** to a paediatric specialist
Test urine within 24 hours
If urine test positive, treat with antibiotic using NICE/PHE guideline on pyelonephritis: antimicrobial prescribing

NO

Management depends on age and symptoms

Infant or child over 3 months with suspected UTI:
Most common symptoms: fever, frequency, dysuria, abdominal pain, loin tenderness, vomiting, poor feeding, dysfunctional voiding, changes to continence
Less common: lethargy, irritability, haematuria, offensive urine, failure to thrive, malaise, cloudy urine

Perform a urine dipstick test

POSITIVE nitrite AND POSITIVE leucocyte	POSITIVE nitrite NEGATIVE leucocyte	NEGATIVE nitrite POSITIVE leucocyte	NEGATIVE nitrite AND NEGATIVE leucocyte
Treat as UTI AND start antibiotic **Send urine for culture if:** • under 3 years • suspected pyelonephritis • risk of serious illness • past UTI • no response to treatment and urine sample not already sent	**Treat as UTI** AND start antibiotic if dipstick on fresh urine sample Send urine for culture to confirm diagnosis and reassess with result Repeat urine if not fresh (as old samples can give false positives)	**Send urine for culture** **Under 3 years:** start antibiotic and reassess with culture result **Over 3 years**: only start antibiotics if good clinical evidence of UTI; leucocytes may indicate infection outside urinary tract	**UTI unlikely** Do not start antibiotics Exclude other causes **Send urine for culture if:** • suspected pyelonephritis • risk of serious illness • under 3 months • recurrent UTI • no response to treatment within 24-48 hours and urine sample not sent • symptoms and dipsticks results do not correlate

In ALL follow local guideline on lower UTI: antimicrobial prescribing, safety-net and give self-care advice: advise staff/carer to ask for reassessment if the child is not improved or worse after 24–48 hours

Refer to NICE CG54 for other things to consider in suspected UTI in children

For treatment refer to: local guidelines on UTI (lower): antimicrobial prescribing or NICE guidelines on pyelonephritis (acute): antimicrobial prescribing

11.1.2 Key points for infants/children under 16 years with suspected UTI

Sampling in children:

- if sending a urine culture, obtain sample before starting antibiotics
- if child has alternative site of infection do not test urine unless remain unwell - then test within 24 hour
- if non-invasive not possible consider: catheter sample, or suprapubic aspirate (with ultrasound guidance)
- culture urine within 4 hours of collection, if this is not possible refrigerate, or use boric acid preservative. Boric acid can cause false negative culture if urine not filled to correct mark on specimen bottle

Interpretation of culture results in children:

- single organism $\geq 10^6$ cfu/L (10^3 cfu/mL) may indicate UTI in voided urine
- any growth from a suprapubic aspirate is significant
- pyuria $\geq 10^7$ WBC/L (10^4 WBC/mL) usually indicate UTI, especially with clinical symptoms but may be absent

Other diagnostic tests: do not use CRP to differentiate upper UTI from lower UTI

Ultrasound:

- if proven UTI is atypical (seriously ill, poor urine flow, abdominal or bladder mass, raised creatinine, septicaemia, failure to respond to antibiotic within 48 hours, non-*E.coli* infection): ultrasound all children in acute phase and undertake renal imaging within 4-6 months if under 3 years
- ALL ages with recurrent UTI[1A+]
- for children with non-*E.coli* UTI: ultrasound within 6 weeks if UTI not atypical AND responding to antibiotics

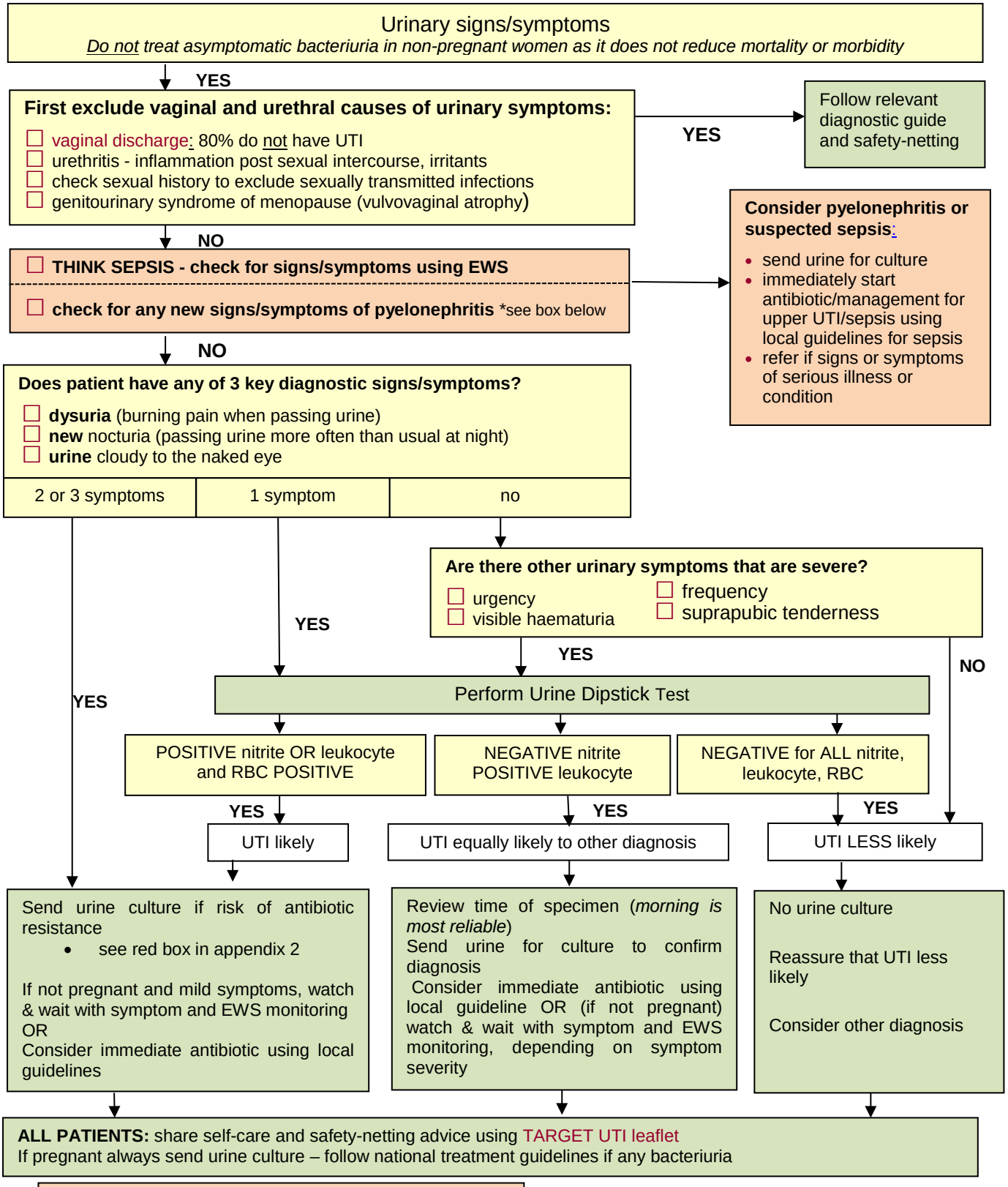
Refer to NICE CG54 **for other things to consider in suspected UTI in children**

For treatment refer to joint NICE/PHE guidance:

Local guidelines on UTI (lower): antimicrobial prescribing or NICE guidelines on pyelonephritis (acute): antimicrobial prescribing

11.1.3 Flowchart for women (under 65years) with suspected UTI

This guide excludes patients with recurrent UTI (2 episodes in last 6 months, or 3 episodes in last 12 months)



11.1.4 Diagnostic points for men under 65 years

Consider other genitourinary causes of urinary symptoms

- in sexually active, check sexual history for STIs for example chlamydia and gonorrhoea
- urethritis due to urethral inflammation post sexual intercourse, irritants, or STIs

Check for pyelonephritis, prostatitis, systemic infection, or suspected sepsis using local policy

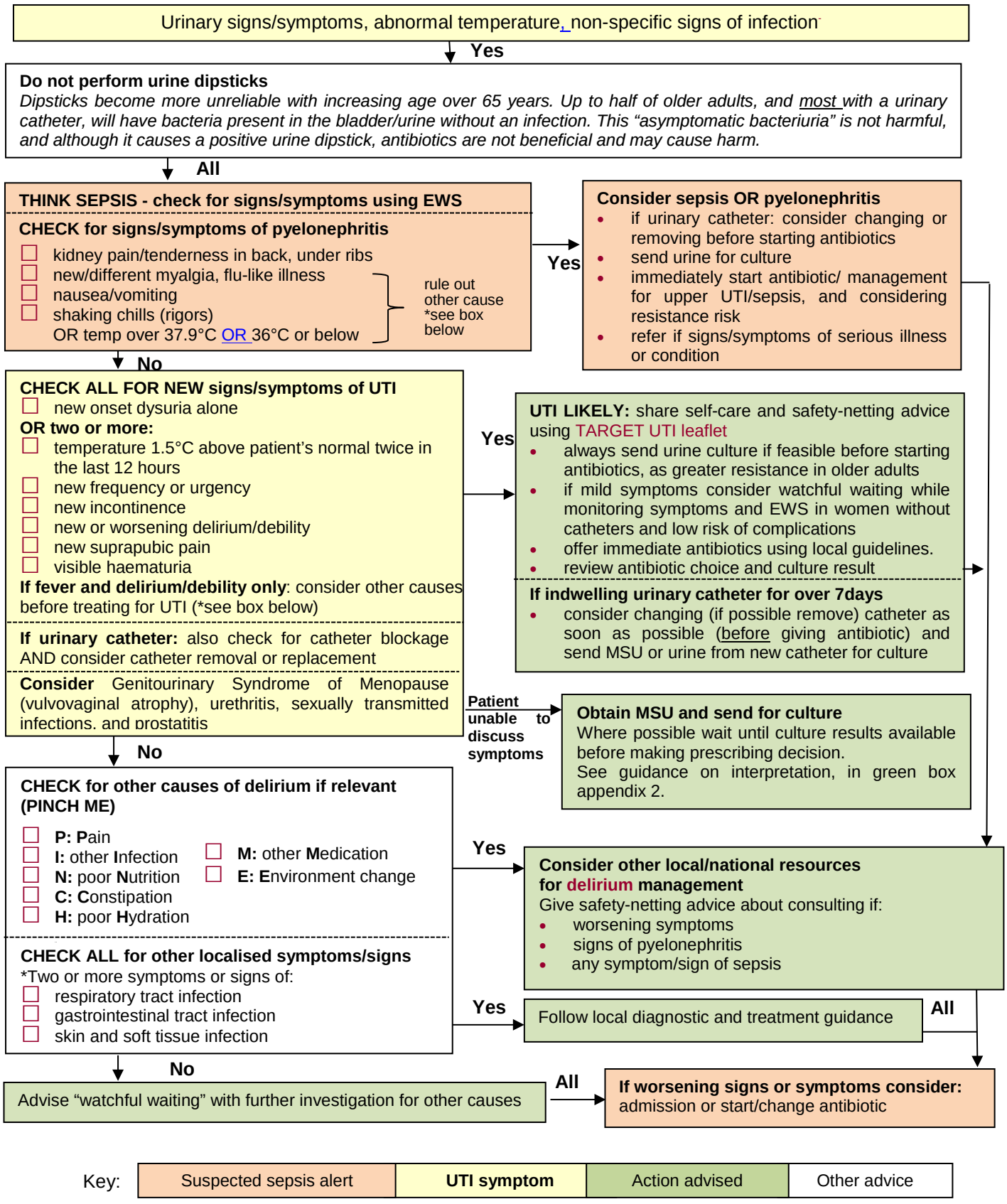
- urinary symptoms with fever or systemic symptoms in men are strongly suggestive of prostatic involvement or pyelonephritis
- acute prostatitis may present with feverish illness of sudden onset, symptoms of prostatitis (low back, suprapubic, perineal, or sometimes rectal pain), symptoms of UTI (dysuria, frequency, urgency or retention), or exquisitely tender prostate on rectal examination
- recurrent or relapsing UTI in men should prompt referral to urology for investigation

Diagnostic points in men

- always send a mid-stream urine sample for culture, collected before antibiotics are given
- dipsticks are poor at ruling out infection. Positive nitrite makes UTI more likely (PPV 96%). Negative for both nitrite and leucocyte makes UTI less likely, especially if symptoms are mild
- if suspected UTI, offer immediate treatment according to local guideline and review choice of antibiotic with pre-treatment culture results

For all patients please refer to the information and reference tables in local guidance

11.1.5 Flowchart for men and women over 65 years with suspected UTI



11.2 Appendix 2 – Urine cultures – When to send and how to interpret

Sending urine for culture and interpreting results in ALL adults

Review need for culture when considering treatment

Send a urine for culture in:
- over 65 year olds if symptomatic and antibiotic given
- pregnancy: for routine antenatal tests, or if symptomatic
- suspected pyelonephritis or sepsis
- suspected UTI in men
- failed antibiotic treatment or persistent symptoms
- recurrent UTI (2 episodes in 6m or 3 in 12m)
- if prescribing antibiotic in someone with a urinary catheter
- as advised by local microbiologist

Consider risk factors for resistance and send urine for culture if:
- abnormalities of genitourinary tract
- renal impairment
- care home resident
- hospitalisation for > 7 days in last 6m
- recent travel to a country with increased resistance
- previous UTI resistant

If prescribing an antibiotic, review choice when culture and antibiotic susceptibility results are available

Sampling in all men and women

Women: mid-stream urine (NHS choices) and holding the labia apart may help reduce contamination but if not possible, sample can still be sent for culture. Do not cleanse with antiseptic, as bacteria may be inhibited
Elderly frail: only take urine sample if symptomatic and able to collect good sample. If incontinent, clean catch in disinfected container and condom catheters for men may be viable options but little evidence to support
Men: advise on how to take a mid-stream specimen (NHS choices)
People with urinary catheters: if changed, collect from newly placed catheter using aseptic technique, drain a few mL of residual urine from the tubing, then collect a fresh sample from catheter sampling port

Culture urine within 4 hours of collection, refrigerate, or use boric acid preservative. Boric acid can cause false negative culture if urine not filled to correct mark on specimen bottle and can affect urine dipstick tests)

How do I interpret a urine culture result if I suspect a UTI?

Culture should be interpreted in parallel to severity of signs/symptoms. False negatives/positives can occur
Do not treat asymptomatic bacteriuria unless pregnant as it does not reduce mortality or morbidity

Urine culture results in patients with urinary symptoms that usually indicate UTI:
- many labs use growth of 10^7-10^8 cfu/L (10^4-10^5 cfu/mL) to indicate UTI
- lower counts can also indicate UTI if patient symptomatic:
  - strongly symptomatic women - single isolate $\geq 10^5$ cfu/L ($\geq 10^2$ cfu/mL) in voided urine
  - in men counts as low as 10^6 cfu/L (10^3 cfu/mL) of a pure or predominant organism
  - any single organism $\geq 10^7$ cfu/L ($\geq 10^4$ cfu/mL)
  - *Escherichia coli* or *Staphylococcus saprophyticus* $\geq 10^6$ cfu/L ($\geq 10^3$ cfu/mL)
  - $\geq 10^8$ cfu/L ($\geq 10^5$ cfu/mL) mixed growth with 1 predominant organism

Epithelial cells/mixed growth:
- the presence of epithelial cells is not necessarily an indicator of perineal contamination, culture result should be interpreted with symptoms and repeated if significance is uncertain
- mixed growth may indicate perineal contamination; however a small proportion of UTIs may be due to genuine mixed infection. Consider a re-test if symptomatic

Red cells: may be present in UTI
- chemical tests may be more sensitive than microscopy as a result of the detection of haemoglobin released by haemolysis
- refer patients with persistent haematuria post-UTI to urology

White blood cells/ leucocytes:
- white cells $\geq 10^7$ WBC/L ($\geq 10^4$ WBC/mL) are considered to represent inflammation in urinary tract, this includes the urethra
- white cells can be present in older people with asymptomatic bacteriuria, as the immune system does not differentiate colonisation from infection

Sterile pyuria:
- in sterile pyuria, consider *Chlamydia trachomatis* (especially if 16-24 years), other vaginal infections, other non-culturable organisms including TB or renal pathology
- If recurrent pyuria with UTI symptoms, discuss with local microbiologist as lower counts down to 10^5 cfu/L (10^2 cfu/mL) may be significant. Higher volume of urine may need to be cultured, including for fastidious organisms

For all patients: take into account of antibiotic susceptibility results and resistance when deciding on management and reviewing antibiotic treatment**.**
Please refer to local guidance.

Follow up: Do not send follow-up urine unless pregnant, or advised by the laboratory

Consider non-urgent referral for bladder cancer in patients ≥ 60 years with recurrent/persistent unexplained UTIs

11.3 Appendix 3 – Prescribing in Penicillin Allergy (also in local guidance)

Allergy is one of the most commonly reported adverse effects of penicillins. The table below gives information on the suitability of available antibiotics in patients who give a history of penicillin allergy. These are colour coded **RED** indicating high risk, **AMBER** to be used with caution and **GREEN** for antibiotics considered safe.

The risk should be assessed by taking a careful history from the patient. Patients often describe symptoms such as nausea and diarrhoea as allergies but these are more likely side effects rather than a true allergy. Patients with a minor skin rash restricted to small areas of the body or a rash that develops more than 72 hours after exposure probably do not have genuine hypersensitivity.

Always record allergies carefully on PARIS and on the prescription / administration chart (kardex)
Check with the patient and the allergy section on PARIS and the kardex before prescribing or administering drugs

Risk to patients with a history of penicillin allergy	Agent
HIGH **(Contraindicated)** Any patient describing true allergy following penicillin exposure must not be prescribed any penicillin again **Speak to microbiology for advice**	**Amoxicillin** **Ampicillin** **Co-amoxiclav** **Flucloxacillin** **Penicillin V** **Pivmecillinam**
LOW **(Caution)** **Avoid if serious type 1 penicillin allergy (e.g. anaphylaxis/ angioedema)** **Use with caution if non-severe allergy (e.g. minor rash only)** **N.B. risk of allergic reaction is greater in ß-lactams most similar to penicillins in underlying structure.**	**Cefaclor** **Cefalexin** **Cefotaxime** **Ceftriaxone**
Considered Safe	**Azithromycin** **Ciprofloxacin** **Clarithromycin** **Clindamycin** **Co-trimoxazole** **Doxycycline** **Erythromycin** **Fidaxomycin** **Lymecycline** **Metronidazole** **Minocycline** **Moxifloxacin** **Nitrofurantoin** **Ofloxacin** **Oxytetracycline** **Rifampicin** **Sodium fusidate** **Tetracycline** **Trimethoprim** **Vancomycin**

11.4 **Appendix 4 - Treatment for patients at risk of QT prolongation**

- Macrolides (Clarithromycin, Erythromycin and Azithromycin) and Quinolones (e.g. ciprofloxacin and levofloxacin) can cause QT prolongation.
- Although the QT effects are mild the macrolides are also inhibitors of liver enzymes that can increase the levels of antipsychotics and other medication increasing risk of adverse effects.
- Service users in the following groups should only be treated with a QT prolonging antibiotic if other options are not available:
    - Service users prescribed psychotropic medications (Haloperidol, Citalopram and Escitalopram) that are contra-indicated with other QTc prolonging drugs.
    - Service users with prolonged QTc intervals
    - Service users taking high dose antipsychotic therapy
- If a service user is in one of the above groups **and** following the local guidance above they would be treated with a QT prolonging drug contact pharmacy or microbiology for advice. Microbiology details can be found in the local procedure.

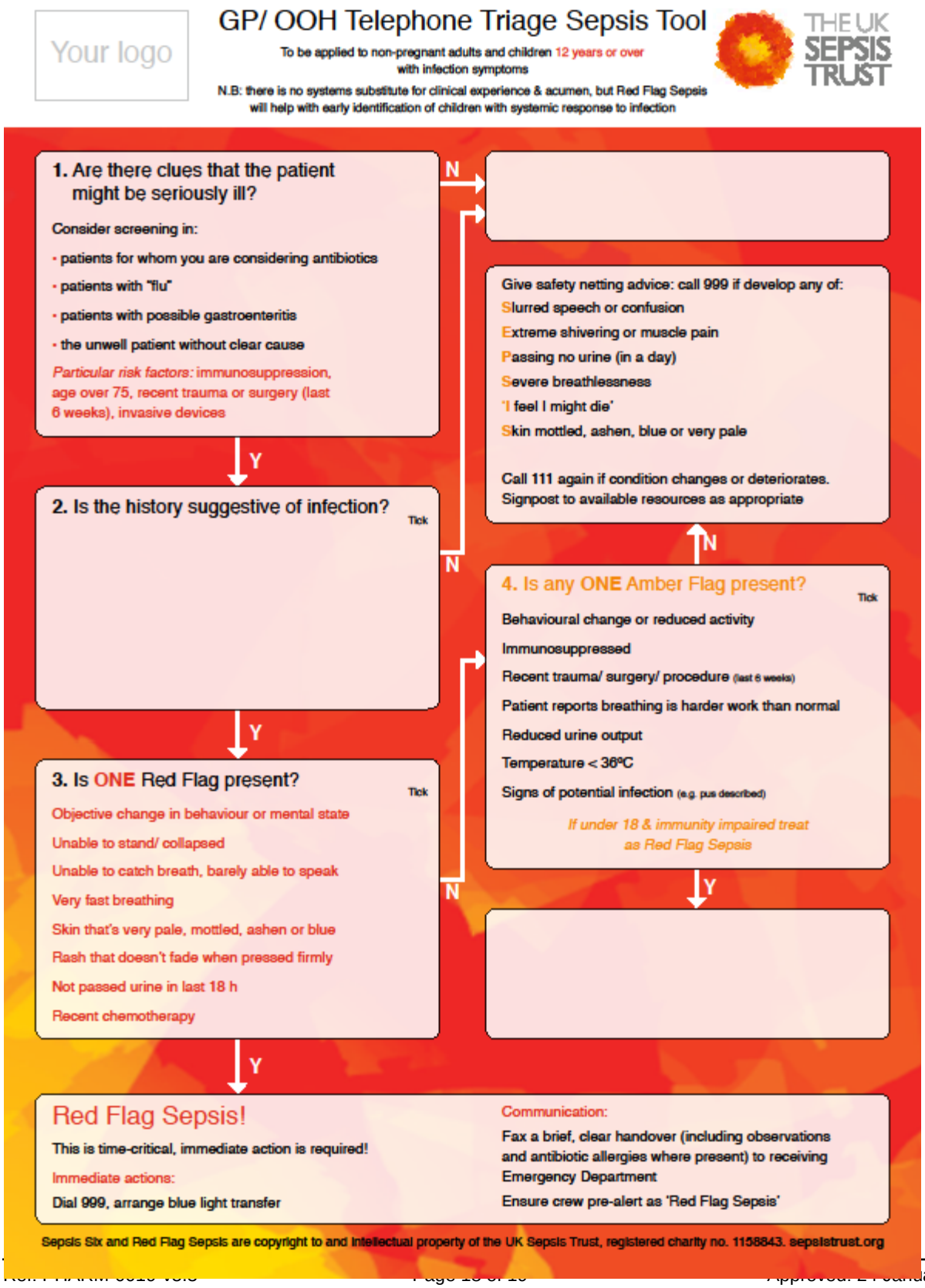
11.5 Appendix 5 - Potential Drug Interactions between Antibiotics and Commonly-Used Psychotropic Drugs

Prescribers should always refer to the current BNF or BNF App for further information. Absence of information should not be assumed to indicate no interaction. Please see above for QTc prolongation interaction information.

Table compiled from BNF Number 72 (September 2016)

Drug 1	Drug 2	Interaction	Effect/Action
Aripiprazole Benzodiazepines Carbamazepine Clozapine Haloperidol Mirtazapine Phenytoin	Rifamycins (Rifabutin /rifampicin)	Plasma concentration of medications reduced	Possibly increase dose, monitor or avoid combination
Carbamazapine & Phenytoin	Doxycycline	Metabolism of doxycycline accelerated	Need to double the dose of doxycycline to ensure effective treatment.
Carbamazepine	Erythromycin and clarithromycin	Plasma carbamazepine concentration increased	Monitor for affects
Carbamazepine	Fluconazole	Plasma concentration of carbamazepine increased	Monitor for adverse effects
Clozapine	Ciprofloxacin & Erythromycin	Increased plasma concentration of clozapine	Monitor for adverse effects, Risk of convulsions
Clozapine	Nitrofurantoin	May reduce white cell count	Avoid
Duloxetine	Ciprofloxacin	Metabolism of duloxetine inhibited	Avoid concomitant use
Galantamine	Erythromycin	Increases plasma concentration of galantamine	
Quetiapine	Clarithromycin Erythromycin Ketoconazole Fluconazole	Plasma concentrations increased	Contraindicated because of increased risk of arrhythmias
Reboxetine	Azoles	Plasma concentrations of reboxetine increased	Should not be given together.
Trazadone	Erythromycin	Reduced clearance of trazadone leading to enhanced effects	Monitor for side effects
Valproate	Pivmecillinam	Increased risk of carnitine depletion – case report of hyperammonaemic encephalopathy	Avoid concomitant use

11.6 Appendix 6 - Sepsis guidance



11.7 Appendix 7 - Patient information leaflet for infections not requiring antibiotics

The royal college of general practitioners (RCPG) has produced several leaflets for patients containing symptom management and safety netting advice. Consider providing one of these leaflets if initiating treatment or delaying prescription of antibiotics if in likely self-limiting or viral illness.

The leaflets can be found on the RCGP website in several different languages. Below are some commonly used examples.

Respiratory tract infection – can be viewed here

Respiratory tract infection pictorial – can be viewed here

Urinary tract infection under 65 year – can be viewed here

Urinary tract infection older adults – can be viewed here