Health Service Executive South East Acute Hospitals

SOUTH EAST ACUTE HOSPITALS

SURGICAL PROPHYLAXIS GUIDELINES

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Disclaimer:
Each situation must be judged on its own merits and it is unreasonable for readers to follow instructions in the guideline, policy or protocol without proper assessment of individual circumstances. The information contained within this guideline, policy or protocol is the most accurate and up to date, at date of approval.

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1.0 Purpose

Surgical antibiotic prophylaxis is an effective management strategy for reducing postoperative infections, provided that appropriate antibiotics are given at the correct time, for appropriate durations and for appropriate procedures. The purpose of this document is to guide the prescriber when deciding whether surgical antibiotic prophylaxis is indicated and if it is indicated, to guide the choice, the administration and duration of the agent.

2.0 Applies to

Most of the recommendations in this guideline apply to elective surgery but some emergency operations are also included.

3.0 Responsibilities

It is the responsibility of the prescribing practitioner to make the final risk assessment for administration of antibiotic prophylaxis. This guidance is based on the best available evidence but its application must be modified by professional judgment.

4.0 Introduction

4.1 General guidance

Surgical prophylaxis is the use of antibiotics to prevent infections at the surgical site, it should be distinguished from pre-emptive use of antibiotics to treat early infection e.g. perforated appendix.

Surgical site Infection (SSI) is one of the most common Healthcare associated infections (HCAI) in Ireland. In a prevalence survey of HCAI conducted in Ireland in 2012 5.2% of patients in Ireland had a HCAI. 18.2% of the HCAIs reported were SSIs, making it the No.1 HCAI in Ireland in 2012 [1]

The goal of surgical prophylaxis is to:
(Adapted from Scottish Intercollegiate Guidelines Network, "Antibiotic prophylaxis in Surgery")[2]

- Reduce the incidence of SSI
- Use antibiotics in a manner that is supported by evidence of effectiveness
- Minimise the effect of antibiotics on the patient's normal bacterial flora
- Minimise adverse effects
- Cause minimal change to the patient's host defences

30-90% of surgical prophylaxis is inappropriate (i.e. Antibiotic given at the wrong time or continued too long).[3] Inappropriate use of antibiotics for surgical prophylaxis increases both the cost and the selective pressure, favouring emergence of resistant bacteria.

4.2 Grades of recommendations

(Adapted from Scottish Intercollegiate Guidelines Network, "Antibiotic prophylaxis in Surgery")[2]

Recommendations are graded A B C D to indicate the strength of the supporting evidence. Good Practice points √ are provided where the SIGN guideline development group wishes to highlight specific aspects of accepted clinical practice.

Please refer to Appendix 1 for details of the grade of evidence.

5.0 Surgical Prophylaxis

5.1 General guidance

- The best defence against infection is skilled surgery: minimisation of tissue damage and avoidance of accumulation of blood and tissue fluid.

- Clean surgery has a low risk of infection therefore prophylaxis is usually not required.

- **Prophylaxis may be indicated if:**
  - High risk operation e.g. large bowel
  - Prosthetic implants
  - High risk patients e.g. diabetes or renal failure.
  - Compromised immune function e.g. neutropenia.
  - Colonised patient e.g. MRSA

- **Choice is governed by:**

  - Procedure
    - The antibiotics selected for prophylaxis must cover the expected pathogens at that operative site.[4]

  - Recent or previous infection

  - Known colonisation with MRSA/known resistant organisms
    - A glycopeptide (e.g. Vancomycin,) should be considered for antibiotic prophylaxis in patients undergoing high risk surgery who are colonised with MRSA. [4] MRSA carriage may be a risk factor for SSI. SSI can cause major morbidity in patients undergoing high risk procedures[2] (See table 1)

Table 1 Non General Surgery reported as high risk of major morbidity for patients who are MRSA positive
(Adapted from the Scottish Intercollegiate Guidelines Network, "Antibiotic prophylaxis in Surgery")[2]

Surgery	Outcome
Orthopaedic surgery	Deep wound infection
Vascular surgery	Prosthetic graft infection
Neurosurgery	Wound and shunt infection
Cardiothoracic surgery	Deep sternal wound

  - History of drug allergy
    - Patients with a history of anaphylaxis, laryngeal oedema, bronchospasm, hypotension, local swelling, urticaria or pruritic rash, occurring immediately after a penicillin therapy, are potentially at increased risk of immediate hypersensitivity to beta-lactams and should not receive prophylaxis with a beta-lactam antibiotic. [4] Please refer to Appendix 3 for additional information.

- **NOTE:** Quinolones (e.g. Ciprofloxacin, levofloxacin) and Macrolides (e.g. Erythromycin, Clarithromycin) are generally **NOT** regarded as suitable agents for surgical prophylaxis.
- **Timing/duration of prophylaxis**

  - Intravenous surgical prophylactic antibiotics should be administered ≤30minutes before the skin is incised. [4]

  - A single preoperative dose of antibiotic is as effective as a full 5-day course of therapy for an uncomplicated procedure. [2,5,6]

  - Give a 2nd dose for a procedure longer than 3 hours or in the event of major blood loss.

  - For the majority of procedures, prophylaxis should not exceed 24 hours.

  - Patients who have documented infection at the time of surgery or within 48 hours post-operatively are excluded from the 24 hour rule.

- Treatment rather than prophylaxis is indicated for procedures associated with obvious pre-existing infection (e.g. abscess, pus or necrotic tissue).

- An agent appropriate for surgical prophylaxis may not be optimal therapy for an established infection. Therefore continuation of an agent as treatment may represent sub-optimal therapy.

- These surgical prophylaxis guidelines will be reviewed annually with reference to regional antimicrobial resistance data.

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This guidance is based on the best available evidence but its application must be modified by professional judgment. The final risk assessment for administration of antibiotic prophylaxis must be undertaken by the patients' doctor.

5.2 How to document surgical prophylaxis:

- Prescribe in the patients medication chart in the "ONCE ONLY PRESCRIPTIONS" section.
- Dose and administration time should be clearly documented
- Duration of surgical prophylaxis should be a **SINGLE DOSE** only except in exceptional circumstances e.g. prolonged surgery, major blood loss.

5.3 Dosage & administration:
(Dose adjustment may be required in renal/hepatic impairment)
****Intravenous prophylactic antibiotics should be administered ≤30 minutes before the skin is incised****

Drug:	Adult prophylaxis dose:	Reconstitute with:	Administration	Comments
Co-amoxiclav	1.2g	20ml Water For Injection	Slow IV (3-4 mins) or infuse 1.2g in 100ml NaCl 0.9% (not Dextrose 5%) over 30-40 mins.	Do not infuse in Dextrose 5%. Use within 20 mins of reconstitution.
Cefuroxime	1.5g (750mg if body weight <50kg)	At least 6ml Water For Injection for 750mg vial and 15ml for 1.5g vial	Slow IV (3-4mins) or infuse in 50-100ml NaCl 0.9%/Dextrose 5% over 30mins.	
Metronidazole	500mg	Ready diluted	Infuse over 20-30 mins	
Gentamicin	2-3mg /kg (If weight >80kg base on lean body mass – doses above 400mg are rarely required)	In solution	Infuse in 50-100ml NaCl 0.9% /Dextrose 5% over 20-30mins.	Do not physically mix with penicillins.
Vancomycin	1g or 15 mg/kg stat (max 1.5g)	10ml Water for injection for 500mg and 20ml for 1000mg.	Dilute in 0.9% NaCl or 5% glucose. 500mg in 100ml and 1000mg in 250ml (max concentration 5mg/ml). Infuse at a rate not exceeding 10mg/minutes, for at least 60 minutes or longer. (>1.5 hours for 1000mg)	Caution when used in combination with gentamicin in patients with renal impairment – use reduced dose. Consult relevant section in Empiric Antimicrobial Guideline Booklet.
Clindamycin	600mg	In solution	Dilute 600mg in 100ml NaCl 0.9%/Dextrose 5%. Infuse each 300mg over at least 10mins.	Doses up to 600mg can be given IM
Amoxicillin	1g	10ml Water for Injection in each 500mg vial	Slow IV (3-4 mins), or infuse in 100ml NaCl 0.9%/Dextrose 5% over 30-60mins.	Use immediately once reconstituted. Can be given IM (add 2.5ml water for injection to 500mg vial).

Type of surgery	Is surgical prophylaxis required?(2)	Prophylactic Antibiotic of choice (see table above for dose)	Penicillin allergy (NOT severe hypersensitivity reaction/anaphylaxis) (see table above for dose)	Severe hypersensitivity reaction/anaphylaxis to penicillins (see table above for dose)

5.3.1 Orthopaedics					
Arthroplasty	B	Recommended**	Cefuroxime	Cefuroxime	Vancomycin
Open fracture (– See also: South East Orthopaedic Guideline - Antibiotic Prophylaxis for Open Fractures in the ED and Orthopaedic Depts)	A	Recommended	Cefuroxime + metronidazole ± Gentamicin	Cefuroxime + Metronidazole ± Gentamicin	Clindamycin + Gentamicin
Open surgery for closed fracture	A	Recommended	Cefuroxime	Cefuroxime	Vancomycin
Hip fracture	A	Recommended	Cefuroxime	Cefuroxime	Vancomycin + Gentamicin
Orthopaedic surgery without implant	D	Not recommended			

- **Antibiotic-loaded cement is recommended in addition to intravenous antibiotics. Up to 24hours antibiotics should be considered. [2]
- Consider addition of Vancomycin if **MRSA** high risk/known colonisation

Type of surgery	Is surgical prophylaxis required?(2)	Prophylactic Antibiotic of choice (see table above for dose)	Penicillin allergy (NOT severe hypersensitivity reaction/anaphylaxis) (see table above for dose)	Severe hypersensitivity reaction/anaphylaxis to penicillins (see table above for dose)

5.3.2 SKIN					
Skin grafting	√	Should be considered	Co-amoxiclav	Cefuroxime	Clindamycin
• Consider addition of Vancomycin if **MRSA** high risk/known colonisation					

5.3.3 LIMB SURGERY					
Lower limb amputation	A	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Clindamycin + Gentamicin
Vascular surgery (abdominal and lower limb arterial reconstruction)	A	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Vancomycin + Gentamicin + Metronidazole
Varicose veins		Should be considered in patients undergoing groin surgery*	Co-amoxiclav	Cefuroxime + Metronidazole	Vancomycin + Gentamicin + Metronidazole
Soft tissue surgery of the hand	√	Should be considered	Co-amoxiclav	Cefuroxime + Metronidazole	Clindamycin
• *A recent study concluded that prophylactic antibiotics are beneficial in patients undergoing groin surgery for varicose veins especially if patients are obese or are current smokers. (8) • Consider addition of Vancomycin if **MRSA** high risk/known colonisation					

Type of surgery	Is surgical prophylaxis required?(2)	Prophylactic Antibiotic of choice (see table above for dose)	Penicillin allergy (NOT severe hypersensitivity reaction/anaphylaxis) (see table above for dose)	Severe hypersensitivity reaction/anaphylaxis to penicillins (see table above for dose)

5.3.4 UROGENITAL SURGERY					
Circumcision (routine elective)	√	**Not recommended**			
Hydrocoeles	C	**Not recommended**			
Urethral catheterization		Should be considered **	Gentamicin stat dose as per renal function and weight	Gentamicin stat dose as per renal function and weight	Gentamicin stat dose as per renal function and weight
TURP	A	Recommended	Gentamicin + Amoxicillin	Gentamicin	Gentamicin

- **The Irish "Guidelines for the Prevention of Catheter-associated Urinary Tract Infection" states that "**There is no role for routine antimicrobial prophylaxis in patients with urinary catheters**" and "Possible benefits of prophylaxis must be balanced against possible adverse effects." However, "pending further evidence it seems reasonable to recommend a single dose of appropriate antimicrobial prophylaxis **in a select group of high-risk patients**" i.e. patients with bacteriuria at high risk of endocarditis or who are significantly immunocompromised (e.g. patients with neutropenia, haematological malignancy, post solid organ transplant). (21)
- Consider addition of Vancomycin if **MRSA** high risk/known colonisation
- See also Appendix 4 – Prophylaxis pre-TRUS-guided biopsy p27.

Type of surgery	Is surgical prophylaxis required?(2)		Prophylactic Antibiotic of choice (see table above for dose)	Penicillin allergy (NOT severe hypersensitivity reaction/anaphylaxis) (see table above for dose)	Severe hypersensitivity reaction/anaphylaxis to penicillins (see table above for dose)
5.3.5 UPPER GASTROINTESTINAL					
Oesophageal surgery	D	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole
Stomach and duodenal surgery	A	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole
Gastric bypass surgery	D	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole
Small intestine surgery	D	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole
• Consider addition of Vancomycin if **MRSA** high risk/known colonisation					
5.3.6 HEPATOBILIARY					
Bile duct surgery	A	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole
Pancreatic surgery	B	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole
Liver surgery	B	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole
Gall bladder surgery (open)	A	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole
Gall bladder surgery (laparoscopic)	A √	**Not recommended** Should be considered in **high risk***** patients	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole
• *****High risk:** intraoperative cholangiogram, bile spillage, conversion to laparotomy, acute cholecystitis/pancreatitis, jaundice, pregnancy, immunosuppression, insertion of prosthetic devices, extremes of age, diabetes, obesity, poor nutritional state, known co-existing bacterial colonization / infections at other sites. • Consider addition of Vancomycin if **MRSA** high risk/known colonization					

Type of surgery	Is surgical prophylaxis required?(2)	Prophylactic Antibiotic of choice (see table above for dose)	Penicillin allergy (NOT severe hypersensitivity reaction/anaphylaxis) (see table above for dose)	Severe hypersensitivity reaction/anaphylaxis to penicillins (see table above for dose)
5.3.7 LOWER GASTROINTESTINAL				
Appendicectomy	A	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole
Colorectal surgery (incl. laparoscopic)	A	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole
Haemorrhoidectomies		Should be considered	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole
• Consider addition of Vancomycin if **MRSA** high risk/known colonisation.					
5.3.8 BREAST SURGERY				
Breast cancer surgery	A	Should be considered*	Co-amoxiclav	Cefuroxime	Clindamycin
Breast reshaping procedures	C	Should be considered*	Co-amoxiclav	Cefuroxime	Clindamycin
Breast surgery with implant (reconstructive or aesthetic)	C	Recommended	Co-amoxiclav	Cefuroxime	Clindamycin
• *Antibiotics may reduce the risk of surgical site infection in breast cancer surgery. (7) • Consider addition of Vancomycin if **MRSA** high risk/known colonization					

Type of surgery	Is surgical prophylaxis required?(2)		Prophylactic Antibiotic of choice (see table above for dose)	Penicillin allergy (NOT severe hypersensitivity reaction/anaphylaxis) (see table above for dose)	Severe hypersensitivity reaction/anaphylaxis to penicillins (see table above for dose)
5.3.9 ABDOMEN					
Hernia repair – groin (Inguinal/femoral OR Laparoscopic with or without mesh)	A	Should be considered*	Co-amoxiclav	Cefuroxime + Metronidazole	Clindamycin
Hernia repair (incisional with or without mesh)	C	Should be considered*	Co-amoxiclav	Cefuroxime + Metronidazole	Clindamycin
Diagnostic endoscopic procedures	D	**Not recommended**			
Therapeutic endoscopic procedures (ERCP and PEG)	D	Should be considered in **high risk#** patients	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole

- *Benefits of prophylaxis for clean surgical procedures is not clear. One analysis of inguinal hernia repair found prophylaxis to be beneficial in repairs with mesh[9] while another analysis concluded that the data was not sufficiently strong to make firm recommendations for or against their use universally[10]

- **#High risk:** intraoperative cholangiogram, bile spillage, conversion to laparotomy, acute cholecystitis/pancreatitis, jaundice, pregnancy, immunosuppression, insertion of prosthetic devices, extremes of age, diabetes, obesity, poor nutritional state, known co-existing bacterial colonization / infections at other sites.

- Consider addition of Vancomycin if **MRSA** high risk/known colonisation

Type of surgery	Is surgical prophylaxis required?(2)	Prophylactic Antibiotic of choice (see table above for dose)	Penicillin allergy (NOT severe hypersensitivity reaction/anaphylaxis) (see table above for dose)	Severe hypersensitivity reaction/anaphylaxis to penicillins (see table above for dose)

5.3.10 SPLEEN (NOTE: Please refer to Appendix 2 on p23 for post-splenectomy prophylaxis and vaccination recommendations)					
Splenectomy	√	**Not recommended** Should be considered in **high risk***patients	Co-amoxiclav	Cefuroxime + Metronidazole	Clindamycin + Gentamicin

- *High risk: intra-operative cholangiogram, bile spillage, conversion to laparotomy, acute cholecystitis/pancreatitis, jaundice, pregnancy, immunosuppression, insertion of prosthetic devices.
- Consider addition of Vancomycin if **MRSA** high risk/known colonization

Type of surgery		Is surgical prophylaxis required?(2)	Prophylactic Antibiotic of choice (see table above for dose)	Penicillin allergy (NOT severe hypersensitivity reaction/anaphylaxis) (see table above for dose)	Severe hypersensitivity reaction/anaphylaxis to penicillins (see table above for dose)
5.3.11 GYNAECOLOGICAL SURGERY					
Abdominal hysterectomy	A	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole
Vaginal hysterectomy	A	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Gentamicin + Metronidazole
Caesarean section	A	Highly recommended	Cefuroxime*	Cefuroxime	Clindamycin
Assisted delivery	A	**Not recommended**			
Perineal tear	D	Recommended for 3rd/4th degree perineal tears involving the anal sphincter/rectal mucosa	Co-amoxiclav	Cefuroxime + Metronidazole	Clindamycin + Gentamicin
Manual removal of the placenta	D	Should be considered Recommended in proven chlamydia or gonorrhoea infection	Co-amoxiclav	Cefuroxime + Metronidazole	Clindamycin + Gentamicin
Evacuation of incomplete miscarriage	A	**Not recommended**			
Intrauterine contraceptive device (IUCD) insertion	A	**Not recommended – consider if known colonisation**			

- Consider addition of Vancomycin if **MRSA** high risk/known colonisation.

*NICE CS Guideline 132 Nov 2011 recommendation: "Offer woman prophylactic antibiotics at CS before skin incision. Do not use co-amoxiclav when giving antibiotics before skin incision" [27]

Type of surgery	Is surgical prophylaxis required?(2)	Prophylactic Antibiotic of choice (see table above for dose)	Penicillin allergy (NOT severe hypersensitivity reaction/anaphylaxis) (see table above for dose)	Severe hypersensitivity reaction/anaphylaxis to penicillins (see table above for dose)
5.3.12 EAR, NOSE & THROAT SURGERY				
Ear Surgery	A **Not recommended**			
Routine nose, sinus and endoscopic sinus surgery	A **Not recommended**			
Complex septoplasty	A **Recommended**	Co-amoxiclav	Cefuroxime	Clindamycin
Tonsillectomy	√ **Not recommended**			
Grommet insertion	B A single dose of topical antibiotic is **recommended**			
Adenoidectomy	A **Not recommended**			
Thyroid lobectomy	Should be considered	Co-amoxiclav	Cefuroxime	Clindamycin
• Consider addition of Vancomycin if **MRSA** high risk/known colonization				

Type of surgery	Is surgical prophylaxis required?(2)	Prophylactic Antibiotic of choice (see table above for dose)	Penicillin allergy (NOT severe hypersensitivity reaction/anaphylaxis) (see table above for dose)	Severe hypersensitivity reaction/anaphylaxis to penicillins (see table above for dose)

5.3.13 HEAD AND NECK SURGERY					
HEAD and neck surgery (clean, benign	D	Antibiotic prophylaxis is **not recommended**			
Head and neck surgery (clean, malignant; neck dissection)	C	Antibiotic prophylaxis **should be considered**	Co-amoxiclav	Cefuroxime + Metronidazole	Clindamycin
Head and neck surgery (contaminated/clean-contaminated)	A	Antibiotic prophylaxis is **recommended***	Co-amoxiclav	Cefuroxime + Metronidazole	Clindamycin

- *Antibiotic prophylaxis should be considered in head and neck surgery that is clean, malignant or includes neck dissection. (2)
- The duration of prophylactic antibiotics should not be more than 24 hours
- Consider addition of Vancomycin if **MRSA** high risk/known colonization

Type of surgery	Is surgical prophylaxis required?(2)	Prophylactic Antibiotic of choice (see table above for dose)	Penicillin allergy (NOT severe hypersensitivity reaction/anaphylaxis) (see table above for dose)	Severe hypersensitivity reaction/anaphylaxis to penicillins (see table above for dose)
5.3.14 NON-OPERATIVE INTERVENTIONS				
Intravascular catheter insertion (Non-tunnelled & Tunnelled CVC)	D A	**Not recommended (14)**		
5.3.15 GENERAL (where procedure does not fit in categories above)				
Clean-contaminated procedures	D	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Please discuss with Microbiology team.
Insertion of a prosthetic device or implant	D	Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Please discuss with Microbiology team.
Dirty or infected procedures		Recommended	Co-amoxiclav	Cefuroxime + Metronidazole	Please discuss with Microbiology team.
• Consider addition of Vancomycin if **MRSA** high risk/known colonization				

6.0 Dissemination and Implementation plan

This guideline will be implemented with the support of a programme of continuing education, evaluation of the current literature and regular examination of antibiotic susceptibility patterns in the SE Acute Hospitals Network.

7.0 Resource Implications

Inappropriate or incorrect use of antibiotic prophylaxis may have adverse cost implications.[12,13] The prophylaxis cost of avoiding one wound infection should be less than estimated costs of treating a wound infection. Implementation of these guidelines, the dissemination and implementation plan and evaluation / audit activities is dependant on provision of adequate resources for Antimicrobial Stewardship in each hospital.

8.0 Evaluation / Audit

Short period audits with stakeholder feedback will be carried out as part of the hospital antimicrobial stewardship programme.

9.0 Revision History

These surgical prophylaxis guidelines will be reviewed annually with reference to regional antimicrobial resistance data.

Revision no:	Revised by:
5 - Approved June 2016.	SE Acute Hospital Network Antimicrobial Stewardship Group.

10.0 References

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Appendices

Appendix 1

(Adapted from Scottish Intercollegiate Guidelines Network, "Antibiotic prophylaxis in Surgery")[2]

Key to Evidence Statements and Grades of Recommendations
Levels of Evidence

1^{++} High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias

1^{+} Well conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias

1^{-} Meta-analyses, systematic reviews, or RCTs with a high risk of bias

2^{++} High quality systematic reviews of case control or cohort studies

High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal

2^{+} Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal

2^{-} Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal

3 Non-analytic studies, e.g. case reports, case series

4 Expert opinion

Grades of Recommendation

Note: The grade of recommendation relates to the strength of the evidence on which the recommendation is based. It does not reflect the clinical importance of the recommendation.

A At least one meta-analysis, systematic review, or RCT rated as 1^{++}, and directly applicable to the target population; or

A body of evidence consisting principally of studies rated as 1^{+}, directly applicable to the target population, and demonstrating overall consistency of results

B A body of evidence including studies rated as 2^{++}, directly applicable to the target population, and demonstrating overall consistency of results; or

Extrapolated evidence from studies rated as 1^{++} or 1^{+}

C A body of evidence including studies rated as 2^{+}, directly applicable to the target population and demonstrating overall consistency of results; or

Extrapolated evidence from studies rates as 2^{++}

Good Practice Points

√ Recommend best practice bases on the clinical experience of the guideline development group.

Additional information and references can be found at www.SIGN.ac.uk

Appendix 2

Post-splenectomy prophylaxis in adults

Note: These guidelines are intended for use in adult patients only. For immunisation schedule for children with splenectomy or hyposplenism seek expert advice.

Individuals with an absent or dysfunctional spleen (hyposplenism) are at increased risk of severe infection.

The commonest pathogen is **Streptococcus pneumoniae**, but other organisms also present significant risks, including **Haemophilus influenzae** type b (Hib) and **Neisseria meningitidis**. There are also potential risks from overseas travel, particularly with regard to malaria and unusual infections, for example those resulting from animal or tick bites.

It is essential to educate patients regarding the risk and the importance of prompt recognition and treatment of infections. Patients and their relatives should be aware that, despite pneumococcal vaccine and prophylactic antibiotics, breakthrough pneumococcal infection may occur and when unwell patients should seek and follow urgent medical advice. Patients should be encouraged to wear an alert bracelet or equivalent and carry a card with information about their condition. Patients should be educated about the risks of animal bites and potential risks of tick and mosquito-borne diseases.

Timing of Vaccination

All vaccines should be **ideally given at least 2 weeks before splenectomy, or 2 weeks after splenectomy**. All other unimmunized patients at risk (i.e. newly identified hyposplenic patients) should be immunized at the first opportunity.

In general, immunization should be undertaken at least 2 weeks before immunosuppressive therapy and should be delayed at least 3 months after immunosuppressive chemotherapy.

Extreme care should be taken to ensure patients are not lost to follow up where first vaccination follows discharge from hospital.

Pneumococcal vaccination

Adults should be offered pneumococcal polysaccharide vaccine (PPV) regardless of previous vaccination status.

Request general practitioner send a clotted sample for pneumococcal antibody levels 4-6 weeks post vaccination. Patients who respond well serologically to PPV measured 4–6 weeks post-dose may be followed with serial antibody levels and boosted with repeat PPV as required.

Alternatively PPV may be repeated at intervals of 5 years; however, this strategy does not detect non-responders who are at particularly high risk of invasive pneumococcal disease. Patients with a good serological response to pneumococcal vaccine may experience increased local site reactions from repeat vaccinations.

Patients with sub-optimal or no serological response to PPV represent a high-risk group for invasive pneumococcal disease. They may benefit from Pneumococcal Conjugate Vaccine (PCV) immunization with 2 doses given 4 weeks apart. Discuss with Microbiologist if necessary.

Haemophilus influenzae b vaccination

Adults should receive one dose of a Hib conjugate vaccine, irrespective of their previous immunization status.

Meningococcal vaccination

Adults should receive one dose of a MenC conjugate vaccine, irrespective of their previous immunization status.

This should be followed by a single dose of the quadrivalent MenACWY conjugate vaccine one month later, irrespective of their previous immunization. Advise general practitioner in discharge letter of requirement for this vaccine.

Influenza vaccination

• All patients should receive yearly influenza vaccination.

Prophylaxis

The increased risk of infection is life-long but is highest early after splenectomy.

The risk is greatest in children up to the age of 16 years and in adults over 50 years.

Life long prophylactic antibiotics should be offered to patients considered at continued high risk of pneumococcal infection

Factors associated with high risk of invasive pneumococcal disease in hyposplenism include:

-age less than 16 years or greater than 50 years

-inadequate serological response to pneumococcal vaccination

-a history of previous invasive pneumococcal disease

-splenectomy for underlying haematological malignancy particularly in the context of on-going immunosuppression

Antibiotic prophylaxis is recommended for a minimum of 1 to 2 years in low risk patients.

All low risk patients should be counselled regarding the risks and benefits of lifelong antibiotics and may choose to continue or discontinue prophylaxis
Oral penicillin (preferably phenonxymethlypenicillin) is the drug of choice.
In patients with confirmed penicillin allergy erythromycin may be substituted.

Doses:

Phenoxymethlypenicillin 500mg-600mg b.d.
e.g. Kopen 500mg b.d. or Calvepen 666mg b.d.

Amoxicillin 500mg o.d.

Erythromycin 250-500mg bd. (consider interactions with other drugs and consult with hospital pharmacist if necessary)

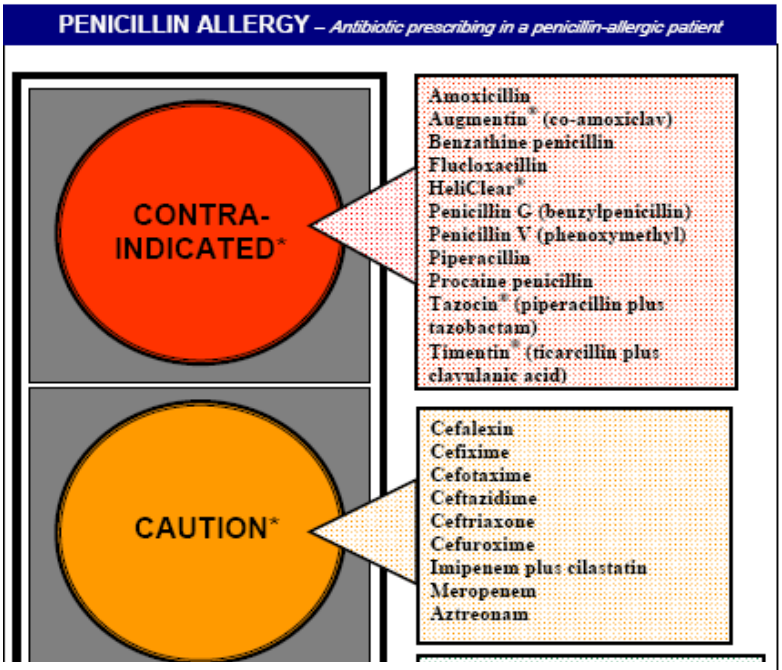
Patients developing symptoms and/or signs of infection, despite the above measures, must be given systemic antibiotics and admitted urgently to hospital.

References:

Davies, John M., et al. "Review of guidelines for the prevention and treatment of infection in patients with an absent or dysfunctional spleen: Prepared on behalf of the British Committee for Standards in Haematology by a Working Party of the Haemato-Oncology Task Force." *British journal of haematology* 155.3 (2011): 308-317.

The Immunisation Guidelines for Ireland, 2013: Chapter 3 Immunisation of Immunocompromised Persons – accessed at www.immunisation.ie June 2014

Appendix 3: Penicillin Allergy



- **It is important to document exactly what symptoms occurred before deciding if a patient is truly penicillin allergic. Check with Patient / Relatives / GP / Community Pharmacist to clarify the nature of allergic reaction.**
- Many patients are misdiagnosed as being Penicillin allergic
- An incorrect diagnosis of penicillin allergy leads to unnecessary avoidance of this relatively non-toxic class of drugs, exposes the patient to potentially more toxic drugs, increases health care costs and contributes to the development of antibiotic resistance.
- Patients are often labelled as having a hypersensitivity reaction when in fact a patient may be experiencing a side effect of penicillin, such as gastrointestinal upset (e.g. nausea, diarrhoea) or headache.
- Other concomitant medicines can also be responsible for triggering a hypersensitivity reaction. Therefore, it is important to consider the timeframe over which the hypersensivity reaction has developed relative to the initiation of different medications.
- Patients who have previously presented with *a less severe penicillin allergy (e.g. rash)* may be prescribed cephalosporins/ carbapenems if the benefits outweigh the risks of cross reactivity. The potential for an allergic reaction should be monitored and resuscitation equipment available if required.
- Patients who are documented as having experienced a *severe reaction (anaphylaxis)* from a penicillin should not be prescribed cephalosporins, carbapenems and other betalactam containing antibiotics where acceptable alternatives available. A risk-benefit assessment may be needed in certain circumstances. Discuss individual case with senior clinician and clinical microbiology team if needed.

Appendix 4: Antimicrobial Prophylaxis Pre TRUS-Guided Prostate Biopsy

Antimicrobial prophylaxis is recommended for <u>all</u> patients undergoing TRUS-guided prostate biopsy

The figure on next page outlines the recommended approach.

Patients with a history of colonisation/infection or with risk factors for CRE should be screened in advance with a rectal swab for CRE carriage and not listed for TRUS-guided prostate biopsy pending CRE screening results.

If the results of CRE screening are positive, it is recommended that the multi-disciplinary team (MDT) discuss the optimal strategy for performing the prostate biopsy safely in this patient.

Thereafter there are two recommended options (2a and 2b in Figure 4 below):

Oral ciprofloxacin 750mg as a one drug antimicrobial prophylaxis regimen for patients *without* risk factors for colonisation with resistant *Enterobacteriaceae.*

Patients with risk factors for antimicrobial resistant *Enterobacteriaceae* (other than CRE) should be given a two drug antimicrobial prophylaxis regimen.

A combination of ciprofloxacin and an aminoglycoside is recommended (unless the patient has a history of previous microbiology results indicating resistance to fluoroquinolones and/or aminoglycosides, in which case the prophylaxis choice should be discussed with the local clinical microbiologist

Before prescribing antimicrobial prophylaxis, it is important to document if the patient has an antimicrobial allergy and calculate the Creatinine Clearance (CrCl) for adjustment of dosing/therapy in renal impairment

Please refer to figures on next page.

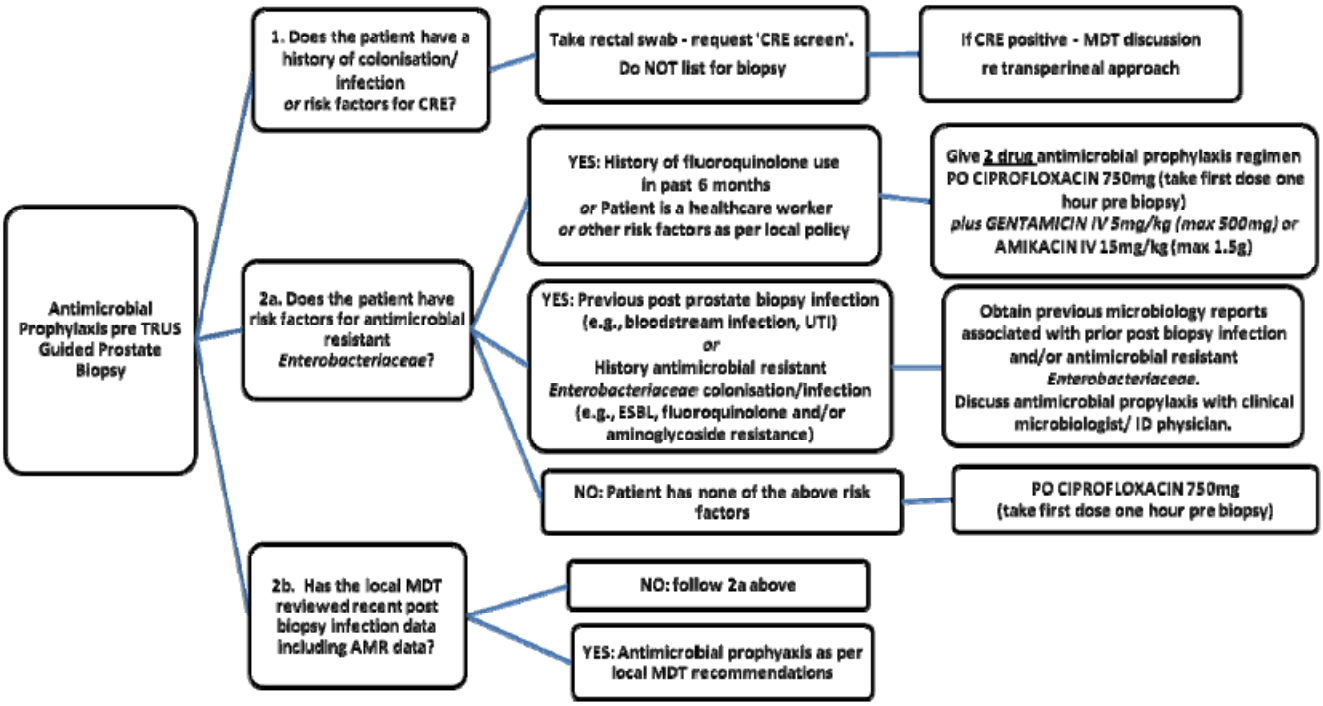


Table 1: Empiric Antimicrobial Prophylaxis for patients undergoing TRUS-guided prostate biopsy [12,14,16,18,19]

Drug	Route	Dose if normal renal function	Adjust in renal impairment	How long before the biopsy?	Duration
Ciprofloxacin	PO	750mg	None	1 hour	One further dose 12 hours post-biopsy
‡Gentamicin	IV	5mg/kg (max 500mg)	*Use alternative if CrCl < 30ml/min	30 minutes§	Single dose
‡Amikacin	IV	15mg/kg (max 1.5g)	*Use alternative if CrCl < 30ml/min	30 minutes§	Single dose

‡Consult local policy for details of administration of intravenous gentamicin or amikacin.

*If renal impairment (CrCl < 30ml/min) or contra-indication to aminoglycoside use, consult clinical microbiologist/infectious diseases physician for advice.

§Note, the timing of the end of the infusion should coincide with commencement of biopsy.

Reference:

Adapted from: National Policy on the Prevention and Management of Infection Post Trans Rectal Ultrasound (TRUS) Guided Prostate Biopsy
NCCP National Prostate Biopsy Infection Project Board
NCCP&HSE 2014

SIGNATURE SHEET:

The information contained in the attached document must be read and fully understood by all staff.

Please print and sign your name below when you have done so.

DATE	PRINT NAME	SIGNATURE