Aim

To help guide antibiotic selection in children with allergies, a risk stratification approach has been adopted based on the current available evidence.

Background

Beta-lactams are the most commonly used antibiotics and include penicillins (e.g. amoxicillin, piperacillin, benzylpenicillin), cephalosporins (e.g. cefalexin, ceftriaxone) and carbapenems (e.g. meropenem). Similarly Beta-lactam allergies are the most frequently reported antibiotic reactions in children.

Recent data support that the majority of patients who are ‘labelled’ with a Beta-lactam allergy can in fact tolerate the antibiotic in question without the need for skin testing. Moreover, the use of alternative antibiotics for patients labelled with allergy leads to poorer clinical outcomes, prolonged hospitalisation, increased costs and increased adverse effects.

The risk stratification system used in this guideline is a safe but simplified approach to a very complex issue. An individualised approach may be required in certain settings.

Risk Classification

Beta-lactam allergies can be classified into high risk and low risk based on the likelihood of subsequent reaction upon exposure.

- **No risk:** no previous reaction; non-immune mediated intolerances (e.g. nausea, diarrhoea); family history of Beta-lactam allergy.
- **Low risk:** a delayed rash (> 1 hr after initial exposure) without mucosal or systemic involvement (without respiratory distress and/or cardiovascular compromise).

- **High risk:** an immediate rash (< 1 hr after exposure); anaphylaxis; severe cutaneous adverse reaction {e.g. Drug Rash with Eosinophilia and Systemic Symptoms (DRESS) and Stevens – Johnson syndrome (SJS) / Toxic Epidermal Necrolysis (TEN)} or other severe systemic reaction.

### Management

The Children’s Antimicrobial Management Programme (ChAMP) guidelines stratify recommendations based on Beta-lactam allergy and risk classification.

- **Low risk:** alternate antibiotic as per ChAMP empiric guidelines AND:
  - If ≥ 1 year since reaction: consider oral challenge for PCH inpatients if stable in discussion with Immunology
  - If < 1 year since reaction: Immunology outpatient referral to explore allergy / de-labelling

  Please refer to: Antibiotic Challenge (Immunology) Protocol

- **High risk:** Immunology referral, alternate antibiotic as per ChAMP empiric guidelines.
  - For high risk patients a non-Beta-lactam antibiotic is generally recommended. Refer to individual guidelines for specific antibiotic recommendations.
  - In selected patients with a history of high-risk allergy, a Beta-lactam from another subclass (e.g. a cephalosporin or carbapenem) may be considered in discussion with Immunology if alternative options are limited.

The majority of true Beta-lactam allergies are mediated by reactivity to the side chains present on the beta-lactam ring. Antibiotics with similar side chains in both the penicillin and cephalosporin classes carry a higher risk of cross reaction (Figure 1). There is a very low risk of cross reaction (< 2%) if a Beta-lactam with a different side chain is administered.
Figure 1: Antibiotics grouped by similar side chain. In vitro data proposed cross-reactivity between cefoxitin and cephalothin based upon shared but not shared R1. Exactly the same drug R1 – Identical R1 side chain. R1* – Almost identical R1 side chain. R2 - Identical R2 and non-identical R1 with some cross-reactivity. R1** Non-identical R1 with some clinical cross-reactivity.
Related CAHS internal policies, procedures and guidelines

Allergic Reactions and Anaphylaxis – Management for Planned Allergy Challenges (Immunology)

Antibiotic Challenge

References and related external legislation, policies, and guidelines (if required)


### Beta-lactam Allergy Guideline

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