RCPCH Progress

Paediatric curriculum for excellence

Paediatric Allergy, Immunology and Infectious Diseases

Sub-specialty Syllabus

Version 2
Approved by the GMC for implementation from 1 September 2021

RCPCH
Royal College of Paediatrics and Child Health
Leading the way in Children's Health

This document outlines the syllabus to be used by doctors completing Paediatric Allergy, Immunology and Infectious Diseases training in the United Kingdom (UK). It accompanies the RCPCH Progress curriculum and Assessment Strategy.

This is Version 2. As the document is updated, version numbers will be changed and content changes noted in the table below.

Version number	Date issued	Summary of changes
2	September 2021	Document reviewed as part of the Shape of Paediatric Training review. 'Using the Syllabus with ePortfolio' (page 5) updated. Introductory Statement (page 6) updated - last paragraph added. Columns with 'able to' (pages 19 - 21) removed and bullet numbers updated.

Introduction

This syllabus supports the completion of the RCPCH Progress curriculum and should be used with the curriculum document and Assessment Strategy.

The purpose of the curriculum is to train doctors to acquire a detailed knowledge and understanding of health and illness in babies, children and young people. The curriculum provides a framework for training, articulating the standard required to work at Consultant level through key progression points during their training, as well as encouraging the pursuit of excellence in all aspects of clinical and wider practice.

The curriculum comprises Learning Outcomes specifying the standard trainees must demonstrate to progress in training and attain a Certificate of Completion of Training (CCT). The syllabi supports the curriculum by providing further instructions and guidance on how the Learning Outcomes can be achieved and demonstrated.

Using the Syllabus

Paediatric trainees are required to demonstrate achievement of generic and sub-specialty or General Paediatric Learning Outcomes throughout their training period.

For all Level 1 and Level 2 trainees, there are 11 generic paediatric Learning Outcomes for each level. At Level 3, there are a further 11 generic paediatric Learning Outcomes for all trainees and several additional Learning Outcomes in either General Paediatrics or the sub-specialty to which the trainee has been appointed.

This syllabus contains five interlinked elements, as outlined in Figure 1 which illustrates how each element elaborates on the previous one.

Elements of the Syllabus

The **Introductory Statement** sets the scene for what makes a Paediatric Allergy, Immunology and Infectious Diseases (PAIID) Specialist.

The **Learning Outcomes** are stated at the beginning of each section. These are the outcomes which the trainee must demonstrate they have met to be awarded their Certificate of Completion of Training (CCT) in Paediatrics. Progress towards achievement of the Learning Outcomes is reviewed annually at the Annual Review of Competence Progression (ARCP).

Each Learning Outcome is mapped to the General Medical Council (GMC) Generic Professional Capabilities framework. Each trainee must achieve all the Generic Professional Capabilities to meet the minimum regulatory standards for satisfactory completion of training.

The **Key Capabilities** are mandatory capabilities which must be evidenced by the trainee, in their ePortfolio, to meet the Learning Outcome. Key Capabilities are therefore also mapped to the GMC Generic Professional Capabilities framework.

The **Illustrations** are examples of evidence and give the range of clinical contexts that the trainee may use to support their achievement of the Key Capabilities. These are intended to provide a prompt to the trainee and trainer as to how the overall outcomes might be achieved. They are not intended to be exhaustive and excellent trainees may produce a broader portfolio or include evidence that demonstrates deeper learning. It is not expected that trainees provide ePortfolio evidence against every individual illustration (or a set quota); the aim of assessment is to provide evidence against every Key Capability.

The **Assessment Grid** indicates suggested assessment methods, which may be used to demonstrate the Key Capabilities. Trainees may use differing assessment methods to demonstrate each capability (as indicated in each Assessment Grid), but there must be evidence of the trainee having achieved all Key Capabilities.

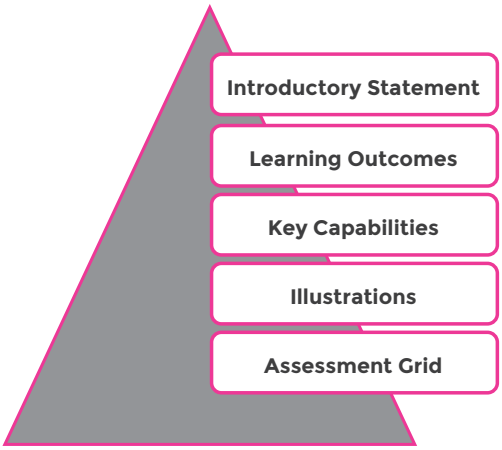

Figure 1: The five elements of the syllabus

Using the Syllabus with ePortfolio

The ePortfolio is used to demonstrate a trainee's progression using assessments, development logs and reflections. Events should be linked to the Progress curriculum specifically against the key capabilities at the appropriate level.

Further guidance on using the ePortfolio is available on our website: https://www.rcpch.ac.uk/resources/rcpch-eportfolio-kaizen-guidance-trainees

Paediatric Allergy, Immunology and Infectious Diseases Introductory Statement

Introductory Statement

A Paediatric Allergy, Immunology and Infectious Diseases (PAIID) specialist is a doctor who works across all paediatric age groups to investigate, diagnose and manage infectious, immunological and allergic disorders. They work in both inpatient and outpatient settings, with acute and chronic presentations of disease and provide specialist regional advice in a model of shared care with local hospitals. Most specialists will have one primary area of interest (allergy, immunology or infection), but will have core training in all three areas. PAIID paediatricians usually practice in multidisciplinary teams in centres with co-located sub-specialty disciplines, including Paediatric Intensive Care Unit (PICU) and adult Allergy, Immunology and Infectious Disease (AIID) specialists Paediatric Gastroenterology and with diagnostic laboratory services, eg immunology, microbiology and virology laboratories.

At the tertiary level, PAIID paediatricians sub-specialising in allergy have a strong understanding of the immune system as it relates to allergic disease and are able to undertake and interpret the complete range of investigations and interventions used for diagnosis and management, including disease modifying treatment strategies across all organ-systems. They understand the importance of the multi-disciplinary team in the long-term management of multi-system allergic disease and the de-labelling of allergic disease, where necessary. They are skilled in supporting other healthcare professionals in local and community teams to deliver efficient and well-informed allergy treatments and prevention.

PAIID paediatricians sub-specialising in immunology and infectious diseases have developed detailed knowledge of the developing immune system and its role in infection and immune-mediated disease in children and young people. They are able to investigate and manage rare or unusual infections, including infections in the returning traveller. Furthermore, they are knowledgeable about the interpretation of microbiological and immunological investigations and have had laboratory experience in a tertiary centre. They are involved in the treatment of primary and secondary immunodeficiency, including Human Immunodeficiency Virus (HIV) and infection in the immunocompromised host. They may be involved in the administration of immunotherapies, such as immunoglobulin replacement therapy and should understand the role of bone marrow transplantation, immunosuppression and immunomodulators in treatment. PAIID specialists are involved in infection prevention and control in hospital settings and the community and liaise with public health teams to manage outbreaks and pandemics.

The PAIID specialist will contribute to evidence-based guidelines for the investigation and management of paediatric infectious diseases, immunology and atopic disease, including through membership of the British Paediatric Allergy, Immunology and Infectious Diseases special interest group.

Sub-specialty Learning Outcomes

	Sub-specialty Learning Outcomes	GMC Generic Professional Capabilities
1.	Demonstrates ability to expertly investigate, diagnose and manage conditions within paediatric allergy, immunology and infectious diseases.	GPC 3, 5, 6
2a.	Manages all aspects of paediatric infectious diseases (including the diagnosis and management of common, specific scenarios) and appropriately uses diagnostics, therapeutics, vaccines and infection-control measures.	GPC 3, 5, 6
2b.	Manages all aspects of paediatric immunology (including the diagnosis of common and rare, primary and secondary immunodeficiencies) and understands the appropriate referral for, management of and complications associated with definitive treatments (including bone marrow transplant and gene therapy).	GPC 3, 5, 6
2c.	Manages all aspects of paediatric allergies (including the diagnosis and management of common and rare allergic conditions) and applies diagnostic procedures and new or complex therapies to optimise clinical care.	GPC 3, 5, 6
3.	Ensures up-to-date knowledge and understanding of new developments in relevant sub-specialty strands and utilises this knowledge to develop and update specialised protocols and guidelines to inform clinical practice and develop initiatives nationally and internationally.	GPC 3, 5, 6, 9

Sub-specialty Learning Outcome 1

Demonstrates ability to expertly investigate, diagnose and manage conditions within paediatric allergy, immunology and infectious diseases.	GPC 3, 5, 6

Key Capabilities

Demonstrates proficiency in the investigation and management of common presentations of paediatric allergy, immunology and infectious diseases (including common allergic disorders, anaphylaxis, drug and vaccine allergy and conditions that mimic allergy; common presentations of primary and secondary immunodeficiency, inflammatory disorders and vasculitis; complex febrile and infectious conditions, infection control and infections in the immunocompromised host).	GPC 3, 5, 6

Illustrations

Applies specialist knowledge to investigate, diagnose and manage the following within their specialisation, recognising some areas of overlap among the PAIID training strands:	
Allergic disorders:	
1.	Allergic disorders affecting the skin, nose, chest and gut.
2.	Anaphylaxis.
3.	Drug and vaccine allergy, including advising on alternative agents and desensitisation strategies.
4.	Conditions that mimic allergy, including those with immunological and functional bases.
Immunological disorders:	
1.	Primary and secondary immunodeficiencies.
2.	Autoimmune disorders.
3.	Inflammatory disorders.
4.	Autoinflammatory conditions.
5.	Vasculitis.
Infections:	
1.	Complex febrile illness (eg prolonged fever and abscesses).

2.	Rare or atypical infections (eg leishmaniasis and multi-drug resistant tuberculosis [MDR TB]).
3.	Opportunistic infections in the immunocompromised host, including the post-transplantation setting.
4.	Contagion and required infection-control procedures.

Sub-specialty Learning Outcome 2A (Infectious Diseases)

Manages all aspects of paediatric infectious diseases (including the diagnosis and management of common, specific scenarios) and appropriately uses diagnostics, therapeutics, vaccines and infection-control measures.	GPC 3, 5, 6

Key Capabilities

Demonstrates an understanding of the management of infectious disorders and advises colleagues on the investigation and management of common and uncommon presentations of infectious diseases.	GPC 3, 5, 6
Demonstrates management skills in special paediatric infectious disease scenarios (eg HIV and mycobacterial infections and travel and refugee health).	GPC 3, 4, 5
Applies knowledge of the epidemiology, basic biology and host-pathogen relationships in paediatric infectious diseases to aid diagnosis (including in HIV and opportunistic infections in children and young people with immunodeficiencies) and demonstrates experience in a range of inpatient and outpatient settings (including the PICU and neonatal unit [NNU]).	GPC 3, 4
Applies knowledge of laboratory tests (microbiological and molecular) to interpret patient results and demonstrates ability to communicate the type of test, its effective use and its interpretation to general paediatric and other specialist colleagues.	GPC 3
Applies the principles of infection control to inpatient and outpatient settings, liaises effectively with the relevant infection-control teams and agencies and applies knowledge of pathogens to inform them of infection-control procedures, eg timing, precautions, contact tracing.	GPC 5
Applies knowledge of antimicrobial therapies (including mode, mechanism and site of action) to guide the treatment of infectious conditions and educates colleagues and develop evidence-based guidelines.	GPC 3, 6, 8, 9
Applies knowledge of vaccination to inform others of vaccination policies in special circumstances (including vaccine prophylaxis, catch-up vaccination and vaccination in immunocompromised hosts).	GPC 4, 6

Illustrations

Diagnosis and management of infections:	
1.	Advises on treatment and prophylaxis of common childhood exanthems in special circumstances, such as in the immunocompromised and in the neonatal period (eg chickenpox and measles).
2.	Demonstrates the ability and provides specialist advice on investigating and managing foetal and neonatal infections (eg cytomegalovirus, toxoplasmosis, syphilis, hepatitis B and C and herpes simplex virus) at the time of initial infection and takes a lead role in coordinating follow-up care using a multidisciplinary team (MDT) approach.
3.	Assesses the relevance of nutrition on infectious disease severity and outcome.
4.	Applies in depth knowledge of the presentation, management and prophylaxis of opportunistic infections in the immunocompromised host (including viral and fungal infections).
5.	Provides advice on and/or directly manage complex clinical conditions, including community-acquired and healthcare-associated infections, such as: • Sepsis and toxin-mediated diseases • New and emerging infections as well as currently "unclassified" diseases with possible infectious aetiologies (such as Kawasaki disease) • Upper and lower respiratory tract infections (including otitis media, epiglottitis, retropharyngeal abscess, lymphadenitis, mastoiditis, sinusitis, empyema, pneumonia and cystic fibrosis) • Central nervous system infections (meningitis, encephalitis, abscess) and post-infectious conditions (such as Guillain-Barre syndrome, acute disseminated encephalomyelitis and ventriculoperitoneal shunt infections) • Urinary tract infections • Cardiovascular infections (endocarditis, myocarditis, pericarditis) • Genitourinary infections and sexually transmitted infections in conjunction with adult Genitourinary Medicine specialists • Gastrointestinal, abdominal and hepatobiliary infections (including hepatitis B and C) • Ocular infections • Musculoskeletal and skin infections • Systemic infections (bacteraemia, sepsis) and inflammation • Foreign body and central venous lines (CVL)-related infections • Surgical and traumatic wound infections • Prolonged and recurrent fever

Specific Scenarios	
Mycobacterial Disease:	
1.	Demonstrates proficiency in formulating management plans with advice from colleagues in microbiology for the treatment of mycobacterial infections (including non-tuberculous mycobacteria and MDR TB) and understands the Bacillus Calmette–Guérin vaccine (BCG) complications.
Human Immunodeficiency Virus:	
1.	Applies in depth knowledge of the appropriate interventions and the importance of the MDT approach to reducing mother-to-child transmission of HIV.
2.	Demonstrates expertise in a paediatric HIV specialist centre (including in the management of children and adolescents with HIV and in the prevention of mother-to-child transmission [PMTCT]).
3.	Demonstrates knowledge of current HIV treatment trials and the requirements for reporting to the UK National Study of HIV in Pregnancy and Childhood (NSHPC) and the Collaborative HIV Paediatric Study (CHIPS).
4.	Demonstrates expertise in working with adolescents with HIV and recognises the complex issues surrounding their care (including the biopsychosocial aspects and the management of sexually transmitted diseases [STDs]).
5.	Effectively delivers care to children and adolescents presenting with new and chronic HIV diagnoses, with experience in the following: • Diagnosing and performing primary assessments • Screening for and treating co-infections • Initiating treatment • Managing social and psychological factors • Prescribing antiretroviral treatment for HIV in children with particular knowledge of when to start or change regimens, therapeutic drug monitoring, adverse drug effect monitoring and drug resistance development • Participating in multidisciplinary care meetings for families with HIV and dealing with the challenges of drug administration and timing of disclosure
Travel Medicine, Refugee and Global Health:	
1.	Provides up-to-date health information for overseas travel covering vaccinations, prophylaxis and general travel precautions (eg water sources and foods to avoid).
2.	Provides detailed advice on how to manage fever in a returning traveller.
3.	Provides a holistic approach to children and young people presenting with presumed infection from vulnerable populations, such as refugees, paying particular attention to their nutritional state and vaccination status, as well as to possible parasitic infections.
Epidemiology:	
1.	Applies knowledge of the epidemiology of infectious conditions and the relevance of animal exposure, geography and immigration to the diagnosis of infection.

Microbiology – bacteria, fungi, viruses and parasitic agents:	
1.	Provides evidence of the application of knowledge and understanding about the importance of the following areas of microbiology: • Basic biology of micro-organisms (including structure, function, genetics and nomenclature) • Disease-causing micro-organisms (including incubation periods, clinical presentations, pathogenesis and host responses) • Microbial virulence factors (including their global and local importance)
Laboratory Skills:	
1.	Demonstrates laboratory experience, an understanding of laboratory skills and knowledge of the following: • An overview of the laboratory accreditation process and standards, including internal quality control and external quality assurance • Health and safety laboratory induction training, which includes proper handling of pathogenic organisms • The principles and applications of common laboratory techniques in everyday use in medical microbiology, virology and immunology laboratories • The range of diagnostic investigations available in different clinical scenarios, the optimal samples to send and the conditions in which to send them • Correct handling of biohazardous specimens and advises others of the risks associated with such specimens • The principles and applications of less commonly used laboratory techniques, including relevant reference ranges (eg Minimum Inhibitory Concentrations [MIC] and Pyruvate Kinase [PK]) • Mechanisms of resistance to antimicrobial agents, the laboratory tests for resistance and their limitations
Public Health and Infection Control:	
1.	Demonstrates proficiency in working with infection control teams in hospital and community settings, which includes the following: • Liaising with public health regarding the notification about and surveillance of disease • Understanding outbreak management • Knowledge to deal with highly contagious infections, such as haemorrhagic fevers • Recognises the need to change the hospital or community environment to reduce risk of disease transmission and prevent infection in the immunocompromised • Contact tracing, particularly for conditions, such as tuberculosis

Therapies – antimicrobials, immune modulatory therapies, post-exposure prophylaxis (PEP):	
1.	Develops, implements and maintains an effective antimicrobial stewardship programme; understands its importance in managing infection and its effectiveness in managing antimicrobial resistance.
2.	Applies knowledge of the key properties of the classes of antimicrobial agents active against bacteria, fungi, parasites and viruses, including: • Mechanisms of action • Spectrums of activity and resistance patterns • Routes of administration • Dosing regimens • Penetration • Side effects • Limitations
3.	Recognises how pharmacodynamics and pharmacokinetics affect antimicrobial choice and dosing.
4.	Explores in detail the mechanisms of action, roles and limitations of monoclonal antibodies, antitoxins and immunoglobulins in infectious and inflammatory conditions.
5.	Uses second-line treatments for infectious agents, including antibacterials, antivirals, antiretrovirals, antifungals and anti parasitic agents, especially for unusual infections.
Vaccination:	
1.	Demonstrates breadth of understanding of issues within the vaccine field, including: • Formulates a vaccination plan in a child with an incomplete vaccination history, utilising knowledge of how vaccination schedules differ among nations • Plans the schedule, indication and use of vaccines in post-exposure prophylaxis (eg rabies and hepatitis B) • Selects and interprets tests to determine protective vaccine responses • Provides advice on the use of active and passive immunisation in infections, including during outbreaks (eg measles and cholera) • Demonstrates respect for and the ability to work and effectively communicate with immunisation coordinators, nursing staff, public health colleagues and others responsible for vaccine policy and delivery

Sub-specialty Learning Outcome 2B (Immunology)

Manages all aspects of paediatric immunology (including the diagnosis of common and rare, primary and secondary immunodeficiencies) and understands the appropriate referral for management of and complications associated with definitive treatments (including bone marrow transplant and gene therapy).	GPC 3, 5, 6

Key Capabilities

Applies knowledge of the ontogeny, normal and abnormal functions of the immune system to aid in diagnosing and managing primary and secondary immunodeficiencies and demonstrates experience in a range of inpatient and outpatient settings (eg the PICU and NNU).	GPC 5
Applies detailed knowledge of the immune system to recognise, investigate and manage the following: • Inflammation triggered by a non infectious condition. • Immune-deficient states presenting as infectious or allergic disease (eg dedicator of cytokinesis 8 [DOCK-8], Wiskott–Aldrich syndrome [WAS] and Omenn syndrome). • Immunodysregulatory disorders (eg hemophagocytic lymphohistiocytosis [HLH]).	GPC 3, 5
Advises local and offsite colleagues on the immediate investigation and management of primary and secondary immunodeficiencies and their complications.	GPC 8
Applies knowledge of laboratory tests (immunological, molecular and genetic) to interpret patient results and communicates the type of test, its effective use and interpretation to general paediatric and other specialist colleagues.	GPC 3, 5
Demonstrates management skills in special scenarios in paediatric immunology, such as in immunoglobulin replacement therapy, preparation for transplantation and the long-term management of patients post-transplantation.	GPC 3, 5, 6

Illustrations

1.	Applies comprehensive knowledge of all immune system defects resulting in disease.
2.	Recognises different presentations of immunodeficiencies and undertakes comprehensive laboratory testing for these disorders, especially in newborns.
3.	Explains the molecular genetic tests available for the diagnosis of primary immunodeficiency disorders.
4.	Explains genetic test results to families.
5.	Recognises how to investigate and manage infections of immunocompromised hosts, including those undergoing bone marrow or solid organ transplantation.
6.	Applies in depth knowledge of the presentation and management of opportunistic infections in immunocompromised hosts, including viral, fungal and parasitic infections.
7.	Demonstrates in-depth knowledge of the appropriate prophylaxis for opportunistic infections in immunocompromised hosts.
8.	Applies knowledge on the use and limitations of cellular therapies for the treatment of viruses in immunocompromised patients.
9.	Summarises the key properties of classes of antimicrobial agents active against bacteria, fungi, parasites and viruses, including: • Mechanism of action • Spectrum of activity and resistance patterns • Route of administration • Dosing regimen • Penetration • Side effects • Limitations
10.	Demonstrates how pharmacodynamics and pharmacokinetics affect drug choice and dosing.
11.	Explores in detail the mechanisms of action, roles for and limitations of monoclonal antibodies, antitoxins and immunoglobulins in infectious and inflammatory conditions.
12.	Utilises second-line treatments for infectious agents, including antibacterials, antivirals, antiretrovirals, antifungals and anti parasitic agents, especially for unusual infections.
13.	Recognises and treats non-infectious complications in immunocompromised children and young people, including lymphoproliferative disorders, malignancy, autoimmune and autoinflammatory complications.
14.	Develops an investigation and management plan for hereditary angioedema and recognises its complications.
15.	Applies detailed knowledge and understanding of the principles and practice of immunoglobulin replacement therapy, how it is administered and the possible complications.
16.	Explains the complexities of delivering immunoglobulin replacement therapy both in the community and in the hospital.

17.	Discusses the indications for gene and cell therapy to treat primary immunodeficiency.
18.	Formulates a management plan for immunosuppressive agents in the setting of immunodeficiency (eg graft-versus-host disease [GvHD], autoimmune cytopenias and Omenn syndrome).
19.	Explains and consents for complications of immune-based therapy, including toxicity, infection, graft-versus-host disease and late effects (eg post-bone marrow transplant [post-BMT]).
In the context of transplantation:	
1.	Recognises the indications for different types of stem cell infusions (eg unconditioned, haplo-identical and mismatched).
2.	Recognises the principles of stem cell transplantation and the selection of donor and conditioning regimes.
3.	Recognises the principles and applications of BMT cellular therapies.
4.	Applies in-depth knowledge of the development, mode of action and rationale underlying immunisation strategies in the immunocompromised child.
5.	Applies in-depth knowledge of the indications and contraindications of revaccination in post-hematopoietic stem cell transplantation (post-HSCT).

Sub-specialty Learning Outcome 2C (Allergy)

Manages all aspects of paediatric allergies (including the diagnosis and management of common and rare allergic conditions) and applies diagnostic procedures and new or complex therapies to optimise clinical care.	GPC 3, 5, 6

Key Capabilities

Manages all allergic disorders and advises on appropriate investigations and rare allergic conditions (eg multiple non-immunoglobulin E [non-IgE]-mediated food allergies, food protein-induced enterocolitis, eosinophilic oesophagitis angioedema, mast cell disorders, the urticarias and unusual causes of anaphylaxis).	GPC 3, 5, 8
Understands the epidemiology of allergy and its impact, primary and secondary prevention, the multiple systems involved and the genetic components.	GPC 3, 4
Applies knowledge of laboratory and clinical tests – in vitro, in vivo and molecular (eg microarray) – to interpret patient results and communicates effectively the type of test, its appropriate use and interpretation to general paediatric and other specialist colleagues.	GPC 3, 4, 5
Effectively diagnoses, manages and treats the spectrum of drug, venom and latex allergies as well as organises, safely performs and supervises a full range of challenges across the complete spectrum of allergic conditions.	GPC 3, 6
Applies knowledge of the immunological mechanisms of immunotherapy to guide the treatment of conditions using immunotherapy in all its forms and understands the development and mechanisms of tolerance.	GPC 3, 6
Applies knowledge of the ontogeny, normal and abnormal functions of the immune system to assist in the diagnosis and management of allergic conditions.	GPC 3, 6
Judiciously selects investigations and demonstrates a robust understanding of their clinical application and limitations relevant to the sub-specialty (eg allergen-specific IgE and components).	GPC 3, 6

Illustrations

Demonstrates detailed knowledge and understanding of:	
1.	The aetiology of allergic disorders, including the manner in which atopy, allergen exposure and micro-organisms may interact in the pathogenesis of allergic disease.
2.	The cellular and molecular pathology of IgE- and non-IgE-dependent conditions, including anaphylaxis.
3.	The classification of hypersensitivity reactions, including those that are non-immunologically mediated.
4.	The epidemiology of allergic conditions and the relevance of geography, migration and ethnicity.
5.	The broad presentation of allergic disease, including the spectrum of food allergy, to include IgE-mediated, non-IgE-mediated and mixed presentations (eg eosinophilic gut disorders).
6.	The multisystem nature of allergy and its potential manifestations within a child (eg the relationship among early house dust mite sensitisation, rhinitis and asthma).
7.	The natural history of allergic conditions and how these may manifest in individual children and young people.
8.	The latest research and evidence-based guidelines around primary and secondary prevention of atopic disease to advise on weaning practice, measures to prevent food allergy (eg early allergen introduction) and asthma (eg immunotherapy for allergic rhinitis).
9.	The role of genetics in atopic disorders and relevance for clinical practice (eg filaggrin).
10.	The mechanisms of tolerance induction and relation to emerging desensitisation treatments for food allergy.
11.	The mechanisms of inhalant allergen immunotherapy.
Respiratory allergy	
Demonstrates knowledge and understanding of:	
1.	The role of airborne allergen exposure in the development and control of respiratory allergic conditions.
2.	The aerobiology of airborne allergens (eg pollens, house dust mites, animal dander and moulds).
3.	The concept of the unified airway and the clinical benefits of treating rhinitis in patients with asthma.
4.	The link between allergy and obstructive sleep apnoea.
5.	The principles and techniques for nasal and conjunctival allergen provocation tests, having observed the procedures in specialist clinics.
6.	The normal anatomy of the airway and how this changes in allergic disorders.

7.	The principles and practice of nasal endoscopy, including normal and abnormal appearances of the nasal passages.
8.	Identifies allergic and non-allergic causes of rhinitis and conjunctivitis and advises on allergen avoidance, as appropriate.
9.	Selects treatments for seasonal and persistent rhino-conjunctivitis, advises on correct use and escalate appropriately.
10.	Creates written plans for the treatment and prevention of rhinitis symptoms.
Food allergy	
Demonstrates knowledge and understanding of:	
1.	The classification of pan-allergen families (eg latex-fruit syndrome and lipid transfer protein [LTP]).
2.	The clinical presentations of antigen cross-reactivity (eg pollen food syndrome).
3.	The principles and practice of gastrointestinal endoscopy and the macroscopic and microscopic findings in allergic gut diseases.
4.	Recognises and uses adjuvant testing appropriately to distinguish between primary and secondary food allergy and drafts a management plan accordingly.
5.	Recognises and pro-actively manages children and young people at risk of multiple food allergies and judiciously use anticipatory testing.
6.	Diagnoses and manages IgE- and non-IgE-mediated food allergies.
7.	Diagnoses and manages allergic enteropathies, understands the role of dietary exclusion and the use of systemic treatments.
8.	Interprets a dietary diary and identifies food triggers.
9.	Provides advice on exclusion diets for mothers and babies, recognising and discussing the risks and benefits, sensitive to ethnic, religious and family beliefs.
10.	Provides advice on appropriate dairy-free baby diets (including on maternal exclusion during breastfeeding and selection of hypoallergenic milk formulas) and provides guidance on an appropriate weaning diet in line with familial and cultural choices.
Skin	
Demonstrates knowledge and understanding of:	
1.	The immunological mechanisms underpinning eczema, urticaria and angioedema (including hereditary angioedema and mast cell disorders).
2.	The classification and causes of eczema, acute and chronic urticaria and angioedema, as well as exacerbating factors and their appearance in different skin tones.
3.	The role of investigations in physical urticarias and how they are performed.
4.	The role of allergic triggers (both food and airborne) and non-allergic triggers in the pathogenesis and control of eczema.
5.	Provides specialist management of children and young people with urticaria and angioedema, including the use of immunomodulatory drugs when necessary.
6.	Diagnoses and manages children and young people with hereditary angioedema, including advising about prophylaxis and peri-operative management.

7.	Works in partnership with an MDT and dermatology colleagues to initiate intensive topical treatments for severe eczema, including emollients, anti-inflammatory preparations, wet wraps and immunomodulatory medications.
8.	Provides advice on appropriate dietary modifications in eczema.
9.	Writes specialist treatment regimes.
10.	Uses a standardised tool (eg Scoring Atopic Dermatitis [SCORAD] or Patient Orientated Eczema Measure [POEM]) to assess eczema extent and severity in an affected child and young person.
11.	Works with patients/families to facilitate shared decision making around treatments.
12.	Optimises patient engagement with eczema care plan.
Drugs, latex and vaccines	
Demonstrates knowledge and understanding of:	
1.	The classification and mechanisms of drug-related disorders.
2.	The routes of exposure, risk factors, natural history, aetiology and clinical sequelae of latex allergy.
3.	Investigates and manages antibiotic and local and general anaesthetic reactions and provides guidance on alternative agents.
4.	Develops and uses drug challenges and desensitisation protocols for antibiotics and other drugs (eg non-steroidal anti-inflammatory drugs [NSAIDS]).
Anaphylaxis	
1.	Takes a systematic approach to the identification of triggers for anaphylaxis, including food and other causes (eg exercise, drugs, insects and idiopathic).
2.	Differentiates between allergic and non-allergic causes, whether immunological or functional (eg vocal cord dysfunction).
3.	Investigates appropriately to establish a differential diagnosis of immunological disorders (including mastocytosis and hereditary angioedema [HAE]).
4.	Conducts a risk assessment of patients at risk of anaphylaxis and provides an appropriate acute management plan, including training of patients who require adrenaline auto-injectors.
5.	Co ordinates local support for children and young people at risk of anaphylaxis at home and in schools (eg for patients with food allergy or those receiving drug therapy).
Skills:	
1.	Performs and interprets: • Skin testing, including skin prick, intradermal and patch testing • Lung function testing, including computerised spirometry and fractional exhaled nitric oxide (FENO) testing

2.	Conducts allergen challenges: • Performs patient selection, management of reactions and identification of high risk challenges; drug provocation challenges, latex, food protein-induced enterocolitis syndrome (FPIES) • Provides appropriate discharge advice according to the challenge outcome
3.	Formulates challenge protocol procedures anti-IgE • Knowledgeable on the use of anti-IgE, selection of patients, contraindications, management of reactions and monitoring of treatment effectiveness
Immunotherapy:	
1.	Justifies selection of appropriate patients, with knowledge of immunotherapy contraindications.
2.	Monitors treatment and its efficacy, understanding the indications for discontinuation of therapy.
3.	Applies detailed understanding of the pathogenesis of immunotherapy reactions to provide best practice management of reactions.
4.	Educates others about the changing clinical picture and management of allergy during childhood (eg risk-taking behaviour of adolescents in relation to food allergies and the development of autonomy in adolescents in relation to personal control of conditions, such as asthma).
5.	Demonstrates expertise in working with patients to achieve a shared understanding of an optimal treatment plan and appropriate self-care practices.

Sub-specialty Learning Outcome 3

Ensures up-to-date knowledge and understanding of new developments in relevant sub-specialty strands and utilises this knowledge to develop and update specialised protocols and guidelines to inform clinical practice and develop initiatives nationally and internationally.	GPC 3, 5, 6, 9

Key Capabilities

Provides appropriate advice and guidance to regional speciality services in the management of complex patients.	GPC 5, 8
Actively supports the development and delivery of research, either through initiating or collaborating in basic and clinical research projects.	GPC 6, 9
Takes a lead in service development, including the preparation of appropriate guidelines (eg food and drug provocation challenges, allergen desensitisation/tolerance induction, BMT, multi-drug resistant infections and surgical prophylaxis).	GPC 5, 6
Provides expert advice and education at the local and regional level for the management of paediatric infectious diseases, immunology and allergy.	GPC 5, 8

Illustrations

1.	Demonstrates an understanding of the latest research and national and international evidence-based guidelines on important topics in PAIID, such as the following: • Primary and secondary prevention of atopic disease to advise on weaning • Practices and measures to prevent food allergy (eg early allergen introduction) and asthma (eg immunotherapy for allergic rhinitis) • The use of novel monoclonal antibodies for Kawasaki disease treatment • The development of new formulations of anti-tuberculosis medications • Trials on the use of cellular therapies for viral infections in transplant patients
2.	Applies up-to-date understanding to inform practice through guideline writing with regular updating of guidelines relevant to the PAIID strand.
3.	Demonstrates an interest in up-to-date research relevant to the strand, either through personally taking part in research or through activities, such as attendance at conferences and national meetings.

4.	Interprets and translates complex concepts into lay language to engage with the public, including patients and their families, schools and GPs, to ensure best patient care.
5.	Keeps up to date with the literature and the constant evolution and discovery of new pathogenic micro organisms, novel diagnoses and diagnostic techniques (eg molecular, genetic and other tests relevant to the subspecialty).
6.	Enters patients into internet-based databases, such as the European Society for Immunodeficiencies (ESID) registry for primary immunodeficiencies and the Research Electronic Data Capture (REDCap) database for children with TB infection and disease.

Assessment Grid

This table suggests assessment tools which may be used to assess the Key Capabilities for these Learning Outcomes. This is not an exhaustive list and trainees are permitted to use other methods within the RCPCH Assessment Strategy to demonstrate achievement of the Learning Outcome, where they can demonstrate these are suitable.

Key Capabilities	Assessment / Supervised Learning Event suggestions									
	Paediatric Mini Clinical Evaluation (ePaed Mini-CEX)	Paediatric Case-based Discussion (ePaed CbD)	Directly Observed Procedure / Assessment of Performance (DOP/AoP)	Acute Care Assessment Tool (ACAT)	Discussion of Correspondence (DOC)	Clinical Leadership Assessment Skills (LEADER)	Handover Assessment Tool (HAT)	Paediatric Multi Source Feedback (ePaed MSF)	Paediatric Carers for Children Feedback (Paed CCF)	Other
All:										
Demonstrates proficiency in the investigation and management of common presentations of paediatric allergy, immunology and infectious diseases (including common allergic disorders, anaphylaxis, drug and vaccine allergy and conditions that mimic allergy; common presentations of primary and secondary immunodeficiency, inflammatory disorders and vasculitis; complex febrile and infectious conditions, infection control and infections in the immunocompromised host).	✓	✓			✓	✓	✓	✓	✓	
Infectious Disease:										
Demonstrates an understanding of the management of infectious disorders and advises colleagues on the investigation and management of common and uncommon presentations of infectious diseases.	✓	✓				✓	✓	✓	✓	
Demonstrates management skills in special paediatric infectious disease scenarios (eg HIV and mycobacterial infections and travel and refugee health).	✓	✓				✓	✓	✓	✓	
Applies knowledge of the epidemiology, basic biology and host-pathogen relationships in paediatric infectious diseases to aid diagnosis (including in HIV and opportunistic infections in children and young people with immunodeficiencies) and demonstrates experience in a range of inpatient and outpatient settings (including the PICU and neonatal unit [NNU]).	✓	✓						✓	✓	

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Applies knowledge of laboratory tests (microbiological and molecular) to interpret patient results and demonstrates ability to communicate the type of test, its effective use and its interpretation to general paediatric and other specialist colleagues.	✓	✓				✓		✓		
Applies the principles of infection control to inpatient and outpatient settings, liaises effectively with the relevant infection-control teams and agencies and applies knowledge of pathogens to inform them of infection-control procedures, eg timing, precautions, contact tracing.	✓	✓				✓		✓		
Applies knowledge of antimicrobial therapies (including mode, mechanism and site of action) to guide the treatment of infectious conditions and educates colleagues and develops evidence-based guidelines.	✓	✓				✓		✓		
Applies knowledge of vaccination to inform others of vaccination policies in special circumstances (including vaccine prophylaxis, catch-up vaccination and vaccination in immunocompromised hosts).	✓	✓				✓		✓		
Immunology:										
Applies knowledge of the ontogeny, normal and abnormal functions of the immune system to aid in diagnosing and managing primary and secondary immunodeficiencies and demonstrates experience in a range of inpatient and outpatient settings (eg the PICU and NNU).	✓	✓			✓	✓		✓		
Applies detailed knowledge of the immune system to recognise, investigate and manage the following: • Inflammation triggered by a non infectious condition. • Immune-deficient states presenting as infectious or allergic disease (eg dedicator of cytokinesis 8 [DOCK-8], Wiskott–Aldrich syndrome [WAS] and Omenn syndrome). • Immunodysregulatory disorders (eg hemophagocytic lymphohistiocytosis [HLH]).	✓	✓				✓		✓		
Advises local and offsite colleagues on the immediate investigation and management of primary and secondary immunodeficiencies and their complications.	✓	✓				✓		✓		

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Applies knowledge of laboratory tests (immunological, molecular and genetic) to interpret patient results and communicates the type of test, its effective use and interpretation to general paediatric and other specialist colleagues.	✓	✓				✓		✓		
Demonstrates management skills in special scenarios in paediatric immunology, such as in immunoglobulin replacement therapy, preparation for transplantation and the long-term management of patients post-transplantation.	✓	✓				✓		✓		
Allergy:										
Manages all allergic disorders and advises on appropriate investigations and rare allergic conditions (eg multiple non-immunoglobulin E [non-IgE]-mediated food allergies, food protein-induced enterocolitis, eosinophilic oesophagitis angioedema, mast cell disorders, the urticarias and unusual causes of anaphylaxis).	✓	✓				✓	✓	✓		
Understands the epidemiology of allergy and its impact, primary and secondary prevention, the multiple systems involved and the genetic components.	✓	✓				✓	✓	✓		
Applies knowledge of laboratory and clinical tests – in vitro, in vivo and molecular (eg microarray) – to interpret patient results and communicates effectively the type of test, its appropriate use and interpretation to general paediatric and other specialist colleagues.	✓	✓						✓		
Effectively diagnoses, manages and treats the spectrum of drug, venom and latex allergies as well as organises, safely performs and supervises a full range of challenges across the complete spectrum of allergic conditions.	✓	✓				✓		✓	✓	✓
Applies knowledge of the immunological mechanisms of immunotherapy to guide the treatment of conditions using immunotherapy in all its forms and understands the development and mechanisms of tolerance.	✓	✓						✓	✓	✓
Applies knowledge of the ontogeny, normal and abnormal functions of the immune system to assist in the diagnosis and management of allergic conditions.	✓	✓					✓	✓	✓	
Judiciously selects investigations and demonstrates a robust understanding of their clinical application and limitations relevant to the sub-specialty (eg allergen-specific IgE and components).	✓	✓					✓	✓	✓	

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All:										
Provides appropriate advice and guidance to regional speciality services in the management of complex patients.	✓	✓				✓		✓	✓	
Actively supports the development and delivery of research, either by initiating or collaborating in basic and clinical research projects.	✓	✓				✓		✓		
Takes a lead in service development, including the preparation of appropriate guidelines (eg food and drug provocation challenges, allergen desensitisation/tolerance induction, BMT, multi-drug resistant infections and surgical prophylaxis).	✓	✓				✓		✓		
Provides expert advice and education at the local and regional level for the management of paediatric infectious diseases, immunology and allergy.	✓	✓				✓		✓		