

An eLearning programme to improve prescribing competency in paediatrics

A Guide for Prescribers Working in Paediatrics



Health Education England

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Safer Prescribing

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1.0 BACKGROUND

There are an estimated 237 million medication errors occurring in England every year¹ and approximately one in ten patients are harmed while receiving hospital care. Medication errors can be defined as "a failure in the treatment process that leads to, or has the potential to lead to, harm to the patient"2. Medication prescribing errors are those that have specifically occurred during the prescribing process, where there is a failure to order the right drug at the right dose at the right frequency for the right patient. In the UK, medication errors account for 10-20% of all adverse events in the National Health Service (NHS), and the estimated cost of 'probably avoidable' Adverse Drug Reactions (ADRs) is £1.6 billion per annum¹.

Medication errors are common in the paediatric hospital setting³, with one study reporting an overall error rate of 13.2% in paediatric inpatients⁴. Prescribing in this setting poses many unique challenges:

- Paediatricians are required to prescribe for a wide range of specialities.
- Doses are required to be calculated based on weight or body surface area, and this can vary widely ٠ and change rapidly during a course of treatment.
- It is common practice to prescribe unlicensed or off-label medicines, and the evidence to guide therapeutic choices is limited compared to adult medicine.
- Prescribing decisions must be family-centered.
- Selecting and prescribing the correct formulation of a medicine is crucial for the patient and their relatives/carer.

Doctors are taught pharmacology and prescribing as a component of the medical undergraduate curriculum; however, paediatric prescribing is generally poorly represented. The majority of training in paediatric prescribing is at postgraduate level and takes place within the clinical environment, which can be variable and does not consistently cover all areas.

In a survey⁵ of specialist paediatric trainees in the West Midlands (n=100), just over two thirds reported that they felt underprepared to prescribe for neonates and children. The majority of trainees (90%) said they had been directly involved in an error, and 30% in a prescribing-related incident. This under-preparedness to prescribe is also observed in trainees undertaking START (Specialty Trainee Assessment of Readiness for Tenure) in ST7, prior to obtaining their Certificate of Completion of Training (CCT) in ST8. When asked whether an eLearning programme could support their practice, 80% agreed that this could have a positive impact on their prescribing competence. In view of the unique challenges faced by prescribers in paediatrics, the Royal College of Paediatrics and Child Health (RCPCH) has identified prescribing as a key area for improving training and competence.

Background to SCRIPT 1.1

SCRIPT was first developed in 2011 by a team of clinical pharmacists and clinical pharmacologists working in both education and healthcare in the West Midlands. Commissioned by Health Education England's West Midlands Team, the aim of the project was to provide an eLearning programme to improve the prescribing competency of Foundation trainees in the region. Owing to the success of this web-based platform, a team of Paediatric trainees supported by the Head of the School of Paediatrics (Helen Goodyear), applied for funding in 2013 to develop a variant specifically aimed at doctors undergoing specialist paediatric training. During the COVID-19 pandemic, all of the SCRIPT eLearning programme's portfolios (excluding Dentistry) have been made available free of charge to all healthcare professionals working in the NHS.

⁴ Ghaleb MA, Barber N, Franklin BD, Wong ICK. The incidence and nature of prescribing and medication administration errors in paediatric inpatients. Archives of Disease in Childhood. 2010;95(2):113-8.

⁵ Hay, E., et al. G87 (P) Assessment of trainees prescribing confidence and competence; a prospective questionnaire survey. (2016): A49-A51.



¹ Elliott RA, Camacho E, Campbell F, Jankovic D, et al. Prevalence and Economic Burden of Medication Errors in the NHS in England. Policy Research Unit in Economic Evaluation of Health and Care Interventions. Sheffield, United Kingdom: University of Sheffield and University of York; 2018.

² Ferner RE, Aronson JK. Clarification of Terminology in Medication Errors: Definitions and Classification. Drug Safety. 2006;29(11):1011-22.

³Kaushal R, Bates DW, Landrigan C, McKenna KJ, et al. Medication Errors and Adverse Drug Events in Pediatric Inpatients. JAMA. 2001;285(16):2114-20.

2.0 THE RESOURCE

The programme comprises of web-based eLearning modules relating to prescribing and therapeutics across all paediatric specialties. The modules have been authored by specialist paediatric consultants and pharmacists, with significant input from trainees. Each module has been externally peer reviewed to ensure accuracy and relevance to paediatric practice.

The modules are divided into five categories:

	General Therapeutics
Principles of Paediatric Prescribing	Cannabis-Based Products for Medicinal Use
Developmental Pharmacology	Dermatology
Practical Prescribing	Diabetes
Utilising the BNFC	Endocrine (1)
General Paediatrics	Endocrine (2)
Acutely Unwell Child	Gastroenterology and Hepatology
Infection and Immunity*	Inflammatory Disease
Neonates	Neurology
Paediatric Emergencies	Nutrition
	Renal Disease
Surgical Specialities	Respiratory
Ear, Nose and Throat	
General Surgery and Burns	Advanced Therapeutics
Ophthalmology	Cardiology
Surgical Prescribing Scenarios*	Malignancy and Haematology
	Paediatric Intensive Care Unit

The learning outcomes for each module are based on the RCPCH Curriculum⁶.

2.1 Structure of the modules

Each module has the same core components, commencing with a pre-test of 10 questions designed to allow you to determine your baseline knowledge on the subject. The pre-test will automatically load when you enter the module. You will be given a score out of 10 at the end of the test, but will not be provided with feedback at this stage. This is followed by a brief overview of the module, recommendations for any background pre-module reading ('pre-requisites') and a list of learning outcomes.

The learning generally starts with a case vignette, which introduces some of the key concepts covered in the module. You will then work through content pages interspersed with in-module activities to embed learning. At the end of the module, key points will be summarised and suggestions for further reading made. When all of the content has been viewed, a 10 question post-test is activated which automatically starts when you exit the module. The questions in the post-test will be the same or similar to those presented in the pre-test and asked in a random order. You will be provided with feedback for each question as you answer it and given a score out of 10 at the end of the test.

Each individual module is designed to take about 60 minutes in total to complete. For your convenience, modules can be completed in more than one sitting. You can exit a module part-way through and come back to it later. Your profile page will show your progress through the modules and allows you to rejoin a partially completed module where you left it.

http://www.rcpch.ac.uk/training-examinations-professional-development/postgraduate-training/general-paediatrics-training/ge#curriculum the set of the se

⁶Royal College of Paediatrics and Child Health. General Paediatrics Training Curriculum. Available online at

2.2 Certification

Upon completion of the module, a certificate will be made available as a PDF stating:

- Your name.
- The module title.
- The learning outcomes of the module.
- The date and time the certificate was generated.

You will be able to print the certificate or download it as proof of module completion. Once a module has been completed, the certificate will be available at any time from your user profile.

2.3 The pre/post-test score

The pre/post-test is intended to help you determine your baseline knowledge on the module subject, and be a measure of knowledge acquisition. They also add an element of interactivity. The questions have not been reviewed by an examination board.

The SCRIPT team has not set a pass mark and the post-test score is not generated onto the module certificate. You can access information about your pre-test and post-test scores for all modules completed, at any time from your user profile.

3.0 TRAINING AND CONTINUING PROFFESSIONAL DEVELOPMENT

Some NHS Trusts, institutions, or practices may choose to mandate specific SCRIPT modules. These modules will be determined locally, not by the SCRIPT team or Health Education England. If this is the case, your progress through the modules may be monitored by named individuals in your organisation (see section 3.3), and consistent low scores throughout may call for modules to be re-set and for the test to be re-taken. Re-setting of modules is a local decision and one that should be taken in discussion with you. Should you wish to take the post-test again, modules can also be re-set by you from your user profile page.

3.1 Paediatric Specialist Trainees

We recommend that Paediatric Specialist Trainees complete all Paediatric SCRIPT modules gradually during ST training. We strongly suggest that SCRIPT is completed prior to sitting the Specialty Trainee Assessment of Readiness for Tenure (START) assessment in ST7.

3.1.1 Level 1 trainees (ST1–ST3)

We recommend you complete the 'Principles of Paediatric Prescribing' and 'General Paediatrics' modules.

3.1.2 Level 2/3 trainees (ST4/5–ST6+)

The remainder of the modules should be completed as you progress through level 2/3 training (see Figure 1). You may choose to complete more modules at an earlier stage, especially if they support your current role.





Figure 1: Modules and recommended year of completion during specialist paediatric training
* modules still under development, Spring 2021

The modules will help you fulfil several parts of the paediatric curriculum on the ePortfolio, as well as prepare you for a successful outcome at START in the prescribing station. The module certificates can serve as evidence that you have completed training relating to prescribing and therapeutics.

3.2 Continuing professional development

All SCRIPT modules can be used as part of your commitment to continuing professional development (CPD). The content, case studies and activities included within the module are intended to prompt reflection on practice. Certificates provided at the end of the module can be downloaded to serve as evidence of module completion. Once completed, you may also want to re-visit modules at a later date to reflect on how your practice has changed as a result of completing the module. You can revisit modules as many times as you want from your profile page.



3.3 How is my progress monitored?

SCRIPT eLearning has a dedicated management site that may be accessed by named individuals in your organisation to monitor your progress through the modules. This serves two purposes:

- 1. It can ensure that you are taking steps to develop your prescribing knowledge in postgraduate education
- 2. It can encourage discussion about prescribing during workplace education and in your appraisals

If modules are mandated, the named individual in your organisation may have access to the following information about your progress:

- When you have completed the modules (day of week and time of day).
- How long you spent on the learning.
- Your pre- and post-test scores.

Your progress will only be monitored if modules have been mandated as part of your training.

3.4 SCRIPT and the ePortfolio

Some regions will require you to upload your module certificates to a folder labelled 'SCRIPT' on ePortfolio so that your progress can be monitored. These may be assessed during the progress review meetings, in addition to the information gathered from the SCRIPT management site.

3.5 Probity

Probity is at the heart of the medical profession. Probity means being honest, trustworthy and acting with integrity. The General Medical Council (GMC) Good Clinical Practice states: **"You must always be honest about your experience, qualifications and current role "** [Act with honesty and integrity; paragraph 66]⁷.

Since SCRIPT was introduced into the Foundation training programme in 2010, we have monitored its use by users. This has been conducted for *quality assurance* and to ensure that users are using the resource as intended. Importantly, our research has informed how we integrate the learning into postgraduate education^{8,9}. At the beginning of each module, you are reminded about the above statement of probity from the GMC. This is because we have found evidence of dishonest behaviours from Foundation trainees to work around mandated modules in order to progress through the Annual Review of Competency Progression (ARCP). These includes fraudulently creating certificates for modules that have not been completed, completing multiple modules simultaneously by opening a number of tabs on the computer, and rushing through modules in under 10 minutes (note: the average time to complete a module is 30 - 40 minutes).



⁷General Medical Council (2013). Good Medical Practice. Available online at http://www.gmc-uk.org/guidance/good_medical_practice.asp

⁸Brooks, H. L., Pontefract, S. K., Hodson, J., et al. (2016) An evaluation of UK foundation trainee doctors' learning behaviours in a technology-enhanced learning environment. BMC Medical Education, 16: 133. ⁹Brooks, H. L., Pontefract, S. K., Vallance, H. K., et al. (2016) Perceptions and Impact of Mandatory eLearning for Foundation Trainee Doctors: A Qualitative Evaluation. PLoS ONE, 11 (12): e0168558.

4.0 **REGISTRATION**

For Paediatric Specialist Trainees

- 1. Go to www.safeprescriber.org, and select 'Paediatric'.
- 2. Click **'Sign up'**, then under member select **'Sign up'** again.
- 3. Select the region you work in, then under 'Register' enter your email address and click 'Get started'.
- 4. During registration, you will be asked to provide the following information:
 - i. Name
 - ii. Email address
 - iii. Telephone Number
 - iv. Profession
 - v. Professional Number (e.g. GMC number)
 - vi. School
 - vii. Password (must be more than eight characters)
- 5. When you have entered your details, you will need to agree to the terms and conditions.
- 6. You will receive an email confirming your registration. When this is complete, you can login and access all the modules.
- 7. When you have completed a module, a certificate will be made available which you can upload to your ePortfolio.

Your registration information is not shared with a third party and is maintained on a secure server.

For Other Prescribers Working in Paediatrics

- 1. Go to www.safeprescriber.org, and select 'Paediatric'.
- 2. Click 'Sign up', then under NHS select 'Sign up' again.
- 3. During registration, you will be asked to provide the following information:
 - i. Name
 - ii. Email address (it must be an NHS.uk or NHS.net email address to obtain free access)
 - iii. Telephone Number
 - iv. Profession
 - v. Region
 - vi. Password (must be more than eight characters)
- 4. Select 'Register' and you will be taken to your profile page.
- 5. You will receive an email confirming your registration. When this is complete, you can login and access all the modules.
- 6. When you have completed a module, a certificate will be made available which you can upload to your ePortfolio.

Your registration information is not shared with a third party and is maintained on a secure server.



5.0 FREQUENTLY ASKED QUESTIONS

5.1 Technical problems

What do I do if I have forgotten my password?

On the login page, click to indicate you have forgotten your password. Enter your email address and click submit. You will receive an email that contains a link to change your password.

What do I do if I have forgotten the email address I registered with?

Email us at <u>info@safeprescriber.org</u> or click 'Contact/Feedback' in the bottom right hand corner of the SCRIPT homepage. The technical team will respond accordingly.

5.2 Content queries and feedback

Who do I contact if I spot an error on the site?

Email us at <u>info@safeprescriber.org</u> or click 'Contact/Feedback' in the bottom right hand corner of the SCRIPT homepage. The editorial team will review your query and respond accordingly.

5.3 SCRIPT and the Training Programme

How long do the modules take to complete?

Each module takes an average of 60 minutes to complete.

Is there a pass mark for the post-test?

The questions have not been reviewed by an examination board. As such, a pass mark has not been set and the post-test score is not generated onto the module certificate. However, decisions may have been made at a local level about applying a pass mark for the modules. If applicable, this information will be communicated to you locally. When modules are mandated, your progress through the modules may be monitored by named individuals within your organisation, and consistently low scores throughout may call for modules to be re-set and for the test to be re-taken.

How do I get the module certificate?

A certificate is generated upon completion of all elements of the module. This includes the pre- and post-test.

What should I do with the certificates?

Some regions will require you to upload your module certificates to a folder labelled 'SCRIPT' on ePortfolio so that your progress can be monitored. These may be assessed during the progress review meetings in addition to the information gathered from the SCRIPT management site.

6.0 APPENDICES

APPENDIX 1: Module titles and learning outcomes



APPENDIX 1: Module titles and learning outcomes

Category	Principles of Prescribing
Module Title	Learning Outcomes
Developmental Pharmacology	 At the end of this module, you should be able to: Describe how children and neonates handle medicines differently from adults and how this will influence prescribing. Explain how the processes of drug metabolism differ in neonates and children compared to adults. Relate the pharmacokinetics of a drug to the adjustments in dose, frequency and choice of formulation required for children. Define an Adverse Drug Reaction (ADR), and explain the role and function of the Yellow Card Scheme. Explain the difference between pharmacokinetic and pharmacodynamic drug interactions and list some examples of each.
Practical Prescribing	 At the end of this module, you should be able to: Discuss why children are more vulnerable to medication errors, and how to avoid them. Demonstrate the different ways a dose may need to be calculated, including those based on body weight and Body Surface Area (BSA). Calculate maintenance and rehydration fluid requirements for children of all weights and ages. Explain what is meant by unlicensed and off-label prescribing, and provide example of this in paediatrics. Recognise that age appropriate medicines are not always readily available for children, and understand how this is managed in practice.
Utilising the BNF for children	 At the end of this module, you should be able to: Describe the basic layout and structure of the BNFC and navigate your way around the BNFC smartphone mobile app, online and book version. Describe the information contained within the 'General Guidance' section. Find, and accurately interpret, the dose, route, frequency and indication for a given medicine. Find information on the licensed status of a medicine. Find information about the different formulations available for a medicine, and identify excipients contained within these. Find instructions on the administration of medicines given via intravenous infusions, as well as those specifically for neonatal intensive care. Describe the information available in the appendices and indices of the BNFC.



Category	General Paediatrics
Module Title	Learning Outcomes
Acutely Unwell Child	 At the end of this module, you should be able to: Initiate treatment to manage Convulsive Status Epilepticus (CSE), and escalate management according to response. Accurately prescribe adrenaline and affiliated medicines for a child presenting with anaphylaxis. Explain to a child and their carer how to administer an adrenaline auto-injector (e.g. EpiPen®) and the steps to take after a dose has been administered. Manage an acute exacerbation of asthma in children. Initiate appropriate fluid management and medicines to treat hypoglycaemia outside the neonatal period. Initiate fluid management, insulin and medicines to manage Diabetic Ketoacidosis (DKA) in children. Manage an acute episode of psychosis.
Infection and Immunity*	 At the end of this module, you should be able to: Describe the different classes of antibacterials and their spectrum of activity on microorganisms. Discuss the pharmacological management of active and latent tuberculosis. Initiate pharmacological treatment for the management of malaria. List the different types of vaccinations available. Counsel children and/or their relatives/carers on the adverse effects, cautions and contraindications associated with different types of vaccines. Know where to find up-to-date information on the prescribing indications for immunoglobulins. Discuss the management of children with a primary or secondary immune deficiency who are exposed to chickenpox. Initiate antiretroviral therapy for a newborn delivered to a mother who is HIV positive.
Neonates	 At the end of this module, you should be able to: Describe how neonates handle drugs differently from adults and how this influences prescribing. List the medicines recommended to be administered in a resuscitation situation, and be able to calculate the required doses based on weight. Explain how therapeutic hypothermia can affect the pharmacokinetics of medicines. Select appropriate fluid and parenteral nutrition and calculate the volumes required. Explain the nutritional requirements and supplementation required to ensure adequate growth and development. Prescribe medicines for neonates to manage common problems, such as respiratory distress syndrome, hypotension, seizures and pain.
Paediatric Emergencies	 At the end of this module, you should be able to: List the six elements of the Paediatric Sepsis Six® Care bundle (from birth—11-years-old) and discuss the role of blood products and components in the management of sepsis. Know where to find reputable, reliable and up-to-date information on the management of poisoning and toxicity. Discuss the initial management of a patient presenting with suspected poisoning due to a drug overdose. Know where to find reputable, reliable and up-to-date information on the management of inherited metabolic diseases. Initiate pharmacological treatment for the management of a cardiac arrest. Describe the process of organising an inter-hospital transfer.

*Module currently in development and learning outcomes subject to change

Category	Surgical Specialities
Module Title	Learning Outcomes
Ear, Nose and Throat	 At the end of this module, you should be able to: Identify when antimicrobials are indicated for the management of commonly encountered ENT conditions, and select the most appropriate drug, dose, route and duration of treatment. Discuss the management of epistaxis. List the pharmacological treatment options available for the management of allergic rhinitis. Describe the management of acute uncomplicated sinusitis. Discuss the medical management of post-tonsillectomy bleeding. Describe appropriate treatment(s) for the management of airway oedema.
General Surgery and Burns	 At the end of this module, you should be able to: Describe the elements of the drug history that are important for preoperative patients. Discuss the role of prophylactic antimicrobials in the perioperative period. List the pharmacological treatment options available for the management of postoperative nausea and vomiting. Initiate pharmacological treatment for the management of pain during the perioperative period, considering all the patient's comorbidities (e.g. renal impairment). Describe how to accurately calculate the total body surface area affected by a burn. Know how to calculate resuscitation fluids for a child with a burn. Discuss the importance of considering venous thromboembolism prophylaxis in a child with a major burn.
Ophthalmology	 At the end of this module, you should be able to: Administer ocular medicines safely and effectively to children of all ages. Select appropriate ocular medicines to administer during the examination of a child. Initiate appropriate pharmacological treatment for the management of periorbital and orbital cellulitis. Select the most appropriate treatment option for the management of conjunctivitis in different age groups. Describe the pharmacological management of pain associated with ocular conditions. Discuss the potential ophthalmic adverse effects associated with some prescribed medicines. Counsel patients and/or relatives/carers on the safe administration of ocular medicines.
Surgical Prescribing Scenarios*	 At the end of this module, you should be able to: List the medicines commonly initiated in the preoperative management of appendicitis. Describe the role of intravenous fluid resuscitation, prophylactic antimicrobials and air reduction enemas in the management of intussusception. Discuss the management of Central Line-Associated Bloodstream Infections (CLA-BSI). Describe the pharmacological management of diabetes mellitus and epilepsy in the perioperative period. List the scenarios where patients may require perioperative corticosteroids and the potential complications if patients are not managed appropriately.

*Module currently in development and learning outcomes subject to change



Category	General Therapeutics
Module Title	Learning Outcomes
Cannabis-Based Products for Medicinal Use	 At the end of this module, you should be able to: Describe the basic pharmacology of cannabinoids. Discuss the legislative changes that occurred in 2018. List the potential therapeutic indications for CBPMs. List the prescribing restrictions relating to CBPMs. Discuss some of the key considerations for the prescribing and supply of a CBPM. Describe the CBPMs that are available in the UK and their licensed status. Know where to find reputable, reliable and up-to-date guidelines relating to the prescribing and supply of CBPMs.
Dermatology	 At the end of this module, you should be able to: Initiate therapy for the management of atopic eczema and step treatment up and down according to response and as recommended by NICE guidance. Select and prescribe appropriate topical treatments for psoriasis. List the systemic treatments available for psoriasis and explain their use to patients and their families. Select and prescribe topical therapy and antibacterials for acne vulgaris, and list the indications for isotretinoin use. Differentiate between common skin infections and select appropriate treatment. Recognise when disease severity warrants systemic therapy, such as with immunosuppressants. Recognise which haemangiomas need treatment and be able to commence treatment with propranolol. Treat and manage common causes of hair loss. Manage skin erythemas and Epidermolysis Bullosa (EB) in the newborn. Recognise drug reactions and manage the early stages of the most severe, including Stevens-Johnson Syndrome (SJS), Toxic Epidermal Necrolysis (TEN) and DRESS syndrome (Drug Reaction with Eosinophilia and Systemic Symptoms).
Diabetes	 At the end of this module, you should be able to: Describe the onset and duration of action of different insulins available in the UK. Calculate a patient's insulin: carbohydrate ratio and insulin sensitivity factor. Manage diabetes during an episode of acute illness (i.e. 'sick day rules'). Discuss the initial management of hypoglycaemia in a conscious or unconscious patient. List the diabetes-related complications and associated conditions that should be monitored and managed. Counsel children and/or their relatives/carers on the importance of self-management.
Endocrine 1	 At the end of this module, you should be able to: Discuss the role of screening in the identification of congenital hypothyroidism. Initiate levothyroxine for the management of congenital hypothyroidism and know how often the patient's thyroid function should be monitored. List the pharmacological treatment options available for the management of hyperthyroidism. Describe the potential neonatal complications of maternal thyrotoxicosis and the management of newborn babies at risk of neonatal thyrotoxicosis. Describe the pharmacological management of Congenital Adrenal Hyperplasia (CAH). Counsel children and/or their relatives/carers on managing corticosteroids during an acute illness (i.e. 'sick day rules'). Discuss the role of glucocorticoid and mineralocorticoid replacement in the pharmacological management of Cushing's syndrome.

Category	General Therapeutics
Module Title	Learning Outcomes
	At the end of this module, you should be able to:
Endocrine 2	 Describe the role of somatropin (growth hormone) in the management of children with growth failure. List the medicines used for pubertal suppression in precocious puberty. Describe the medicines used in the induction of puberty in boys and girls. List the cautions associated with prescribing desmopressin for the management of diabetes insipidus. Initiate intravenous calcium gluconate 10% for the emergency management of acute severe hypocalcaemia. Discuss the prevention and management of vitamin D-deficiency rickets.
Gastroenterology and Hepatology	 At the end of this module, you should be able to: Initiate pharmacological treatment for the management of constipation in line with NICE guidance. Select an appropriate milk replacement when managing cows' milk protein and/or lactose intolerance. Initiate therapy and effectively manage Gastro-Oesophageal Reflux Disease (GORD). Discuss the role of exclusive enteral feeding in inducing remission in patients with Crohn's disease. List the pharmacological treatment options available for the management of IBD and the factors affecting drug selection. List the factors that affect hepatic drug clearance. Initiate appropriate treatment(s) for the management of cholestasis. Discuss the management of bleeding in acute hepatic failure. Counsel children and/or their relatives/carers on the adverse effects associated with
	Counsel children and/or their relatives/carers on the adverse effects associated with tacrolimus.
Inflammatory Disease	 At the end of this module, you should be able to: Initiate pharmacological treatment for the management of pain associated with inflammatory disease considering all the patient's comorbidities (e.g. renal impairment). Discuss how Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) are used in the management of inflammation and pain. Initiate corticosteroids for management of inflammatory disease, and understand how to wean them appropriately. List the commonly prescribed systemic medicines used in the management of inflammatory disease (i.e. non-biologic and biologic disease modifying drugs). List the medicines that can cause immunosuppression, and know when to seek specialist advice when managing infections in an immunocompromised patient. Counsel children and/or their relatives/carers on the administration and adverse effects of medicines used in the management of inflammatory disease.
	At the end of this module, you should be able to:
Neurology	 Initiate pharmacological treatment for the management of acute seizures in the pre-hospital setting. Counsel relatives/carers on the safe management of acute seizures in the pre-hospital setting. List the patient factors to be considered when selecting an antiepileptic medicine. Select appropriate antiepileptic treatment and start treatment according to BNFC guidelines. Counsel children and/or their relatives/carers on the administration and adverse effects of antiepileptic treatment. Manage infantile spasms and monitor for the adverse effects of treatment. Initiate therapy for spasticity and oral secretions. Initiate therapy for sleep disorders. Select an appropriate treatment for the management of migraine and cluster headaches. List the warning signs associated with headache that would warrant referral for further

Category	General Therapeutics
Module Title	Learning Outcomes
Nutrition	 At the end of this module, you should be able to: Describe the clinical scenarios that may require children to have additional nutritional support in order to ensure adequate growth and development. List the enteral supplements available to provide nutritional support in infants and older children. List the vitamins and Pancreatic Enzyme Replacement Therapy (PERT) that may be required for patients with cystic fibrosis. Explain the risks associated with re-feeding syndrome and how it can occur. Discuss the factors to consider prior to initiating parenteral nutrition. List the common drug-feed interactions.
Renal Disease	 At the end of this module, you should be able to: Describe how to assess and accurately calculate renal function in children. Explain how impaired renal function affects the pharmacokinetics of medicines. Identify common medicines that need dose adjustment and/or additional monitoring in renal impairment. Describe (a) intravenous fluid therapy; (b) management of hyperkalaemia; and (c) management of hypertension in renal impairment. Discuss the management options for nephrotic syndrome. Describe the pharmacological management of nocturnal enuresis and Urinary Tract Infections (UTIs). Know where to find information to guide prescribing in renal impairment.
Respiratory	 At the end of this module, you should be able to: Discuss the pharmacological management of chronic asthma. Describe the different devices available for delivering inhaled drug therapy, and be able to select the most suitable device for your patient. Discuss the management of cystic fibrosis with a particular focus on the antimicrobials used in the prevention and treatment of infection. List the vitamins and Pancreatic Enzyme Replacement Therapy (PERT) that may be required in children with cystic fibrosis. Describe the evolving role of personalised medicine in the management of cystic fibrosis. List the common causative organisms of pneumonia. Initiate, review and revise antibacterial(s) therapy for the management of pneumonia. Discuss the role of long-term oxygen therapy. Know where to find evidence-based information to guide prescribing in respiratory disorders.



Category	Advanced Therapeutics
Module Title	Learning Outcomes
Cardiology	 At the end of this module, you should be able to: Describe the mechanism of action of the different classes of diuretics, and list the monitoring requirements to minimise the risk of adverse effects. Describe the role of diuretics in the management of ventricular septal defect. Describe the role of prostaglandin, antiplatelet and anticoagulant therapies in the management of duct dependent circulation. List the medicines that should be initiated in a patient with dilated cardiomyopathy. Categorise antiarrhythmics medicines according to the Vaughan-Williams classification based on their mechanism of action. List the adverse effects of antiarrhythmics and describe the monitoring requirements to minimise the risk of these occurring. List the signs and symptoms digoxin toxicity and describe how this is managed. Initiate immunoglobulins for the management of Kawasaki disease. Describe the aims of treatment in the management of Tetralogy of Fallot.
Malignancy and Haematology	 At the end of this module, you should be able to: Describe some of the oncology and haematology conditions encountered in paediatrics, including brain tumour, lymphoma, newly diagnosed leukaemia, Immune Thrombocytopenic Purpura (ITP), and sickle cell crises. Know the restrictions relating to the prescribing, dispensing, checking and administration of intrathecal therapy. List the baseline monitoring requirements and adverse effects of some systemic anticancer therapies (SACT). Initiate appropriate treatment for the management of some of the adverse effects associated with SACT, including neutropenic sepsis, chemotherapy-induced nausea and vomiting, mucositis and tumour lysis syndrome. Discuss the management of deep vein thrombosis. Initiate appropriate treatment for the management of an acute painful episode of sickle cell disease. Know when to escalate concerns and seek specialist advice where necessary.
Paediatric Intensive Care Unit	 At the end of this module, you should be able to: Describe how critically ill children handle medicines differently from 'healthy children' and how this influences prescribing. Know where to find information on the compatibility of medicines. List the medicines recommended in the management of intubation and sedation. Discuss the use of vasoactive medicines to maintain cardiovascular stability. Describe the principles of managing a traumatic brain injury, including raised intracranial pressure.

