MODULE 1: THERAPEUTIC MANAGEMENT OF DISEASE

Contact Hours

The course comprises some 52-54 hours of lectures and 6-8 clinical therapeutics tutorials. A small number of students have their clinical medical attachment to the Department of Therapeutics at St. James’s Hospital. Bedside clinical tutorials in therapeutics in the 1st and 2nd Semesters are held at St. James’s Hospital provided sufficient staff are available, with the opportunity to see clinical pharmacology in practice. Through the use of hospital staff – intern, senior house officer and registrars based on the Hospital wards, students have contact with real patients and the participation of the Clinical Pharmacists fosters inter-professional liaison. Alternatively small group Seminars using Drug Kardex are organised. It has been the Department’s wish to develop this format of problem-based learning increasingly with smaller groups of students asked to review and discuss prescribing (drug Kardex). Students are given an outline of the patient’s condition and are asked to comment on therapy, monitoring of beneficial and toxic effects, dose adjustments depending on the patients clinical conditions and issues of drug interaction, compliance, etc.

Lecturer(s)

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Aims
The aim of this module is to develop a knowledge, skills and attitudes for safe prescribing in common medical conditions and emergencies relevant and effective in dealing with common situations likely to be encountered by a medical practitioner in day to day practice of clinical medicine. Additionally the module offers opportunity for developing the ability to critically appraise published literature to maintain the relevance of the ability in the face of therapeutic advances.

Learning Outcomes

On successful completion of this course, students will be able to display the following attributes

1. Knowledge
   a. Broad knowledge of pharmacological treatment of a wide range of conditions covered in the lecture course
   b. Broad knowledge of pharmacological treatment of common medical emergencies

2. Skills
   a. Ability to prescribe safely and effectively
   b. Develop an understanding of practicalities of prescribing in hospital setting.

3. Attitudes
   a. Appreciation of how to critically appraise information in relation to drug therapy especially in peer-reviewed journals
Course Content

SYNOPSIS OF CLINICAL PHARMACOLOGY LECTURE COURSE

Principles And Practice Of Clinical Pharmacology [10 lectures]

1. **Pregnancy and lactation**
   The underlying principles of drug toxicity and teratogenesis in pregnancy is illustrated by recent literature examples. Consideration is given of the drugs to use and avoid in treating important conditions during different trimesters and in lactation. Again, attention is drawn to information sources and the safe management of common symptoms and conditions in pregnancy. This is followed by a brief consideration of pregnancy induced changes in drug handling.

2. **Management of overdose and poisoning**
   The overall management of overdose and assessment of such patients is considered with detailed description of the use of antidotes, particularly for paracetamol. The role of activated charcoal, forced diuresis, haemoperfusion etc. is considered. The social and psychiatric aspects of suicide and para suicide are discussed.
   The function of the National Poisons Information Centre is outlined.

3. **Prescribing at extremes of age**
   The particular problems in drug handling both for the neonate, premature infant and child is contrasted to that of the elderly. The use and problems of particular drugs and the mechanism underlying the problems are considered. This lecture explores how a knowledge of kinetics/drug elimination may allow one to choose alternates from different therapeutic categories to avoid toxicity. Polypharmacy and its risks and practical issues (child proof containers, aids for elderly etc.) are explored also.

4. **Factors affecting the clinical response to drugs I:**
   Pharmacokinetics and Pharmacogenomics, Cytochrome P-450, 3A4, 2D6, 2C9, Inhibition and Induction.

5. **Factors affecting the clinical response to drugs II**
   Here the important issues of patient compliance and comprehension and patient knowledge of medicines and beliefs is considered together with an approach to educate patients. A synopses of the important physiological, pathological and genetic factors including ethnic are described with practical application what to do when the patient ‘fails to respond to therapy’ is considered. Placebo and associated ethical issues are considered with emphasis on patient autonomy.
6. **Therapeutic Drug Monitoring  ADR/Interactions**  
Pharmacokinetic principles. Anti-epileptic drugs, aminoglycosides, digoxin, theophylline uses and limitations.

7. **ADR/Interactions: Medication Errors**  

8. **Pharmaceutical Medicine and Drug Development**  
Drug development. Role of industry in research and sponsorship. Technological advances and how they have assisted the development of new medicines. Selection of New Chemical Entities. Formulation and route of administration issues. Toxicology testing. Clinical trial programmes, licensing. Pharmacovigilance/post marketing surveillance-methods and responsibilities. Advertising and promotion of medicines.

9. **Prescribing cost effectively**  
Here the importance of pharmacoeconomics, methods of assessment - cost-effectiveness/utility, quality of life assessment etc. is introduced. Rational prescribing through the use of generics, formularies and protocols is outlined as are the important influences on prescribers (including patient demands, pharmaceutical representatives etc.) and the hospital/GP interface is discussed.

10. **Herbal Medicine**  
Brief historical background to use of herbal medicines, problems associated with the use of herbal medicines – lack of standardization, contamination, adverse drug reactions, drug interactions. Some commonly used herbal medicines are covered including St. John’s Wort, Ginseng, Ginko Bilboa, Echinacea. Role of Pharmacy. OTC.

**CARDIOVASCULAR MEDICINE: [6 lectures]**

1. **Management of Heart Failure including Acute Pulmonary Oedema**  
Principles and problem areas are considered including digitalis are covered such as toxicity, potassium levels, heart failure and the use of digitalis in patients in sinus rhythm. The indications for ACE inhibition and beta-blockade and the risks associated with therapy are discussed and the role of older therapies such as nitrates, hydrallazine, nitroprusside are examined in the context of the relevant trial results. The intensive care of the severe heart failure patient is presented with emphasis on the role (and risks) of renal dose dopamine, dobutamine and other inotropes. Anti-arrhythmics, and aminophylline are sometimes indicated in heart failure and this is discussed as in acute left ventricular failure. The uses and abuses of diuretics including spironolactone are considered.
2. **Management of Cardiac Arrhythmias and Cardiac Arrest**
   The arrhythmias are described in relation to the classes of drug (e.g. Class I) and the specific conditions for which they are indicated e.g. atrial fibrillation, supraventricular/ventricular tachycardia. Drugs for use in individual disorders such as Wolff Parkinson White, Torsade de Pointes, cardiac arrest etc. are presented. The possible risks of certain therapies e.g. flecinide (and its pharmacogenetics) are emphasised. Kinetic issues arise in relation to lignocaine and amiodarone. Cardiac arrest is considered in more detail.

3. **Management of Ischaemic Heart Disease, Myocardial Infarction**
   The antianginals are discussed with patient selection emphasised. The particular use of aspirin, thrombolysis, converting enzyme inhibition, heparin/warfarin, nitrates, magnesium is discussed. The modern management of acute myocardial infarction is described based on the results of the international mega trials e.g. ISIS I - IV. Controversial therapies and the need for on-going and future trials are considered.

4. **Management of Hyperlipidaemia and Cardiovascular Risk/PVD [2]**
   Hyperlipidaemia is an important modifiable risk for vascular disease and drug strategies (statins, resins, fibrates, nicotinic acid, ezitimibe) to lower cholesterol are presented e.g. mixed hyperlipidaemia, raised lipids in patients with risk factors. Familial hyperlipidaemia is also discussed. Aspects of diet and obesity are also covered in this lecture. Secondary prevention (β-blockers, ACE inhibitors, aspirin etc.) particularly use and safety of statins is considered. The medical management of peripheral/ carotid vascular disease is outlined. Drug therapy (NRT) for smoking cessation is also outlined.

5. **Hypertension: Modern Management**
   Hypertension is discussed in the context of diagnosis, investigation and appropriate therapy. The importance of end organ damage – arterial stiffness, proteinuria, LV hypertrophy is outlined and anti-hypertensive therapy tailored accordingly. The six main types of anti-hypertensives are described. The use of β-blockers, calcium antagonists and α blockers, diuretics, ACE inhibitors and AT2 receptor antagonists is discussed in the context of patient selection (smoker, diabetic etc.) is summarised as is to the management of hypertensive emergencies. The need for combined therapy is considered in achieving “good BP control”.

**RESPIRATORY MEDICINE: [3 Lectures]**

1. **Management of Respiratory failure/Drug induced respiratory disease/Symptomatic therapy.**
2. **Management of Asthma, COAD**
Prophylactic agents, Bronchodilators, Xanthines, anticholinergic, $\beta_2$ agonists, steroids etc. The recent controversies are used to illustrate the need to continuously review one’s practise. Patient instruction, technique, how to assess therapy, home care, devices, cigarette cessation, physiotherapy, steroids, and the management of Status Asthmaticus are discussed and the latter illustrated by presenting current guidelines.

3. **Management of Respiratory Tract Infections /TB**
Includes not alone pneumonia but Viral, bacterial, mycobacterial, fungal and others including pneumocystis. Treatment of complications and management of pneumonia in immunocompromised host are outlined. The particular problems of antituberculous chemotherapy resistance and compliance are emphasised.

**GASTROENTEROLOGY: [4 Lectures]**

1. **Management of Common Gastrointestinal Tract and Symptomatic Treatment**

2. **Management of Peptic Ulcer disease, H.pylori infection**
Management of Peptic Ulcer disease and its complications. The place of Triple therapy is outlined. Specific therapy $H_2$ blockers. Bismuth. Antacids, Proton pump inhibitors (omeprazole), Anticholinergics (pirenzpine), Prostaglandin analogues (misoprostol), Sucralfate is compared. The use of Cytoprotection with NSAIDS and the management of in upper G.I. haemorrhage is considered.

3. **Management of Liver Disease; Prescribing in and drug induced disease**
Treatment of liver disease/alcoholism with encephalopathy (Neomycin, lactulose, coagulation etc.) is described. Drugs contraindicated in liver disease - alternatives to use for common conditions. Drugs causing liver disease are also considered together with pharmacological management of chronic active liver disease and hepatitis (including role of interferon) and of portal hypertension ($\beta$-blockers, somatostatin, terlipressin, vasopressin etc) is outlined.
4. Management of Inflammatory Bowel Disease and Treatment of Gallstone/Pancreatic Disease
The role of Steroids (local and systemic) Sulphasalazine, olsalazine, mesalazine and fluid replacement is considered.
The management of antibiotic induced diarrhoea (pseudomembranous colitis) and common G.I. infections. The management of acute cholecystitis, Gallstones (dissolving agents - chenodeoxycholic acid, ursodeoxycholic acid). Pancreatic supplements and hazards are outlined.

CNS: NEUROLOGY, PSYCHIATRY AND ANAESTHESIOLOGY: [10 lectures]

1. Management of Anxiety and Insomnia
The role of commonly used hypnotics and anxiolytics is discussed. 

2. Management of Depression and Mania
Lithium and its role in bipolar depression, mania; preparations/kinetics, adverse effects, interactions and monitoring. 
Tricyclics - kinetics, adverse effects, overdose 
5-HT-reuptake inhibitors - Prozac society. Expanding indications - obsessive, compulsive disorders, panic attacks. 

3. Management of Confusion, Dementia and Acute Psychoses
Drowsiness and Confusion:: as side-effects of drugs. 
Hypothermia:: as side-effects of drugs and how to treat 
Management of attention-deficit hyperactivity disorder. 
Alzheimers (tacrine and other agents) management of.

4. Management of Parkinson’s Disease
L Dopa - on - off; end of dosage phenomenon. The use of Dopa decarboxylase inhibitors, Dopamine agonists (bromocryptine, lysuride, pregolide) amantadine, selegiline, Anticholinergics (benztropine, procyclidine) and their problems. How to combine therapy and tailor dosage

5. Management of Epilepsy and Vertigo
Indications for therapy. Driving. Pregnancy. The problems and practise of using Phenytoin, Carbamazepine, Sodium Valproate, Phenobarbitone,
Ethosuxamide, Vigabatrin, Lamotrigine is discussed as mono or dual therapy for the common forms of epilepsy. Monitoring, withdrawal of therapy. Status epilepticus and Meniere’s disease (hyoscine, antihistamines, beta-histine). Management of vertigo/motion sickness.

6. Management of Pain syndromes and migraine

7. Use of Analgesics and Management of Terminal illness
The place of Analgesics: - Aspirin, Opioids: morphine MST and oral, diamorphine, pethidaine, codeine, buprenorphine, fentanyl, dextropropoxyphene, paracetamol, NSAIDS, compound analgesics. Role of Hospice, home care, infusion pumps, nutrition, skin care, steroids and sedatives are discussed.


9. Anaesthesia, Peri-anaesthetic Drugs and ICU Therapy

RHEUMATOLOGY AND BONE DISEASE: [2 lectures]

1. Management of Rheumatoid Arthritis, Osteoarthritis and Gout
   The drugs covered include: NSAIDS and aspirin, steroids (glucocorticoids), methotrexate, azathiaprine, Cyclosporin A, gold, penicillamine, sulphasalazine, colchicine, probenecid, sulphapyrazone, allopurinol. The acute management and chronic (DMARDS, allopurinol) of both RA and Gout is described. The role of physiotherapy and surgery is emphasised.

2. Bone Disease and Management of Osteoporosis
   Management of Parathyroid (hypo-, hyper) disorders.
   Rickets/osteomalacia: calciferol
   Management of Paget’s Disease: calcitonin, biphosphonates: etidronate, pamidronate.
   Acute management of hypercalcaemia.
   Management of osteoporosis including prevention (diet, HRT, Vitamin D, fluoride, biphosphonates).

ENDOCRINOLOGY: [3 lectures]

1. Endocrine I: Drug therapy in Pituitary, Hypothalamic and Adrenal Disorders
   Posterior Pituitary: Cranial diabetes insipidus: arginine vasopressin (thiazide)
   Somatropin (human growth hormone analogue). Management of acromegaly.
   Anterior Pituitary (including gonadorelins -prostatic cancer), Hypothalamus, Adrenals: glucocorticoids, mineralcorticoids (fludrocortisone). Cushing Disease and management of adrenal insufficency.
   Management of of obesity - limited role of appetite suppressants.

2. Endocrine II: Drug therapy of thyroid disease
   Management of hyper- and hypothyroidism
   Drug induced goitre and thyroid disease. Treatment of thyroid crisis and myxoedema coma.

3. Endocrine III: Management of diabetes mellitus
   Insulin preparations, how to combine/adjust. Importance of diet. How to monitor progress and prevent complications (cardiac, nephropathy etc.).
NEPHROLOGY AND GENITOURINARY: [2 lectures]

1. Management of Renal Disease and Drugs and the Kidney
   Drug therapy for renal disease - nephritis, nephropathy
   Drug induced: Glomerulonephritis, interstitial nephritis, papillary necrosis, urinary tract infection (UTI) including cystitis.
   Management of acute (including hyperkalaemia) and chronic renal failure.

2. Drugs and the Kidney/Genito Urinary Problems
   Drug therapy for Prostatism: fenesteride, indoramin, Prazosin.
   Urinary incontinence: oxybutynin, propantheline, tricyclic antidepressants.
   Management of Ureteric colic, renal stones: diclofenac.
   Nocturnal enuresis: imipramine (tricyclic antidepressants).
   Erectile dysfunction: drugs causing and sildenafil. Papaverine and prostaglandin injections for condition. Management of UTI, (recurrent)
   Prescribing in patients with renal disease (drugs and dialysis).

REPRODUCTIVE ENDOCRINOLOGY/OBSTETRICS AND GYNAECOLOGY: [2 lectures]

1. Clinical use of Sex hormones, contraception and HRT
   Indications and adverse reactions for the use of sex hormones.
   The use of sex hormones for HRT and menstrual regulation.
   Type of oral contraceptives and their mechanism of action.
   Type of preparations available for clinical use. Other forms of contraception.
   Undesirable side effects and precautions for the use of sex hormones.
   The use and adverse effects of anti-oestrogens and anti-progestogens in clinical practice.
   Induction of ovulation.
   The use of androgens, anti-androgens and anabolic steroids and their side effects.

2. The induction and control of labour and premature labour
   The indications for drugs for the induction of ovulation, premenstrual tension and dysfunctional uterine bleeding together with practical aspects and contraindications are discussed. Emphasis is on oxytocin, ergotamine, prostaglandins, gonadotrophins and the role of surfactants.
NUTRITION AND BLOOD

1. **Blood: Therapy of anaemias**
The Management of common anaemias including use and hazards of blood and platelet transfusions is discussed as in the use of: Iron, B12, Folate, Erythropoietin, Colony Stimulating Factors (indications, hazards and their role), Immunoglobulins.

2. **Blood: Coagulation and Fibrinolysis**
*Anticoagulation*: The use of heparin (including low molecular weight) is illustrated by the management of DVT/Pulmonary embolism. The expanding indications for long term warfarin are described with the importance of control, patient education, interactions. Antiplatelet agents (aspirin, clopidogral particularly) and toxicity is described. Thrombolysis and the use of Fibrinolytic drugs (streptokinase, apsac, alteplase etc.) is described and the use of Factors VIII and IX is discussed.

SPECIAL SENSES AND SKIN: [2 lectures]

1. **Treatment of common Ophthalmological & ENT Disorders**
This deals with the drugs used in conditions such as -

*Glaucoma*: (beta adrenergic blockers, miotics (pilocarpine, physostigmine) and eye infections, conjunctivitis, corneal including viral.

Drugs causing side effects such as cataract, corneal deposits and the principles of drug administration to they eye are outlined.

Treatment of common ENT conditions - infections etc. and use of decongestants, antibiotics is considered. The use of medicines in otitis externa, chronic otitis media and removal of wax is described as are allergic conditions.

2. **Management of common dermatological conditions**
Management of eczema, psoriasis, acne, parasitical infestations illustrates the use of different forms of preparations including steroids, antipsoarial agents, PUVA, etretinate/isotretinoin, methotrexate and parasitical agents. Emollients, sunscreens, antiperspirants and topical disinfectants are also mentioned.

IMMUNOLOGY AND HYPERSENSITIVITY: CANCER CHEMOTHERAPY: [3 lectures]

1. **Immunopharmacology and vaccination**
This covers the use of immunosuppressive drugs in disease and organ transplantation and the management of connective tissue disorders. azothiopyrine: cyclosporin. Place of steroids, interferons and recombinant interleukins is discussed.
The principles of vaccinations are outlined with common schedules (including foreign travel) and adverse reactions to vaccines and immunoglobulins described.

2. **Management of Allergic/Hypersensitivity Conditions**
   Treatment of conditions include anaphylaxis, drug induced hypersensitivity reactions (Types I-IV), urticaria, angioneuretic oedema, allergic conjunctivitis, rhinitis etc. Drugs covered in this lecture include adrenaline, antihistamines (chlorpheniramine, terfenadine), topical sodium cromoglycate, corticosteroids. The use of antihistamines in nausea and motion sickness is also mentioned.

3. **Cancer Chemotherapy**
   Commonly encountered anti-mitotic regimens are mentioned (with hazards of handling). (Detailed lectures on individual drugs in IIIrd year medical).
   The overall management of common cancers (lung, small cell, breast-tamoxifen, prostate) is considered to illustrate the role of chemotherapy/hormonal therapy and hazards of same and their management (nausea, marrow suppression (GM-CSF) infection etc.

TREATMENT OF COMMON INFECTIONS, TROPICAL DISEASES AND AIDS: [3 lectures]
(Note: Other areas covered by Clinical Microbiology)

1. **Common infections and antibacterial prophylaxis**
   The choice and use of therapy in the management of common infections - ENT, respiratory, gastrointestinal, skin etc. are considered with brief reference to important kinetic aspects, reactions/interactions and toxicity of commonly used Antibiotics: Penicillins, Cephalosporins, cephamycins, beta-lactams, Aminoglycosides, Sulphonamides and trimethoprim (current controversy re. sepTRin), Macrolides, Quinolones, Tetracyclines, Metronidazole, Chloramphenicol, Fusidic Acid, Vancomycin.
   The use of antimicrobials in surgery and other antibacterial prophylaxis is described. These lectures are complemented by a more detailed consideration of individual drugs in the Microbiology course.

2. **Management of Serious Infections including Fungal and Viral**
   The management (including contacts) of meningitis and endocarditis is described. Treatment of important fungal and viral conditions with antifungal (amphotericin, imidazoles, triazoles, mystatin etc) and Antiviral Agents: Acyclovir, Idoxuridine, Inosine pranobex, Amantadine, Gancyclovir, Foscarnet, Tribavirin is outlined in the same context as 3 above.

3. **Sexually transmitted diseases including HIV and management of AIDS**
HIV: Pneumocystis prophylaxis: co-trimoxazole, pentamidine. Opportunistic infections. Inhibition of HIV: Zidovudine (AZT) DDI and newer drugs and combined therapy (Concorde) are discussed. The management of common STD (gonorrhoea, syphilis, non specific urethritis), pelvic inflammatory disease and vaginal infections is also described.

Indicative Resources
Recommended Text Books


Each student should have one of the following: (later edition if available)

Reference Texts:

Journals:
- Drug and Therapeutic Bulletins
- National Medicines Information Centre Bulletin (www.stjames.ie)

Electronic Source

- Cochrane Library via Trinity site or www.hrb.ie
Methods of Teaching and Student Learning

The teaching techniques employed include formal lectures as well as small group tutorials designed to expose the students to the more practical aspects of prescribing using drug prescribing charts used for inpatient prescribing (Kardex) as a template. Where possible small group bedside teaching of Clinical Pharmacology will be undertaken.

Methods of Assessment

Summative
Student progress is evaluated by assessment at the end of the 1st Semester and a major examination at the end of the 2nd Semester (based on both terms work).

1. Michaelmas Assessment 20% (50 MCQs)
2. Hilary Term Assessment 60%
   This examination comprises 50 MCQs (10%), 10 obligatory Short Answer Questions (30%) and two essay questions (20%) and
3. Viva Voce/Practical Examination (20%) in May.
   This is also an opportunity to consider extenuating circumstances. The viva voce examination is structured, all students receive a Drug Kardex for comments and also are asked to deal with a medical emergency. Commonly students are also asked to comment on laboratory results, e.g. therapeutic drug monitoring, demonstrate how to use an inhaler, etc. At the viva-voce, each student is usually examined by two examiners, one of whom is an experienced clinician. Usually some 85-90% of the students pass the examination with the remainder asked to attend a supplemental examination using the same format (MCQ, SAQ, Essays, Viva) in September.
**Formative** – informal assessments are used to ‘check in’ with students to find out what they are learning and what they don’t understand; do not contribute towards a final grade: are done during the drug Kardex tutorials.

**Evaluation**

Audits seeking student feedback evaluating various aspects of module delivery and effectiveness are conducted at the end of term.