THE INDISPENSIBLE QUICK-REFERENCE GUIDE TO CLINICAL PHARMACY

OXFORD HANDBOOK OF CLINICAL PHARMACY

Edited by Philip Wiffen | Marc Mitchell
Melanie Snelling | Nicola Stoner

Practical, quick-reference information for daily use by pharmacists

Complements the *British National Formulary*

Includes vital information on controlled drugs, adverse drug reactions, and pharmacogenetics

Features a key section on end-of-life pathways and symptom management in palliative care

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Oxford Handbook of Clinical Pharmacy

Second edition

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Foreword

The world we live and work in has changed, and continues to change rapidly. Clinical pharmacy is one area where change is at its most rapid, and the extent and speed of change poses a major challenge. Although this book covers a huge amount of ground, perhaps three main areas stand out to a non-pharmacist looking over the pharmacist's shoulder.

The first is the interpretation of clinical evidence about efficacy (or effectiveness) and harm of medicines. The number of new medicines, and studies of existing medicines, is exploding, producing more information than we can handle. The key to handling it is often to have good systematic reviews of good randomized trials, when the results will be secure.

The second is to reassess how we look at harm. Adverse events that are rare, but serious, will hardly ever be uncovered in randomized trials because of insufficient numbers. The trend is to perform large observational database studies of clinical practice, often with millions of participants; some of these will make us think again about medicines we have always considered safe.

The third is the translation of knowledge into clinical practice. There are any number of different ways this can affect clinical pharmacists—from use of expert computer systems to halve the rates of adverse drug reactions, to the generation of care pathways to deliver better outcomes for patients with less hassle and at lower cost. This requires real management skills—not bureaucracy, let me emphasize, which is what most of us see badged as management.

All three of these demand that clinical pharmacists have a range of skills, and the key is that they know and understand the tools of evidence-based healthcare. This includes management as well as knowledge of clinical trials in order to convert efficacy into effectiveness.

The use of evidence is massively misunderstood. The most often used definition of evidence-based medicine is the *'conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients.*[1] It is interesting that this was in response to a critic of evidence-based medicine, John Grimley Evans, who made a very similar point: *'Managers and trialists may be happy for treatments to work on average; patients expect their doctos to do better than that'.*[2]

Both of these emphasize the point that each of us is an individual, and that we have to treat average results from trials or reviews with a degree of caution, both for efficacy and harm. Robert Temple, a thoughtful FDA researcher, has recently commented that '*whether accomplished by sophisticated genetic or receptor analyses or by empirical observation of response to treatment, there is growing recognition that people are not all the same in the way that they respond to treatment and that groups that might*

1 Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS (1996). Evidence based medicine: what it is and what it isn't. *British Medical Journal* **312**, 71–2.
2 Grimley Evans J (1995). Evidence-based and evidence-biased medicine. *Age and Ageing*, **24**, 461–3.

respond differently should be studied, a change from the established wisdom of conducting trials with broad entry criteria while eschewing subset analyses'.[3]

There are some intriguing results out there, relating differences in efficacy to genetic polymorphisms affecting drug absorption and metabolism, the way drugs pass the blood–brain barrier, as well as changes in receptors. Keeping up and coping with these changes is by no means going to be easy, let alone incorporating them into clinical pharmacy. All we can be sure of is that more change is on the way.

Andrew Moore
Chief Editor, *Bandolier*
2006

3 Temple RJ (2005). Enrichment designs: efficiency in development of cancer treatments. *Journal of Clinical Oncology* **23**, 4838–9.

Preface to the second edition

The second edition of this book sees some significant revisions following feedback on the first edition and also developments in therapeutics. We have been encouraged to see the use of the first edition and also the production of the *Oxford American Handbook of Clinical Pharmacy* which has borrowed extensively from our work.

Clinical pharmacy services are only as good as the pharmacists who provide them, and there are still battles to be fought and won. It remains a disappointment that clinical pharmacy in the UK has not embraced the academic rigour seen in some countries and that the research culture inbred into junior doctors has yet to infect pharmacists in the same way.

This book is the distillation of 60–70 years of combined experience between the authors with the hope that it will contribute to assisting clinical pharmacists fulfil their potential. The book is organized into chapters that follow, we hope, a logical layout, with additional information organized into chapters designed to provide additional know-how. This handbook was never perceived as a formulary, but hopefully it will provide wisdom that can be used at the bedside, in the department, or on call.

The Oxford Handbook series is well established and although pharmacists have used many of the volumes, this is the first is written specifically for pharmacists. We hope that it will prove useful to clinical pharmacy practitioners and teachers.

PW
MM
MS
NS
2011

Preface to the first edition

One of the authors began their clinical pharmacy career at a time when pharmacists entered a ward with trepidation and more than once was shouted at by a feisty ward sister protecting her territory. Since then, things have moved on a long way such that an internationally renowned surgeon stated recently that clinical pharmacy (provided by his capable clinical pharmacist) was one of the best things anyone had provided for him in his professional career.

This illustrates, perhaps, that clinical pharmacy services are only as good as the pharmacists who provide them and there are still battles to be fought and won. It remains a disappointment that clinical pharmacy in the UK has not embraced the academic rigor seen in some countries and that the research culture inbred into junior doctors has yet to infect pharmacists in the same way.

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Symbols and abbreviations

↑	increased
↓	decreased
>	greater than
<	less than
♂	male
♀	female
°	degrees
A&E	accident and emergency
A&W	alive and well
AAA	abdominal aortic aneurysm
ABC	airway, breathing, and circulation
abdo	abdominal
ABPI	Association of the British Pharmaceutical Industry
ACE	angiotensin-converting enzyme
ACV	assist control ventilation
ADR	adverse drug reaction
AF	atrial fibrillation
AFB	acid-fast bacilli
ALP	alkaline phosphatase
ALT	alanine aminotransferase
APPT	activated partial thrombin time
AS	ankylosing spondylitis
AST	aspartate aminotransferase
AUC	area under the plasma concentration curve
AV	arteriovenous
BiPAP	bilevel positive airway pressure
BMI	body mass index
BMR	basal metabolic rate
BNF	*British National Formulary*
BP	blood pressure
BPH	benign prostatic hyperplasia
BSA	body surface area
C/O	complaining of
CAPD	continuous ambulatory peritoneal dialysis
CAVD	continuous arteriovenous haemodialysis

CAVH	continuous arteriovenous haemofiltration
CD	controlled drug
CHF	congestive heart failure
C-MRSA	community-acquired MRSA
CMV	continuous mandatory ventilation
CNS	central nervous system
CO_2	carbon dioxide
COC	combined oral contraceptive
COPD	chronic obstructive pulmonary disease
COSHH	Control of Substances Hazardous to Health
CPAP	continuous positive airway pressure
CSF	cerebrospinal fluid
CTC	common toxicity criteria
CVC	central venous catheter
CVP	central venous pressure
CVS	cardiovascular system
CVVHDF	continuous venovenous haemodiafiltration
CXR	chest X-ray
CYP450	cytochrome P450
Da	dalton
DBP	diastolic blood pressure
DDx, ΔΔ	differential diagnosis
DHx	drug history
DIC	disseminated intravascular coagulation
DM	diabetes mellitus
DOE	disease-orientated evidence
DTI	direct thrombin inhibitor
DUE	drug-use evaluation
DVT	deep vein thrombosis
Dx, Δ	diagnosis
E/C	enteric-coated
EBM	evidence-based medicine
ECF	extracellular fluid
ECG	electrocardiogram
eGFR	estimated glomerular filtration rate
ESBL	extended-spectrum β-lactamases
EU	European Union
FH	family history
G6PD	glucose 6-phosphate dehydrogenase
GABA	γ-aminobutyric acid

GCP	good clinical practice
GFR	glomerular filtration rate
GI	gastrointestinal system
GIT	gastrointestinal tract
GMP	good manufacturing practice
GOR	glucose oxidation rate
GORD	gastro-oesophageal reflux disease
GP	general practitioner
GSL	general sales list
GTN	glyceryl trinitrate
HbA_{1c}	glycosylated haemoglobin
HD	haemodialysis
HDL	high-density lipid
HDF	haemodiafiltration
HF	haemofiltration
HIT	heparin-induced thrombocytopenia
HIV	human immunodeficiency virus
HPA	Health Protection Agency
HPC	history of presenting complaint
HRS	hepatorenal syndrome
HRT	hormone replacement therapy
IA	intra-arterial
ICF	intracellular fluid
IM	intramuscular
IMP	investigational medicinal product
IMV	intermittent mandatory ventilation
INR	international normalized ratio
IO	intra-osseous
IPS	Institute of Purchasing Supply
ITU	intensive therapy unit
IV	intravenous
Ix	investigations
JVP	jugular venous pressure
K^+	potassium
KCCT	kaolin cephalin clotting time
LFT	liver function test
LMWH	low molecular weight heparin
LTOT	long-term oxygen therapy
M/R	modified-release
MAOI	monoamine oxidase inhibitor

MARS	molecular absorbent recirculating system
MCH	mean corpuscular haemoglobin
MCHC	mean corpuscular haemoglobin concentration
MCV	mean cell volume
MDA	Medical Devices Agency
MDI	metered-dose inhaler
MDS	monitored dose system
MHRA	Medicines and Healthcare Products Regulatory Agency
MI	myocardial infarction
MIC	minimum inhibitory concentration
MOAI	monoamine oxidase inhibitor
MRSA	meticillin-resistant *Staphylococcus aureus*
MSSA	meticillin-susceptible *Staphylococcus aureus*
NBM	nil by mouth
ng	nanogram
NGT	nasogastric tube
NHS	National Health Service
NICE	National Institute of Health and Clinical Excellence
NNH	number needed to harm
NNRTI	non-nucleoside reverse transcriptase inhibitor
NNT	number needed to treat
NPSA	National Patient Safety Agency
NSAID	non-steroidal anti-inflammatory drug
NSF	National Service Framework
NSTEMI	non-ST-segment elevation myocardial infarction
NYHA	New York Heart Assocation
O/E	on examination
O_2	oxygen
ortho	bones and joints
PA	psoriatic arthritis
PABA	para-amino benzoic acid
$PaCO_2$	partial pressure of carbon dioxide in arterial blood
PaO_2	partial pressure of oxygen in arterial blood
PC	presenting complaint
PCC	prothrombin complex concentrate
PCI	percutaneous coronary intervention
PE	pulmonary embolism
PEEP	Positive end-expiratory pressure
PEG	percutaneous endoscopic gastroscopy
PGD	patient group direction

PICC	peripherally inserted central catheter
PMCPA	Prescription Medicines Code of Practice Authority
PMH	past medical history
PMR	prescription medication records
PMS	pre-menstrual syndrome
PNS	peripheral nervous system
po	per os (by mouth)
POD	patient's own drug
POEM	patient-orientated evidence that matters
POM	prescription-only medicine
PONV	postoperative nausea and vomiting
POP	progestogen-only pill
PPI	proton pump inhibitor
ppm	parts per million
pr	per rectum (by the rectum)
prn	pro re nata (as required)
PSV	pressure support ventilation
PT	prothrombin time
PUD	peptic ulcer disease
QP	qualified person
RA	rheumatoid arthritis
RBC	red blood cell
Resp	respiratory system
RPSGB	Royal Pharmaceutical Society of Great Britain
SBOT	short-burst oxygen therapy
SBP	systolic blood pressure
SC	subcutaneous/ly
S/R	systems review
SH	social history
SIMV	synchronous intermittent mandatory ventilation
SOB	short of breath
SPC	summary of product characteristics
SR	sinus rhythm
SSRI	selective serotonin re-uptake inhibitor
stat	at once
STEMI	ST-segment elevation myocardial infarction
T_3	tri-iodothyronine
T_4	thyroxine
T_{max}	time to maximum drug concentration
TB	tuberculosis

TBC	to be confirmed/awaiting confirmation
TBG	thyroid-binding globulin
TDM	therapeutic drug monitoring
TENS	transcutaneous electronic nerve stimulation
TG	triglyceride
TIA	transient ischaemic attack
TPN	total parenteral nutrition
TNF	tumour necrosis factor
TPO	thyroid peroxidase
TRH	thyrotrophin-releasing hormone
TSH	thyroid-stimulating hormone
t-PA	tissue plasminogen activator
U&E	urea and electrolytes
UFH	unfractionated heparin
UKMI	UK Medicines Information
v/v	volume in volume
v/w	volume in weight
VAC	vacuum-assisted closure
VAS	visual analogue scale
VAT	value added tax
VF	ventricular fibrillation
VRE	vancomycin resistant enterococci
VRSA	vancomycin resistant MRSA
VT	ventricular tachycardia
VTE	venous thromboembolism
VV	venovenous
WCC	white cell count
w/v	weight in volume
w/w	weight in weight
WHO	World Health Organization

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