Emergencies in Medical Practice

EDITED BY

C. ALLAN BIRCH

TENTH EDITION

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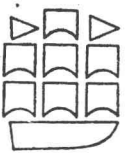

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Preface to the Tenth Edition

REVISION for this tenth edition has been a continuous process since the ninth appeared. The arrangement of chapters remains the same but much pruning has been needed to accommodate new material. Twelve of the 32 contributors are new. Only three of the original 19 authors of 1948 remain (Birch, Cheetham and Avery Jones). Retirement and change of interest, but death in only one case, has caused changes in the authorship of seven chapters. Dr Wilkinson's account of 'Emergencies in Blood Diseases' has been taken over by Dr John MacIver, also of Manchester. Surgeon Captain Peter Preston, Professor of Naval Medicine, fills the gap caused by the death of Surgeon Captain J. M. Cliff. Professor G. M. Bull, because his contact with renal disease has lessened, has handed his chapter to Dr J. M. Goldsmith of the Urological Centre in Liverpool. David Pyke continues from King's College Hospital the authoritative account of diabetic emergencies originally written by Wilfrid Oakley. Dr Bertram Mandelbrote of Oxford gives an account of psychiatric emergencies previously written by Denis Leigh. Roger Williams and Martin Smith, who have made liver disease one of the growing points of medicine, contribute a section on hepatic coma. Gillian Hanson from her wide experience of intensive care at Whipps Cross Hospital writes on 'Resuscitation' in place of Sherwood Jones and has helped me to bring the account of postoperative emergencies up-to-date. Thelwall Jones in retirement has been replaced by Professor Schilling and J. M. Harrington. Dr R. E. Irvine and Dr Theodore Strouthidis, from their experience at St Helen's Hospital, Hastings, and the country's newest geriatric unit at Bexhill, emphasise special aspects of medical emergencies in old people.

This is one of the few medical textbooks which has survived for over 25 years and its success is very gratifying. Of the many doctors who have helped me to produce this tenth edition I must first record my grateful thanks to Bobbie Irvine, the clinical tutor at Hastings, for his kindness in allowing me to maintain contact with clinical medicine in two acute hospitals and the Postgraduate Centre. Other Hastings doctors who have helped me include Gwyn Roberts, M.S., F.R.C.S. (surgeon and my former H.P.); Duncan Lawrie (cardiologist); Harry Middleton and Stephen Bramwell (anaesthetists); Kathleen J. Harrison (haematologist) and Eurwen Innes (rheumatologist), as well as many registrars. In addition I have corresponded with many professional people, particularly Dr A. S. R. Peffers of

the Air Corporations Joint Medical Service; Mr S. R. Speller, O.B.E., LL.B., Ph.D., late Secretary and Director of Education of the Institute of Hospital Administrators; David Maclean, F.R.C.S., of the Surgical Unit of the London Hospital and Robert Sells, F.R.C.S., of Liverpool. Lord Platt and Dr John Surtees of Eastbourne have given valuable advice. Mr D. B. Mathieson, Chief Pharmacist at The Royal East Sussex Hospital, Hastings, has willingly answered many queries. All contributors have been very patient with my editorial actions in some of which they have shared.

Many of the lists in the appendices of earlier editions are now unnecessary and have been deleted. The temptation to flood the text with references has been resisted without, it is hoped, making the statements too dogmatic. I have not sought to include detailed descriptions of all emergency procedures, feeling that hospital doctors should seek instruction by colleagues where necessary.

Tables and figures have been numbered by chapter and not serially. The words intravenous, intravenously and intramuscular appear so often in the text that they have been replaced by i v and i m. I am grateful to many doctors who have written advice and criticism. I will be glad to have correspondence about this edition. It will be carefully considered by Colin Ogilvie who I hope will become editor as well as remaining a contributor next time.

Although medicine is my main interest my wife has seen to it that I have continued with other pursuits and I have not neglected my bees entirely. Secretarial work has been managed personally at Salter's Corner with some professional help from Mrs Marion Packer. Messrs Churchill Livingstone have been very patient with my efforts to produce a perfect edition.

SALTER'S CORNER,
HASTINGS, May 1976.

C. Allan Birch

From the Preface to the First Edition

A MEDICAL emergency is any condition or circumstance of a patient which calls for immediate action other than surgery. Just what conditions might be included in this definition is a matter of opinion and the doctor's list, consisting mostly of absolute emergencies, will be shorter than the patient's which includes the relative ones.

Our methods for dealing with urgent and non-urgent illnesses differ. In the latter it is not very important whether the diagnosis is made to-day or to-morrow and so there is time to consider every detail. In the urgent case, however, a diagnosis must be made at once. We must recognise what matters at the moment and there is rarely time to appeal to special diagnostic methods.

When events are moving fast, it is the physician who is deeply versed in the natural history of disease who is likely to be of the greatest service to the patient in peril of his life. In the words of Professor J. A. Ryle, 'Eyes without the microscope, ears without the stethoscope, wits without the help of chemistry and radiology, not that we should deny ourselves the proper use of these, can often carry us a long way.' In an emergency they may have to carry us the whole way.

Another important aspect of emergencies which it behoves us to remember is the anxiety of the patient and his relatives. When summoned we should go at once, preserving the equanimity which Osler taught us to cultivate, yet avoiding the bustle and bounce against which Trotter warned us. Our attitude should be one of alertness in diagnosis, safety in treatment and care in what we say.

With these principles in mind I started some years ago to prepare statements on the treatment of the acute and urgent illnesses which came my way. I had found that clear and concise instructions on what to do in these emergencies were scattered amongst the sections on general therapeutics in medical text books.

When I reviewed my notes with a view to publication it was apparent that I could not hope to deal adequately with all aspects of the subject. I therefore sought the help of colleagues in the various fields of medicine. Our aim has been to provide information as accurate and explicit as possible for the practitioner and hospital physician faced with an acutely ill patient or a critical situation. As a mere list of treatments would be dull, some discussion has been included on diagnosis and the principles on which treatment is based. Details are given of important practical points such as where the rarer drugs may be obtained, and the telephone numbers which might be needed in an emergency. References to original work have been included only in a few special instances.

LONDON, 1948 C. ALLAN BIRCH

Acknowledgement

THE illustration, 'Colours for Medical Gas Cylinders', which appears facing page 68, is reproduced from BS 1319 : 1955 by permission of the British Standards Institution, 2 Park Street, London WIA 2BS.

Note on SI Units

TRADITIONAL and SI units are given in the text, since this edition appears when the change over to SI units is not completed everywhere. It is hoped that the period when both units are in use will be short, but to help the reader who may be uncomfortable with SI units and also to facilitate the reading of articles written before 1975 conversion factors are given in the table reproduced, slightly altered, by kind permission, from *Practical Paediatric Problems*, 4th edition, 1975, by Professor J. H. Hutchison, CBE, MD, London: Lloyd-Luke. Alternatively nomograms can be used.

The SI system (*Système International d'Unités*) was recommended in 1960 by the General Conference of Weights and Measures. It is based on seven fundamental units: metre, kilogram, second, ampère, kelvin, candela and mole. In it the new unit for chemical measurement is the mole (mol). Strictly this is the amount of a substance which contains as many atoms as 0·012 kg of carbon 12. In practice

$$\text{a mole} = \frac{\text{Weight in grams}}{\text{Molecular weight (MW)}}$$

The unit of volume in SI units is the cubic metre but as this is so large the litre or cubic decimetre is used in clinical chemistry. The old term 'mg per 100 ml' (often erroneously stated as 'mg per cent') becomes mg/dl.

For many measurements the amounts will be expressed in millimoles per litre (mmol/l). For convenience other fractions or multiples of the basic unit have been defined.

Factor	*Name*	*Symbol*
10^{12}	tera-	T
10^{9}	giga-	G
10^{6}	mega-	M
10^{3}	kilo	k
10^{2}	hecto-	h
10^{1}	deca-	da
10^{-1}	deci-	d
10^{-2}	centi-	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p
10^{-15}	femto	f
10^{-18}	atto	a

Measurements of plasma electrolytes are already expressed in SI units, for example, plasma sodium 140 mmol/l, and these will not alter but because the molecular weight of glucose is 180 a blood glucose of 180 mg/100 ml becomes 10 mmol/l. For bilirubin it is assumed that it is unconjugated and has a MW of 585 but as, by convention, it is desirable to use units resulting in numerical values between 0·1 and 1 000 the micromol is used instead of the mmol to produce a normal range of about 1–20μmol/l.

Although there is a recommendation to express haemoglobin in SI units it will probably remain g/dl, with red cells as 10^{12}/l (instead of 10^{3}/mm^{3}), conversion factor 10^{6}. PCV (haematocrit) is no longer given as a percentage but as a ratio of two measurements. Thus 40 per cent becomes 0·40 (conversion factor 0·01).

For the present, column measurements (BP and CVP) will continue to be stated in mmHg and cm water. When conversion is required 1 mmHg equals 133 pascals and 1 cm water equals 98 pascals.

pH is not excluded by the SI system and since it is on a logarithmic scale it cannot be simply converted by a factor to hydrogen ion concentration in litres of solution. It may be retained until it is decided to adopt reporting H ion concentration in mmol/l.

The reporting of enzyme activity is not altered by the adoption of SI units. The recommended convention at present is units/l.

Drugs are prescribed in mass units but when estimated in body fluids in the laboratory the result is generally expressed in SI units although the precise convention is not completely agreed.

Proteins and materials of uncertain molecular weight are expressed as mass concentrations per litre, i.e. g/l (not mg/100 ml). To convert mg/100 ml to mmol/l we divide by the molecular weight and multiply by 10.

Some easily remembered approximate factors to convert SI units back to traditional units are:

urea, multiply by 6

calcium, multiply by 4

glucose, multiply by 18.

For other conversions the table should be consulted or a pocket converter such as the one issued by St Thomas' Hospital or used by Ciba Laboratories.

Conversion Factors for SI Units

	MW	From SI Units	To SI Units
Amino-acid nitrogen	14·01		
Plasma		mmol/l × 1·401 = mg/dl	mg/dl × 0·714 = mmol/l
Urine		mmol/24 hr × 14·01 = mg/24 hr	mg/24 hr × 0·0714 = mmol/24 hr
Ammonium	17·03	μmol/l × 1·703 = μg/dl	μg/dl × 0·587 = μmol/l
Barbiturate	184·2	μmol/l × 0·0184 = mg/dl	mg/dl × 54·29 = μmol/l
Bilirubin	584·7	μmol/l × 0·0585 = mg/dl	mg/dl × 17·1 = μmol/l
Calcium	40·08		
Plasma		mmol/l × 4·008 = mg/dl	mg/dl × 0·250 = mmol/l
Urine		mmol/24 hr × 40·08 = mg/24 hr	mg/24 hr × 0·0250 = mmol/24 hr
Catecholamines (Urine)	183·2	μmol/24 hr × 183 = μg/24 hr	μg/24 hr × 0·00546 = μmol/24 hr
Cholesterol	386·7	mmol/l × 38·7 = mg/dl	mg/dl × 0·0259 = mmol/l
Copper	63·54		
Plasma		μmol/l × 6.35 = μg/dl	μg/dl × 0·157 = μmol/l
Urine		μmol/24 hr × 63.5 = μg/24 hr	μg/24 hr × 0·0157 = μmol/24 hr
Cortisol	362·5	nmol/l × 0·0362 = μg/dl	μgdl/ × 27·6 = nmol/24 hr
Creatinine	113·1		
Plasma		μmol/l × 0·0113 = mg/dl	mg/dl × 88·4 = μmol/l
Urine		mmol/24 hr × 0·113 = g/24 hr	g/24 hr × 8·84 = mmol/24 hr
Ethanol (Alcohol)	46·07	mmol/l × 4·607 = mg/dl	mg/dl × 0·217 = mmol/l
Fat (Faecal) (as stearic acid)	284·5	mmol/24 hr × 0·284 = g/24 hr	g/24 hr × 3·52 = mmol/24 hr
Fibrinogen	Uncertain	g/l × 100 = mg/dl	mg/dl × 0·01 = g/l
Glucose	180·2		
Blood or Plasma		mmol/l × 18·02 = mg/dl	mg/dl × 0·0555 = mmol/l
Urine		mmol/l × 0·0180 = g/dl	g/dl × 55·5 = mmol/l
CSF		as for blood or plasma	as for blood or plasma
HMMA (or VMA) (Urine)	198·2	μmol/24 hr × 0·198 = mg/24 hr	mg/24 hr × 5·05 = μmol/24 hr
Hydroxyproline (Urine)	131·1	mmol/24 hr × 131·1 = mg/24 hr	mg/24 hr × 0·00763 = mmol/24 hr

Conversion Factors for SI Units—contd.

	MW	From SI Units	To SI Units
Iron and TIBC (Total Iron Binding Capacity)	55·85	μmol/l × 5·59 = μg/dl	μg/dl × 0·179 = μmol/l
Lead	207·2		
Blood		μmol/l × 20·7 = μg/dl	μg/dl × 0·0483 = μmol/l
Urine		μmol/24 hr × 207 = μg/24 hr	μg/24 hr × 0·00483 = μmol/24 hr
Magnesium	24·31		
Plasma		mmol/l × 2·43 = mg/dl	mg/dl × 0·411 = mmol/l
Urine		mmol/24 hr × 24·3 = mg/24 hr	mg/24 hr × 0·0411 = mmol/24 hr
Oestriol (Urine)	288·4	μmol/24 hr × 0·288 = mg/24 hr	mg/24 hr × 3·47 = μmol/24 hr
Phenylalanine	165·2	μmol/l × 0·0165 = mg/dl	mg/dl × 60·5 = μmol/l
Phosphate	30·97		
Serum		mmol/l × 3·10 = mg/dl	mg/dl × 0·323 = mmol/l
Urine		mmol/24 hr × 0·0310 = g/24 hr	g/24 hr × 32·3 = mmol/24 hr
Pregnanediol (Urine)	320·5	μmol/24 hr × 0·320 = mg/24 hr	mg/24 hr × 3·12 = μmol/24 hr
Pregnanetriol (Urine)	336·5	μmol/24 hr × 0·336 = mg/24 hr	mg/24 hr × 2·97 = μmol/24 hr
Protein	Uncertain	g/l × 0·1 = g/dl	g/dl × 10 = g/l
Serum Albumin	Uncertain	g/l × 0·1 = g/dl	g/dl × 10 = g/l
CSF Protein	Uncertain	g/l × 100 = mg/dl	mg/dl × 0·01 = g/l
Protein-bound Iodine	126·9	nmol/l × 0·0127 = μg/dl	μg/dl/78·8 = nmol/l
Salicylate	138·1	mmol/l × 13·81 = mg/dl	mg/dl × 0·0724 = mmol/l
17-Ketosteroids (Urine) (as dehydroepiandrosterone)	288·4	μmol/24 hr × 0·288 = mg/24 hr	mg/24 hr × 3·47 = μmol/24 hr
Thyroxine	776·9	nmol/l × 0·0777 = μg/dl	μg/dl × 12·87 = nmol/l
Triiodothyronine	651·01	nmol/l × 0·651 = ng/dl	ng/dl × 1·54 = nmol/l
Triglyceride (as triolein)	885·4	mmol/l × 88·5 = mg/dl	mg/dl × 0·0113 = mmol/l
Urate (uric acid)			
Plasma	168·1	mmol/l × 16·81 = mg/dl	mg/dl × 0·0595 = mmol/l
Urea	60·06	mmol/l × 6·01 = mg/dl	mg/dl × 0·166 = mmol/l
Po_2 } Pco_2 }	—	kPa × 7·52 = mmHg	mmHg × 0·133 = kPa

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ACUTE POISONING
THE HAZARDS OF MEDICAL PROCEDURES
ACUTE (NON-SURGICAL) ABDOMINAL CATASTROPHES
OTHER (NON-SURGICAL) ABDOMINAL EMERGENCIES
FITS, FAINTS AND UNCONSCIOUSNESS
BITES AND STINGS AND MISCELLANEOUS EMERGENCIES
MEDICO-LEGAL AND OTHER NON-CLINICAL EMERGENCIES
POST-OPERATIVE MEDICAL EMERGENCIES (with Gillian C. Hanson)
SOME PRACTICAL PROCEDURES

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HEPATIC COMA AND PRECOMA
(with Roger Williams)

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