Acute Stroke Care

You have just encountered a possible stroke patient. You ask yourself, what should I do first? How do I know it is a stroke? Is it too late to reverse the damage? How do I do the right things in the right order? This book will help you answer these critical questions. It provides practical advice on the care of stroke patients in a range of acute settings. As new and effective treatments become available, and designated stroke centers are created, this guidebook will help inform the healthcare professionals responsible for delivering care.

The content is arranged in chronological order, covering the things to consider in assessing and treating the patient in the emergency department, the stroke unit, and then on transfer to a rehabilitation facility. All types of stroke are covered.

A comprehensive set of appendices contain useful reference information including dosing algorithms, conversion factors, and stroke scales.

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Cambridge Pocket Clinicians

Cambridge Pocket Clinicians provide practical, portable, note-based guidance for medical trainees, junior doctors, residents, and those from outside the field seeking an accessible overview. Written making maximum use of lists, bullet points, summary boxes and algorithms, they allow the reader fast and ready access to essential information.

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A Manual from the University of Texas-Houston Stroke Team

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Every effort has been made in preparing this publication to provide accurate and up-to-date information which is in accord with accepted standards and practice at the time of publication. Although case histories are drawn from actual cases, every effort has been made to disguise the identities of the individuals involved. Nevertheless, the authors, editors and publishers can make no warranties that the information contained herein is totally free from error, not least because clinical standards are constantly changing through research and regulation. The authors, editors and publishers therefore disclaim all liability for direct or consequential damages resulting from the use of material contained in this publication. Readers are strongly advised to pay careful attention to information provided by the manufacturer of any drugs or equipment that they plan to use.

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Preface

You have just been called to the emergency department to evaluate and treat a possible stroke patient. You ask yourself: What should I do first? How do I know it is a stroke? Is it too late to reverse the damage, and if not, how do I do it? How do I make sure that I do things correctly during the first day or so to prevent worsening? This handbook is designed to answer these real-life questions. As new and effective stroke treatments are now available, and the creation of designated stroke centers for optimal care of stroke patients is endorsed and put into practice, there is a need for a guidebook that will help enlarge and inform the group of healthcare professionals responsible for delivering this care.

The handbook has been compiled from the day-to-day experiences of the Stroke Team at the University of Texas Medical School – Houston in caring for acute stroke patients on a dedicated in-patient stroke service. It describes the options and underlying rationale for making treatment decisions for stroke patients in the emergency department, stroke unit, neurological critical care unit, and pre-rehabilitation setting. It is evidence-based where evidence exists, but much of what is included reflects our best interpretation of what should be done in the absence of conclusive data.

It is intended as a practical guide to be used by medical students, house officers, and other clinicians with first-hand responsibility for the "nuts and bolts" care of these patients.

The handbook has been arranged generally in chronological order, covering the things one should consider in assessing and treating the patient in the emergency department (ED), then the stroke unit, and then on discharge or transfer to a rehabilitation facility.

Having dealt with the diagnosis of stroke and the essential first steps in the emergency department, we then consider the management of each type of stroke in turn. We begin with ischemic stroke, followed by separate chapters detailing several important issues in ischemic stroke management; the use of thrombolytic therapy, how to approach neurological deterioration, selecting appropriate secondary stroke prevention, and, finally, transient ischemic attack. Then we move on to intracerebral hemorrhage and subarachnoid hemorrhage, before ending chapters on how to organize stroke care and the principles of rehabilitation and stroke recovery.

There is more detail in the ischemic stroke chapter because it represents the initial and most complex decision-making in the ED. When called to the ED to see an acute stroke patient, most often it will be an ischemic stroke, and since the therapy for this condition is most urgent, you should start by assuming it is an ischemic stroke. If, during your evaluation of the patient, you determine that the patient has a TIA or hemorrhage, then many of the same principles outlined in the ischemic stroke chapter also will apply, but you will find specific information for patients with TIA or hemorrhage in their appropriate chapters.

The appendices contain useful reference information that is referred to in the text but is detailed and hard to remember, such as dosing algorithms and conversion factors, standing

orders, drug protocols, various stroke scales, and detailed description of imaging sequences and brainstem syndromes.
* In the text, an asterisk marks where there is sufficient evidence to make a strong recommendation based on randomized trials or consensus statements. However, for most decisions, such data do not exist, and we have not hesitated to include our advice based on our collective experiences, and observations of where mistakes are frequently made, and we have emphasized by bold lettering some of those areas where there are particular important values or pieces of information that can help facilitate proper treatment and avoid errors.

We emphasize that this is a **manual for acute stroke diagnosis and treatment**, and hence some disclaimers are needed for what this work does **not** cover. We presume the reader has a basic knowledge of neuroanatomy and vascular physiology, covered in medical and nursing school curricula. None of this is covered, though we provide a refresher for vascular anatomy in an appendix. Similarly, we presume the reader has a basic knowledge of the neurological examination and its common findings in stroke patients, covered in courses on physical diagnosis. Again, this is not covered, though we provide a review of some of the more rare brainstem syndromes in an appendix. Finally, we recognize that a detailed description of the epidemiology, pathology, and outcome of stroke and all of its subtypes, and even many aspects of its diagnosis, treatment, and prevention are left uncovered. For these, we refer the reader to standard excellent texts on cerebrovascular disease.

We hope that this work will help the reader become more comfortable in dealing with the complexities of urgent decision-making, thereby increasing the number of medical personnel engaged in providing acute stroke care, with the end result of reducing the devastation caused by stroke in our society.

Abbreviations

ACA	anterior cerebral artery
ACE	angiotensin converting enzyme
AHA	American Heart Association
ARR	absolute risk reduction
ASA	American Stroke Association
AVM	arteriovenous malformation
CBC	complete blood count
CBV	cerebral blood volume
CEA	carotid endarterectomy
CN	cranial nerve
CPP	cerebral perfusion pressure
CSF	cerebrospinal fluid
CT	computed tomography
CTA	CT angiography
CUS	carotid ultrasound
DBP	diastolic blood pressure
DSA	digital subtraction angiography
DVT	deep venous thrombosis
ED	emergency department
EEG	electroencephalogram
EKG	electrocardiogram
FDA	Food and Drug Administration (USA)
FFP	fresh frozen plasma

GCS	Glasgow coma scale
HIT	heparin-induced thrombocytopenia
HITTS	heparin-induced thrombocytopenia with thrombotic syndrome
IA	intra-arterial
ICA	internal carotid artery
ICH	intracerebral hemorrhage
ICP	intracranial pressure
ICU	intensive care unit
IM	intramuscular
INR	international normalized ratio
IV	intravenous
IVH	intraventricular hemorrhage
LDL	low-density lipoprotein
LMN	lower motor neuron
LTAC	long-term acute care
MAP	mean arterial pressure
MCA	middle cerebral artery
MI	myocardial infarction
MRA	magnetic resonance angiogram
MRI	magnetic resonance imaging
NIH	National Institutes of Health
NIHSS	National Institutes of Health Stroke Scale
NINDS	National Institute of Neurological Disorders and Stroke
NNH	number needed to harm
NNT	number needed to treat
NPO	nil per os (nil by mouth)
OT	occupational therapy
PCA	posterior cerebral artery
PEG	percutaneous endoscopic gastrostomy
PFO	patent foramen ovale

PO	per os (by mouth)
PT	physical therapy
PTT	partial thromboplastin time
RLS	right-to-left shunt
RRR	relative risk reduction
SAH	subarachnoid hemorrhage
SBP	systolic blood pressure
SC	subcutaneous
SNF	skilled nursing facility
ST	speech therapy
TCD	transcranial Doppler ultrasound
TEE	transesophageal echocardiogram
TIA	transient ischemic attack
TPA	tissue plasminogen activator
TTE	transthoracic echocardiogram