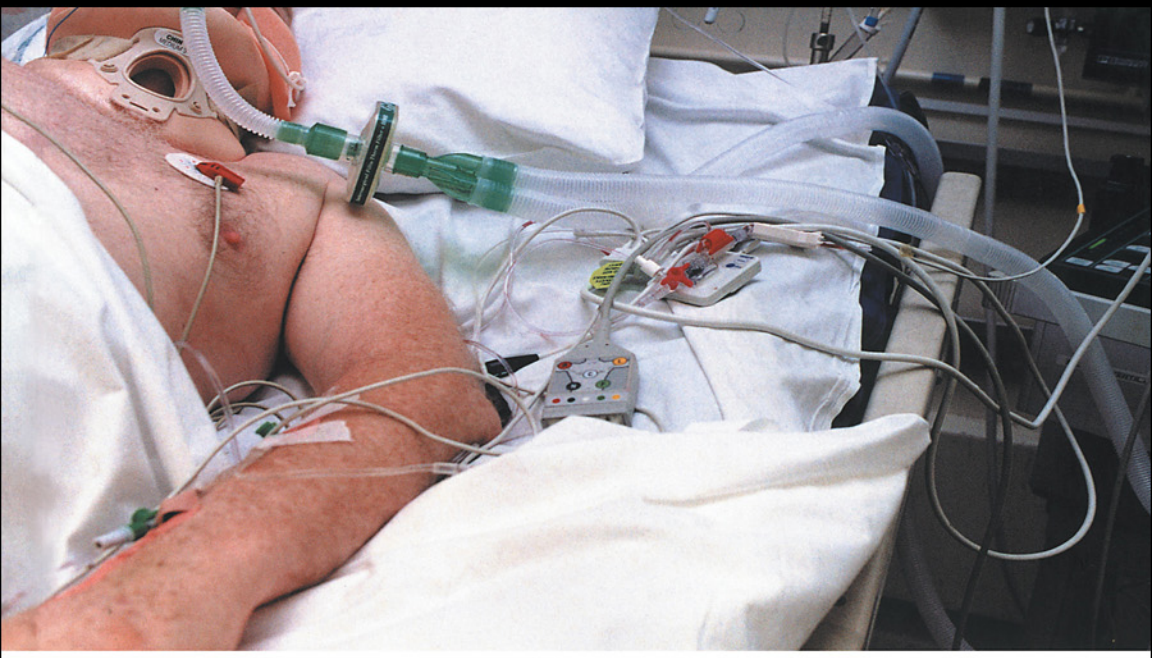

Intensive Care Nursing

A framework for practice

Philip Woodrow

'This is an excellent introduction for qualified nurses who are interested in intensive care nursing.'
Brian Belle-Fortune, *Nursing Times*

'I would certainly recommend the inclusion of this book on the reading list for registered nurses on intensive care courses and as a useful addition to the bookshelves in intensive care units.'
Annie Chellel, *Nursing Standard*

Intensive Care Nursing

Intensive care is one of the most rapidly developing areas of Healthcare. This introductory textbook is written specifically for qualified nurses who are working in intensive care units and also for those undertaking post-registration courses in the speciality. *Intensive Care Nursing* is structured in four parts. 'Fundamental Aspects' explores patient-focused issues of bedside nursing; 'Monitoring' describes the technical knowledge necessary to care safely for ICU patients; 'Pathophysiology and Treatments' illustrates the more common and specialised disease processes and treatments encountered; 'Developing Practice' looks at how nurses can use their knowledge and skills to develop their own and others' practice. This accessible text is:

- Comprehensive: it covers all the key aspects of intensive care nursing.
- User-friendly: it includes fundamental knowledge sections, introductions, chapter summaries, a glossary of key terms, extensive and up-to-date references and a comprehensive index.
- Clearly written: by an experienced university lecturer with a strong clinical background of working in intensive care nursing. He has also published widely in the nursing press.
- Practically-based: end-of-chapter clinical scenarios provide stimulating discussion and revision topics.

Intensive Care Nursing will be welcomed by ICU nurses throughout the world.

Philip Woodrow, MA, RGN, Dip.N., Grad. Cert. Ed., is a Senior Lecturer at Middlesex University, where he is responsible for ENB 100 courses in intensive care nursing.

Jane Roe is a Lecturer-Practitioner at St George's Hospital Medical School and Kingston University, St George's Hospital Intensive Therapy Unit.

What the reviewers said:

'An informed, well written and clinically focused text that has ably drawn together the central themes of intensive care course curricula and will therefore be around for many years…. Revision activities and clinical scenarios should encourage students to learn as they engage in analysing and reflecting on their everyday practice experiences. More experienced nurses will also find it a valuable reference source as a means of refreshing their ideas or in developing practice.'

John Albarran, *Faculty of Health and Social Care, University of the West of England*

'An excellent book which will be useful to nurses working in ICUs in many countries. The writers have managed to integrate theory with practice to produce an easy-to-read practical text which will be useful to both beginning and experienced ICU nurses.'

Kathy Daffurn, *Associate Professor and Co-Director Division of Critical Care, Liverpool Health Service, Liverpool, Australia*

'Incredibly comprehensive…this text should meet Woodrow's goal of contributing to the "further growth of intensive care nursing". It should find a place on the shelves of intensive care units, as well as in Higher Education institutions providing critical care courses. It will also be a welcome source of reference for nurses caring for critically ill patients outside of the intensive care unit.

Woodrow provides a balance between pathophysiology oriented aspects of nursing practice and the relationship between patient/family and nurses that is the very essence of intensive care nursing. The text is helpfully punctuated with activities for the reader, whilst the extensive

references also enable the reader to pursue specific aspects in greater depth.'

Ruth Endacott, *Adviser and Researcher in Critical Care*

'A book geared for practical use, it will be helpful to many intensive care nurses, especially those new to the discipline.'

Pat Ashworth, Editor, *Intensive and Critical Care Nursing*

Intensive care nursing

A framework for practice

■ *Philip Woodrow*

Clinical Scenarios by Jane Roe

LONDON AND NEW YORK

To the States or any one of them, or any city of the States, Resist much, obey little, Once unquestioning obedience, once fully enslaved, Once fully enslaved, no nation, state, city, of this earth, ever afterwards resumes its liberty.

Walt Whitman

Fashion, even in medicine.

Voltaire

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Preface

This book is for intensive care nurses. Intensive care nursing is a diverse speciality, and a text covering its every possible aspect would neither be affordable nor manageable to most clinical staff. This text, therefore, is necessarily selective, and will probably be most useful about 6 to 12 months into intensive care nursing careers. It assumes that readers are already qualified nurses, with experience of caring for ventilated patients, who wish to develop their knowledge and practice further. Discussion of clinical issues is therefore followed by implications for practice.

Knowledge develops and changes; controversy can, and should, surround most issues. Some controversies are identified, others are not. But every aspect of knowledge and practice should be actively questioned and constantly reassessed. If this book encourages further debate among practising nurses it will have achieved its main purpose.

Since a novice (Benner 1984) has little knowledge or experience, 'basic' nursing texts tend to explain almost everything. This book is for competent and advanced practitioners, however, whose knowledge and experience will vary. To help readers, 'fundamental knowledge' is listed at the start of many chapters, so that readers can pursue anything they are unsure about. Much 'fundamental knowledge' is related anatomy and physiology, and it would be a disservice to readers to displace other material for superficial summaries when there are many excellent anatomy and physiology texts available.

Any book is necessarily a pragmatic balance between the author's priorities and interests; this book represents mine. Part I concentrates on values and some of the 'basic' aspects of care that can be lost in the dehumanised technological ICU environment. Part II reviews various means of monitoring, including application to relevant problems (e.g. intracranial hypertension). The more common pathologies seen in ICUs are included in Part III as nurses need an understanding of pathophysiologies and treatments. Many more topics could be covered (some were removed during writing), but this is not fundamentally a book about pathophysiology and the cost of comprehensiveness would be the book remaining largely unused and unread. Finally, Part IV explores aspects of career development.

Any stage of professional development is a beginning rather than an end; to help readers develop further, each chapter concludes with 'further reading', which is generally restricted to recent and easily accessible books and articles. Full publication details are given in the References, pp. 539–67. A few classic key texts are also included in the

further reading sections and, where the original year of publication provides a historical context for material, I have included this with the year of the edition consulted (for example, Nightingale 1980 [1859]). The large numbers of specialist, general nursing and other medical journals means that new material is frequently appearing and readers should pursue current material through their libraries.

The clinical scenarios by Jane Roe provide an opportunity for nurses to apply the knowledge acquired in each chapter to a clinical situation.

I have tried to adopt Eliot's 'the word precise, but not pedantic'. The glossary explains technical terms that are likely to cause problems and the first occurrence of these have been highlighted in the text. Few laws of physics or medical formulae are included unless frequently used in clinical nursing practice. Many chapters identify issues surrounding families; this implicitly includes friends and all other significant visitors. A few chapters include references to statute and civil law; these are usually English and Welsh law, and so readers in Scotland, Northern Ireland and outside the United Kingdom should check applicability to local legal systems. I have tried to minimise errors, but some are almost inevitable in a text of this size; like any other source, this text should be read critically.

Although intensive care nursing is younger than most healthcare specialities, it already possesses a wealth of nursing knowledge and experience. I hope this book contributes to further growth of intensive care nursing, and enables readers to develop their own specialist practice.

Acknowledgements

I am grateful to everyone who has helped in the development of this text, especially Jane Roe (who has contributed so much as both author of the clinical scenarios and who has been a particularly conscientious reviewer of every chapter) and Fidelma Murphy (whose experience of both paediatric and general intensive care is combined in the chapter about nursing children in general ICUs). I would also like to thank all the reviewers who read and assisted with comments on the developing typescript: John Albarran, University of the West of England; Kate Brown and Maureen Fallon, Nightingale Institute, King's College University; Kay Currie, Glasgow Caledonian University; Lynne Harrison and Mandy Odell, University of Central Lancashire. Thanks also to Jane Fellows, who illustrated the book.

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I am grateful to everyone at Middlesex University for the support given towards this book, and for the sabbatical leave which enabled me to complete it. I would especially like to thank Sheila Quinn (Senior Lecturer, Middlesex University), who has helped me at so many stages of my career, and who first suggested I should write a textbook. I am grateful to Sue MacDonald (RM) for her comments toward the obstetrics chapter.

I would also like to thank everyone who has helped develop my ideas, especially past and present staff of the Whittington Hospital and all my past students and colleagues and clinical staff at Chase Farm and North Middlesex Hospital.

And of course this book would not have been possible without the encouragement and support of Routledge, in particular Alison Poyner and Moira Taylor.

Philip Woodrow, March 1999

Abbreviations

ACE	angiotensin converting enzyme
ACT	activated clotting time
ACTH	adrenocorticotrophic hormone
ADH	antidiuretic hormone
AF	atrial fibrillation
AIDS	acquired immune deficiency syndrome
AMV	assisted mandatory ventilation
ANF	atrial natriuretic factor (also called atrial natriuretic peptide =ANP)
ANP	atrial natriuretic peptide (also called atrial natriuretic factor =ANF)
APRV	airway pressure release ventilation
APSAC	anisolylated plasminogen streptokinase activator complex
ARDS	acute respiratory distress syndrome
AST	asparate transaminase
ATP	adenosine triphosphate
BE	base excess
BiPAP	biphasic/bilevel positive airway pressure
BMI	body mass index
BMR	basal metabolic rate
BNF	British National Formulary
BSA	body surface area
BUN	blood urea nitrogen
c/cal	calorie
CABG	coronary artery bypass graft
cAMP	cyclic adenosine monophosphate
CAPD	chronic ambulatory peritoneal dialysis

CAT	computerised axial tomography (see also CT)
CAVH	continuous arteriovenous haemofiltration (=ultrafiltration); rarely now used in ICU
CAVHD	continuous arteriovenous haemodialysis
CAVHDF	continuous arteriovenous haemodiafiltration
CCUs	coronary care units (US: critical care units)
CD4, CD8	CD=cluster designation, the numbers refer to different types
CFAM	Cerebral Function Analysing Monitor
CFM	Cerebral Function Monitors
CK	creatine kinase (formerly, creatine phosphokinase: CPK)
CMV	(1) cytomegalovirus; (2) controlled minute volume (depending on context)
COP	colloid osmotic pressure
COPD	chronic obstructive pulmonary disease
COSHH	Containment of Substances Hazardous to Health
CPAP	continuous positive airway pressure
CPB	cardiopulmonary bypass
CPK	creatine phosphokinase
CPP	cerebral perfusion pressure
CRRT	continuous renal replacement therapy
CSF	cerebrospinal fluid
CT	computerised tomography (see also CAT)
CVA	cerebrovascular accident (stroke)
CVP	central venous pressure
CWH	continuous venovenous haemofiltration
CWHD	continuous venovenous haemodialysis
CWHDF	continuous venovenous haemodiafiltration
Da	dalton (kilodalton: kDa)
DHHNK	diabetic hyperosmolar hyperglycaemic nonketotic coma
DIC	disseminated intravascular coagulation
E coli	*Escherichia coli*, a lactose-fermenting species of bacteria
$ECCO_2R$	extracorporeal carbon dioxide removal
ECMO	extracorporeal membrane oxygenators
EDRF	endothelium derived relaxing factor
EEC	electroencephalogram
EMD	electromechanical dissociation

EMRSA	epidemic strains of MRSA (see below)
EPIC	European Prevalence of Infection in Intensive Care
ERCP	endoscopie retrograde cholangiopancreatography
ESR	erythrocyte sedimentation rate
ESRF	endstage renal failure
ETT	endotracheal tubes
FDPs	fibrin degradation products
FEV	forced expiratory volume (so FEV1=forced expiratory volume at one second)
FFP	fresh frozen plasma
FiO_2	fraction of inspired oxygen (see Glossary)
FVC	functional ventilatory capacity
GABA	gamma aminobutyric acid
GBS	Guillain Barré syndrome
GCS	Glasgow Coma Scale
GI	gastrointestinal
GTN	glyceryl trinitrate
GvHD	graft-versus-host disease
HAI	hospital acquired infection (nosocomial)
HAS	human albumin solution (ie albumin for infusion)
HAV	hepatitis A virus
HbA	adult haemoglobin
HbF	fetal haemoglobin
HbS	sickle cell haemoglobin
HBV	hepatitis B virus
HCV	hepatitis C virus
HDU	high dependency unit
HDV	hepatitis D virus
HELLP	haemolysis elevated liver enzymes and low platelets
HES	hydroxyethyl starch
HEV	hepatitis E virus
HFJV	high frequency jet ventilation
HFOV	high frequency oscillatory ventilation
HFV	high frequency ventilation
HITTS	heparin-induced thrombocytopaenia and thrombosis syndrome

HIV	human immunosuppressive virus
HLA	human leucocyte antigen
HME	heat moisture exchanger
HUS	haemolytic uraemic syndrome
IABP	intra-aortic balloon pumps
ICP	intracranial pressure
Ig	Immunoglobulin (eg IgA=immunoglobulin A)
IL	interleukin
IMA	internal mammary artery
IMV	intermittent mechanical volume
iNO	inhaled nitric oxide
INR	international normalised ratio (of prothrombin time)
IPPB	intermittent positive pressure breathing
IPPV	intermittent positive pressure ventilation
IPR	individual performance review
IRDS	infant respiratory distress syndrome (see also RDS)
IRV	inverse ratio ventilation
IVOX	intravenous oxygenators
kPa	kilopascal
LDH	lactate dehydrogenase
LIMA	left internal mammary artery
LMAs	laryngeal mask airways
LVAD	left ventricular assist device
m/s	metres per second
MAP	mean arterial pressure
MCL	modified chest lead
MDMA	3–4 methylenedioxymethamphetamine (Ecstasy)
MI	myocardial infarction
mmol	millimole (unit for measuring chemicals)
MMV	mandatory minute ventilation
MODS	multiorgan dysfunction syndrome
MOF	multiorgan failure
MRSA	multiresistant (or methicillin resistant) *Staphylococcus aureus*
MSSA	methicillin sensitive *Staphylococcus aureus*
mv	millivolt

NAPQI	N-acetyl-p-bezoquinone imime
NIRS	near infrared spectroscopy
NPPV	noninvasive positive pressure ventilation
NSAID	nonsteroidal anti-inflammatory drug
PAC	pulmonary artery (Swan Ganz) catheters
PACP	pulmonary artery capillary pressure
PAFC	pulmonary artery flotation catheters
PaO_2	partial pressure of arterial oxygen
PAWP	pulmonary artery wedge pressure
PBC	primary biliary cirrhosis
PCA	patient controlled analgesia
PCOP	pulmonary capillary occlusion pressure
PCP	*Pneumocystis carinii* pneumonia
PCWP	pulmonary capillary wedge pressure
PDIs	phosphodiesterase inhibitors
PEEP	positive end expiratory pressure
PEG	percutaneous endoscopie gastrostomy
PEG	perfluorocarbon
PGE_2	prostaglandin E_2
PGI_2	prostaglandin I_2, also known as prostacyclin
pHi	intramucosal pH
ppm	parts per million
PS	pressure support
PSV	pressure support ventilation
PTCA	percutaneous coronary angioplasty
PTT	prothrombin time
PUFAs	polyunsaturated fatty acids
PVR	pulmonary vascular resistance
QALYs	Quality Adjusted Life Years
RAP	right atrial pressure
RDS	respiratory distress syndrome
REM	rapid eye movement
RNA	ribonucleic acid
RQ	respiratory quotient
RR	respiratory rate
RVEDP	right ventricular end diastolic pressure

SA	sinoatrial (node)
SBC	standardised bicarbonate
SEE	standardised base excess
SCUF	slow continuous ultrafiltration removal of ultrafiltrate, usually using a small-pore filter, so minimising solute removal; used only for removing/reducing fluid overload
SD plasma	solvent detergent plasma
SDD	selective digestive decontamination
SCOT	serum glutamic oxaloacetic transaminase
SIADH	syndrome of inappropriate antidiuretic hormone
SIMV	synchronised intermittent minute volume
SIRS	systemic inflammatory response syndrome; (formerly called septic inflammatory response syndrome)
SNP	sodium nitroprusside
SV	stroke volume
SVR	systemic vascular resistance
SWOT	strengths, weaknesses, opportunities, threats
TCNS	transcutaneous nerve stimulation (see TENS)
TENS	transcutaneous electrical nerve stimulation (see TCNS)
TIPS	transjugular intrahepatic portosystemic shunt
TMP	transmembrane pressure
TMR	total metabolic rate
TNF	tumour necrosis factor
t-PA, TPA	tissue plasminogen activator
TPN	total parenteral nutrition
TTP	thrombotic thrombocytopenia purpura
TV	tidal volume (also written at Vt)
UKTSSA	United Kingdom Transplant Support Service Authority
VAD	ventricular assist devices
VAP	ventilator associated pneumonia
V/Q	ventilation to perfusion ratio
VRE	vancomycin resistant enterococci
vWF	von Willebrand’s Factor

Part I
Fundamental aspects of ICU nursing

Part I explores issues that are fundamental to ICU nursing and can be read sequentially or used as a resource for later chapters.

It develops issues that may have been introduced during pre-registration courses, but which can too easily be lost in the technical demands of intensive care. The first chapter therefore explores the values underlying intensive care nursing; the second chapter develops these through outlining two influential moments in psychology. The third chapter examines issues about the environment in which intensive care patients are nursed. Intensive care units (ICUs) developed primarily from respiratory units, and so Chapters 4 and 5 discuss respiratory management while Chapter 6 reviews sedation. The human needs and problems of nursing rituals are explored in the chapters on pain management, pyrexia, nutrition, mouthcare, eyecare and skincare. The next two chapters then explore the extremes of age: paediatrics and older adults. Most ICU patients are immuno-compromised, and infection control is discussed in Chapter 15. The final chapter of this section applies ethical principles and theories to ICU nursing practice.

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Chapter 1
Nursing perspectives

Introduction

This book explores issues for intensive care nursing practice, and this first section establishes its core fundamental aspects. Nurses' salaries have always formed a major part of healthcare budgets: Endacott (1996) estimates that nursing accounts for three-quarters of ICU costs. Thus it is important for ICU nurses to clarify their roles in, and value to, healthcare in order to be able to 'articulate the importance of their role in caring for patients and their relatives' (Wilkinson 1992:196). To help readers to do this, this first chapter explores what nursing means in the context of intensive care and the following chapter outlines two schools of psychology (behaviourism and humanism) that have influenced healthcare and society.

The Department of Health publication *A Strategy for Nursing* (DoH 1989) identified four possible roles for nurses:

1 as surrogate parent
2 as technician
3 as contracted clinician
4 as advocate

Previously, Ashworth (1985) had identified similar role conflicts within ICUs:

1 the technician
2 the doctors' assistant
3 the carer for patients while others deal with technical treatment and maintenance
4 the 'prickly' professional

Both these documents raise issues of values and beliefs. Acknowledging and continuously re-evaluating our individual values and beliefs is part of human growth, so that examining nursing's values and beliefs within the context of our own area of practice is part of our professional growth. This is something that each nurse can usefully explore and there are a number of published exercises available in this respect (e.g. Manley 1994), but essentially it means working out a nursing philosophy for oneself. What is meant by this is not some esoteric message hung neatly on a wall and seldom read or practised—such as 'man is a bio-psycho-social being'—but, rather, simple values which may be more meaningful—such as 'remember our patients are human'.

This question of values is well illustrated by the semantic dilemma of whether to call the speciality 'Intensive Therapy' (ITU) or 'Intensive Care' (ICU)—in practice, the terms are often interchangeable, and many ICU staff value cure rather than care (Steel &