

FUNDAMENTALS

# Fundamentals of Applied Pathophysiology for Paramedics

EDITED BY  
**IAN PEATE**  
**SIMON SAWYER**



WILEY Blackwell



Fundamentals of

# **Applied Pathophysiology for Paramedics**



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EDITED BY

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*To all those health and care professionals all around the world who worked tirelessly during the COVID-19 pandemic*





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# Contributors

## **George Bell-Starr FdSc MCPara**

George began his career in paramedicine studying at the University of Worcester before starting with South Western Ambulance Foundation Trust as a newly qualified paramedic in 2017. He has continued to study, focusing particularly on clinical reasoning. His key areas of interest include mentoring, developing paramedic practice and frailty. In late 2020, he began training as an advanced practitioner in primary care within the Mid-Dorset Primary Care Network.

## **Carl Clare RN DipN MSc (Lond) PGDE (Lond)**

Carl began his nursing career in 1990 as a nursing auxiliary. He later undertook three years of student nurse training at Selly Oak Hospital (Birmingham), moving to the Royal Devon and Exeter Hospitals, then Northwick Park Hospital, and finally the Royal Brompton and Harefield NHS Trust as a resuscitation officer and honorary teaching fellow of Imperial College (London). Since 2006, he has worked at the University of Hertfordshire as a senior lecturer in adult nursing. His key areas of interest are long term illness, physiology, sociology and cardiac care. Carl has previously published work in cardiac care, resuscitation and pathophysiology.

## **Neil Coleman MSc**

Officer in the National Ambulance Service, Ireland

With a wealth of experience spanning over two decades in the National Ambulance Service, Neil is an Advanced Paramedic, Assistant Professor at University College Dublin, and former soldier and firefighter. Neil has actively contributed to the development and presentation of courses from entry-level first aid to the accreditation of a BSc programme. He has overseen several large-scale medical education programmes, including International Trauma Life Support, the Advanced Paramedic Programme (Ireland), and served as the Global Education Manager for a European-based College. Neil is dedicated to advancing healthcare education to ensure a lasting impact on the profession and the training of future paramedic professionals.

## **Sadie Diamond-Fox MCP ACCP (mFICM) BSc (Hons) RN PGCAHP NMP (V300) FHEA**

Sadie qualified as an adult nurse in 2008 and has since worked in various critical care departments. She progressed to her current advanced practice roles, which include advanced critical care practitioner, assistant professor in advanced critical care practice (FHEA) and regional advancing practice supervision and assessment lead for Health Education England. Sadie is also currently a second-year PhD candidate. She has an extensive teaching portfolio spanning multiple disciplines within postgraduate healthcare education, making a wide range of contributions at local and international levels. Her key areas of interest are postgraduate healthcare education, acute, emergency and critical care, physiology and pharmacology, advanced-level practice and simulation and virtual reality education modalities.

## **Terry Dore MSc PGDip HPE PGDip AP PGCert**

Terry worked for 20 years in Dublin Fire Brigade as a firefighter/paramedic and progressed to advanced paramedic after study at University College Dublin (UCD). He subsequently undertook a research MSc at UCD and a BSc (Hons) in paramedic studies in University of Limerick. He studied at the Royal College of Surgeons in Ireland and gained a postgraduate diploma in health professions education, becoming a clinical educator. He currently teaches advanced paramedic practitioners for the National Ambulance Service in Ireland and has recently begun an MSc in health, safety, and human factors at the Technological University Dublin. He has a keen interest in prehospital research and wishes to progress evidence-based prehospital practice. Terry is certified with both the Health and Care Professions Council and the Pre-Hospital Emergency Care Council as a paramedic and advanced paramedic in the United Kingdom and Ireland, respectively.



**Sarah Eastwood (nee Lumley) BHSc (Hons) BNurs (Hons) PGradDip**

Sarah began her paramedic career with Queensland Ambulance Service in Brisbane in 2012 while studying a double degree in paramedicine and nursing. Sarah then moved to Cairns upon qualifying as an advance care paramedic. Sarah undertook her postgraduate qualifications in paramedic science through Monash University and then completed her training as a critical care paramedic in 2021. Sarah also works as a flight care paramedic with the Queensland Ambulance Service. After working casually as an academic for Central Queensland University, Sarah recently accepted a lecturer position, where her main areas of interest are electrophysiology and clinical education. This is Sarah's first published writing.

**Derek Fox MSc EMS**

Derek is employed as a district officer/advanced paramedic and has been a member of Dublin Fire Brigade for 32 years. He currently holds a diploma in emergency medical technology from North-eastern University in the USA. He also holds a Graduate Diploma in Emergency Medical Science and a Masters (MSc) in emergency medical science, both from University College Dublin, giving him advanced paramedic status in Ireland. He is currently a facilitator and a national examiner for the Pre-Hospital Emergency Care Council. He has been involved in the training and 'on road' supervision of advanced paramedics and paramedics for Dublin Fire Brigade and emergency medical technicians for a private company.

**Alexandra Gatehouse MCP ACCP (mFICM) Bsc (Hons) Physiotherapy NMP (V300)**

Alex graduated from Nottingham University in 2000 with a Bsc (Hons) in physiotherapy. Following junior rotations in the Newcastle Hospitals NHS Foundation Trust she specialised in respiratory physiotherapy in adult critical care, also working in New Zealand. In 2012, she trained as an advanced critical care practitioner, completing a Masters in clinical practice in critical care and qualifying in 2014. Alex subsequently completed her non-medical prescribing qualification and continues to rotate within all of the critical care units in Newcastle Upon Tyne, also enjoying teaching on the regional transfer course. She is a co-founder of the Advanced Critical Care Practitioner Northern Region Group and is a committee member of the North East Intensive Care Society. Alex has presented abstracts at the European Society of Intensive Care Medicine and the North East Intensive Care Society conferences.

**Ashley Ingram BSc (Hons) MCPPara**

Ashley began his career with South Western Ambulance Foundation Trust as an ambulance care assistant. Over the space of seven years, he worked his way up to a registered paramedic, training while working full time. He worked as an ambulance paramedic for three years, during which time he took a keen interest in palliative and end-of-life care. He has recently embarked on a primary care role as a frailty practitioner. Working within a multidisciplinary team, he focuses on admission avoidance with patients who reside in care homes in Dorset, UK. He looks forward to developing this role in the future.

**Noleen P. Jones RN RNT Adv Dip in Leadership and Management BSc Nursing Med FHEA**

Noleen's nursing background is mainly in critical care, where she worked for 26 years. During that period, she additionally held the posts of senior sister and lead nurse for education and training before moving onto clinical practice development for the Gibraltar Health Authority. This role enhanced her interest in education. She increasingly taught on the pre-graduate nursing programmes, leading on to her undertaking a teaching and learning course and moving into teaching fulltime. Noleen is also a basic life support and moving and handling instructor for the organisation. Noleen is Principal Lecturer (Ag) at the Gibraltar Health Authority School of Health Studies. Noleen teaches in the BSc and diploma and access (adult) nursing courses at the University of Gibraltar. Her key interests include cardiac and respiratory care, simulation and teaching practice skills.

**Kylie Kendrick BNurs BSc Paramedicine Registered Paramedic GC.paramedicine MPH PhD(C) FHEA**

Kylie joined Rural Ambulance Victoria in 2008, working as a clinical mentor until transitioning into higher education. Kylie has undertaken a Master's in public health. Her research investigated the sleep health in undergraduate students. She has now transitioned to a PhD, where her research remains relevant to sleep health, although she has moved to the paramedic cohort. Kylie has undertaken a variety of roles in higher education, including programme development and accreditation, and has received citations for outstanding contributions to student learning through innovative practice.

**Ian Macleod BParamedicSc DipVET Dip WHS**

Ian is a career paramedic with 20 years' experience in a range of operational contexts and leadership roles. He has a strong passion for facilitating quality training and development for students and colleagues. Ian lives in South Australia with his supportive paramedic wife Stacey and 10-year-old stepson Levi. In addition to paramedicine, Ian works in mines and industrial fire and rescue and training content writing, and is an accredited rock-climbing guide. While currently engaged as a remote area paramedic in outback South Australia, Ian is completing a Master of Medical and Health Science through research, concentrating on virtual reality as a pedagogical platform for mass casualty triage training. He retains a strong interest in emergency and disaster management. At home, Ian has an extensive LEGO collection, enjoys four-wheel-driving, camping and trailbike riding.

**Tom E. Mallinson BSc (Hons) MBChB PGChE MRCPG MCPara MCoROM FHEA FAWM FRGS**

Tom initially trained as a paramedic with the University of Hertfordshire and the London Ambulance Service NHS Trust before completing his medical degree at the University of Warwick. He is currently a prehospital care doctor and rural GP in Scotland. Tom is also Co-Director of Prehospital Care with BASICS Scotland and a lecturer in remote paramedic practice for the College of Remote and Offshore Medicine, Malta.

**Tim Millington BSc (Hons) Paramedic Science BSc (Hons) Physiology/Pharmacology MSc Advance Clinical Practice**

Tim began working as a paramedic at Doncaster Ambulance station in 2009. He went on to establish himself in a busy emergency department in Rotherham, working throughout the COVID-19 pandemic as an advanced clinical practitioner and non-medical prescriber. He is presently a PHD candidate with the University of Hertfordshire. He has a research interest in resuscitation and has published work in the *Journal of Paramedic Practice*. He is also an experienced advanced life support instructor with the Resuscitation Council UK. He currently works as a consultant paramedic practitioner with the Yorkshire Ambulance Service NHS Trust and an advanced clinical practitioner in emergency medicine with Rotherham Hospital Foundation Trust.

**Ian Peate OBE FRCN**

Ian began his nursing career at Central Middlesex Hospital, becoming an enrolled nurse practising in an intensive care unit. He later undertook three years of student nurse training at Central Middlesex and Northwick Park hospitals, becoming a staff nurse and then a charge nurse. He has worked in nurse education since 1989. His key areas of interest are nursing practice and theory. Ian has published widely. He is editor in chief of the British Journal of Nursing, founding consultant editor of the Journal of Paramedic Practice and consultant editor International Journal for Advancing Practice. Ian was awarded an OBE for his services to nursing and nurse education and was granted a fellowship from the Royal College of Nursing. Ian is visiting professor at Northumbria University, St George's University of London and Kingston University London, professorial fellow Roehampton University and visiting senior clinical fellow at the University of Hertfordshire.

**Rory Prevett GDip BSc (Hons) Dip NQEMT AP**

Rory began his prehospital paramedic career in 2004, becoming a firefighter/paramedic with Dublin Fire Brigade. He later undertook a postgraduate diploma with University College Dublin to become an advanced paramedic, winning the Pantridge Award for academic excellence. With a keen interest in education and training, he became an instructor for International Trauma Life Support, Ireland, and a member of the teaching faculty for International Trauma Life Support Dublin Fire Brigade/Royal College of Surgeons in Ireland. He has a deep interest in airway management. He has in the past sat on the statutory regulator (PHECC) Medical Advisory Committee and was a prehospital governance assessor for Pre-Hospital Emergency Care Council. He currently holds the position of Chief Practitioner for the Order of Malta Ambulance Corps, Ireland, and was previously the clinical manager for Medcore Private Ambulance Service, Dublin.

**Liam Rooney BSc (Hons) GDip Dip NQEMT-AP**

Liam has worked as a firefighter/paramedic since 2007, when he completed his Diploma in Emergency Medical Technology – Paramedic with the Royal College of Surgeons, Ireland. In 2016, he completed a BSc (Hons) in Paramedic Studies at the University of Limerick, winning the Graduate Entry Medical School Award for overall performance. In 2017, he undertook a graduate Diploma in Emergency Medical Science through University College Dublin. Liam currently practices as an advanced paramedic with Dublin Fire Brigade. He joined the faculty of DX2 Institute of Pre-Hospital Education in 2017, where he delivers multiple courses in prehospital education, and is also a tutor at University College Dublin. He has a keen interest in geriatric medicine and pain management in dementia patients.

**Simon Sawyer PhD, BPara, BPsychMan/Mar, GCHPE**

Simon has worked as an advanced life support paramedic in Victoria, Australia, since 2012. He began designing and teaching paramedic programmes as a lecturer at Monash University in 2015. Simon holds an adjunct senior lecturer position with the Paramedicine Department at Griffith University, where he studies family and domestic violence, paramedic education and paramedic wellbeing. Simon completed a PhD on the paramedic response to family violence and teaches paramedics how to respond to patients experiencing family and domestic violence. Simon is currently the Director of Education at the Australian Paramedical College and still works as a paramedic.

**Melanie Stephens BSc (Hons) MA PGCAP PhD**

Melanie commenced her career at Manchester Royal Infirmary in 1991 as a registered general nurse and is currently a senior lecturer in adult nursing within the School of Health and Society. Melanie is a health and social care researcher with specific research interests in pressure redistributing properties of seating, tissue viability, and interprofessional working and learning. She has undertaken research to provide an evidence base for products used in the 24-hour management of pressure ulcers and affective domain development of student nurses. Melanie co-led an amendment to the UK Tissue Viability Society seating guidelines with service users and is using this work to impact policy and practice. She is currently leading a feasibility study on the impact of interprofessional student training care homes on residents, care home staff and students. Experienced in mixed methods of enquiry, working with practitioners and commerce to develop research for the use in the clinical environment.

**Scott Stewart PhD(VU) MBus(VU) DipHealthSci(AOTC) DipEd(Monash) BSc (Monash) MACPara Registered Paramedic**

Scott dabbled in zoology before working as a biology and maths teacher in a secondary school and then joining Ambulance Victoria in 1992. Scott's Master's research evaluated customer satisfaction in ambulance services while his PhD focused on the teaching of evidence-based practice. He has lectured in paramedicine at Monash University, Victoria University, St George's University of London and is currently paramedicine national professional practice lead and senior lecturer at the Australian Catholic University. Scott was involved in the Gibraltar Ambulance Service transitioning to paramedic level and was a consultant for the South East Coast Ambulance Service, UK, on the development of a critical care paramedic level. He is currently engaged in developing the Timor-Leste ambulance service. Scott is a member of the Global Paramedic Higher Education Council.

**Matt Wilkinson BP(H1) PhD(C)**

Matt is a practicing emergency paramedic and medical researcher. He is currently a Westpac Scholar and inaugural University of Melbourne MDHS PhD Award recipient, and his undergraduate thesis won a University Medal and Best Presentation at two international medical conferences. As well as working clinically, he also tutors Indigenous undergraduates. He lives on the Sunshine Coast with his partner and their beautiful golden retriever puppy (called Waffles).

**Aimee Yarrington FCPara BSc (Hons) MSc**

Aimee has been a qualified midwife since 2003. She has worked in all areas of midwifery practice, from high-risk consultant-led units to low-risk stand-alone midwife-led units. She left full-time midwifery practice to join the ambulance service, starting as an emergency care assistant and working her way up to paramedic, while always keeping her midwifery practice up to date. She has worked in several areas within the ambulance service, including the emergency operations centre and the education and training department. Her work towards improving the education of prehospital maternity care has led to her being awarded a fellowship award from the College of Paramedics. Aimee strives to improve the teaching and education for clinicians dealing with prehospital maternity care.

**David Yore GDip Dip NQEMT P**

David has a background in paramedicine and more recently in education and training. He has developed a keen interest in research and professional development. He began working in the field in 2016 and has since progressed to work in a statutory emergency ambulance service following the completion of a diploma in paramedical science from University College Cork, Ireland. David is undertaking a Master's in specialist paramedic practice and hopes to continue his research, particularly in the areas of paramedicine and prehospital care.

# About the Editors

## **Ian Peate OBE FRCN**

Ian began his nursing career at Central Middlesex Hospital, becoming an enrolled nurse practising in an intensive care unit. He later undertook three years of student nurse training at Central Middlesex and Northwick Park hospitals, becoming a staff nurse and then a charge nurse. He has worked in nurse education since 1989. His key areas of interest are nursing practice and theory. Ian has published widely. He is editor in chief of the British Journal of Nursing, founding consultant editor of the Journal of Paramedic Practice and consultant editor International Journal for Advancing Practice. Ian was awarded an OBE for his services to nursing and nurse education and was granted a fellowship from the Royal College of Nursing. Ian is visiting professor at Northumbria University, St George's University of London and Kingston University London, professorial fellow Roehampton University and visiting senior clinical fellow at the University of Hertfordshire.

## **Simon Sawyer PhD, BPara, BPsychMan/Mar, GCHPE**

Simon has worked as an advanced life support paramedic in Victoria, Australia, since 2012. He began designing and teaching paramedic programmes as a lecturer at Monash University in 2015. Simon holds an adjunct senior lecturer position with the Paramedicine Department at Griffith University, where he studies family and domestic violence, paramedic education and paramedic wellbeing. Simon completed a PhD on the paramedic response to family violence and teaches paramedics how to respond to patients experiencing family and domestic violence. Simon is currently the Director of Education at the Australian Paramedical College and still works as a paramedic.

# Preface

We are delighted to have been asked to edit this new text *Fundamentals of Applied Pathophysiology for Paramedics*. There are 19 chapters in the text, a systems approach has been generally adopted. This textbook offers readers an introduction to pathophysiology related to the paramedic setting in a variety of academic programmes at colleges, universities or a vocational setting. Key disorders are described, together with a number of additional conditions that provide information on diseases with distinguishing features for each.

The *Fundamentals of Applied Pathophysiology for Paramedics* has been written by experienced clinicians and academics, primarily for the student undertaking programmes of study that are related to paramedic practice, with the aim of making the subject understandable, stimulating and related to your work as a paramedic. The human body has an amazing capacity to respond to illness in a number of physiological and psychological ways; humans are able to compensate as a result of the changes that occur due to the disease and pathophysiological processes, and the impact that they can have on a person. The *Fundamentals of Applied Pathophysiology for Paramedics* can assist in developing the paramedic's critical thinking, encouraging innovation and creativity related to the health and wellbeing of the people to whom you offer care and support. Critical thinking and clinical reasoning will lead to correct clinical judgements and practice; they are fundamental requirements in paramedicine.

Pathophysiology addresses the cellular and organ changes occurring when disease is present, as well as the impact that these changes can have on a person's ability to function. When there is an interruption to normal physiological functioning (e.g. illness), this becomes a pathophysiological issue. It has to be remembered that normal health is not and will never be exactly the same in any two people, because of this the term 'normal' has to be treated with caution. An understanding of pathophysiological 'normal' and 'abnormal' can assist when helping the patient in a competent, compassionate, safe and effective manner. The *Fundamentals of Applied Pathophysiology for Paramedics* is a foundation text, helping the reader to grow personally and professionally concerning the provision of care. It is primarily intended for those who come into contact with people who may present with physical health problems in various settings. The text focuses on the adult person. Illness and disease are discussed explicitly, highlighting the fact that people do become ill and they do experience disease.

The *Fundamentals of Applied Pathophysiology for Paramedics* considers diseases, their aetiology and acquired diseases. Chapters address signs and symptoms, investigations and diagnosis, with the purpose of revealing the cause of the signs and symptoms to make a diagnosis. Another important part of the pathophysiology is the prescription of any treatment that the paramedic is required to provide and administer. To do this effectively, it is essential that you have a sound knowledge of pathophysiology. Pathophysiology also allows the paramedic to offer a prognosis, referring to a patient's chance of survival or recovery; depending on the disease, the prognosis can be a full recovery, partial recovery, or fatal.

The early chapters help to prepare the reader for some of the more complex discussions that are to follow. Chapters commence and conclude with questions that aim to trigger reflection and encourage further thought. In the snapshots (case studies), pseudonyms are used to maintain confidentiality. Where appropriate, we have included boxed information that will help you when you are offering care and support to people. Red flags are also incorporated; these flags contain significant information warning you to be cautious in your approach. Orange flags alert the reader to psychological considerations and information concerning the management of medicines as related to the chapter. The snapshots generally include data concerning the patient's vital signs, control and dispatch information, pertinent background information, a 'windscreen' report and an ABCDE approach. These elements can help to relate important concepts to

care, offering more insight into the patient's condition and therefore to their needs. This approach has been taken to help you to learn as you apply the concepts being discussed.

We encourage you to ask questions such as 'Why is the patient experiencing this?', 'Why are they, all of a sudden, experiencing this change?', 'What do we need to do to help this patient?', 'Is this an emergency?' and then to go on and answer these questions. When you are able to understand what is going on in a person's body at the cellular level, you will be helped to understand it. Understanding pathophysiology and pathophysiological changes can help you as you respond and react to abnormal changes in patients in a faster, more accurate way. This understanding can make a significant difference in your role as a paramedic and to positive patient care outcomes.

We do not expect you to read the *Fundamentals of Applied Pathophysiology for Paramedics* from cover to cover; you are instead encouraged to dip in and out of it. The aim is to invite you in and encourage you; to stimulate your appetite, so you may read and learn further. We truly hope that you enjoy reading the text and applying it to practice situations. We hope that you will enjoy studying the topics that have been presented so as to encourage you to delve deeper. We also wish to stimulate you with a sense of curiosity with enthusiasm, ensuring that the patient is at the centre of all that you do and that the care you offer is safe, effective and appropriate.

Ian Peate  
Simon Sawyer

# Acknowledgements

Ian would like to thank his partner Jussi Lahtinen for his ongoing encouragement.

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We would like to thank the team at Wiley for their enthusiasm, encouragement and support.





## Learning the Language: Terminology

Ian Peate

### AIM

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This chapter aims to provide insight and understanding with regards to the terminology used in the provision of healthcare related to anatomy, physiology and pathophysiology.

### LEARNING OUTCOMES

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On completion of this chapter, you will be able to:

- Discuss the terms anatomy, physiology and pathophysiology.
  - Describe the prefixes and suffixes used in anatomy, physiology and pathophysiology.
  - Explain the directional terms used in medicine.
  - Describe the anatomical planes and anatomical regions of the body, and the body cavities.
- 

### Test Your Prior Knowledge

1. What do you understand by the term *pathology*?
2. What is the difference between a sign and a symptom?
3. How is the root word altered by a prefix or a suffix?
4. What are the contents of the thoracic cavity?

## Introduction

Science, and particularly the provision of healthcare, is replete with Latin and Greek terminology. Latin names are used for all parts of the body and Greek terms are also common (the Greeks are said by many to be the founders of modern medicine). Paramedics and other healthcare staff use pathophysiological concepts as they work with people to whom they offer care and may be experiencing some type of health condition or disease.

## Red Flag Alert: Jargon

Like any country with its own language, the medical field also has its own jargon. This is important so communication between healthcare professionals can take place quickly and efficiently without the need for too much explanation. It is a specific language that is not just used by paramedics, nurses, doctors and other people who are actively involved in the medical arena but is also important for all others who work in the healthcare arena (e.g. pharmacists, physiologists and dentists). Its correct use can have a significant impact on ensuring the best patient care.

What is important is that we are all speaking the same language; failure to do so or making assumptions can lead to error and mistakes.

# Anatomy and Physiology

Anatomy discusses the study of the structure and location of body parts, while physiology is the study of the function of body parts. Both these terms are interlinked. Understanding where the body parts are located can help you to understand how they function. As an example, McGuiness (2021) explains that the various functions of the heart and the four chambers, together with the valves, make up the anatomy. Visualising these many structures can assist in understanding how blood flows through the heart and how the heart beats; this is related to its function and is its physiology.

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## Anatomy

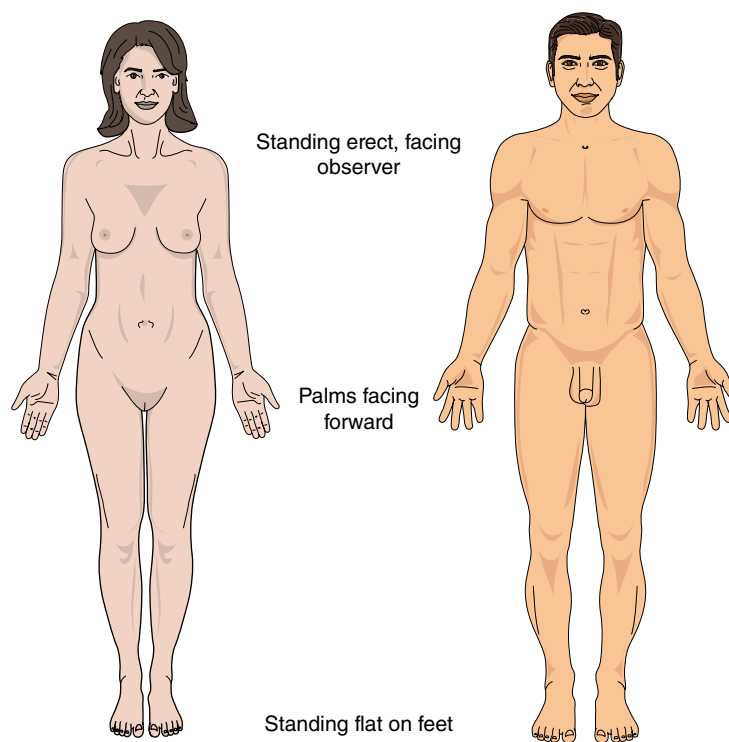
### The Body Map

Learning anatomical terminology is like learning a new language. Developing your learning, understanding more and adding different terms to your vocabulary can help you to talk confidently about the body. The anatomical directional terms and body planes present a universally recognised language of anatomy. When undertaking the study of anatomy and physiology, it is essential that you have key or directional terminology so that you are able to give a precise description as you or others refer to the precise location of a body part or structure.

### Reflective Learning Activity

When you are next on placement, identify how many times during a shift you hear the various clinicians describe and discuss the anatomy, physiology and pathophysiology of a patient. Note the terminology being used and how there is a clearer understanding between the team when using one language – anatomical and physiological terminology.

All parts of the body are described in relation to other body parts and a standardised body position known as the anatomical position is used in anatomical terminology. An anatomical position is established from a central imaginary line that runs down the centre or mid-line of the body. When in this position, the body is erect and it faces forwards, with the arms to the side, palms face forwards with the thumbs to the side, the feet are slightly apart with the toes pointing forwards (Figure 1.1).



**FIGURE 1.1** Anatomical position.

## Orange Flag Alert: Speaking with Patients

While you are encouraged to use the correct anatomical and physiological terminology when conversing with other colleagues, caution must be exercised when speaking in front of and with patients. Paramedics can inadvertently use words and jargon that are strange to patients; they may not realise that the meaning is not clear. While there are some concepts that are familiar and obvious to paramedics, these same concepts may be alien to patients.

Try first to establish what the patient knows and understands before you launch into a discussion that begins at a level that is either too complex or too simple for the patient. Too often, our healthcare environments fail to recognise the needs of people with different levels of understanding about their health. This can mean that patients fail to receive the right care at the right time.

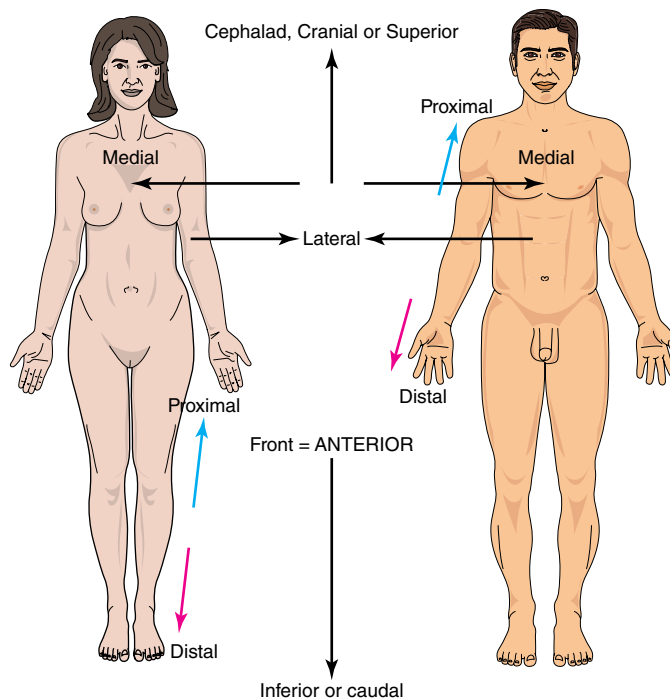
Use of jargon can instil fear, cause confusion and result in poor patient care.

The standard body ‘map’ or anatomical position (just like a map) is that of the body standing upright (orientated with the north at the top), with the feet at shoulder width and parallel, toes forward (Figure 1.1). Humans are bilaterally symmetrical. The standard position is used to describe body parts and positions of patients irrespective of whether they are lying down, lying on their side or facing down.

As well as understanding the anatomy and the physiology (the structure and function), understanding directional terms and the position of the various structures is also required. Table 1.1 lists common anatomical descriptive terms that you will need to become acquainted with. This list is not exhaustive, you will come across additional terms as you work through the various chapters. Figure 1.2 depicts anatomical positions.

**TABLE 1.1** Anatomical descriptive terms.

Anatomical term	Relationship to the body
Anterior	Front surface of the body or structure
Posterior	Back surface of the body or structure
Deep	Further from the surface
Superficial	Close to the surface
Internal	Nearer the inside
External	Nearer the outside
Lateral	Away from the mid-line
Median	Mid-line of the body
Medial	In the direction of the mid-line
Superior	Located above or towards the upper part
Inferior	Located below or towards the lower part
Proximal	Nearest to the point of reference
Distal	Furthest away from the point of reference
Prone	Lying face down in a horizontal position
Supine	Lying face up in a horizontal position



**FIGURE 1.2** Anatomical positions.

## Snapshot 1.1

You are on a call to a nursing home for a 70-year-old man who is dysphasic.

### Pre-arrival Information

The patient is conscious and breathing.

### Windscreen Report

The area outside the nursing home looks safe. There is an ambulance parking bay available close to the main door.

### Entering the Location

As you arrive, a member of staff greets you; he is waiting at the door. He tells you that the patient was experiencing dysphagia and struggling to swallow his breakfast then he suddenly dropped his spoon. You are told that this is unusual for the patient, as he normally enjoys his breakfast and eats without any assistance.

### On Arrival with the Patient

The patient has been put in the left lateral position in the communal dining area with a pillow supporting his head. You explain to the patient what you are doing using terminology that he will understand.

### Patient Assessment

**General appearance:** The patient is alert and conscious, and he appears to be slumped to the left-hand side as if he has a left-sided hemiparesis. He is dysphasic.

**Circulation to the skin:** pale.

**Work of breathing:** normal.

### Primary Survey

**Danger:** nil.

**Response:** alert on the ACVPU (alert, confusion, voice, pain, unresponsive) scale.

**Airway:** open, clear and patent.

**Breathing:** rate – appears normal rate (18 breaths/minute); there is no evidence of tachypnoea or dyspnoea. Rhythm – regular. Quality – bilateral equal air entry with chest rise and fall.

**Circulation:**

- Heart rate feels slightly tachycardic.
- Rhythm – irregular.
- Quality – palpable radial pulse.
- Skin: normal skin temperature, taken with a tympanic thermometer.
- Capillary refill time: two seconds. No evidence of cyanosis.

**Disability:**

- PEARL: normal pupil size.
- GCS: E4, V3, M6 = 13/15.
- Grip strength: weakness in left-hand side.
- Allergies: penicillin.

**Exposure:** appropriate for vital signs.

### Environment

There is a chair and by patient's front door. Safety reassessed – nil danger.

## Reflective Learning Activity

Look through the information provided in Snapshot 1.1 and highlight all of the information that is associated with anatomy, physiology and pathophysiology. Highlight and find the anatomical and physiological terms and determine the meaning.

## Anatomical Planes of the Body

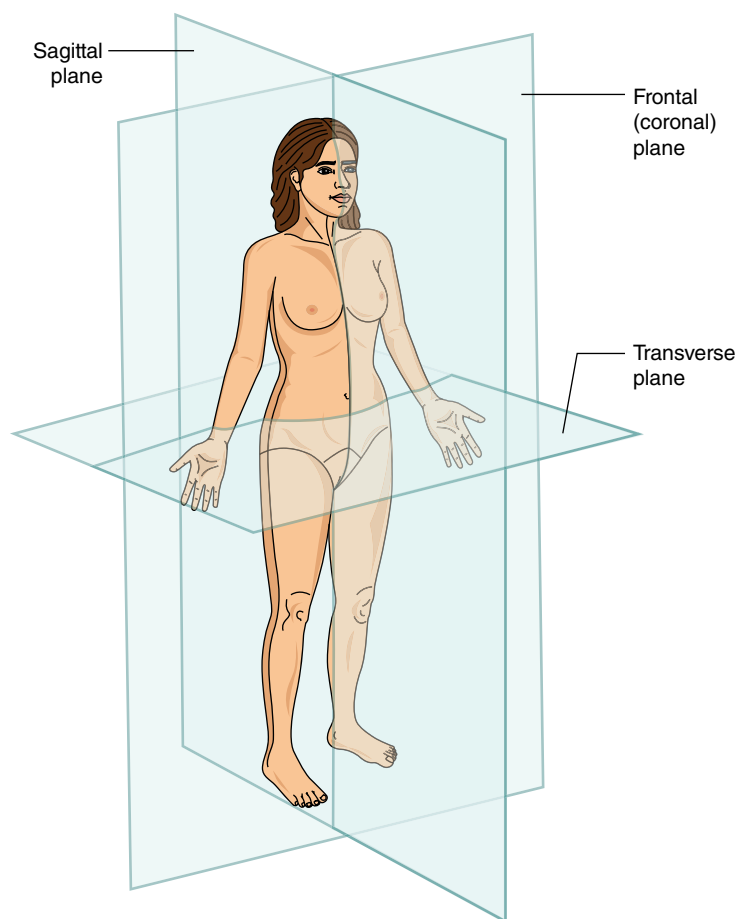
A plane is an imaginary two-dimensional surface that passes through the body. There are three planes that are generally referred to in anatomy and healthcare (Figure 1.3).

- Sagittal
- Frontal
- Transverse.

The *sagittal plane*, the vertical plane, is the plane that divides the body or an organ vertically into the right and left sides. If this vertical plane runs directly down the middle of the body, it is known as the midsagittal or median plane. If it divides the body into unequal right and left sides, then it is called a parasagittal plane.

The *frontal plane* is the plane dividing the body or an organ into an anterior (front) portion and a posterior (rear) portion. The frontal plane is often referred to as a coronal plane (the word *corona* is Latin for crown).

The *transverse plane* divides the body or organ horizontally into the superior (upper) and inferior (lower) portions.



**FIGURE 1.3** Anatomical planes.