FUNDAMENTALS

Fundamentals of

Maternal Pathophysiology

EDITED BY
CLAIRE LEADER
IAN PEATE

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WILEY Blackwell

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EDITED BY

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This book is dedicated to my late brother Marc Davenport

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Preface

Maternal pathophysiology refers to the study of abnormal physiological processes that occur in pregnant individuals. It focuses on understanding the changes in the maternal body that may arise during pregnancy and the impacts they can have on maternal health and the well-being of the developing fetus. Pregnancy involves significant physiological adaptations to support the growth and development of the fetus. Maternal pathophysiology explores the alterations that occur in various body systems during pregnancy and any deviations from the normal physiological processes. This field of study aims to identify and understand the underlying mechanisms of maternal health conditions, complications and diseases that can arise during pregnancy. Pathophysiology involves examining the alterations in cellular, tissue and organ functions, as well as the interactions between different body systems, to gain insight into the progression and impact of disease. By studying pathophysiology, midwifery students and healthcare professionals can better comprehend the underlying causes and mechanisms of diseases, which in turn helps inform diagnostic and treatment approaches.

The intricacies of human reproduction, pregnancy and childbirth intersect with the fascinating field of disease processes. *Fundamentals of Maternal Pathophysiology* helps readers unravel the complex web of physiological changes and pathological conditions that affect the health of women and birthing people and their babies with confidence and competence.

Pregnancy is an incredible journey that brings with it profound physiological transformations. However, alongside these remarkable changes there exist numerous challenges and potential risks that can arise during this unique period in a woman's life. Understanding the fundamental mechanisms behind the pathophysiology of these complications is crucial for midwifery students and those healthcare professionals who are involved in maternal care.

Fundamentals of Maternal Pathophysiology serves as a comprehensive guide, providing readers with a deep exploration of the maternal pathophysiological processes that can disrupt the normal course of pregnancy. We delve into the intricate workings of the reproductive system, hormonal fluctuations, placental physiology and the impact of maternal health conditions on the developing fetus.

There are 21 chapters in *Fundamentals of Maternal Pathophysiology*, taking readers on an enlightening journey through the major categories of maternal pathophysiology. We discuss the normal physiology of reproduction and the astonishing event of fertilisation. Building on this foundation, we explore the physiological adaptations that occur during pregnancy, examining the changes in the cardiovascular, respiratory, endocrine, immune and other systems.

With a solid understanding of the normal processes, we then turn our attention to the disorders and complications that can arise during pregnancy. Maternal conditions such as gestational diabetes, hypertensive disorders and autoimmune diseases are addressed in detail, providing insight into their underlying mechanisms, diagnostic criteria and management approaches.

Our overall aim is to equip the student midwife with the knowledge necessary to recognise, diagnose and manage these conditions effectively, ultimately promoting optimal outcomes for both mother and baby. It is important to note that this book is not intended to replace clinical experience or professional guidance. It serves however as a companion to extend your existing knowledge and offer a solid foundation in maternal pathophysiology. Each chapter is designed to present the information in a clear and concise manner, with an emphasis on clinical relevance and evidence-based practices.

We are grateful to the authors, clinician and academics, who are experts in their respective fields, whose contributions have made this book a reality. Their expertise, dedication and passion for maternal health are evident through these pages and we hope their expertise and insight will inspire and empower midwives in their ongoing pursuit of excellence in maternal care.

We sincerely hope that *Fundamentals of Maternal Pathophysiology* will serve as a valuable resource for midwifery students, academics and healthcare professionals alike. May it provoke in you a curiosity and thirst for knowledge, fostering a deeper understanding of the intricate world of maternal pathophysiology as we strive towards improving the health and well-being of pregnant individuals and their families.

Finally, a note on language. Inclusive language in health and care is crucial for promoting equality, respecting diversity and ensuring that everyone feels represented and valued. It involves using language that is inclusive of all individuals, regardless of their gender identity, sexual orientation, race, ethnicity, disability or other characteristics. By employing inclusive language, we can foster a more inclusive and accessible environment for readers, patients and professionals alike.

When discussing gender and sex, one of the significant challenges is the complexity and fluidity of the terminology that is and that can be used. The concept of gender is multifaceted and may vary across cultures, communities and individuals. Understanding and navigating this terminology requires sensitivity, open-mindedness and a willingness to learn and adapt to evolving perspectives. It is recognised that not all birthing people will identify with their biological sex and a 'gender additive' approach to language has been advocated in the context of contemporary maternity services. This acknowledges that women may be negatively affected by reproductive health inequalities. The terms 'woman' and 'women' are used in this book along with a range of terms to identify and describe those people to whom we have the privilege to offer maternal care.

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About the Companion Website

This book is accompanied by a companion website.

www.wiley.com/go/leader/maternalpatho 

This website includes:

- Multiple choice questions

CHAPTER 1

Learning the Language: Terminology

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

LEARNING OUTCOMES

On completion of this chapter the reader will be able to:

- Discuss the terms and context around anatomy, physiology and pathophysiology
- Further understand prefixes and suffixes used in anatomy, physiology and pathophysiology
- Understand directional terms
- Describe the anatomical planes, the 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. Name and define the nine regions of the abdomen.

Science, particularly in terms used in the provision of healthcare, is inundated with Latin and Greek terminology. For all parts of the body Latin names are used and Greek terms are also common, as the Greeks are said to be the founders of modern medicine. Healthcare staff use pathophysiological concepts as they work with people to whom they offer care and as they offer treatment to those who are experiencing some type of health condition or disease.

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Companion website: www.wiley.com/go/leader/maternalpatho

Red Flag

Like any country with its own language(s), the medical field has its own language too. This is important so that 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 midwives, nurses, doctors and other people who are actively involved in the medical arena. It is important for all those who work in healthcare, for example pharmacists, physiologists and dentists. Its correct use can have a significant impact on ensuring the best care.

What is important is that we are all speaking the same language. Failure to do so or making assumptions about what is meant can lead to error and mistakes.

Anatomy and Physiology

Anatomy is the study of the structure and location of body parts, while physiology is the study of the function of body parts. Both of these terms are interlinked. Understanding where the body parts are located can help you understand how they function. McGuiness (2010) explains that when thinking of the various functions of the heart and the four chambers along with the valves, this is the anatomy. Visualising these many structures can assist in understanding how blood flows through the heart and how the heart beats, which are related to its function and as such its physiology.

Anatomy

The Body Map

Learning anatomical terminology is like learning a new language. When your learning has developed and you understand more and add different terms to your vocabulary, this can help you talk confidently about the body. The anatomical directional terms and body planes present a universally recognised language of anatomy.

Red Flag

When undertaking the study of anatomy and physiology, it is essential that you have key or directional terminology so that you can give a precise description when you or others refer to the location of a body part or structure.

Learning Event

When you are next on placement, identify how many times during a shift you hear the various clinicians describe and discuss anatomy, physiology and pathophysiology. Note the terminology being used and how between the team there is a clear understanding 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 an imaginary central line that runs down the centre or midline of the body.

Orange Flag

While you are encouraged to use the correct anatomical and physiological terms when conversing with other colleagues, caution must be exercised when speaking in front of and with families. Midwives and other healthcare professionals can inadvertently use words and jargon that are strange, and they may not realise that the meaning is not clear. There are some concepts that are familiar and obvious to the multidisciplinary team but may be alien to patients.

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

Using jargon can instil fear, cause confusion and result in poor 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). When in this position the body is erect and faces forwards, with the arms to the side, the palms face forwards with the thumbs to the side, and the feet are slightly apart with the toes pointing forwards (see Figure 1.1). Humans are usually bilaterally symmetrical. This 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 the function), you also need to understand directional terms and the position of the various structures. Table 1.1 lists common anatomical descriptive terms that you will need to become acquainted with. Figure 1.2 gives a more detailed depiction of anatomical positions.

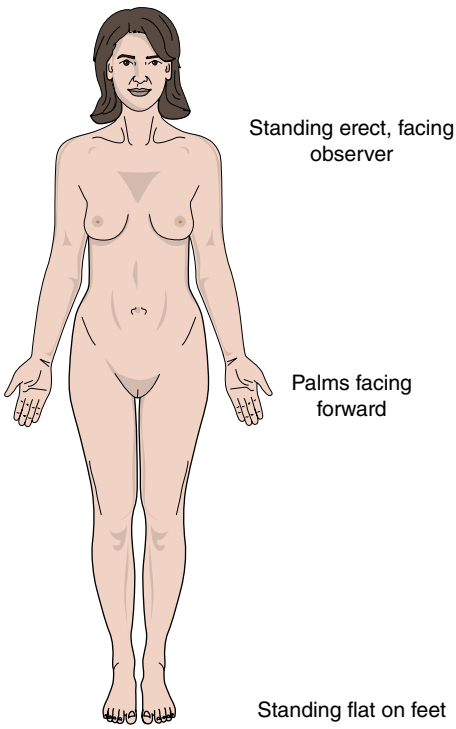

FIGURE 1.1 Anatomical position: anterior view of the body.

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 midline
Median	Midline of the body
Medial	In the direction of the midline
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

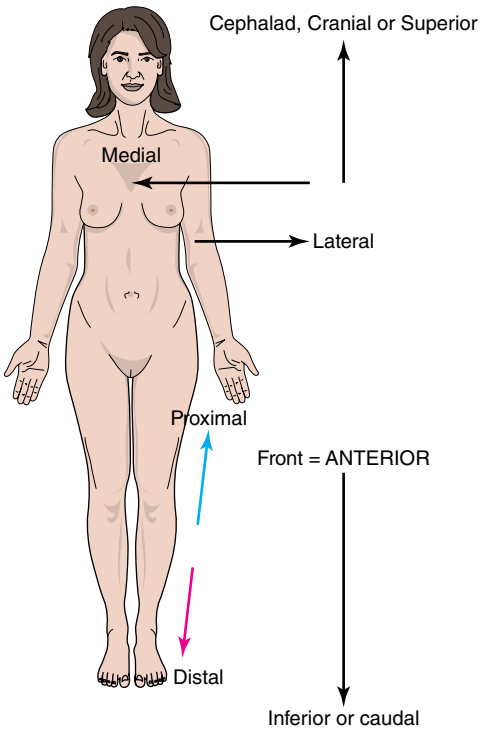

FIGURE 1.2 Anatomical position.

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 (see Figure 1.3):

- Sagittal
- Frontal
- Transverse

The sagittal plane, the vertical plane, is the plane that divides the body or an organ vertically into right and left sides. If this vertical plane runs directly down the middle of the body, this 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 portion and a posterior 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 upper (superior) and lower (inferior) portions.

Anatomical Regions of the Body

The body is divided up into regions, again like a map, which compartmentalises the body into the following sections:

- Head and neck
- Trunk (thorax and abdomen)

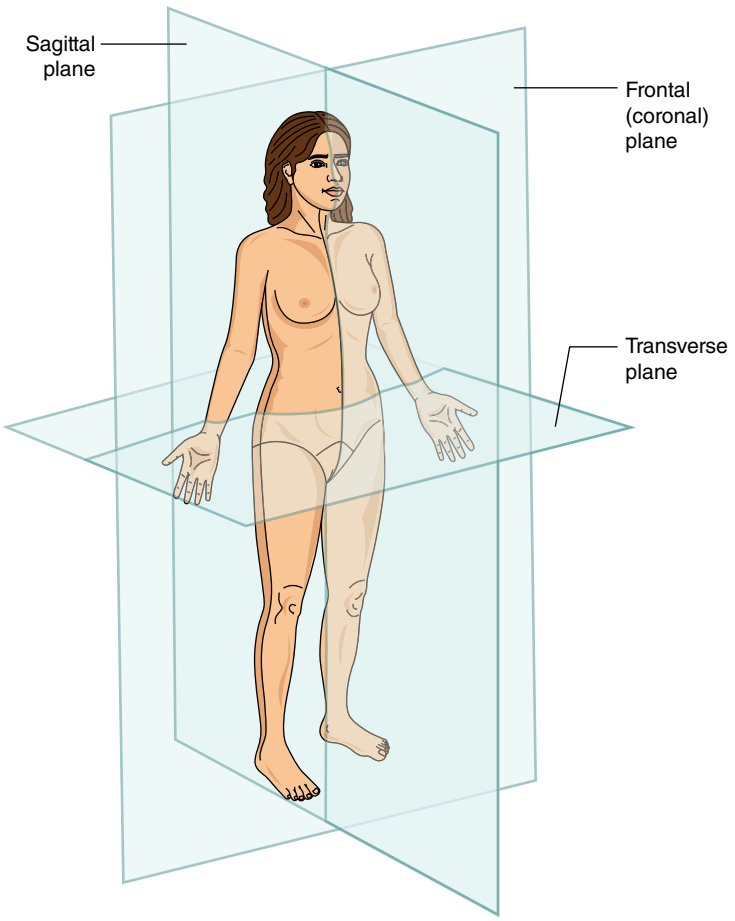

FIGURE 1.3 Anatomical planes.

- Upper limbs (arms)
- Lower limbs (legs)

Tables 1.2–1.5 outline the correct terminology for each region.

TABLE 1.2 Anatomical regions of the head and neck.

Anatomical phrase	Area of the body
Cephalic	Head
Cervical	Neck
Cranial	Skull
Frontal	Forehead
Occipital	Back of head
Ophthalmic	Eyes
Oral	Mouth
Nasal	Nose

TABLE 1.3 Anatomical regions of the trunk (thorax and abdomen).

Anatomical phrase	Area of the body
Axillary	Armpit
Costal	Ribs
Mammary	Breast
Pectoral	Chest
Vertebral	Backbone
Abdominal	Abdomen
Gluteal	Buttocks
Inguinal	Groin
Lumbar	Lower back
Pelvic	Pelvis/lower part of abdomen
Umbilical	Navel
Perineal	Between anus and external genitalia
Pubic	Pubis