

# Essential microbiology for wound care

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## Details

Essential Microbiology for Wound Care

Edited by Valerie Edwards-Jones

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## General Characteristics

This is a first edition of the book. It is in paperback, published in 2016.

The book has 179 pages, and is printed in 220x140 mm format. There are 11 chapters, with 13 tables and 6 boxes plus additional 68 boxes with definitions (19 boxes), facts (11 boxes) and key points (38 boxes), 13 figures and 22 colour plates in the book. The whole book has 259 references and 14 suggestions for further reading.

There are 10 contributors writing particular chapters alone or as co-authors. All authors are from different health and scientific institutions in UK. Valerie Edwards-Jones is the editor, author of three chapters and co-author of the last chapter.

The book is primarily "...aimed at the wound care practitioners...", but will be very useful to specialists in infectious diseases, surgeons, and nurses who come in contact with patients who have acute or chronic wounds. The book offers basic knowledge of wound microbiology but also precise facts about many aspects of wound management, and is suitable for trainees of different medical and nursing specialties. Some of the chapters could also be useful for medical and nursing students.

## Organisation of the Book

The book starts with two forewords: the first foreword is from Professor Gregory Schultz (Department of Obstetrics and Gynaecology, Institute for Wound Research, University of Florida, US), and the second is from Professor Sue Bale (Aneurin Bevan University

Health Board, St Cadoc's Hospital, Newport, UK). After the forewords there is a short Preface, followed by Contents, List of contributors and 11 chapters. At the end there is a comprehensive 2-column Index on 6.5 pages.

### Content of the Book

Chapter one ("Introduction" by Valerie Edwards-Jones) briefly describes a history of wound science and wound management, definitions of microbiology, what microorganisms we are dealing with, what relations different microbes have with humans, and a short description of the human defence system against microbes. From this chapter we have learned that wound debridement and cleansing are essential for the wound healing and this postulate has been known for many centuries now.

Chapter two ("Microbiology: the basics" by Valerie Edwards-Jones) describes basic but essential characteristics of different groups of microorganisms important for understanding the pathogenesis of wound infections. Four main groups of microorganisms (bacteria, fungi, parasites and viruses) are briefly described and their mechanisms of causing wound infection are pointed out, especially bacterial adherence factors.

In Chapter three ("Collection, transport and laboratory processing of wound, tissue and bone samples" by Geoff Edwards-Jones) we will find all details about how to take different samples for microbiological diagnosis of wound infection, how to transport them to preserve viability of microbes and the laboratory investigations for bacteria in these samples. It is a pity however that only laboratory diagnosis of bacteria is described in details, while laboratory diagnosis of viruses and fungi is intentionally missing because bacteria "cause majority of problems in both acute and chronic wounds". Laboratory techniques for isolation, identification and susceptibility testing of bacteria are described in some technical details just to give a picture about the complexity of laboratory diagnosis of bacterial infections. Non-culture methods are also briefly mentioned. I would prefer that quantitative biopsy culture (Chapter four) as well as quantitative susceptibility testing of bacteria (Chapter seven) would be also included in this chapter.

Chapter four ("Acute versus chronic wounds: microbiological differences" by Richard White), gives in systematic way first a description of wound healing, then a classification of wounds and wound types with the most important characteristics of each type, and then typical pathogens in specific type of chronic wounds, pointing out to the difference between microbial species causing acute and chronic wound infection. The importance of fungi in acute and especially in chronic wounds is emphasized. The problems of sampling wounds (swab versus biopsy) and quantitative versus qualitative culture are discussed.

In Chapter five ("Wound pathogens" by Valerie Edwards-Jones) the most important individual bacterial pathogens are described, including their virulence factors, pathogenesis of infections they cause and some complications that could arise from these infections. *Staphylococcus aureus*, *Streptococcus pyogenes*, *Pseudomonas aeruginosa*, and *Clostridium perfringens* are described in details. Other bacteria, that occur rarely, are also mentioned.

Chapter six ("Understanding biofilms" by Rose Cooper) is essential for the understanding of wound infections, especially chronic wound infections. At the beginning, the short history of understanding biofilms is presented and we can learn that biofilm history in wound infection is actually very short – only some 10 years. Following is a comprehensive review of biofilm development, its role in wound infection, and finally the treatment and prevention of biofilms in wounds. This chapter also has the most comprehensive reference list (80 references).

Chapter seven ("Antimicrobial agents used in wound care" by Chris Roberts) starts with short definitions of antimicrobial agents, their activity against bacteria (bacteriostatic versus bactericidal) and laboratory testing of antimicrobial agents (minimum inhibitory concentration [MIC], minimum bactericidal concentration [MBC], disc diffusion, therapeutic monitoring) – may have been better placed in chapter three (in chapter three only disc diffusion was described). There is a paragraph entitled "When should you stop using topical agents on wounds?" where it is not completely clear if the author is referring to antibiotics when he says "the use of topical

antiseptic/antimicrobial agents". After that paragraph, systemic antimicrobial treatment is discussed very briefly and then there is a detailed description of the most important topical agents (silver, iodine, inadine, polyhexamethylene biguanide [PHMB], octenidine) and alternate forms of treatment of chronic wound infections (honey, larval therapy and plant and plant oils). In the Conclusion, the author emphasizes a 7-14 day intervals assessment of the wound.

In Chapter eight ("Dressings used in wound care" by Madeleine Flanagan) we have details of different kinds of wound dressings with their functions and indications. First of all there is an emphasis on the knowing about the particular wound phase of healing to be able to choose correct wound dressing. There is a very informative and comprehensive table describing different classes of dressings and their function. A table with the characteristics of an ideal dressing is also available. Details about the concept of wound bed preparation follow, which gives the basis for the selection of the type of dressing: removal of non-viable tissue and control of bioburden (dressings for wound debridement, antimicrobial dressings), maintenance of wound moisture (dressings for the moisture balance), controlling wound odour (dressings for malodorous wounds), preventing the spread of infection and protecting surrounding skin.

Chapter nine ("Infection prevention and control" by Martin Kiernan) comprises a problem of healthcare associated (HCA) wound infections in surgical wounds and main measures to prevent it. In the introduction there are definitions of wounds that can be encountered in healthcare (acute: trauma, surgery and chronic: pressure ulcer, leg ulcer). Following is an overview of HCA wound infections and their role in all HCA infections: HCA surgical wound infections were in third place with 15.7% of all HCA infections in 2011 in England, after respiratory and urinary tract infections. Besides morbidity, the cost of these infections is a huge problem. The main measures of prevention are described: hand hygiene, personal protective equipment, aseptic technique for acute and clean techniques for chronic wounds. Special emphasis is put on problem microorganisms (multi-drug resistant) as causative agents of HCA wound infections.

Chapter ten ("Treatment strategies for wound infection" by Jacqui Fletcher, Keith Harding, and Alastair Richards) summarises how to manage wound infections in different wounds, using different methods and means according to the wound type. There is very good table with three examples of different patients and laboratory findings that serve as a base for therapeutic decision. Then there is a figure with the types of wounds and signs of infection that unfortunately is difficult to read, but the web address of the source is provided. There is a very important second figure, presenting a decision-making algorithm for wounds, also reproduced from the literature and very useful for readers. At the end of the chapter, types of debridement are presented in text and in table.

Finally, chapter eleven ("Future of wound care" by Valerie Edwards-Jones, Chris Roberts, Richard White, and Madeleine Flanagan) presents all three most important areas for improvement of management of wounds. First is the development of products for cleaning and debridement of wounds that are rapid and that will not cause further damage or pain to the wounds, and some new solutions are mentioned. Second is the development of "products and techniques that speed up wound healing" with several examples described. Third is development of "products and techniques that reduce scarring" and some examples are mentioned too. In conclusion, the authors emphasise the need of acknowledgement of importance of wounds in routine healthcare, and the need for rapid translation of new scientific data into routine practice.

### Organization of the Chapters

All chapters are organised in the same way which is very convenient for readers to understand the messages of the topic. Each chapter starts with the identification of objectives (four to seven, depending on the chapter). The text is divided in several paragraphs with specific subtitles. Throughout the text there are several kinds of boxes: small boxes called **Definition** (for example: "**Microbial taxonomy** is the process of organising or classifying organisms into different groups and subgroups. **Nomenclature** is a system of naming a microorganism"), smaller or larger boxes called **Fact** (for example: "The taxonomic rang **kingdom** is divided into five different subdivisions: **Animalia** (vertebrates

and invertebrates), **Plantae** (plants), **Fungi**, **Protista** and **Monera** (containing eubacteria)”) and smaller or larger boxes called **Key point** (for example “The scientific name assigned to a microorganism consists of **genus** and **species**, written in italics or underlined, with the first letter of the genus in upper case and the species in lower case, for example, *Staphylococcus aureus*”). Together with the objectives named at the beginning of the chapter, this chapter organization is very convenient for teaching/learning purposes (for students and trainees). At the end of each chapter there is a list of references, and most chapters also have suggestions for further reading.

The whole text is rich in tables, figures and photos. This makes the book easier to read and understand. Boxes are especially good as they divide the text and make it interesting to follow.

### Conclusion

“Essential microbiology for wound care” is a book that integrates the whole field of acute and chronic wounds: starting with the microbiology and basic characteristics of microorganisms causing wound infections, laboratory diagnostics (details of specimen taking, laboratory workup, and interpretation of laboratory findings together with the sensitivity testing), pathogenesis of wound infections (including the important role of biofilms), clinical diagnosis and finally treatment. Treatment is especially comprehensively covered – wound assessment, infection assessment, choices of local antiseptic or systemic antibiotic treatment, and the choice of different wound dressings. At the end, special emphasis is put on new research and achievements. So we have here a complete picture of the wound management, including prevention of

healthcare associated wound infection. The data in the book are corroborated with the essential literature references and are fully up to date.

However, it may be preferable for the next edition to put all laboratory microbiological methods in one chapter, instead of in three as in this edition (Chapter 3, 4 and 7). It would be good to add laboratory diagnosis of fungi to Chapter 3.

The book makes very good theoretical basis for the beginners in the field of wound management. It is also first choice book for professionals of related fields in medicine when they first encounter patient with wound infection – they will have good orientation where to go to have further information. I would select two chapters because of their importance: first Chapter 3 (“Collection, transport and laboratory processing of wound, tissue and bone samples”) that has very useful practical data about sampling which is of utmost importance for diagnosis of infection, and Chapter 6 (“Understanding biofilms”) that gives new insight into pathogenesis of wound infection and will be in the focus of research for new agents against these infections.

A special advantage of the book is that all parts are short and condensed so you can learn rapidly, or you can have rapid and precise advice for routine practice with patient. The layout of chapters with many different boxes is very convenient for this too. The language and the style are simple and clear, so even non-native English speakers can read the book easily. I believe that all these characteristics will help to spread this book throughout the medical professions in many countries.