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Microbiology Curriculum Standard

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Purpose
Interactions between humans and Microorganisms are important in causing ophthalmic disease. A breadth of understanding in microbiology is the basis of rational clinical management.

The purpose of the curriculum standard in microbiology and virology is to define the required core knowledge in ophthalmic microbiology. The learning outcomes and their associated performance criteria cover the areas of:

M1 Classification of Microorganisms
M2 Normal microbial flora of the human body
M3 Host defences against infection
M4 Principles of diagnostic medical microbiology
M5 Microorganisms Associated with Infectious Diseases of the Eye and Adnexa
M6 Infection control and therapy

The rationale for a separate curriculum standard in microbiology is that an understanding of the basics of microbiological taxonomy, specimen collection and analysis, and treatment provides an overview for the assessment and management of all ophthalmic infections.

Assessment Method
Supervised online assessment using Multiple Choice Questions (MCQ) and Extended Matching Questions (EMQ). Clinical scenarios will be utilised when appropriate.

References
The Eye Basic Sciences in Practice 3rd Edition
Forrester JV, Dick AD, McMenamin PG, Lee WR. WB Saunders 2008

Medical Microbiology and Immunology Examination and Board Review 9th Edition
Levinson. Lange Medical Publications 2006

American Academy of Ophthalmology, *Basic and Clinical Science Course*. San Francisco, 2007/8
Section 1, Chapter 8
Section 8, Chapters 6 and 7

Structure
This standard comprises six elements and their associated learning outcomes and performance criteria.

LEARNING OUTCOMES	PERFORMANCE CRITERIA
M 1 Classification and Biology of Microorganisms **1.1** Classify the Microorganisms, outlining the characteristics of each of the major groups. **1.2** Explain the biology of Microorganisms relevant to ophthalmic disease **(Levinson Ch 1, 5, 7, 32, Section VIII)**	**1.1** • Description and definitions of the major groups of Microorganisms (bacteria, fungi, protozoa, helminths and viruses) • Sub-classification of bacteria, fungi, protozoa, helminths and viruses **1.2** • Transmission of infection • The infectious process • The clonal nature of bacterial pathogens • Regulation of bacterial virulence factors • Bacterial virulence factors • Biofilm and other protective mechanisms
M 2 Normal Microbial Flora of the Human Body **2.1** Describe and explain the nature and the role of the normal microbial flora in the eye, adnexa and upper respiratory tract. **(Levinson Ch 6; Forrester Ch 8)**	**2.1** • Role of the resident flora in health and disease • Normal flora of the conjunctiva, eyelashes and eye lids • Normal flora of the mouth and upper respiratory tract
M 3 Host Defences Against Infection **3.1** Describe the physical and physiological defences of the body against infection **(Levinson Ch 8, 33, 57; Forrester pp 436-438; AAO BCSC Section 8 Chapters 6)**	**3.1** • Lids • Blinking • Tears • Conjunctiva • Innate immunity • Acquired immunity

M 4 Principles of Diagnostic Medical Microbiology	
4.1 Describe the techniques in ocular microbiological diagnosis.	**4.1** • Methods of specimen collection • Methods of specimen transport • Issues in specimen contamination • Issues in laboratory diagnostic criteria; normal flora or infection
4.2 Describe the basics of micro-organism culture and identification.	**4.2** • Microbiological stains and their interpretation • Basic culture media and uses • Effect of temperature and atmosphere requirements • Susceptibility testing; general principles and interpretation • Non-culture methods of identification of organisms including molecular techniques • Infectious disease serology
4.3 Interpret the results of microbiological tests **(Levinson Ch 9; Forrester Ch 8, AAO BCSC Chapter 6, p 134-137)**	**4.3** • Interpreting lab reports

M 5 Microorganisms Associated with Infectious Diseases of the Eye and Adnexa **5.1** Explain the biological characteristics of, ophthalmic diseases caused by, and treatment of, the listed organisms: **(Levinson Chs 9, 37, 50, & section VIII (p477); Forrester Ch 8; AAO BCSC Section 8 Chapters 6& 7)**	**5.1** **Common bacteria** • Staphylococci • Streptococci • Pseudomonads • Haemophillus • Chlamydia **Less common bacteria** • Corynebacterium • Propionibacterium • Neisseria gonorrhea • Bartonella • Mycobacteria • Spirochetes • Actinomyces • Nocardia • Moraxella • Bacillus cereus **Fungi** • Candida • Cryptococcus • Aspergillus • Fusarium • Mucor • Scedosporium **Protozoa** • Acanthamoeba • Toxoplasma **Helminths** • Toxocara • Onchocerca **Viruses** • Adenovirus • HIV • Hepatitis viruses • Herpes-simplex viruses • Varicella-zoster virus • Cytomegalovirus • Molluscum contagiosum virus • Rubella virus • Human Papilloma virus

M 6 Infection Control and Therapy	
6.1 Describe the mechanisms of action, uses and limitations of anti-microbial therapy. **(Levinson Ch 10, 11, 35, 50; Forrester Ch 8, p458-461)**	**6.1** • Therapies commonly used • Mechanisms of action • Mechanisms of resistance to therapy • *In vitro* versus *in vivo* sensitivity **Antibiotics** • Sulphonamides • Aminoglycosides • Penicillins • Cephalosporins • Tetracyclines • Macrolides • Chloramphenicol • Fluoroquinolones **Antifungals** • Imidazoles • Polyenes • Antimetabolites • Allylamines **Antivirals** • Purine/pyrimidine analogues • Aciclovir family • Foscarnet **Antiamoebic therapy (topical)** • Propamidine • Chlorhexidine • Polyhexamethyl Biguanide
6.2 Explain the principles of infection control and the details of disinfection and sterilisation. **(Levinson Ch 13; Forrester Ch 8; p 462)**	**6.2** • Contact lens solutions • Corneal storage medium • Irrigation solutions • Sterilisation; methods, uses and limitations • Disinfectants, antiseptics • Preservatives