

BMS 6301 – GENERAL MEDICAL MICROBIOLOGY AND INFECTIOUS DISEASE

Course Syllabus – Fall Semester, 2006

General Information

- Description:** This course provides learning opportunities in the basic principles of medical microbiology and infectious disease. It covers mechanisms of infectious disease transmission, principles of aseptic practice, and the role of the human body's normal microflora. The biology of bacterial, viral, fungal, and parasitic pathogens and the diseases they cause are covered. Relevant clinical examples are provided. The course provides the conceptual basis for understanding pathogenic microorganisms and the mechanisms by which they cause disease in the human body. It also provides opportunities to develop informatics and diagnostic skills, including the use and interpretation of laboratory tests in the diagnosis of infectious diseases.
- Format:** Combination of 1-hour lecture/case-based class sessions and 2-hour case-based discussion/demo lab sessions with small groups (see topical syllabus, below).
- Course Director:** David L. Balkwill, Ph.D.
Office: Room 2370-E
Office Hours: Open – students are welcome to stop by anytime.
Phone: 644-9219
Email: david.balkwill@med.fsu.edu
- Other Instructors:** Lecture: Myra Hurt, Ph.D.
Small Group Facilitation: Curtis Altmann, Ph.D.; Susanne Cappendijk, Ph.D.; Gail Galasko, Ph.D.; Jamila Horabin, Ph.D.; Edward Klatt, M.D.; Johanna Paik, Ph.D.; Graham Patrick, Ph.D.; Randolph Rill, Ph.D.; Yanchang Wang, Ph.D.
- Required Text:** *Medical Microbiology, 5th Ed.* (2005) Murray, Rosenthal, and Pfaller, Elsevier-Mosby, ISBN: 0-323-03303-2.
- NOTE:** Students may also use the previous (4th) edition of this text. A table that indicates the equivalent chapters in each version of the text is provided on the Blackboard site for the course.
- Supplemental Texts:** *Sherris Medical Microbiology, 4th Ed.* (2004) Ryan and Ray (Eds.), McGraw-Hill, ISBN: 0-8385-8529-9
- Medical Microbiology, A Guide to Microbial Infections: Pathogenesis, Immunity, Laboratory Diagnosis, and Control, 16th Ed.* (2002) Greenwood, Slack, and Peutherer (Eds.), Churchill Livingstone; ISBN: 0443-07077-6.

Medical Microbiology, 3rd Ed. (2004) Mims, DOckrell, Goering, Roitt, Wakelin, and Zuckerman, Mosby; ISBN: 0-7234-3259-7.

Medical Microbiology & Immunology: Examination & Board Review, 7th Ed. (2002) Levinson and Jawetz, Lange Medical Books/McGraw Hill; ISBN: 0-07-138217-8

Electronic Resources: <http://www.cdc.gov/mmwr/>

Access Medicine/Harrison's Online

Class schedules, weekly assignments, and information on coverage of exams are posted on the Blackboard website for this course. Copies of all handouts, lecture topic summaries, and Power Point presentations are also posted at this site.

NOTE: The cases for the small group/lab sessions are posted on the WebPath site (click on "Microbiology"). This site also contains some optional microbiology tutorials that should be helpful in preparing for the national boards.

Topical Syllabus

1-Hour Lecture/Case-Based Class Sessions

Introduction to the Course: learning objectives; course format; evaluation, testing, and grading policies; expectations; etc.

Lecture 01. Bacterial Classification, Morphology & Cell Structure: medically important groups of microorganisms, classification (taxonomy) of bacteria, morphology (cell shapes, Gram stain), ultrastructural features (cytoplasm, cell envelope, external features), bacterial spores.

Lecture 02. Bacterial Metabolism & Growth: nutrient requirements of bacteria, overview of metabolism, aerobic respiration, anaerobic respiration, fermentation, biosynthesis, bacterial growth.

Lecture 03. Bacterial Genetics – Basic Concepts & Gene Expression: the bacterial genome (chromosome, extrachromosomal elements, bacteriophages), gene organization (operons, cis-trons), DNA replication (binary fission, replication rules & fidelity), polymerase chain reaction.

Lecture 04. Bacterial Genetics – Genes, Maintenance & Exchange: mutation & repair (types of mutations, mutagens, DNA repair processes), gene transfer (transposons, extrachromosomal elements, mechanisms of DNA exchange, recombination, genetic engineering, etc.).

Lecture 05. Mechanisms of Bacterial Pathogenesis: entry into the human body; adhesion, colonization & invasion; pathogenic actions of bacteria (tissue destruction, toxins, immunopathogenesis); mechanisms for escaping host defenses.

Lecture 06. The Gram-Positive Cocci – I: *Staphylococcus aureus* (cutaneous infections, food poisoning, endocarditis, toxic shock syndrome, etc.), *Staphylococcus epidermidis* (endocarditis, catheter & shunt infections, etc.), *Enterococcus* (urinary infections, septicemia, etc.).

Lecture 07: The Gram-Positive Cocci – II: *Streptococcus pyogenes* (pharyngitis, impetigo, erysipelas, rheumatic fever, etc.), *Streptococcus pneumoniae* (pneumococcal pneumonia, otitis media, sinusitis, meningitis, etc.), *Streptococcus agalactiae* (neonatal diseases, other infections).

Lecture 08. The Gram-Positive Bacilli: *Bacillus anthracis* (anthrax), *Listeria monocytogenes* (neonatal diseases, etc.), *Corynebacterium diphtheriae* (diphtheria), *Clostridium perfringens* (gas gangrene, food poisoning, etc.), *Clostridium tetani* (tetanus), *Clostridium botulinum* (botulism), *Clostridium difficile* (gastroenteritis), *Erysipelothrix rhusiopathiae* (erysipeloid).

Lecture 09. The Gram-Negative Cocci & Anaerobic Bacilli: *Neisseria gonorrhoeae* (gonorrhea, PID, etc.), *Neisseria meningitidis* (meningitis, etc.), *Escherichia coli* (gastroenteritis), *Salmonella* (gastroenteritis, enteric fevers, etc.), *Shigella* (shigellosis), *Yersinia* (bubonic plague, enterocolitis), *Vibrio* (cholera, gastroenteritis, etc.), *Campylobacter* (gastroenteritis), *Helicobacter* (gastritis, gastric & duodenal ulcers).

Lecture 10. The Gram-Negative Aerobic Bacilli: *Pseudomonas aeruginosa* (pulmonary, skin & urinary infections, etc.), *Bordetella pertussis* (whooping cough), *Francisella tularensis* (tularemia), *Brucella* (undulant fever, etc.), *Haemophilus* (meningitis, otitis, chancroid, arthritis, etc.), *Legionella pneumophila* (Legionnaires' Disease, Pontiac fever).

Lecture 11. Anaerobes, Actinomyces, Mycobacteria & Mycoplasmas: *Actinomyces* (endogenous infections), *Propionibacterium* (acne), anaerobic Gram-negative bacilli (chronic sinusitis & otitis, brain abscesses, skin & tissue infections, etc.), *Nocardia* (pulmonary & cutaneous infections), *Mycobacterium* (tuberculosis, leprosy, etc.), *Mycoplasma* (atypical pneumonia, etc.).

Lecture 12. Spirochete, Rickettsial, & Chlamydial Pathogens: *Treponema pallidum* (syphilis, yaws, etc.), *Borrelia* (relapsing fever, Lyme disease), *Rickettsia rickettsiae* (Rocky Mountain spotted fever), *Rickettsia prowazekii* (epidemic typhus), *Rickettsia typhi* (endemic typhus), *Coxiella burnetii* (Q fever), *Chlamydia trachomatis* (trachoma, urogenital infections, etc.), *Chlamydophila pneumoniae* (pneumonia), *Chlamydophila psittaci* (ornithosis).

Lecture 13. Sterilization, Disinfection & Antisepsis: medical importance of methods, definitions and approaches (sterilization, disinfection, antisepsis), mechanisms of action (physical and chemical agents).

Lecture 14. Transmission of Infectious Microbial Diseases: spread of disease in populations, reservoirs of infection (human, animal, and non-living reservoirs), portals of entry and portals of exit, modes of transmission (contact, vehicles, vectors).

Lecture 15. Viral Classification, Structure, & Replication – I: basic characteristics and classification of viruses, virion structure (non-enveloped viruses, enveloped viruses), viral replication: overview, recognition & attachment to host cell, penetration.

Lecture 16. Viral Classification, Structure, & Replication – II: viral replication: uncoating, macromolecular synthesis (general information, transcription and replication of DNA and RNA viral genomes, production of viral proteins), assembly, release from host cell.

Lecture 17. Mechanisms of Viral Pathogenesis: acquisition & infection of target tissue, cytopathogenesis (lytic & nonlytic infections, oncogenic viruses), human host defenses against viral infection, immunopathology, epidemiology of viral diseases, (age, immune status & other host factors), control of viral spread.

Lecture 18. Papillomaviruses, Polyomaviruses, Adenoviruses & Poxviruses: Papillomaviridae—human papilloma viruses (warts, benign tumors, cervical cancer, etc.); Polyomaviridae—BK virus (cystitis), JC virus (PML); Adenoviridae—adenoviruses (pharyngitis, conjunctivitis, cold-like infections, gastroenteritis, pneumonia, acute respiratory tract disease, etc.); Poxviridae—variola virus (smallpox), molluscipoxvirus (molluscum contagiosum), etc.

Lecture 19. Herpesviruses & Picornaviruses: Herpesviridae—herpes simplex viruses (cold sores, genital herpes, encephalitis, etc.), varicella-zoster virus (chicken pox, shingles, etc.), cytomegaloviruses (congenital disorders), Epstein-Barr virus (mononucleosis, Burkitt's lymphoma); Picornaviridae—rhinoviruses (common colds), polioviruses (polio), Coxsackie viruses (meningitis, encephalitis, myocarditis, pericarditis, cold-like diseases, conjunctivitis, etc.), echoviruses (meningitis, encephalitis, exanthems, myocarditis, pericarditis, etc.).

Lecture 20. Parvoviruses, Paramyxoviruses, Orthomyxoviruses & Reoviruses: Parvoviridae—B19 (fifth disease, aplastic crisis); Paramyxoviridae—parainfluenzaviruses (cold-like diseases, croup, etc.), mumps virus (mumps), measles virus (measles), respiratory syncytial virus (colds, bronchitis, etc.); Orthomyxoviridae—influenzaviruses (influenza, other respiratory infections, etc.); Reoviridae—rotaviruses (gastroenteritis), colt iviruses (Colorado tick fever).

Lecture 21. Rhabdoviruses, Togaviruses & Bunyaviruses: Rhabdoviridae—rabies virus (rabies), vesicular stomatitis virus (flu-like disease); Togaviridae—various encephalitis viruses (flu-like disease, encephalitis, etc.), rubella virus (German measles); Bunyaviridae—various encephalitis viruses (flu-like disease, encephalitis), phleboviruses & nairoviruses (hemorrhagic fevers, encephalitis, etc.), hantaviruses (hantavirus pulmonary syndrome, ARDS, etc.).

Lecture 22. Hepatitis Viruses, Retroviruses, Miscellaneous Viruses & Prions: summary of hepatitis viruses; Retroviridae—HIV (AIDS), HTLV (adult acute T-cell lymphocytic leukemia); Caliciviruses—Norwalk virus (gastroenteritis); Coronaviridae—coronoviruses (common colds, SARS); Flaviviridae—flaviviruses (encephalitis, dengue hemorrhagic fever, yellow fever, etc.); Filoviridae—Ebola & Marburg viruses (hemorrhagic fevers); prions.

Lecture 23. Basic Biology of Fungi: general characteristics, classification, medical importance of major fungal groups, fungal cell structure, fungal morphology, fungal replication, general information on fungal pathogenesis.

Lecture 24. Superficial, Cutaneous & Subcutaneous Mycoses: mechanisms of fungal pathogenesis, superficial mycoses (pityriasis versicolor, tinea nigra, black piedra, etc.), cutaneous mycoses (etiology, ecology & epidemiology, clinical manifestations), subcutaneous mycoses (lymphocutaneous sporotrichosis, chromoblastomycosis, phaeohyphomycosis, etc.).

Lecture 25. Systemic and Opportunistic Mycoses: histoplasmosis (reticuloendothelial cytomycosis), blastomycosis (Gilchrist's disease, North American blastomycosis), paracoccidioidomycosis (South American blastomycosis), coccidioidomycosis, cryptococcosis, candidiasis (skin and nail diseases, disseminated infections, etc.), aspergillosis, zygomycosis, *Pneumocystis carinii* pneumonia.

Lecture 26. Commensal & Pathogenic Human Microflora: normal microflora of the human body, dual nature of normal flora with respect to disease, normal flora of major human body systems (respiratory tract & head, gastrointestinal tract, genitourinary system, skin).

Lecture 27. Basic Biology of Parasites: medical importance of parasites & parasitic diseases, classification & structure of protozoa (Sarcomastigophora, Ciliophora, Apicomplexa, Microspora), classification & structure of metazoa (helminths, arthropods), physiology & replication.

Student Presentation with Informatics Skills

During the section of the course that deals with parasitic pathogens, students will be divided into groups and each group will prepare a presentation on one parasitic organism to give to the whole class. Students will use informatics skills to obtain, organize, and present the information.

2-Hour Case-Based Discussion/Demo-Laboratory (Small Group) Sessions

Small Group/Lab 01. Diagnosis of Infectious Disease – General Principles: collection of specimens, microscopic methods (simple stains, Gram stain & other differential stains, fluorescent stains), biochemical methods, etc..

Small/Group/Lab 02. Molecular & Serologic Diagnostic Methods: cases illustrating the technology of DNA probes, DNA fingerprinting methods, PCR-based methods, precipitation & immunodiffusion, enzyme-linked immunofluorescence assays (ELISA), radioimmunoassay (RIA), etc.

Small Group/Lab 03. Laboratory Diagnosis of Bacterial Diseases I – Culture & Handling: cases illustrating collection & handling of specimens, types of pathogens to be expected for various body fluids & tissues, etc.

Small Group/Lab 04. Laboratory Diagnosis of Bacterial Diseases II – Epidemiology: cases illustrating infections related to epidemiologic surveillance.

Small Group/Lab 05. Bacterial Genetics & Antibiotic Resistance: cases illustrating the role of gene transfer in rapid spread of antibiotic resistance & development of multiple resistance, causes of antibiotic resistance, implications for future practice of medicine.

Small Group/Lab 06. Aseptic Practice & Nosocomial Infections: cases illustrating the etiology & epidemiology of nosocomial infections, medical & economic significance, techniques for prevention of nosocomial infections.

Small Group/Lab 07. Laboratory Diagnosis of Viral Disease: cases illustrating use of cytology, electron microscopy, viral isolation & growth (cell culture, etc.), detection of viral proteins & genetic material, viral serology.

Small Group/Lab 08. Laboratory Diagnosis of Protozoan & Other Parasitic Diseases: cases illustrating the general considerations of life cycle and pathogenesis of infection for intestinal, urogenital & blood infections (collection of specimens, techniques for specimen examination), alternatives to microscopic methods.

Evaluation of Student Performance and Grading

The material for examinations and quizzes will come from lectures, small group sessions, material on the Blackboard site for the course, handouts, *and the textbook*. The format for written examinations will be multiple choice questions (single best answer).

There will be three integrated block examinations in the Fall semester. These examinations will cover material in all the courses for the four weeks prior to each examination. The microbiology component of each examination will consist of 36 multiple choice questions. There will also be eight laboratory (small group session) quizzes and one parasitology presentation (using informatics skills) in this course. The final grade will be based upon the total score calculated from the total number of points as follows:

118 questions on the integrated block examinations	= 118 points
5 questions on each of 8 laboratory (small group session) quizzes	= 40 points
Parasitology presentation	= 10 points
Total	= 168 points

Grading for the course is based on a numeric score calculated as a percentage achieved from all possible points, as follows:

A = > 90% correct	C = 70-76.9% correct
B+ = 87-89.9% correct	D = 65-69.9% correct
B = 80-86.9% correct	F = < 65.9% correct
C+ = 77-79.9% correct	

Attendance, Remediation, and Other College of Medicine Policies

COM Attendance Policy – Philosophy:

We believe that...

Professionalism is a major component of our medical curriculum. We believe students should conduct themselves appropriately in the various educational activities of the curriculum. This conduct includes coming to educational activities on-time, using the laptop computers only for course work during the educational activity, and not disrupting the class if late. The faculty should also demonstrate professionalism, by starting and ending all scheduled educational activities on time and providing a course schedule with clearly explained course policies in the course syllabus. Any changes in the schedule should be given to the students in a timely manner.

Students will be accountable and personally responsible for attending all educational activities (small groups, labs, clinical experiences, examinations, lectures, computer sessions, etc.).

Unexcused absences reflect negatively on the goals and objectives of the medical curriculum and demonstrate unprofessional behavior by the respective student.

We owe it to our state legislature and the citizens of the State of Florida to provide a quality educational program that meets the needs of our students in preparing them for the M.D. degree.

Attendance Policy:

Students are expected to attend all scheduled activities. Students are expected to be on time. Being on time is defined as being ready to start at the assigned time. If a student has an emergency that prevents her/him from attending a scheduled activity, s/he is to call and notify the Office of Student Affairs (Year 1/2) or the Regional Campus Dean (Year 3/4) and request that they inform the supervisors/professors/clerkship faculty/education director for that activity. If at all possible, the student should also call and at a minimum, leave a message with one of the course/clerkship directors. It is important that students realize that their absence or tardiness negatively impacts a number of other people. Attendance, including tardiness, is part of the student's evaluation for professionalism. Negative evaluations may result in decreased grades and in severe cases, referral to the Student Evaluation and Promotion Committee.

Procedure for Notification of Absence (Year 1-2 Courses):

If the student knows in advance of an upcoming legitimate absence, the "Advance Request for Absence from Educational Activity(ies)" form should be completed with signatures from the student, the Associate Dean for Student Affairs, the course faculty member and the Course Director. The form will be filed in the Office of Student Affairs. The implications for the absence (e.g., remediation, course grade adjustment, make-up exam, etc.) will be given to the student by the course director and final decisions regarding these actions shall rest with the course director.

If the absence occurs due to an unforeseen emergency, the student should contact the course director and the Associate Dean for Student Affairs immediately to report the absence including the reason for the absence. The implications for the absence (e.g., remediation, course grade adjustment, make-up exam, etc.) will be given to the student by the course director and final decisions regarding these actions shall rest with the course director.

Remediation Policy for Absences from Examinations, Quizzes, Small Group Sessions, Preceptor visits, and Clerkship Call:

The remediation policies for absences from examinations, quizzes, small group sessions, and clerkship call are:

1. **POLICY ON MISSED EXAMINATIONS:** Students are required to take major in-term and final examinations. Based on Curriculum Committee policy, a student can only be excused from an examination by a course/education director decision based on the personal situation of the student. The Course/Education Director will determine the time of the exam make-up session. Also, according to the Curriculum Committee decision and the existence of the FSU COM honor code, the student will be given the same examination given to the other students. *In this course (BMS 6301), all examinations must be made up within one week of returning to class.*
2. **POLICY ON MISSED QUIZZES:** Students are required to take scheduled and unscheduled quizzes in the courses/clerkships. A student can only be excused from a quiz by a Course/Education Director decision based on the personal situation of the student. The student must make arrangements with the Course/Education Director to make up a missed quiz. Also, according to the curriculum committee decision and the existence of

the FSU COM honor code, the student will be given the same quiz given to the other students. *In this course (BMS 6301), all quizzes must be made up within one week of returning to class.*

3. **POLICY ON MISSED SMALL GROUP SESSIONS, PRECEPTOR VISITS, AND CLERKSHIP CALL:** The student should contact the Course Director, small group leader, Clerkship Director or Education director for instructions on remediation of the missed session and material covered. *In this course (BMS 6301), missed small group sessions must be made up within one week of returning to class. They will be made up by handing in written answers to the questions in the small group cases and a written, one-page discussion of the material covered in the missed session.*

Academic Honor Code:

The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to ". . . be honest and truthful and . . . [to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at <http://www.fsu.edu/~dof/honorpolicy.htm>).

Students With Disabilities:

Students with disabilities needing academic accommodations should:

- (1) Register with the Student Disability Resource Center [SDRC], and provide documentation of their disability.
- (2) Bring a letter to the Course Director from the SDRC indicating the need for academic accommodations. This should be accomplished within the first week of the course. Specific arrangements should be made with the Course Director five working days prior to any examination for which accommodations are being requested.

Evaluations

Student evaluations throughout the course are an important way of improving medical education, particularly during the founding years of the College of Medicine. Not only are your comments and suggestions valued, but the evaluation process represents one way for you to become familiar with the peer review process. Peer review is an important quality management function in all branches of medicine. In order for peer review to work properly, it must be taken seriously by both the evaluators as well as those being evaluated. Therefore, we ask that you give careful consideration to evaluations. When making comments, consider what you would say if you were face to face with the person to whom the comments are directed. How would you react if the comments were directed at you? Give thought to how learning resources were used in regard to the way to learn best. What worked for you and what did not? How is your time used optimally? Are you making adequate progress? Are you being challenged to improve? Be specific.

Ultimately, your use of the evaluation process can help you learn how to improve your own medical practice.

Course Objectives

Knowledge

- K1. Develop a knowledge base of principles of microbial taxonomy, structure, physiology, and function.
- K2. Develop a vocabulary for describing the taxonomy of microbial organisms and the diseases they produce.
- K3. Develop familiarity with the major types of pathogenic microorganisms and the diseases that they produce in humans.

Skills

- S1. Demonstrate the ability to use the laboratory to diagnose infections, including appropriate specimen collection and test ordering.
- S2. Demonstrate the ability to interpret laboratory findings in the context of the patient's presentation and findings.
- S3. Demonstrate knowledge of general categories of therapeutic modalities available to treat infections.
- S4. Demonstrate knowledge of public health surveillance and measures to deal with infections in a population.
- S5. Demonstrate problem solving ability and diagnostic reasoning with infectious diseases.
- S6. Develop an ability to use evidence-based medicine to determine methods for diagnosis and treatment of infections.
- S7. Demonstrate knowledge of clinical manifestations in the history and physical examination that point to infection.
- S8. Demonstrate knowledge of the effect of age on the types of infections seen in the life cycle, including those seen in perinatal, pediatric, and geriatric patients.
- S9. Demonstrate the ability to correlate microbial infection with radiologic findings.

Attitudes/Behaviors

- A1. Demonstrate professional attitudes and behaviors towards others.

Integration with College of Medicine Goals and Objectives

Knowledge

- Demonstrate the application of the scientific bases of health, disease, and medicine to common and high impact medical conditions in contemporary society.
- Describe the development, structure and function of the healthy human body and each of its major organ systems at the macroscopic, microscopic, and molecular levels.
- Recognize and discuss the implications of altered structure and function (pathology and pathophysiology) of the body and its major organ systems that are seen in various diseases and conditions.
- Identify changes in the structure and function of the human body associated with the aging process and be able to distinguish normal changes associated with aging from those that denote disease.
- Describe the molecular basis of diseases and maladies and the way in which they affect the body (pathogenesis).
- Demonstrate the ability to use basic biobehavioral and clinical science principles to analyze and solve problems related to the diagnosis, treatment, and prevention of disease.
- Describe strategies to support life long learning via both print and electronic sources to assist in making diagnostic and treatment decisions (*e.g.*, practice guidelines) and to remain current with advances in medical knowledge and practice (*e.g.*, medical information data bases).

Skills

- Demonstrate the appropriate use of laboratory tests and radiographic studies in making diagnostic and treatment decisions.
- Demonstrate the ability to evaluate the patient's medical problems and to formulate accurate hypotheses to serve as the basis for making diagnostic and treatment decisions.
- Demonstrate the ability to acquire new information and data and to critically appraise its validity and applicability to one's professional decisions, including the application of information system technologies for support of clinical decision-making.
- Demonstrate the ability to organize, record, research, present, critique, and manage clinical information.
- Demonstrate the ability to communicate compassionately and effectively, both verbally and in writing, with patients, their families, colleagues and others with whom physicians must exchange information in carrying out their responsibilities.
- Demonstrate the ability to work effectively as part of a health care team, with appreciation for the multiple contributions of other health care professionals and agencies to the health of the individual and the health of the community.

Attitudes/Behaviors

- Demonstrate professionalism and high ethical standards in all aspects of medical practice, specifically competence, honesty, integrity, compassion, respect for others, professional responsibility and social responsibility.
- Demonstrate awareness of the health care needs of aging patients and a willingness to care for the elderly.