Welcome to the first lecture for the course entitled PHC 6517 Infectious Disease Prevention Strategies. I am your instructor for the course: Donna Haiduven, PhD, RN, CIC. This lecture lays the groundwork for the course and discusses the concepts of primary, secondary and tertiary disease prevention as applied to infectious disease and infection control. It is essential that you understand these concepts and can apply them to the various subjects in this course.

There are three objectives in this first class session. First, you should be able to define primary, secondary & tertiary in terms of the general disease prevention context. Next, you should be able to list & describe primary, secondary & tertiary strategies in infectious disease & infection control situations. Finally, you should be able to outline the model of these three strategies to be used in this course.

By this time, if you have not done so, please review the Course Syllabus. It clearly lays out the course objectives and assignments. This course is one of the 4 required courses in the USF College of Public Health’s Infection Control Certificate Program and MPH in Infection Control Program. It is also an elective course in the Global Communicable Diseases Tract in the MPH program.

In this course, infectious diseases that will be covered include the following: 1) those that are vaccine-preventable, like varicella or measles; 2) those of concern in healthcare facilities (such as meningococcal meningitis or scabies); 3) those related to intentional acts of bioterrorism (e.g., the CDC’s Category A Agents of Biological Terrorism: anthrax, botulism, etc.); 4) those that are related to natural and intentional disasters and are of public health concern (e.g., enteric diseases, zoonotic diseases, etc.); 5) those transmitted by the fecal-oral route or food-related (e.g., hepatitis A, Salmonella); and finally the sixth category is 6) epidemic Ebola.
As for general terms, the first classified levels of disease prevention were coined by Leavell & Clark in 1965 to include: primary, secondary and tertiary. The levels of prevention include primary prevention with the desired outcome of health promotion and specific protection (counseling against smoking, immunization for measles); secondary prevention with the desired outcome of presymptomatic diagnosis and treatment (screening asymptomatic women for breast cancer with mammography, screening asymptomatic women for cervical cancer with Pap smear testing); and tertiary prevention with the desired outcome of disability limitation for early symptomatic disease and rehabilitation for late symptomatic disease (treatment of high cholesterol after myocardial infarction, occupational therapy following a stroke). These levels define strategies that are available to practitioners to promote health and prevent disease. Though some interventions do not fit neatly into the classification, the concept is most useful in educating patients about screening interventions (a secondary prevention) that are frequently confused with a primary prevention strategy.

Using this classification, let’s go into more detail about the three levels. Primary prevention was defined as “based on measures to promote general optimum health, or specific protection against disease agents or the establishment of barriers against agents in the environment”.

Applying those definitions to the fields of infectious diseases and infection control, examples of primary infectious disease prevention strategies are as follows: 1) immunizations 2) building plans 3) outbreak plans, 4) bioreadiness plans, 5) education, and 6) the isolation of diagnosed cases. We will expand more on these examples in a few minutes.

Secondary infectious disease prevention strategies are designed to achieve prompt and adequate treatment of the pathogenic process as soon as it is detectable. Some examples of these strategies include post-exposure prophylaxis (PEP), treatment of contained casualty cases, isolation of suspected cases of infectious diseases, implementation of bioreadiness plans, working-up an outbreak of an infectious disease, and restricting an employee with a contagious condition, at work. We will go more into these examples in later slides.
Tertiary strategies for general disease prevention consist of corrective therapy (in order to prevent sequelae and limit disability) or rehabilitation (if the disease or condition is too advanced). Examples of this in terms of our course include mass casualty bioterrorism situations, therapy for smallpox scars, revision of bioreadiness, building and/or outbreak plans, education and isolation (quarantine) of contacts of cases.

The following strategies are those to prevent infectious diseases and foster infection control both in healthcare settings and on a global scale: Isolation/precautions; Current Immunizations; PEP & Work Restrictions; Cleaning, Sterilization & Disinfection; Antisepsis & Hand Hygiene; Infection Control Patient Care Practices; Prevention of Foodborne Illness; Disaster Management and Bioreadiness. Let’s talk a bit more about each of these. The Categories of Isolation/Precautions recommended by the Centers for Disease Control & Prevention are essential to learn from an infection control standpoint. These are used in healthcare facilities and in some cases, at home, to prevent transmission of infectious disease. There have been numerous updates in the immunizations recommended for healthcare workers and the general public. We will cover both categories in this course. The principles of cleaning, sterilization, and disinfection are essential for infection control practice. Antisepsis and Hand Hygiene are global infection control strategies to prevent or reduce transmission of microorganisms. Infection control patient care practices are required for preventing urinary tract infections, intravascular-device-related infections, surgical site infection, pneumonia and environmental control. You will learn about all of these in this course. Prevention of foodborne illness is important from the healthcare facility to the global level. This is also true of disaster management and bioreadiness-requiring preparation at the home and family level, in the workplace, on a community level, and at state, national and global scales.

In the next few slides, we will lay out the concepts of primary, secondary and tertiary infectious disease prevention strategies using a categorization system I have developed to apply to the fields of infectious disease and infection control. You will need to be familiar with the divisions and concepts in this model for application in this course. (You may or not agree with these concepts and I welcome any constructive feedback/discussion. I am always available via e-mail).

The primary, secondary and tertiary infectious disease prevention strategies are divided here for easy reference. Note how some strategies cross two or more categories, depending upon the context in which they are presented.
Under primary infectious disease prevention strategies in this model, the following are included: immunization, bioreadiness, outbreak plans, building plans, education and isolation of diagnosed cases. Let’s expand on these examples. Giving a child the MMR (measles, mumps or rubella vaccine) or administering influenza or pneumococcal pneumonia vaccines to seniors is a primary infectious disease prevention strategy. Plans for working up an outbreak or dealing with a bioterrorism attack or pandemic influenza are primary strategies when they are in place for preparation or prevention. Building plans, with evacuation and safety routes, designed to prevent or reduce injury and death in emergency situations, are an example of a primary strategy. Education given to healthcare workers on Universal Precautions, to prevent them from acquiring a bloodborne infection, is an example of a primary strategy. If someone has been diagnosed with an infectious disease, then placing them in isolation is a primary infectious disease prevention strategy. As you will see in the next few slides, there are instances when isolation can be a secondary or a tertiary strategy. For purposes of this course, you will need to be able to distinguish between these three strategies when given infectious disease or infection control examples.

The first example of a secondary strategy is post-exposure prophylaxis, also known as PEP. An example of PEP would be to administer rifampin to healthcare workers exposed to a case of meningococcal meningitis, to prevent them from acquiring meningococcal disease. On a purely grammatical basis, the term “post-exposure prophylaxis” is an oxymoron, as it consists of two words with opposite meanings. In terms of this course, it is important to understand that it is a secondary infectious disease prevention strategy. It is a medication or an immunization administered after exposure to a known or suspected condition in under to prevent the exposed person from acquiring that disease or condition. Let’s say there is a measles exposure in a hospital to healthcare workers from a pediatric patient. As PEP, the measles vaccine can be given 72 hours post-exposure to prevent measles. The next example is treatment in a contained casualty situation. Let’s say, for example, that 10 soldiers in Operation Iraqi Freedom present in a field hospital with upper respiratory symptoms. A rapid test is then made available to determine that the offending agent is anthrax. Those affected will be treated with a particular antibiotic with specific activity against anthrax to optimize treatment. (We will go into much more detail of this in the “Bioreadiness Lecture” later in this course). This is a contained casualty situation where the offending organism/condition is known and can be effectively managed. If a hospital had to implement its bioreadiness plan in an anthrax attack by terrorists, that would be another example of a secondary strategy. If a nursing home had an influenza outbreak that was being worked up to establish control measures and to prevent further cases, that would be another example. If an intentional or unintentional release of a biological agent occurred in a definitive area, a healthcare facility might activate its alarm modes, employ purge isolation and/or go into a “shelter in place” mode. These would all be examples of secondary strategies for
building plans. If a community were experiencing the first stage of pandemic influenza, a town meeting might be called to discuss strategies such as social distancing, and treatment with anti-viral agents. This level of education would be a secondary strategy, as the pandemic flu has already started and efforts to prevent further spread need to be taken. Also included in this category is if a healthcare worker with a contagious condition, such as herpetic whitlow (or a herpes zoster infection), were put on work restrictions (e.g., wearing gloves), to prevent transmission to other healthcare workers or patients. Finally, in terms of isolation/precautions, if someone were suspected to have an infectious disease that required isolation in the healthcare setting, this would be an example of a secondary infectious disease prevention strategy. In this particular example, the strategy is to prevent further exposure should the condition develop. Another non-infectious condition may be diagnosed, negating the need for further isolation. Or an infectious condition may not develop. However, if it does, the patient is already isolated and can be treated if needed.

Tertiary infectious disease strategies are listed here and include: mass casualty treatment, education, revision of bioreadiness, building and/or outbreak plans, extended control measures, smallpox scar therapy, and isolation of contacts. Let’s use another example from Operation Iraqi Freedom. If a very large number of troops present in different field hospitals and stations with acute upper respiratory symptoms and a terrorist threat has been received, it may not be possible to obtain a rapid diagnosis. The symptoms may be due to several of the Category A Agents. Given this situation, it may be prudent to use an antibiotic that covers for anthrax, tularemia AND pneumonic plague. In this case, that would be ciprofloxacin or doxycycline. This would provide initial treatment for a large number of individuals, those exposed and those who may already have symptoms, until a definitive diagnosis is made. For the education and revision of plans example, let’s use the discovery of a new resistant organism causing an outbreak in a large teaching hospital. It may turn out that the existing outbreak plan was not adequate for containing the outbreak and it has to be revised. The healthcare personnel have to be educated on how to deal with this out of control situation. Both of these are examples of tertiary strategies. Why they are tertiary is because a disease or condition has already occurred, there is no effective treatment and the outbreak has not been controlled with existing plans. Thus, a revision of plans and accompanying education must be provided. With SARS, it was not immediately known what the exact organism was causing this syndrome. Extended control measures, such as stricter isolation techniques and travel policies, needed to be enacted until the exact source of the condition was discovered. These were examples of extended control measures. If there were an intentional attack with smallpox in this country and some individuals contracted illness with resulting scars, then therapy for those scars would be a tertiary strategy. Disease has already occurred and treatment is only supportive, so now this is the option for limiting further disability from the disfiguring scars. The final example has to do with isolation again. If there was an
exposure to a viral hemorrhagic fever (e.g., Lassa fever) on an airplane as an example, a strategy for the contacts would be to have them remain at home for 17-21 days, checking their temperature daily and only reporting to a healthcare facility if symptomatic. This would be a case of isolating an exposed individual, who may or may not contract the illness. This action is known as “quarantine”, where exposed but non-symptomatic individuals are confined at home or some other location to observe for disease. Another example would be if a healthcare worker with varicella exposed some in-patients before rash developed (varicella or chickenpox is contagious for 1-3 days before rash develops). Any in-patients who had to stay in the hospital for other reasons would need to be isolated in Airborne Isolation until or if lesions developed. If no disease developed and they were still hospitalized, they could then be removed from this isolation. If disease did develop, then they would not only have to be placed on Airborne, but Contact Precautions as well. At that point, the isolation would be a primary strategy. Until then, it is a tertiary strategy.

In this diagram, you can see that some strategies appear in two or three categories of prevention. For example, treatment can be a secondary or tertiary infectious disease prevention strategy. In a contained casualty situation, it would be a secondary strategy. In a mass casualty situation, it would be a tertiary strategy. Education crosses all three strategies, dependent upon the nature and purpose of that education, and as evidenced by the previous examples given. There are situations when isolation can be primary, secondary, or tertiary and in the latter situation it is called “quarantine”.

Let’s summarize what we have accomplished in this first lecture. The definitions of primary, secondary and tertiary disease prevention were provided. These were then expanded to include them in the context of infectious diseases and infection control. Finally, the categorization schema for this class were outlined, laying the groundwork for the rest of the course. This concludes the Lecture on Infectious Disease Prevention Strategies. Next, you need to watch the film “Influenza 1918” and answer the questions on the worksheet while you are watching it. This is a way of reducing material AND there will be questions from this worksheet on the exam. If you turn in the completed worksheet that accompanies the film, it is possible to get one extra credit point.

This concludes the lecture entitled “Infectious Disease Prevention Strategies”.

Summary
• Defined primary, secondary & tertiary infectious disease prevention strategies
• Categorized, defined & provided examples for application in this course
• Laid groundwork for rest of the course