

Chapter 11 Homework

1. What is a QALY? How much is our society willing to spend to gain one QALY?
2. Draw and label a graphical representation of health policy space. In which quadrant of the graph would the following interventions be located?
 - o Measles vaccinations for children
 - o Antiretroviral drug therapies for HIV infected patients
 - o Screening all women for ovarian cancer using serum CA125 levels
3. Explain why it is important to consider “additive procedures” when analyzing the cost effectiveness of new medical technologies. Give a specific example in which additive procedures influenced cost effectiveness.
4. Cardiovascular disease is the leading cause of death in the United States.
 - o What are four major treatments for coronary artery disease?
 - o Currently, coronary artery disease is diagnosed using coronary angiography, a painful and expensive technique. You have just developed a new, painless technique to diagnose coronary artery disease. The technique is also substantially less expensive than coronary angiography. Somewhat surprisingly, some health economists predict that the introduction of your new technique will actually cause health care expenditures to grow. Why might they make this prediction?
5. When detected early, ovarian cancer is curable for 95% of women. Unfortunately, in the majority of cases, ovarian cancer is not detected until widespread metastasis has occurred. In this circumstance, ovarian cancer is fatal approximately 63% of the time. The American Cancer Society estimates that there will be about 25,580 new cases of ovarian cancer in the United States in 2004. About 16,090 American women will die of the disease in 2004. On average, 22 years of life are lost when a woman dies of ovarian cancer. You have developed a new blood test that can detect ovarian cancer in the earliest possible stages. Each blood test costs \$200 to perform. There are 292 million Americans, approximately 70 million of whom are women over age 40.
 - o How much money would we spend annually if all women over age 40 were screened with this new test?
 - o Calculate the annual mortality rate of ovarian cancer without the use of the new test. Compare this to the expected annual mortality rate of ovarian cancer with the use of the new test.
 - o If the new test was used, how many years of life would be gained?
 - o If this test was administered annually to all women over age 40, how many \$ would we spend per year of life gained?
 - o Based on your answer to part d, do you think this test would be adopted in the developed world? In the developing world? Explain your reasoning.
6. In the US, HIV infection is often discovered at an advanced state, when patients seek treatment for complications due to AIDS. When detected early, HIV infection can be controlled using HAART. On average, early detection of HIV infection extends the life of HIV patients by 1.8 years. Currently, we do not screen the general population for HIV infection. However, recent articles in the February 10, 2005 issue of the New England Journal of Medicine argue that we should consider voluntary screening of all patients, particularly those in higher risk groups. In this problem, you will be asked to do some calculations to determine whether you agree with their conclusions. The prevalence of HIV

infection in the general US population is 0.33%. There are 292 million Americans, 140 million of whom are over age 40. The cost of screening for HIV is approximately \$2.

- How many Americans are infected with HIV?
- If the test was administered to all Americans, how much would we spend in testing?
- If the new test was used, how many years of life would be gained?
- If this test was administered to all Americans, how many \$ would be spent per year of life gained?
- Based on your answer to part d, do you think this test would be adopted in the developed world? In the developing world? Explain your reasoning.
- Approximately 1 person per 200,000 individuals tested will have a false positive test result. In other words, their HIV test will be positive even though they do not have HIV. If we test all Americans, how many people will receive a false positive result?

7. You have developed a new technology that could detect pre-cancerous cells in the sputum. This technology can enable much earlier detection of lung cancer, reducing the fraction of lung cancer patients that die of their disease from 90% to 15%. Your test costs \$100 to perform. Assume that on average, 18 years of life are lost when a person dies of lung cancer. There are 292 million Americans, 140 million of whom are over age 40. There are 173,770 new cases of lung cancer in the United States each year.

- How much money would we spend annually if all adults over age 40 were screened with this new test?
- Calculate the mortality rate of lung cancer without the use of the new test. Compare this to the expected mortality rate of lung cancer with the use of the new test.
- If the new test was used, how many years of life would be gained?
- If this test was administered annually to all adults over age 40, how many \$ would we spend per year of life gained?
- Based on your answer to part d, do you think this test would be adopted in the developed world? In the developing world? Explain your reasoning