

## **PUBLIC HEALTH IN PRACTICE**

**Jacqueline Davis, OD, MPH, Melvin Shipp, OD, MPH, DrPH**

### **Chapter Overview**

This chapter will investigate the fundamental differences and similarities between the approaches taken by public health professionals and clinical health care providers in their efforts to achieve optimal global health. Also preventive public health measures that impact the clinical manifestation of disease will be defined and categorized. Lastly, the individual, societal and economic consequences of vision loss and public health efforts to reduce its burden will also be considered.

### **Objectives**

1. The reader will be able to explain why most public health initiatives are not highly visible to the public.
2. The reader will be able to differentiate between services typically provided by public health professionals and those delivered by health care practitioners. The reader will also be able to recognize situations when the responsibilities of the two disciplines overlap.
3. The reader will be able to relate the three stages of the natural history of disease to the public health continuum.
4. The reader will be able to correlate the goals of public health intervention efforts to altering the natural history of disease.
5. The reader will be able to identify the challenges present in implementing efforts of disease prevention versus disease treatment.
6. The reader will be able to weigh the human and economic costs associated with disease processes and levels of prevention.

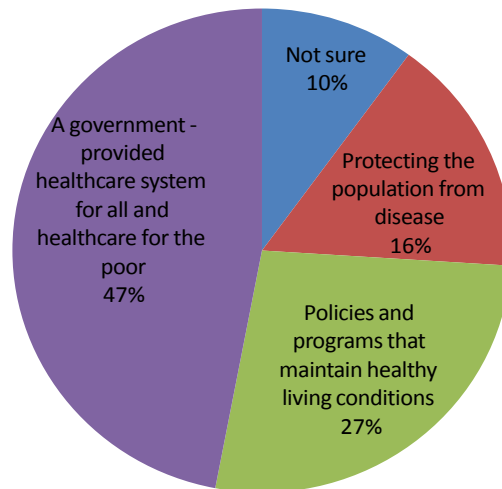
## Public Health Principles in Practice

### ***Misconceptions about Public Health***

The definition and mission of public health encompasses broad concepts and multiple disciplines. With such a broad spectrum of services and activities, there are often misconceptions within the general public about exactly what public health entails.

The 1999 Pew Charitable Trust survey found that most people think of public health as medical treatment for the poor or uninsured (Figure 1). (1) A 1996 Harris poll asked 1000 adults to give their definitions of public health. Despite the fact that 76% said they knew what public health was, very few defined public health in terms of health education or healthier lifestyles (one percent), prevention of infectious disease (one percent), or immunization programs (one percent).(1)

**"When you hear the term Public Health, which of the following do you think of?"**



Source: Funded by the Pew Charitable Trust and conducted by the Mellman Group and Public Opinion Strategies, 1999: National Conference of State Legislatures,

Figure 1- General public perceptions of public health services

Public health in practice is not always readily recognized by the people it serves. A major reason for this is that public health's primary mission is prevention of injury and disease. If public health systems are working properly, injuries and disease are being prevented and therefore the impact of these systems is unappreciated. Most people don't realize the importance of public health working behind the scenes. They tend to take for granted the fact that their water is clean, their workplace is safe and no

infectious outbreaks are occurring. The actions of public health interventions only become apparent to the general public when the prevention system breaks down or a new environmental challenge emerges and thrusts public health agencies' efforts onto the front pages.

### ***Health Care Services vs. Public Health***

There can also be stringent disagreement about where lines should be drawn separating the services offered by health care practitioners (e.g., optometrists, physicians, dentists, etc.) versus those by public health workers (e.g., health educators, sanitarians, epidemiologists, etc.). Many health care practitioners believe that their services fall solely within the realm of clinical care which they believe has little to do with the domain of public health. Also and unfortunately, misconceptions about public health's role in disease prevention, health promotion and ensuring access to health care services, at times are misconstrued by health care practitioners as competition and duplication of services.

**KEY CONCEPT:** *Generally, it can be said that public health prioritizes the health of communities while health practitioners supply health care services to individual patients.*

In reality, the lines between the two domains are not always hard and fast. It is impossible to have a healthy and productive community if the individuals within that community are infirm.

In the context of promoting healthier lifestyles, a health practitioner will counsel an individual patient on the need to exercise, avoid obesity and maintain a healthy BMI (body mass index). In contrast, the public health worker will establish a program that will engage an entire community in active living and healthy weight management.

For the most part, the distinctions between the categories of *health care services* and *public health* are clear and well defined. Protective services such as eliminating toxic waste, encouraging bicycle helmet use, and community disaster preparedness drills all fall squarely within the domain of public health and not within the category of health care services. Overlap of these categories, however, can be found in examples of individual *and* community health promotion services such as human papillomavirus vaccinations and diabetes prevention programs.

### **Public Health Continuum**

To help us gain a better perspective of public health in practice, in this section, we will build a schematic representation of the "Public Health Continuum". This model will

incorporate the different clinical manifestations of disease, the three levels of preventive services and the economic implications of various health interventions.

The first layer of our Public Health Continuum looks at the status of an individual's health over the course of their lifetime. At the extremes of this continuum are "Total Health" and "Death." (Figure 2) The Continuum can describe the lifespan of an individual, or a specific physiologic function (e.g., vision vs. blindness). From birth to death, there are an infinite number of events that have potential impacts on one's health. Ideally, a person would live their entire life in "good" health. In that scenario, and as depicted by the dotted line in Figure 2, their lifeline would be a smooth horizontal line in the total health zone, never taking a vertical turn until the time of death. However, it is unlikely that anyone will *never* encounter any ill health events; events such as an illness, a disease, an injury or exposure to an environmental hazard could cause a vertical deviation away from the horizontal state of "good" health.

### Public Health Continuum

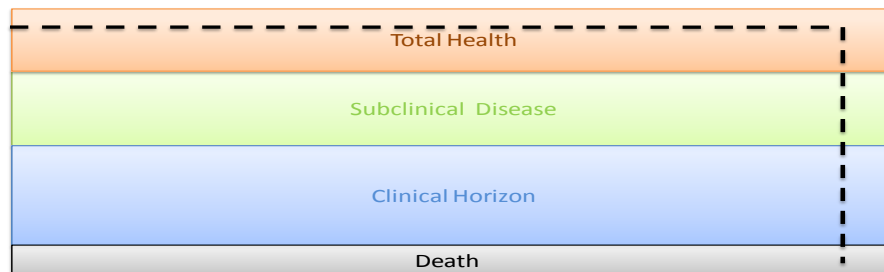


Figure 2- Public Health Continuum (No ill health events until death)

In order to determine when an effective health intervention can or should be applied, it is important to understand the natural, unaltered course of the disorder, from its beginning to its final clinical end points. This is called the **natural history of a disease** which can be broken down into three stages.

During the **predisease stage** (what we previously described as a state of "good" health), a person can be thought of as possessing various factors that either promote or resist disease. These factors include genetic makeup, demographic characteristics (especially age), environmental exposures, nutritional history, social environment, immunology capability and behavioral patterns. (2) Over time, these and other factors

may cause a disease to begin and progress slowly (i.e., most chronic disorders) or progress rapidly (i.e., most infectious diseases, injury). If the disease process produces no symptoms and no clinical signs, then it is considered to be in the **subclinical or latent stage** (green area). When noticeable symptoms or clinically detectable signs appear, the condition has reached the **clinical horizon or symptomatic stage** (blue area). The possible clinical endpoints of symptomatic disease are recovery, disability or death.

To better understand how preventative measures have potential effects on societal health, we will add another element to our public health continuum model. In this component, activities that reduce the burden of mortality and morbidity from a disease or injury are categorized into three levels of intervention (Figure 3). The levels of prevention are explained in the following section.

## Public Health Continuum

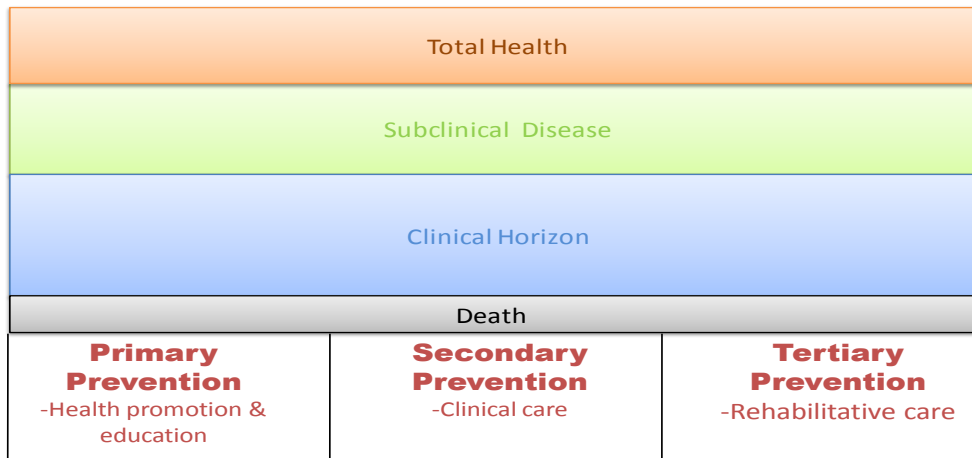


Figure 3 – Continuum with Three Levels of Prevention

### Primary Prevention

**KEY CONCEPT:** *The ultimate goal of a public health intervention is to alter the natural history of a disease in a favorable way.*

This is done by implementing measures that will delay or prevent the disease's clinical signs, symptoms, complications or death. Importantly, some interventions do not **prevent** a disease process, but may **slow** it such that it is not manifested until later in life.

Measures taken to keep the disease process from becoming established are considered to be *primary prevention*. This is done by either eliminating risk factors (i.e., the causes of disease and injury), or by increasing one's resistance to disease. Included in these efforts are health promoting activities that consist of non-treatment interventions such as changes in lifestyle, nutrition and the environment.

**KEY CONCEPT: *Historically, public health has focused on primary prevention.***

Insuring the availability of clean water, effective sewage management, breathable air, and food safety initiatives on a local and global basis are examples of public health primary prevention. It has been suggested that such public health advances are responsible for increasing our life span by 30 years during the 20<sup>th</sup> century.(3) Primary prevention has more recently been expanded to include health education of individuals and communities on how to minimize exposure to disease or harm.

In the area of vision, examples of primary prevention are the use of protective eyewear and appropriate task lighting levels at industrial work sites. There is evidence that the use of sport goggles by children and adults can prevent up to 540,000 sport related eye injuries in America each year. (4) Celebrating the month of January as glaucoma awareness month is another form of primary prevention involving health education and health promotion. Public service announcements encouraging comprehensive dilated vision exams at least every two years is also an example of primary prevention in which a clinical assessment is a key component.

The following case presentation demonstrates how ignoring primary prevention measures can result in tragic outcomes.

#### CASE STUDY 1

Shawna is a fourteen year old girl who loves to play baseball and is good at it. She plays shortstop. In that position, nothing gets past her.

At the beginning of the season, Shawna's coach announced that new league rules required everyone to wear protective eyewear during game time. This ruling was a direct result of an incident from last season in which a player was hit in the face by a line drive and subsequently lost vision in one eye. The coach went on to explain that the requirement could be waived if a parent signed a consent form, absolving the league of any legal liability if their child chose to not wear the eye protection.

Shawna is friends with Tracy—the young lady involved in the accident—and she knows that Tracy’s road to recovery is not over. Tracy has had several eye surgeries and it is doubtful that Tracy will ever play baseball again, partially because of her loss of depth perception from the loss of the use of her right eye.

Shawna is not crazy about the looks of the sports eyewear, but since everyone else is wearing them, they really are not so bad. More importantly, Shawna does not want anything to interfere with her ability to play baseball, so she gladly straps on her goggles as she steps up to the plate.

#### PUBLIC HEALTH QUESTIONS FOR THE CASE STUDY

1. Describe two public health primary prevention initiatives involved in this case study.
2. Why did the baseball league give parents the option to refuse the goggles?

#### **Secondary Prevention**

Many times in the course of the disease process, clinical testing can detect the development of a health condition (i.e., clinical signs) before the patient is aware of it (i.e., clinical symptoms). For example, careful peripheral funduscopy through a dilated pupil may expose a retinal tear before the patient is aware of any photopsia (flashes or floaters). This again is considered to be the *subclinical* or *latent stage of disease*; the clinical testing done to detect the defect is a secondary prevention measure.

The goal of secondary prevention is to stop subclinical disease before it becomes symptomatic or before it can be transmitted to others. Well established clinical testing or screening detect risk factors such as elevated blood pressure to help in the prevention of strokes and heart attacks; mammograms to detect breast cancer; finger sticks to reveal elevated blood sugar levels in prediabetic persons; and PPD skin test to detect cases of asymptomatic tuberculosis.

**KEY CONCEPT: *Most secondary prevention services are performed by healthcare practitioners. These services are aimed at early detection.***

An excellent example of an eye/vision related secondary prevention intervention is the American Optometric Association’s InfantSee program in which optometrists use age-specific clinical techniques to assess the visual health of infants under the age of twelve months. Other examples would be visual field screenings done during comprehensive vision exams to attempt to detect any loss of peripheral vision, and school screenings using the Modified Clinical Technique (MCT) to evaluate the eye health and vision status of early school aged children.

### ***Tertiary Prevention***

Tertiary prevention is rehabilitative or palliative clinical treatment given when a disease or condition has become disabling. The goals of tertiary prevention include reducing the negative impacts or progression of an already established disease, reducing disease related complications and/or providing compensatory function for irreversible lost sensory or motor function.

Tertiary prevention may slow the natural course of some progressive diseases, and prevent or delay many of the complications associated with chronic diseases such as arthritis, asthma and diabetes. National Eye Institute research has shown that patients who maintain tight control on their blood sugar levels have a better chance of delaying or preventing the devastating complications of diabetic retinopathy. Therefore, when an optometrist urges a patient to pay closer attention to A1C levels and blood sugar readings, the optometrist is practicing tertiary prevention.

Tertiary prevention also includes giving an eye patch or prescribing cycloplegic drops to a child to try to reverse the vision loss brought on by amblyopia. Prescribing bifocals for an early presbyope to reduce symptoms of blurred vision at near is another example of an intervention to restore function for a disabling condition; it does not cure the condition or make it go away, but it helps to alleviate the symptoms and it allows the patient to resume their necessary near work. Prescribing a tapering dose of a steroid eye drop for a patient suffering from an anterior uveitis also constitutes tertiary prevention; it attempts to reduce the risk of potential vision loss associated with intraocular inflammation.

### ***Human and Economic Considerations***

The last addition to the model of the Public Health Continuum is a depiction of the human and economic costs associated with disease state and levels of prevention (Figure 4).



## Public Health Continuum

Total Health		
Subclinical Disease		
Clinical Horizon		
Death		
<b>Primary Prevention</b> -Health promotion & education	<b>Secondary Prevention</b> -Clinical care	<b>Tertiary Prevention</b> -Rehabilitative care
\$	\$\$\$	\$\$\$\$\$

Figure 4 – Continuum with Economic Considerations

America spends more than \$2 trillion each year on healthcare, which is more than any other nation in the world. Yet, the U.S. has the highest rate of preventable deaths among 19 industrialized nations. (5) Certainly, many factors are responsible for this state of affairs, but one salient reason is our health care system’s focus on caring for people **after** they have become sick or injured rather than preventing such calamities.

According to the US Centers for Disease Control and Prevention, (CDC), the majority of chronic diseases could be prevented through lifestyle and environmental changes.

**KEY CONCEPT: Preventing chronic diseases is much more cost effective and less expensive than treating the diseases after they occur. (6)**

According to the CDC:

- Reducing adult smoking rates by 1% could result in more than 30,000 fewer heart attacks, 16,000 fewer strokes and \$1.5 billion saving over five years. (5)
- If one tenth of all Americans began a walking program, \$5.6 billion could be saved in the treatment of heart disease.(5)
- Routine childhood vaccinations result in \$50 billion saved annually in direct and indirect costs. (5)

In the realm of vision health, the statistics are equally sobering. Every seven minutes, someone in the United States becomes blind or visually impaired. The NEI estimates that the annual cost of the impact of vision loss and eye disease in the United States is \$68 billion. (6) Importantly, this estimation is only part of the “total” costs; it does not reflect the human costs of loss of mobility, decreased quality of life, or lost productivity.

These costs are expected to increase as the number and proportion of the senior population grows. Many times, seniors with moderate, severe or total vision loss also experience increases in depression, injuries, the need for assisted living services and mortality rates. Medicare is currently paying \$2 billion per year for services provided to senior citizens with vision problems, for non-eye related health issues and needs. (7)

In the case of glaucoma management, the cost of treating glaucoma ranges from an average treatment cost of \$623 per year early in this disease, to a late stage yearly cost of \$2,511. (8) The Ocular Hypertension Treatment Study (OHTS) found that glaucoma eye drops can delay or prevent 50% of all glaucoma cases in African Americans who demonstrate higher rates and more severe cases of glaucoma versus other populations. (9) Therefore early assessment and treatment can significantly reduce the economic burden of glaucoma on our society.

Current treatments for proliferative diabetic retinopathy have reduced the rate of blindness within a 5 years period from 50% to less than 5%. Nonetheless, the number of Americans age 40 and older with diabetic retinopathy is expected to jump from the current 4.1 million, to 7.2 million by 2020. (10)

In patients with Type 1 diabetes, tight control of blood sugar levels has been shown to reduce the rate of retinopathy progression by 54%. (11) An accompanying stringent blood pressure control produced a 47% reduction in the risk of a loss of visual acuity. (12) The NEI estimates that interventions that prevent or delay diabetic retinopathy save the U.S. \$1.6 billion in health care costs annually. (13)

Public health interventions have significant economic ramifications at a societal and individual level. A community’s financial investment toward the well being of its members will be reflected in fewer health disparities, greater universal access to health care and an emphasis on early health education and promotion.

## Case Study 2

Jesse is a sixteen year old high school student who is looking for ways to be accepted by his peers and finds that he likes the “buzz” that he gets from smoking cigarettes. He has heard all of the negative advertisements against smoking, but he

only plans to smoke on weekends when he is hanging out with his friends. Throughout his high school years, he maintains this pattern of week-end only smoking.

When Jesse moves on to college, he finds that the stresses of higher academic expectations and new social demands prompt him to increase his smoking frequency. At this same time, the carcinogenic properties of cigarettes have caused a mutated cell in Jesse’s lung. Without his knowledge, however, his own tumor-suppressing genes are able to quell the mutated cell. Over the next couple of years, more mutated cells occur, but are again checked by his genetic protective system, thus producing no signs or symptoms of any irregularity (Figure 5).

## Public Health Continuum

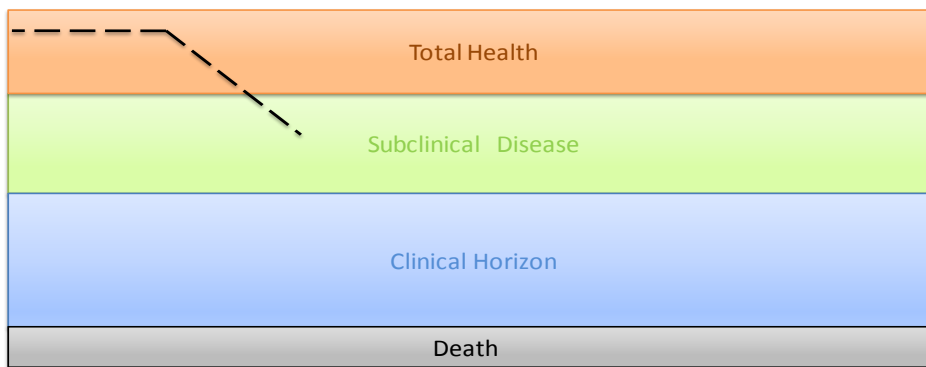


Figure 5 – Jesse’s Health Continuum (at 16 years of age)

At the age of 29, after ten years of a two packs a week smoking habit, Jesse begins to notice symptoms of a smoker’s cough and shortness of breath when he is chasing after his two year old son. He attributes this to getting older, the few extra pounds he has put on from too many trips to his favorite fast food eatery and his smoking habit that he knows he needs to quit. Jesse’s condition has now moved into the clinical horizon (Figure 6).

## Public Health Continuum

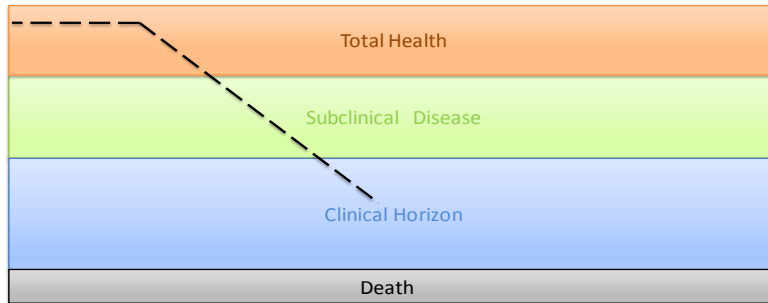


Figure 6 – Jesse’s Health Continuum Reaching Clinical Horizon  
(at 29 years of age)

At the age of 41, Jesse decides to go to his optometrist because he needs help with reading tasks. During this comprehensive vision exam, Jesse tells his doctor that he has recently experienced occasional episodes of shoulder pain and facial dryness on the left side of his body. The O.D. notices that there is a difference between the sizes of Jesse’s pupils (OD > OS) in the darkened room, along with a slight drooping of the left upper lid. As a diagnostic aid, the O.D. instills one drop of 10% liquid cocaine in the left eye which results in no dilation. Two days later, Jesse returns for more testing, in which the O.D. instills one drop of Paredrine 1% (hydroxyamphetamine) in the left eye and observes dilation.

The O.D. promptly refers Jesse to an oncologist because of strong suspicions of Horner’s Syndrome and a possible Pancoast lung tumor. The oncologist confirms the O.D.’s differential diagnosis, convinces Jesse to quit smoking and proceeds with surgical intervention. (For more information about Horner’s Syndrome, see Insert 1)

**Insert 1: Horner Syndrome**

In this case, Horner Syndrome is a constellation of signs and symptoms that occur when the sympathetic innervations to the eye is interrupted. This has occurred because a tumor arising from the apex of the lung has interfered with the nerves running over the lung. The common signs of Horner Syndrome are ptosis (drooping lid), miosis (constricted pupil) and anhidrosis (lack of sweating).

Fortunately, the surgery is effective in removing the cancer, returning his condition to a subclinical state. He will nevertheless require chemotherapy to eradicate any possible metastasis and he must go through physical therapy (tertiary prevention) as he learns to live with the loss of a lung. The continuum represents the various levels of Jesse’s health status over the course of his disease (Figure 7)

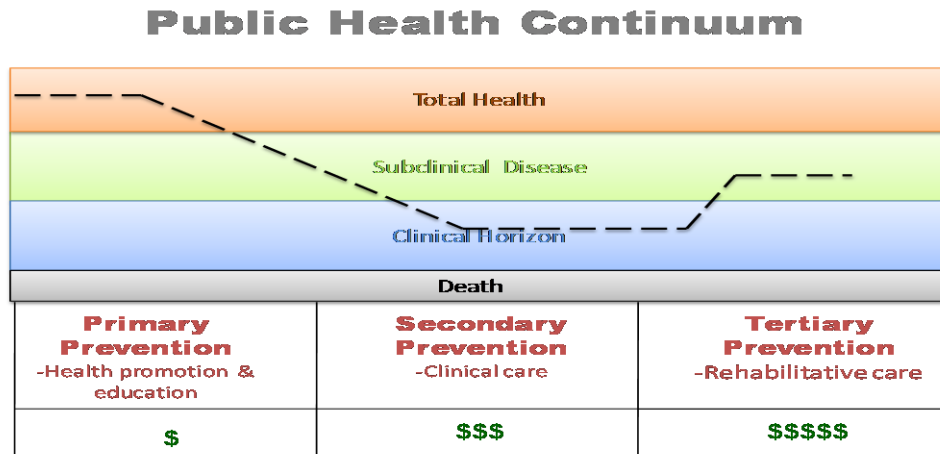


Figure 7 – Jesse’s Health Continuum throughout the Course of His Disease

If Jesse had heeded the public health anti-smoking ads (primary prevention) in his youth, it is likely that he could have avoided this traumatic, debilitating and costly disease. If he had been more conscientious with his health and gone to the doctor for yearly physicals (secondary prevention), it is possible that his cancer might have been discovered earlier, resulting in a better quality of life for him.

**PUBLIC HEALTH QUESTIONS FOR THE CASE STUDY**

1. Why do you think the public health primary prevention warnings against smoking were not effective on Jesse?
2. Although Jesse went to his optometrist for an eye exam, what types of questions did the O.D. probably ask during the exam history that prompted him to suspect a systemic health problem?
3. Effective communication between health care professionals is essential for quality patient care. What type of information about Jesse’s condition do you think that the optometrist shared with the oncologist?

4. Jesse's surgery returned his cancer status to the subclinical level. What other types of health events may be in Jesse's future?

Another vital service that public health provides is disease surveillance. This topic will be discussed more comprehensively in Chapter 2. The following case demonstrates how public health findings can influence the way optometrists practice and the impact that information can have on the care of our patients.

### Case Study 3

Dr. Granger has practiced optometry in the same small rural college town for the past 14 years. She enjoys the mix of caring for the hard working farming community as well as providing services to the young college students because it challenges her clinical skills on a daily basis.

Jonathon, who is the captain of the college cross country team, is usually a very pleasant, compliant contact lens wearer. Today, however, he has arrived to Dr. Grangers' office, on a Monday morning without an appointment, at 7:45AM, sunglasses on and looking rather disheveled. He says that his right eye has been watery and hurting for the past two days and seems to be getting worse. He stopped wearing his contact lenses two days ago and does not remember getting anything in his eye. He denies sleeping in his contact lenses and has always been on time with his replacement schedule.

Corrected acuities with glasses are 20/70 in the right eye with no improvement with pinhole and 20/20 in the left. Slit lamp evaluation reveals a circular, feathery lesion just off the visual axis. The appearance of this corneal lesion is unlike anything that Dr. Granger has ever experienced. She has, however recently read an optometric trade journal regarding the CDC's warning about a recent outbreak of a fungal infection of certain contact lens solutions. The article's description of the fungal clinical presentation seems to match the signs and symptoms that Jonathon is exhibiting.

Dr. Granger decides to take a culture of Jonathon's eye and writes a prescription for a topical anti-fungal agent. When the lab results return positive for fusarium,

Dr. Granger reports the findings to the county health department so that appropriate reports can be filed with the CDC and so that immediate action can be taken to inform the community of the potential sight threatening outbreak. Jonathon will be interviewed in more detail regarding the probable site of purchase of his contact lens solutions.

Fortunately, thanks to public health's national surveillance of health outbreaks and Dr. Grangers' diligence in staying current with optometric literature, Jonathon's vision returns to 20/20 and he is able to return to successful contact lens wear.

## PUBLIC HEALTH QUESTIONS FOR THE CASE STUDY

Dr. Granger has a policy in her office that requires all contact lens wearers to have back-up glasses. Why do you think she has adopted this rule? What type of preventive measure is this?

1. If Jonathon says that he purchased his contact lens solutions back home which is 500 miles away, what is likely to happen?

## Conclusion

Public health in practice is often misunderstood. A better understanding of public health and its relationship to the optometry profession will potentiate opportunities for reducing the burden of vision impairment on individuals and reducing the burden of preventable vision loss on society. Further, it will allow clinicians to provide optimal support and services to patients, communities and societies with the objective of maintaining optimal health for all.

## Study Questions

1. Give three examples of public health promotions, campaigns or interventions that you encounter in your daily lives.
2. Using the Public Health Continuum as a guide, give an example of an *eye condition* that could be prevented with a primary intervention. Give an example of a *systemic condition* that could be prevented with a secondary intervention.
3. Give an example of how you, as an optometrist, might work with other health care or public health professionals to manage a patient's chronic condition? What efforts can you take to help prevent another patient from developing that same condition?
4. Compare and contrast the challenge of managing a "symptomatic" (i.e., many or severe symptoms) vs. an "asymptomatic" (i.e., absent or mild symptoms) condition.
5. Classify the following public health interventions as primary, secondary or tertiary. Give a short explanation for each classification.
  - a. Hand washing campaigns
  - b. Bioterrorism drills
  - c. Peripheral Iridotomy surgery
  - d. OCT (Optical Coherence Tomography) tissue imaging system
  - e. Ultraviolet protection on spectacle lenses

6. A large software corporation is looking for ways to cut its long-term employee health insurance costs. Will it be more cost effective for the corporation to:
  - a. Increase the number of sick days each employee is allowed
  - b. Invest in an onsite work out/exercise facility for employees
  - c. Reduce the co-pay that employees must pay for every doctor visit
  - d. Hire a physician assistant to give medical care to employees  
(Give a short explanation for your choice)
  
- 7 Give an example of a public health intervention that slows the natural history of a disease.

### Take Home Conclusions

1. Public health entails protecting and improving the health of a community through prevention, education and control. It is not an insurance plan for the poor.
2. Public health performs most of its work “behind the scenes”.
3. Public health policies tend to promote community health while health care practitioners concentrate on the health of the individual.
4. The natural history of a disease is the unaltered path that a condition takes from beginning to end.
5. Chronic diseases tend to progress slowly while infectious diseases and injuries progress relatively rapidly.
6. The primary goal of public health preventive measures is to alter the natural history of a disease, to slow it down or to prevent it.
7. Primary prevention tends to be performed by public health professionals.
8. Secondary and tertiary prevention measures tend to be performed by healthcare practitioners.
9. It is more cost effective to prevent a chronic disease than to treat it after it has become established.

### Suggested Readings

Improving the Nation’s Vision Health: A Coordinated Public Health Approach, CDC, Department of Health and Human Services, (2006), USA

<http://www.cdc.gov/diabetes/pubs/pdf/vision.pdf>

### References

1. Hooker, T., & Speissegger, L. (2002). *Public Health, A Legislator's Guide*. Washington, D.C.: National Conference of State Legislatures.
2. Jekel, J., Katz, D., Elmore, J., & Wild, D. (2007). *Epidemiology, Biostatistics, and Preventive Medicine*. Philadelphia: Saunders.



3. Center for Disease Control and Prevention. (1999). Ten Great Public Health Achievements; United States 1900-1999. *Journal of the American Medical Association* , 1481.
4. Prevent Blindness. (2007). Retrieved November 18, 2008, from Prevent Blindness: [www.preventblindness.org/Ohio/OH\\_releases/2007/safetyrels907FINAL.pdf](http://www.preventblindness.org/Ohio/OH_releases/2007/safetyrels907FINAL.pdf)
5. Trust for America's Health. (2008). Retrieved Nov. 18, 2008, from Trust for America's Health: <http://Healthyamericans.org/reports/prevention08>
6. Centers for Disease Control and Prevention. (2004). Economic Costs Associated with Mental Retardation, Cerebral Palsy, Hearing Loss and Vision Impairment. *MMWR* , 53-57.
7. The Alliance for Aging Research and National Alliance for Eye and Vision Research. (2007). *VisionLossSilverbook*. Retrieved November Nov. 11, 2008, from Silverbook Web Site: [http://www.Silverbook.org/Vision LossSilverbook.pdf](http://www.Silverbook.org/VisionLossSilverbook.pdf)
8. Lee, et al. (2006). A Multicenter, Tetrospective Pilot Study of Resource Use and Costs Associated with Severity of Disease in Glaucoma. *Archives of Ophthalmology* , 12-19.
9. Higginbotham, E., et al. (2002). The Ocular Hypertension Treatment Study. *Archives of Ophthalmology* , 701-713
10. National Eye Institute. (n.d.). *National Eye Institute*, Retrieved November 5, 2008, from Diabetic Retinopathy Study: [www.nei.nih.gov/neitrials/viewstudyweb.aspx?id=53](http://www.nei.nih.gov/neitrials/viewstudyweb.aspx?id=53).
11. Fong, D., et al. (2003). Diabetic Retinopathy. *Diabetic Care* , 99-102.
12. Turner, R., et al. (1998). Tight Blood Pressure Control and Risk of Macrovascular and Microvascular Complications in Type 2 Diabetes. *BMJ* , 703-713.
13. National Institute of Health. (n.d.). *National Institute of Health*. Retrieved November 11, 2008, from Diabetic Retinopathy: Fact Sheet: [www.nih.gov/about/researchresultsforthepublic/index.htm](http://www.nih.gov/about/researchresultsforthepublic/index.htm).