

Health Services Curricula Study and Recommendations

An Interactive Qualifying Project Report
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Abstract

The United States is facing a growing concern about increasing costs and decreasing quality and efficiency of the health care delivery within the country. Educational programs focusing on management, information technology and operations within health care industry can help reduce these costs by increasing the efficiency and quality of the services. This paper provides recommendations on what can be offered in terms of health care delivery management in the Department of Management at Worcester Polytechnic Institute.

Executive Summary

With the increasing issues in health care industry, such as the rising costs, quality problems and inefficiencies, there is a great need and room for improvement in the existing system. Authorities have been trying to identify all the existing causes of bottlenecks and inefficiencies in the system but since the health care system in the United States is so complex, it is really hard to identify all of them. Also, the United States is the only industrialized and wealthy country without a universal health care system, which makes it harder for the United States to control all the information on the citizens with or without a health insurance. In this paper, we approached the problems faced in the health care industry from higher education perspective, and developed suggestions on what could the Department of Management at Worcester Polytechnic Institute offer in terms of educational programs for students who are interested in health care industry.

From the literature, we identified six current main issues in the health care delivery system. These issues are discussed in detail in the second chapter of this report which is the literature review (background) section. According to most authorities, one of the most important concepts to establish in the health care system is the knowledge on health care administration and health care information systems. One of the root causes of increasing expenses and poor quality in the system is the poor inflow and outflow of patients' information. The majority of the hospitals in the United States do not have an established patient information tracking system within their facilities. With the help of information technology, hospitals can easily make use of software and keep records of all the incoming and outgoing patients. Also another use of information technology would be to eliminate the mistakes regarding prescriptions. With appropriate software, hospitals can keep a record of all the information on their patients, especially on all the prescribed drugs, so that nobody would be assigned with a wrong prescription.

Education seems to be the most practical and the fastest solution to a big part of the issues and bottlenecks in the existing system. Therefore, a lot of schools have been offering courses, programs and degrees related to health care delivery management. Although the U.S. is the leading country in terms of money invested in health care delivery, at the same time, they are the leading country in health care expenses. Expenses in the health care outweigh the income by

a very big margin and this has been the biggest concern in the existing system. Therefore, education is the best possible way to eliminate a big portion of these expenses. Most of the hospitals and the staff do not have any or enough knowledge on management skills, which leads to poor organization and low level of health care quality provided to the patients. For instance, within most hospitals, experienced physicians are assigned to managerial positions after working a long time in the facility. They might have a solid knowledge about the facility and the staff but they also need to know how organize and manage the existing staff in order to get the best possible performance from them.

In this paper, we first began by looking at the current health care system from a systematic perspective. We identified the types of institutions and organizations that are a part of the whole system. We categorized these institutions and organizations according to various criteria. Then, we looked at the existing major issues in the current health care system. We tried to identify all the major issues that are currently the cause of the quality and inefficiency issues in the United States. Following that, we also looked at the educational programs in the United States related to health care delivery such as nursing schools, medical schools and dental schools.

After gathering all these information on the health care system, we collected qualitative data through interviews with 52 WPI alumni who are currently working in the health care industry via phone calls (n=17) and e-mails (n=35) on their experience in the health care industry. We asked them what kind of courses or educational programs could be offered at the Department of Management at WPI to close the education gap in health care delivery management. To gather more information on the type of courses, programs and degrees, we also looked at 117 of the schools in the United States who are currently offering courses related to health care administration and health care information systems. We analyzed programs offered by schools which are in New England (n=17) in detail. We also did an in depth analysis of the curriculums of 5 of these 17 schools in New England.

After collecting all the data, we analyzed the outcomes from both the interviews and the research, so as to get a clearer idea on what kind of courses can be offered at WPI. There were a great variety of responses from the alumni; therefore, we had to sort all the suggestions according to their importance and overall percentage. Also, most of the schools had a great variety of programs and curriculum. Therefore, we organized and grouped all those courses under certain categories.

After finalizing and combining our analysis on all the information, we drew our conclusions from all the outcomes about what can be accomplished at the Department of Management in WPI. Finally, after looking at our conclusions, we tried to provide suggestions on the groups of courses that can be offered which are management, law & ethics, finance & economics & accounting, operations and information technology. We recommend that these are the main subject groups that a student needs to be educated on to be a managerially trained health care personnel.

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1. Introduction

A health care system in a country consists of services for the prevention and treatment of disease and also maintaining the physical and mental well-being of its citizens (American Psychological Association, 2008). According to the World Health Organization, health care consists of all goods and services designed to promote health, including “preventive, curative, and palliative interventions, whether directed to individuals or to populations” (World Health Organization, 2000a). Before the term “health care” became popular, people used to refer to it as medicine or health sector and spoke of the treatment and prevention of illness and disease. Now, the term “health care” is being widely used for defining any type of service that is provided in order to treat or prevent any kind of disease.

Recently, some countries have been applying the idea of universal health care where the residents of that country can have access to most types of health care regardless of their ability to pay (McDougall, Duckett, & Manku, 2002). In today’s world, most of the developed and developing countries have or have been trying to implement this idea. On the other hand, the economics of a universal system can vary depending on a country’s funding policy. Although many countries are acknowledging this type of health care system, there are still some countries that are following their own policy on delivering and providing health care. The U.S. is considered to be one of the few industrialized and wealthy nations lacking a universal health care system (Chen, Evans, Evans, & Sadana, 2006; Krugman & Wells, 2006).

Although the United States is the leading country in terms of the money spent on health care both as a proportion of gross domestic product and on a per-capita basis, there is still a big problem with providing the desired quality of health care to every citizen. There is an unstoppable increase in medical and insurance costs where insurance costs are going up faster than wages or inflation and also medical bills are devastatingly the most known cause for personal bankruptcy in the United States (Chen et al., 2006; Groman, 2004; Krugman & Wells, 2006). The biggest debate about U.S. health care revolves around concepts such as access, efficiency, and quality. According to a study of the World Health Organization, the U.S. health care system is ranked in the 37th place in overall performance among 191 nations (World Health Organization, 2000b). This shows that there is still a great need and room for improvement in the health care delivery system in the United States. The U.S. is ranked 72nd by health and 1st by

expenditure, which is also an implication of the inefficiency in the health care system. Even though the U.S. is the leading country in terms of money invested in the health care system, the results do not even come close to the expected outcomes. Another study by CIA World Factbook showed that the United States is the 41st nation in the world for lowest infant mortality rate and 45th for the highest total life expectancy (Central Intelligence Agency, 2007). These statistics are all signifying the increasing inefficiency and the decreasing quality in the health care delivery system in the U.S.

Health care delivery in the United States has become an increasing concern for the country because each year the number of people without health insurance keeps increasing dramatically. Between 1987 and 2007, the number of people without health insurance went from 30 million to 47 million (Chen et al., 2006). This means that each year 850 thousand people are being left without health insurance. The main reason for this situation is the increasing cost of receiving health care. For instance, to minimize their costs hospitals are getting rid of their current staff which helps them to maximize their profits at the same time. In contrast, the quality of the health care provided in the hospitals is going down rapidly and bottlenecks are rising in the system due to insufficient number of staff available and the increasing number of the patients that visit hospitals. These bottlenecks and inefficiencies are some of the main reasons why the U.S. is performing poorly and also wasting a lot of money for the health care system.

There is a great deal of inefficiency and inequity behind all the issues that exist in the health care system. As for the inefficiencies, the main reasons are systematic, regulatory and political. System inefficiencies in health care include delays in seeking care, increases in the use of emergency care, shared costs of the uninsured and administrative costs (Groman, 2004). Regulatory inefficiencies are mainly through health care regulatory costs such as lack of coordination, duplicate tests and conflicting receipts from different physicians. Political issues arise from the limitations on the prescribed drug coverage (Burt & McCaig, 2007).

Furthermore, the emergency system is being burdened with the uninsured Americans because they do not go through regular health care and benefit from preventive services. Instead, they visit hospital emergency rooms which puts a great burden on the system because the people with real emergency care needs are being delayed due to frequent visits of uninsured Americans to the emergency rooms at hospitals. The uninsured citizens are not able to pay for preventive services, which require an upfront payment and are relatively more expensive. Then again, the

uninsured people add an extra cost on the people who have legitimate insurance through higher taxes and higher health insurance premiums because the cost of treating these uninsured people are considered as free care by providers, which results in cost shifting on to the insured Americans (Krugman & Wells, 2006). There is also a considerable amount of administrative overhead in the American health care system due to the significant number of players in the system which is mainly the insurance companies. There are also some inequities inside the health care system in the United States regarding the gaps in the health care coverage, disparities in quality of health care offered to minorities and racism. All these are discussed thoroughly in the literature review section of this report.

1.1 The Subject of This Project

This project investigates the issue of health care delivery management and what can be done to reduce the inefficiency and the inequality in the existing system by means of education. The existing system contains many bottlenecks that result in poor quality and inefficiency. To remove the existing bottlenecks in the system, there is a great opportunity for education to step in and make changes to the existing system. Through a better planned and organized education regarding health care, there is a great possibility of reducing costs and increasing the quality of health care through better-trained personnel, better management techniques and better information flow.

Implementing information technology (IT) into the current health care system can help save a lot of costs that occur in the existing health care system. Besides saving costs, it could also help reduce the mistakes that take place during and after delivery of health care such as medical errors and medical bill frauds. Therefore, the subject of this project is very appealing in the sense that IT education and implementation of IT within the health care system is critical in fixing some of the big problems.

1.2 Objectives of This Project

The main goal of this project is to gather qualitative data from both electronic and human sources related to health care delivery management, health IT and informatics education through research and surveys with WPI alumni who are currently working in the industry. After gathering these data, an extensive analysis is done with the purpose of better understanding the

educational needs of the health care industry and identifying the steps that can be taken so as to improve the existing educational system regarding the health care delivery industry. Another goal of this project is to develop recommendations on what type of courses, degrees or programs can be offered regarding management and IT in the Department of Management at WPI based on our analysis.

1.3 The Target Audience

The target audience for this project is mainly people who are currently working in the health care industry or who are interested in serving in this industry in the future. Since there is a limited level of education being offered in the United States regarding health care delivery management and health IT, it would be very beneficial for each audience to learn more about how management can be applied to this industry. IT is a great opportunity for the existing health care system that could help better solve the existing problems. Another audience for this project is the faculty of management at WPI because the recommendations about the educational system can help the faculty think of ways to implement new courses, programs or degrees related to health care delivery management at WPI.

1.4 Layout of the Report

The report consists of six main chapters which are introduction, literature review (background), methodology, interview data collection and analysis, educational programs data collection and analysis and recommendations and conclusions.

The next chapter is the literature review or background chapter which looks into the information gathered from research on the existing health care system in the United States in a systematic overview, existing issues and their causes in the health care system in the United States and existing educational programs in the United States related to health care delivery. This chapter gives detailed information on the type of health care services provided throughout the country which are outpatient services, inpatient services, managed care and integrated organizations and long-term care. The chapter also lists the six main problems that occur in the existing health care delivery system which are the chasm in the health care delivery system, lack of investment in engineering based models to improve the delivery system, workforces issues across multiple disciplines, patient safety, the quality and the efficiency of health care delivery,

increase in chronic conditions and insufficient use of information technology. Finally, the last subsection of the chapter investigates the existing educational programs across the United States, which are medical schools, dental schools, nursing programs and physician assistant programs.

The third chapter of the report is the methodology where we talk about how we group all the contacts we had initially according to the industries in which they work. We also talk about how we eliminated some of the contacts who work in industries that are not related to our project topic. Then, we start talking about how we arrange both our phone and e-mail interviews. We also mention how we will analyze all our gathered data by looking into qualitative data analysis techniques. Finally, we discuss how we collected data about educational programs.

The fourth chapter of the report is the data collection and analysis section where we meticulously look at all types of data that we collected from the interviews of respondents through phone calls and e-mails. We first made general observations on the overall results that we got from the interviews and then went on by analyzing these results in great depth.

Then for the fifth chapter, we looked at the existing educational programs in the United States related to health care delivery. After introducing all the existing programs, we made a detailed analysis on what kind of courses, programs and degrees are offered regarding health care delivery management.

The last chapter of the report is the recommendation and conclusion section which mainly introduces ideas on what can be achieved or established at the Department of Management in WPI regarding health care delivery management. Based on the data that we collected both from the interviews and research, we propose some ideas on what type of courses, programs and degrees might be offered at WPI.

2. Literature Review

To understand how the health care delivery system works, it is essential to look at the existing system and see how it functions. This section will look at the health care delivery in United States from a systematic view. It will also look at the issues that exist with the current system. Finally, as part of this project, educational programs that are offered in the United States regarding the health care delivery system will be discussed.

2.1 Health Care Delivery in United States

This section will look at the process of health care delivery with a systematic approach by examining both the range of health care settings (Sections 2.1.1- 2.1.3) and the services existing for people with special health care needs (Section 2.1.4).

2.1.1. Outpatient and Primary Care Services

Outpatient facilities are for the people who are not in need of an overnight stay at a health care institution such as a hospital or a long-term care facility. Some specific services may be provided by a hospital or a nursing home. For example, many hospitals have emergency departments and other outpatient service centers. Outpatient services are also referred to as *ambulatory care*. As the word implies, ambulatory services are for the “walking” patients. It consists of diagnostic and therapeutic services and treatments. On the other hand, in some cases patients do not ambulate to the service facilities to receive treatment. For instance, in an emergency department, patients may arrive to the facility by land or air ambulance. Therefore, it is more precise to use the term outpatient services, when mentioning any kind of health care delivery that does not require an overnight stay.

Primary care is traditionally the foundation of outpatient or ambulatory care services. According to the World Health Organization primary care can be described as “essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination. It forms an integral part both of the country's health system, of which it is the central function and of the overall social and economic development of the community. It is the first level of contact of individuals, the

family and community with the national health system bringing health care as close as possible to where people live and work, and constitutes the first element of a continuing health care process.” (World Health Organization, April 2006). Primary care is the first time a patient is introduced to the health care delivery system. While primary care may be the foundation for ambulatory health services, it cannot be claimed that all ambulatory care is primary care. An example of this would be that emergency departments are not meant to be primary in nature.

There are two other types of care in outpatient care systems which are secondary and tertiary care (Chua, 2006; Jonas, 2003). Secondary care consists of routine hospitalization, surgery, and specialized outpatient care such as consultation with specialists. Secondary care makes use of advanced diagnostic and therapeutic procedures of a short term care nature. Tertiary care is the most complex level of care because in general tertiary care uses high technology, requires specialized staff and is mostly institution based. Usually, tertiary care requires surgical treatment. With the development of technology specifically in medicine, many secondary care services are now offered in ambulatory care settings.

Types of settings for outpatient service delivery existing in U.S. health care delivery system can be grouped as below and each will be discussed in detail next (Christman & Counte, 1981; Jonas, 2003; Kovner & Jonas 1990; Shi & Singh, 2004; Sultz & Young, 2005):

- a) Private practice
- b) Hospital-based Outpatient Services
 - o Clinical Services
 - o Surgical Services
 - o Emergency Services
 - o Home Health Care
 - o Women’s Health Centers
- c) Free-Standing Facilities
- d) Mobile Medical Services
- e) Home Health and Hospice Services
- f) Ambulatory Long-Term Care Services
- g) Public Health Services
- h) Public and Voluntary Clinics
 - o Community Health Centers
 - o Free Clinics
 - o Miscellaneous Clinics
- i) Alternative Medicine
- j) Telephone Access

a) Private Practice

Physicians at private practice work as office-based practitioners. These physicians and their staff are the major part of the ambulatory and primary care services. Most visits to a private practice involve quite limited examination and testing for a relatively short duration. In the past, solo practices and small partnership practices were quite popular. With the expansion of group practices and institutional affiliations very few graduates are now going for a solo practice. Several factors have caused this shift towards group practices and institutional affiliations. Some of them are the high cost of setting up a new practice, competition from larger health care delivery organizations and increased external controls over private practice of medicine (Institute of Medicine, 1989). Group practice clinics also bring essential advantages to patients because they provide a variety of services such as pharmaceutical, treatment, surgical and diagnostic.

b) Hospital-Based Outpatient Services

In the past, hospital administrators showed very little respect for the outpatient departments of the hospital. The outpatient department was considered as a stepchild for the hospital (David J. Turell, 2002). They were only for people who had difficulty in getting access to private medical care. In today's world, outpatient services are seen as an essential part of the future for health care in America (Suzanne P. Smith & Flarey, 1999). Since inpatient revenues are declining dramatically, hospitals have started to put more emphasis on preventive and outpatient care services. In clinical services private physicians provide care to patients in their own offices. Another component is the surgical services, which provide same-day surgical care to patients. The surgical group in an outpatient service may consist of general surgery, orthopedics, urology, plastic surgery and rehabilitation.

Emergency services are also a part of the outpatient care service system. The emergency department offers service to people who are acutely sick and injured, especially those who are in a serious or life-threatening condition where they require immediate attention (Board on Health Care Services, 2006b, 2007). There are three types of conditions for which patients are sent to an emergency department. Emergent conditions require instant medical attention and time is very critical. Urgent conditions require attention within a few hours; a longer delay in attention may cause serious consequences. Non-urgent conditions are the ones with minor problems, which are

problems that are non-acute or minor in severity. Another outpatient care service is home health care delivery where post-acute and rehabilitation services are offered. The last component of hospital outpatient services is Women's Health Centers which focuses on satisfying the health care needs of women.

c) Free-Standing Facilities

A variety of proprietary, community-based free-standing facilities have been established across U.S. in recent years. They are also referred to as walk-in clinics, urgi-centers, emerge-centers, and surgi-centers. These facilities have given patients the opportunity to receive convenient and rather low-cost health care (Institute of Medicine, 2006; Richard K. Thomas, Louis G. Pol, & William F. Sehnert, 1994). These facilities are usually owned and run by corporations, and health care providers are employed on salary. Walk-in clinics offer ambulatory care services varying from basic primary care to urgent care. These clinics are usually at convenient locations, provide evening and weekend hours and do not require an appointment. Urgi-centers and emergi-centers are open 24 hours a day, seven days a week and require no appointments. Surgi-centers work independently from hospitals and offer surgical services that can be accomplished on an outpatient basis.

d) Mobile Medical Services

Mobile health care services are offered to people who have a severe illness involved in accidents, and affected by disasters (Board on Health Care Services, 2006b; Committee on Quality of Health Care in America, 2001; Institute of Medicine, 2007). These services are offered by trained emergency medical technicians. The on-time care delivery to these patients usually saves lives. To provide a quick response to urgent situations, most urban hospitals and health care centers have acquired a transportation and communication system. Most of them have an established 911 emergency phone line to deliver immediate care to people who are in critical and severe condition.

e) Home Health and Hospice Services

In this type of service, health care is delivered to patients' homes. To receive such treatment, the patients should be in a position where they cannot leave their homes safely and easily enough to get the care at a facility (Center for Disease Control and Prevention, 1993). Hospices provide services to people with a life expectancy of six months or less. These facilities try to address the special needs of dying persons and their families. Hospice services could be either medical or psychological or social.

f) Ambulatory Long-Term Care Services

There are two types of ambulatory long-term care services offered to patients, case management and adult day care (Institute of Medicine, 2006; Reid, Compton, Grossman, & Fanjiang, 2005b). Adult day care provides health care to people during the day to complement informal care delivered at home by family members. Case management aims to come up with the most proper setting to meet a patient's health care needs.

g) Public Health Centers

Public health services are offered by local health departments. The services they offer range from immunization services to a full range of inpatient and outpatient services. They consist of venereal disease clinics, family planning services, screening and treatment for tuberculosis and ambulatory mental health (Chua, 2006; McCarthy & Schafermeyer, 2007). The range of services provided through public health centers depend and vary on the location of the center.

h) Public and Voluntary Clinics

Three different types of public and voluntary clinics are community health centers, free clinics and miscellaneous clinics. The most popular publicly operated clinics are the neighborhood health centers (NHCs) and community health centers. NHCs provide comprehensive ambulatory and social services to the poor living in inner cities and rural areas (Chao, 2007; Eden, Wheatley, McNeill, & Sox, 2008; Reid et al., 2005b). These centers are staffed by multidisciplinary teams of professionals. Community health centers also serve as a

primary care facility for the poor living in inner cities and rural areas but they function under the control of the Bureau of Primary Health Care, U.S. Public Health Service, and U.S. Department of Health and Human Services. A free clinic stands for a general ambulatory care facility providing mainly for the poor and the homeless. Care service is delivered for free and at a nominal charge by a volunteer staff. Other miscellaneous health clinics serve farm workers in agricultural communities and rural areas. Mental health care is also established to offer ambulatory mental health services in rural areas.

i) Alternative Medicine

Alternative medicine is also referred to as “complementary medicine”, “nonconventional therapy”, or “natural medicine.” Recently, self-care and alternative medicine has been growing tremendously due to increasing and high cost of health care delivery (Committee on Quality of Health Care in America, 2001). Homeopathy, herbal formulas and use of natural products for treatment and preventive purposes are some examples of alternative medicine.

j) Telephone Access

Telephone access is a recent type of health care service where patients receive expert opinion and advice during the times when physicians’ offices are closed. Another name for this type of service is called phone care system (Committee on Quality of Health Care in America, 2001; Committee on the Future of Rural Health Care, 2005). Usually, the facilities that offer this kind of service work 24 hours a day and seven days a week. The staff consists of specially trained nurses who usually can address patients’ needs.

2.1.2. Inpatient facilities and Services

Inpatient service is used for an overnight stay at a health care facility. It is more often related to a hospital stay. Residing patients in long-term care facilities are also considered as inpatients. Hospitals are the main part of the inpatient care system. American Hospital Association (AHA) defines hospital as an institution with at least six beds whose primary function is to provide patient services, diagnostic and therapeutic, for specific or general medical conditions (National Center for Health Statistics, 2007). In addition to these, a hospital is required to have a license and an organized physician staff. It should offer continuous nursing

services under the supervision of registered nurses. There are also other requirements that hospitals should comply with such as federal laws, the standards of the Joint Commission on Accreditation of Health Care Organizations and national codes for building, fire protection and sanitation.

Hospitals can be classified according to the conditions listed below (Christman & Counte, 1981; Jonas, 2003; Kovner & Jonas 1990; Shi & Singh, 2004; Sultz & Young, 2005):

- a) By Ownership
 - Public Hospitals
 - Voluntary Hospitals
 - Proprietary Hospitals
- b) By Number of Units Affiliated
- c) By Length of Stay
 - Short-term hospital
 - Long-term hospital
- d) By Type of Service
 - General Hospital
 - Specialty Hospital
 - Psychiatric Hospitals
 - Rehabilitation Hospitals
 - Children's Hospitals
- e) By Public Access
 - Community hospital
 - Non-community hospital
- f) By Location
 - Urban hospital
 - Rural hospital
- g) By Size
 - Small-sized hospital
 - Medium-sized hospital
 - Large-sized hospital
- h) Other Types of Hospitals
 - Teaching Hospitals
 - Church-Affiliated Hospitals
 - Osteopathic Hospitals

a) Classification by Ownership

There are three types of hospitals that can fall under this category, namely public hospitals, voluntary hospitals and proprietary hospitals. Public hospitals are owned by agencies of federal, state or local governments. The word “public” however, does not necessarily mean that a public hospital is open to general public, but only relates to government ownership.

Federal hospitals are run mainly for special groups of federal beneficiaries such as Native Americans, military personnel, and veterans (Jonas, 2003; Reid et al., 2005b). Voluntary hospitals are not related to government and function as a non-profit organization. The reason why these hospitals are referred to as voluntary is that the maintenance and financials of the hospital are done voluntarily by citizens. Proprietary hospitals stand for investor-owned hospitals and they are owned by individuals, partnerships or corporations. They function entirely as a company for the financial benefit of the stockholders.

b) Classification by number of units affiliated

When two or more hospitals are owned, leased, sponsored or managed by a central organization, they are referred to as multiunit hospitals. There is an increasing trend towards large investor-owned companies acquiring or building hospitals to form this kind of health service.

c) Classification by Length of Stay

Hospitals can be classified as short-term and long-term hospitals. A short-term hospital is a facility where the average length of stay is less than 30 days. The majority of hospitals are short-term hospitals. On the other hand, long-term hospitals are the ones with an average stay of more than 30 days. Examples of these institutions are psychiatric hospitals, tuberculosis hospitals and chronic disease hospitals.

d) Classification by Type of Service

There are five different types of hospitals relating to the range of services they offer, namely general hospitals, specialty hospitals, psychiatric hospitals, rehabilitation hospitals and children's hospitals. A general hospital offers a mixture of services which consist of general medicine, specialized medicine, general surgery, specialized surgery, and obstetrics, to satisfy the demands of the community (Board on Health Care Services, 2006a). Specialty hospitals, on the other hand, provide service to only certain types of patients with special conditions or sicknesses. Psychiatric hospitals, a type of specialty hospital, provide diagnostic and treatment services for patients with psychiatric-related illness (Board on Health Care Services, 2006a; Reid

et al., 2005b; Suzanne P. Smith & Flarey, 1999). These institutions have departments to deliver psychiatric, psychological and social work services. Another type of specialty hospital is rehabilitation hospitals, which function as a facility to rehabilitate chronically ill and disabled individuals to a maximum level of functioning. Patients served in these facilities do not have the possibility of getting cured but the level of functioning can be improved. One of the other types of specialty hospitals is children's hospitals. These facilities deal with chronic and congenital cardiac and orthopedic pediatric problems.

e) Classification by Public Access

The most familiar type of hospital is the community hospitals. Community hospitals serve the general public and are a non-federal short-term hospital. The main goal for this type of facility is to help the general community receive proper health care. A community hospital is not restricted to a specific group of people. Community hospitals can have a variety of ownership types such as proprietary, voluntary, state or local government. The variety of services offered by a community hospital depends on the population of the community. The larger the community, the more the services offered and staff employed. Examples of non-community hospitals are hospitals run by the federal government, hospital units of institutions such as infirmaries in colleges and universities and also long-term hospitals.

f) Classification by Location

There are two types of hospitals when classified based on their locations. One is urban hospitals, which are located in a metropolitan area. A metropolitan area is defined as a geographical area with a population of 50,000 people or more or an urbanized area that includes at least 50,000 inhabitants and a total population of at least 100,000 people (Chao, 2007; Ebeler, Bruno, & Schmitt, 2007; Field, N. Lohr, & Yordy, 1993; Suzanne P. Smith & Flarey, 1999). On the other hand, rural hospitals are found in counties where they are not part of a metropolitan area. The biggest difference between a rural and an urban hospital is the operational cost differences between the two. Urban hospitals have higher operational costs because they pay much higher salaries to the staff to stay competitive and they usually offer a wider range of more complex care services to the patients.

g) Classification by Size

There is no standard way to classify hospitals according to their size. The most common way is to count the number of beds the hospitals have. A small hospital is considered to have fewer than 100 beds. Those with 100 to 500 beds are considered to be medium sized. Larger hospitals have more than 500 beds in general (Chua, 2006; Committee on the Future of Rural Health Care, 2005; Jonas, 2003).

h) Other types of Hospitals

There are also some types of hospitals that do not fall under any category, including teaching hospitals, church-affiliated hospitals, and osteopathic hospitals. Teaching hospitals offer approved residency programs for physicians. A teaching hospital can also be classified into minor and major teaching hospitals (Committee for Monitoring the Nation's Changing Needs for Biomedical, 2005; Institute of Medicine, 2007; Reid et al., 2005b). To operate as a full teaching hospital, the facility needs to provide residencies in general medicine, surgery, obstetrics, gynecology and pediatrics. There are three main discrepancies between a teaching and a non-teaching hospital. First, teaching hospitals offer residency as well as patient care. Second, teaching hospitals provide a broader scope of services to patients. Third, unlike non-teaching hospitals, teaching hospitals are usually located in older inner-city and economically depressed areas and are generally owned by state or local governments.

2.1.3. Managed Care and Integrated Organizations

Managed Care can be examined in two different categories. One is the more common approach where it is a mechanism or process of delivering health care services. This approach has two main characteristics, exercising proper control over operations and gathering of delivery, payment and insurance under one organizational setting (Tunis, Korn, & Ommaya, 2002). The other approach to managed care is that it is an organization that tries to deliver health care services without having to deal with an insurance company or a third-party administrator.

Types of managed care organizations are as follows (Christman & Counte, 1981; Jonas, 2003; Kovner & Jonas 1990; Shi & Singh, 2004; Sultz & Young, 2005):

- a) Health Maintenance Organization
 - Staff model
 - Group model
 - Network model
 - Independent Practice Association (IPA) model
 - Direct Contract model
- b) Preferred Provider Organization
- c) Exclusive Provider Organization
- d) Point-of-service Plan

a) *Health Maintenance Organization*

Health Maintenance Organizations also known as HMOs used to be the most popular type of medical care organizations until the commercial institutions came up with PPOs to compete with HMOs (Eden et al., 2008; Reid et al., 2005b; Tunis et al., 2002). In a traditional health care delivery system, health insurance covers medical expenses when a person is sick. Yet, HMOs help people receive care during their sickness and also provide services to people to help them maintain their health. HMOs require a fixed fee per month per enrollee or per member per month in order to get the patients an access to complete range of health care services. People with HMOs have to obtain their care from hospitals, physicians, and other health care personnel that participate in the HMO. HMOs have to follow a certain standard quality in providing services to patients.

HMOs can be categorized by five different models, namely staff, group, network, independent practice association (IPA) and direct contract model. Many HMOs cannot be categorized properly under one single model (Committee on Adolescent Health Care Services and Models of Care for Treatment, 2007; Tunis et al., 2002). Therefore, such plans usually fall under another category that is called mixed models. In the staff model, the HMO has its own salaried physicians. Bonuses are also offered to the physicians depending on their productivity and performance. In comparison to other models of HMOs, the staff model can provide better control over the practice patterns of their physicians. The staff model has the disadvantage of having high salary expenses. Therefore, staff model HMOs need to attract a greater number of enrollees to cover the expenses and make profit. Another model, the group model HMO, has contracts with multispecialty group practices to offer comprehensive services to members. The physicians in this model are employed by the group practice instead of the HMO.

In group model, the group practice is generally paid an all-inclusive capitation fee to offer service to its members. One of the other HMO models is the network model where the HMO has a contract with more than one medical group practice. This model is most applicable to big metropolitan areas and widespread geographic locations. Independent Practice Association (IPA) is also another model for HMOs. IPA is a separate legal entity from the HMO. IPA makes contracts with both group practices and independent solo practitioners. HMOs contract with the IPA for physician services instead of HMOs contracting directly with individual physicians or groups. Under this model, HMOs are still responsible for offering health care services to its members, yet the task of arranging physician services are under the responsibility of the IPA. The last model for HMOs is the Direct Contract Model where it eliminates the need for an IPA intermediary. In this model, HMOs make contracts with a broad range of community physicians and group practices.

b) Preferred Provider Organization

Other than HMOs, PPOs are the most common type of managed care organizations. PPOs made their first appearance in the medical marketplace around late 1970s. This model of managed care offers discounts to patients between 15 to 20 percent from what competitor organizations charge (Eden et al., 2008; Thomson, Mitchell, & Williams, 2006). One of the differences between an HMO and a PPO is that when it comes to paying providers, PPOs substitute discounted fee for service for capitation. Generally, the members agree to benefit from a pre-determined set of physicians and hospitals which PPOs have contracts. These health care providers are called preferred providers. The main advantage of PPOs is that they let the patients get treatment or receive care from physicians or hospitals outside their panel. PPOs, unlike HMOs, reimburse the patient for covered services received from any provider (Committee for Monitoring the Nation's Changing Needs for Biomedical, 2005; Eden et al., 2008). When patients use a provider outside the panel, they have to pay the balance between the scheduled fee and the billed amount. They might also have to pay for higher levels of deductibles and copayments. Therefore, these expenses generally force the patients to receive care from preferred providers. PPOs can also have sponsorship deals with insurance companies, large employers, Blue Cross and Blue Shield, hospitals, or physicians.

c) *Exclusive Provider Organization*

Exclusive provider organizations are very similar to PPOs in nature but they differ in one aspect; patients are restricted to only the list of preferred providers (Chao, 2007; McCarthy & Schafermeyer, 2007). Therefore, this type of managed care is called exclusive provider organization. The main purpose of this type of organization is to save costs.

d) *Point-of-Service Plan*

This type of organization is a combination of features of HMOs with some of the characteristics of patient choice in PPOs. Some of the HMO features that are used in this plan are the risk-based reimbursement to the providers or in other words capitation and the application of gate-keeping model for utilization control (Committee on Quality of Health Care in America, 2001; Edmunds et al., 1997; Manning & Barondess, 1996). In this plan, each member has an assigned primary care provider. The feature that is borrowed from PPO is the option that the patients have when it comes to choosing a non-participating provider at the time of receiving services.

2.1.4. Long-term Care

Long-term care stands for a variety of services offered to temporarily or chronically impaired patients over a long period of time with the aim of helping them to stay at a high level of independent functioning as long as possible (Field et al., 1993; Manning & Barondess, 1996). These services include health care, social support, residential services and mental health. The nature of the long-term care depends on many factors such as levels of intensity and acute, chronic, social and mental needs. Depending on the intensity level, there are different types of health care services provided to the patients. Some of them are personal care, custodial care, restorative care, skilled nursing care and sub-acute care. The needs also vary greatly depending on the condition of the patient. Some of these needs are acute medical needs, ongoing health needs, social support needs, and mental needs. Clients of long-term care involve people with disabilities either mentally retarded or developmentally disabled people, people with AIDS, acute episode patients and older adults.

Some of the types of community based long-term care services are included in the following:

- Home Health Care
- Adult Day Care
- Adult Foster Care
- Senior Centers

Some of the institutions of long-term care are independent or retirement living centers, residential or personal care facilities, assisted living facilities, skilled nursing facilities, sub-acute care facilities, specialized facilities such as intermediate care facility for the mentally retarded and Alzheimer facilities.

2.2 Health Care Problems in United States

The second section addresses six present issues in the health care delivery system.

- Chasm in the health care delivery system
- Lack of investment in engineering based models to improve the delivery system
- Workforce issues across multiple disciplines
- Patient safety and the quality and efficiency of health care delivery
- Increase in chronic conditions
- Insufficient use of information technology

2.2.1. Chasm in the health care delivery system

Quality problems may not always result from lack of knowledge. In the health care case, there is enough knowledge but inadequate staff to use the knowledge and transform it into high quality care. Over the last 50 years, investment in biomedical research increased exponentially (I. Institute of Medicine, 2001). The average number of new drugs approved per year has doubled since the early 1980s (The Henry J. Kaiser Family Foundation, 2000). A previous study on the same topic in 1996 sums this fact as “The knowledge, skills, care interventions, devices, and drugs have advanced more rapidly than our ability to deliver them safely, effectively, and efficiently” (The Robert Wood Johnson Foundation, 1996). Medical science advances and therefore the need for modern pharmaceuticals and health technologies will deepen. If the health care delivery system is not renewed, the gap between the knowledge source and the ability of physicians will widen.

2.2.2. Lack of investment in engineering based models to improve the delivery system

In today’s competitive atmosphere, industrial engineering has become valuable in every manufacturing and services industry in order to design and manage complex production and

distribution systems (Reid, Compton, Grossman, & Fanjiang, 2005a). Industrial engineering helps to meet many objectives including quality and cost. By using the engineering help, processes in all industries are automated such as deliveries from suppliers and data sharing between different productions sectors. It results in being more responsive to customer demands. Health care delivery industry can use help of industrial engineering as well as other industries.

An Institute of Medicine (IOM) study (2001) shows how engineering could help health care industry. IOM claimed that the American health care system needed a major reconstructing and appealed to engineering for help (Committee on Quality of Health Care in America, 2001). The committee proposed six aims for improvement.

- **“*Safe***—avoiding injuries to patients from the care that is intended to help them.
- ***Effective***—providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and overuse).
- ***Patient-centered***—providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.
- ***Timely***—reducing waits and sometimes harmful delays for both those who receive and those who give care.
- ***Efficient***—avoiding waste, in particular waste of equipment, supplies, ideas, and energy.
- ***Equitable***—providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status.” (Committee on Quality of Health Care in America, 2001)

A follow up study of IOM in 2004 shows that a few institutions have made some progress on meeting the six quality aims. But the health care delivery system as a whole did not make progress in achieving these aims and building a twenty-first century, patient-centered health care system (Institute of Medicine, 2006).

Considering the proposed aims of IOM and keeping the complexity of the health care industry in mind, it is crucial to implement industrial engineering use. This can lead to higher production, better quality care and patient-centered health care delivery. The important matter

here is not to copy a manufacturer's industrial engineering approach to the health care industry because health care is much more complex because it is a produced service that needs to comply with the changing patient physiology and the complexities of diseases.

2.2.3. Workforce issues across multiple disciplines

The quality of the health care workforce directly affects quality of health care delivery (Salsberg, 2003). That is the reason for the quality of workforce to be a main concern and possible solution to many quality issues over the recent decades. For example in 1971, a study called Health Maintenance Strategy pointed out the problems in the health care delivery at the time and presented some possible solutions (Ellwood et al., 1971). One of those solutions was to increase the supply of health care manpower. The study suggested that increasing the availability of health care manpower, primarily physicians, would be undoubtedly beneficial. But the same study also pointed out the downsides of more manpower. It claimed that the problem with more manpower was that it would cost more to train. Another problem was that increasing the supply of manpower without changing the structure of health care delivery system would further increase demand and escalate prices since it is the physician who buys the treatments for his patient, but not the patient himself. This does not make sense since the number of patients do not change and nor does the total treatment applied.

There was serious debate over quality and quantity of health care manpower in 1970s and there still is. The reason for this is that it seems beneficial to cut manpower in order to maintain costs. But the unpreventable result of cutting manpower is assigning the ones left to multiple tasks to try to meet increasing demand. Assigning multiple tasks overloads the health care manpower and lowers the quality of service provided.

Very recently, United States Senator for Massachusetts Edward M. Kennedy addressed the health care workforce issues in his press release in February, 12 2008 (Kennedy, 2008).

“Unfortunately, we are facing a crisis in primary care. Family medicine residency positions have dropped by 50% since 1997 and the growth in the supply of primary care physicians for adult patients is now lagging behind the rate of growth of adults. Community health centers continue to report significant vacancies for primary care providers.”

Health care workforce has always been a concern and a subject for debate. Less manpower means overload and lack of quality. But more manpower means increases in cost so

we can conclude that the issues will not be resolved unless an optimum level between quality and quantity is reached.

2.2.4. Patient Safety and the Quality and Efficiency of Health care Delivery

In the 1970's when there were fewer people and services, health care delivery was performed by a family doctor (Ellwood et al., 1971). This was a personal relationship and there was no need to align the benefits of both parties involved. Now that there are many more categories of health care professionals, these people are gathered in hospitals or clinics to perform the health care services. The problem that arises here is that the relationship between the physician and the patient is not personal anymore so the physician may not think of the best interest of the patient. Since the patient is unable to judge his own treatment needs, the physician applies unnecessary services and the patient pays for whatever he is told to pay and he cannot eliminate unneeded expenses.

Mark Chassin (1998) divided these quality issues from physicians in the American health care delivery system in 3 groups:

- Overuse
- Underuse
- Misuse

Overuse occurs when the risk of damage exceeds possible benefits of a treatment. The primary cause of overuse is the FFS (fee for service) plan. Physicians in managed care plans used 22 percent fewer expensive procedures, tests and treatments compared to those in FFS plans (Miller & Luft, 1994). Physicians apply unnecessary services for their own interest. Another cause of overuse is physicians' passion for the services they provide. They cannot provide objective recommendations that are based on scientific evidence. The last two reasons of overuse are psychological. First one is about health care specialists. They feel the pressure to perform a procedure when primary care physicians refer patients to them. The second one is about the patients. The patients also feel that they need to receive some kind of procedure when they see a physician (Chassin, 1998).

The second reason associated with the quality problems is underuse. Underuse is being unable to perform the needed service when it would have created favorable outcomes. The primary causes of underuse are the financial barriers such as lack of insurance or the burden of

deductibles. The second cause of underuse is the inability of physicians to keep all the necessary information to provide successful treatment in their heads (Chassin, 1998).

The last reason of poor quality of health care delivery is misuse. Misuse is the preventable complications of proper health care. This is the area which has no obvious causes that can be addressed. Therefore it is harder to provide solutions but overall we need to align the economic incentives of the physician to those of the patient in order to achieve patient safety (Ellwood et al., 1971).

2.2.5. Increase in Chronic Conditions

Technological achievements in recent decades increased the life expectancy of an average American. The study of National Center for Health Statistics in 2000 claims that an average American expects to live at least 76 years (National Center for Health Statistics, 2000). According to the same study, the life expectancy increased by one for every five years since 1965. Increasing life expectancy is favorable except the increase in the elder population. A previous study of National Center for Health Statistics in 1999 shows that a large proportion of the U.S. population is age 65 and over (National Center for Health Statistics, 1999). This age group is approximately 13% of the population. The same study expects that in 2030, this percentage is going to grow to 20% which raises attention to the growing elder population. Elder population often comes with more chronic conditions compared to the younger. 33% of the population affected by disabling chronic conditions is age 65 or over (Committee on Quality of Health Care in America, 2001). As the elder population grows, the population with chronic conditions also does, which corresponds to approximately 125 million people (Partnership for Solutions, 2002). 60 million of these people have more than one chronic condition. The Institute for Health & Aging claimed in a study in 1996 that the U.S. population with at least one chronic condition is going to grow to 134 million in 2020 (The Institute for Health & Aging, 1996). Newer studies predict that the actual number in 2020 will be more than 134 million (Institute of Medicine, 2007).

Chronic care takes a lot more time and effort than acute care. Hoffman and Rice found that 69 percent of all hospital admissions were to people with chronic conditions (Hoffman, Rice, & Sung, 1996). Today, that percentage has increased to 76 percent. It is not just inefficient use of time and effort; it is a financial burden as well. In 1998, the care provided to people with chronic conditions accounted for 78 percent of all health care spending (Partnership for Solutions, 2002).

The worst part is that the spending amount is disproportional; according to the same study of Partnership for Solutions in 2002, 78% of health care spending is for 44% of the population that has one or more chronic conditions.

With the improvements in the health care technology field, people live longer in the United States. With the extended life expectancy, a high percentage of elderly people have chronic conditions. Therefore, there is a lot of financial and labor force investment done on chronic patients.

2.2.6. Insufficient Use of Information Technology

Information technology is a vital resource for most industries. Current enhancements in computerized systems make it easy to store and reach data. Making use of these technological achievements enable industries to provide higher quality products and services. It has become easier to maintain resources and manage complex production systems.

Even though it is quite obvious how information technology helps industries to provide more effective products and services, health care industry is seriously lacking in using its help especially in clinical computing. Health services ranked thirty-eighth among 53 major non-farm industries tracked by the U.S. Department of Commerce in terms of information technology investment per worker (U.S. Department of Commerce, 1999). Even small advances in the use of information technology in health care have made spectacular changes in the performance of the industry (Reid et al., 2005a).

It is not logical for health care industry to lack in information technology where the primary element of health care is information. This can be observed in steps. A physician or a nurse collects data by physical examination or diagnosis test and store them. After that, a premise is formed and then confirmed by further data collected by other physicians or nurses. This process ends with a feedback which suggests the success of the treatment. These steps become easier to relate to each other with the help of information technology.

The information technology gap of health care industry in administrative dimensions is not as critical as core clinical dimensions. The administrative and financial health care personnel is already using information technology in order to track payments, etc. (Reid et al., 2005a). There are three reasons for the insufficiency of information technology in health care. First reason is the cottage-industry structure of the health care delivery system. The services are provided at small-scale homes rather than large-scale factories. In the health care case, individual

clinics are mentioned as small-scale homes. These small scale businesses cannot finance the investment of information technology since they cannot make up for the cost of the investment. The second reason is that the clinicians are not aware of the advantages of applying information technology to their industry. The last reason is the complexity of the application of information technology to the health care industry (Ammenwerth, Graber, Herrmann, Burkle, & Konig, 2003). This is the reason behind the need for health care staff specially trained in IT.

2.3 Health Care Education in United States

This section will look at the programs that are offered in United States regarding training of the staff in the health care delivery system.

2.3.1. Medical Schools

Medical school in the United States is a graduate institution that takes four years to complete in order to become a physician in the field of medicine (Greiner & Knebel, 2003; Institute of Medicine, 2006; Nielsen-Bohlman, Panzer, & Kindig, 2004; Reid et al., 2005b). In order to be admitted as a medical student, one needs to have a bachelor's degree from an accredited college or university. After getting admitted to a medical school program, it usually takes four years to pursue a Doctor of Medicine (M.D.) or Doctor of Osteopathic Medicine (D.O.) degree. The course of study in these degrees is divided into two sections which are pre-clinical and clinical.

Pre-clinical study generally takes place in the first two years and includes classroom and laboratory work related to subjects such as anatomy, biochemistry, physiology, pharmacology, histology, embryology, microbiology, pathology, patho-physiology and neurosciences. After completion of the pre-clinical studies, candidates usually prefer to take step one of the medical licensing boards which are the United States Medical Licensure Examination (USMLE) and the Comprehensive Osteopathic Medical Licensing Examination (COMLEX) (Johns Hopkins School of Medicine, 2006; NYU School of Medicine, 2007; Wikipedia, 2008a).

The final two years of a medical school consists of the clinical studies, which generally take place on the wards of a teaching hospital or sometimes with community-based physicians. In clinical studies, students make observations and also take part in the care of patients under the supervision of resident and attending physicians. Also, during their final year students are required to perform duties at intern level, which is referred to as sub-internship rotation.

After completion of a four year degree, the students obtain either a degree of M.D. or D.O. They cannot practice until they complete at least an internship and also the completion of step 3 of USMLE or COMLEX.

2.3.2. Dental Schools

Dental school programs in United States generally take four years. In the first two years of dental program, students are required to study basic biomedical sciences at both dental school and also medical school. The reason is that it is believed that oral health is a part of general health. Therefore, most universities require students to take courses in general medicine in order to make a good connection between oral health and general health (Harvard Medical School, 2006; Johns Hopkins School of Medicine, 2006; Wikipedia, 2008b).

During year one, basic biomedical sciences are learned which include morphological sciences, biochemical and physiologic sciences, developmental and molecular biology, pathology, microbiology, immunology and neurosciences.

The second year also contains some basic biomedical studies, and also studies such as oral pathology and radiology. During the end of the second year, students are more pushed towards oral health studies.

During the third year students are encouraged to take courses such as diagnosis and prevention, treatment of active diseases, restorative treatment, treatment of the child and adolescent, etc.

After the third year, dental students generally spend time at dental clinics in order to gain first-hand experience. They also take part in the care of patients and try to develop and improve their dental techniques.

2.3.3. Nursing Programs

Nursing programs in United States consist of different levels of degrees such as Bachelor of Science in nursing, Master of Science in nursing, PhD programs, post-master's certificate programs and online nursing programs (Harvard Medical School, 2006; NYU School of Medicine, 2007; Wikipedia, 2008c).

Bachelor programs are usually accelerated programs which usually take place in 1 to 2 years. This program is often offered to students after they complete a 4 year bachelor's degree program at an accredited university.

Master's programs relating to nursing often take between 2 to 3 years. Students may also have the option to pursue an MBA degree while they are studying for their master's degree in nursing. Some majors in the master's program include clinical nurse specialist, nurse practitioner, nurse anesthesia, clinical research management, nursing informatics.

2.3.4. Physician assistant programs

Physician assistant programs in United States generally take two years to complete starting from an undergraduate degree. The first 12 months are based on pre-clinical studies and the other remaining 12 months are devoted to clinical studies in primary care and the medical and surgical specialties (Harvard Medical School, 2006; Johns Hopkins School of Medicine, 2006; NYU School of Medicine, 2007; University of California Los Angeles School of Medicine, 2007). During the first year, students are encouraged to study courses such as basic medical sciences, physical diagnosis, diagnostic methods, fundamentals of surgery, pharmacology, behavioral aspects of medicine, evidence based medicine, etc. During the second year students delve more into specialized subjects such as E.R. medicine, inpatient medicine, OB/GYN, pediatrics, general surgery, etc. Second year consists of more specialized topics because the goal is to help the students get ready for a real clinical experience.

3. Methodology

After gaining information on the health care industry, health care issues and health care education programs through the literature review, we wanted to obtain opinions of people who were currently working in the health care industry.

This section is a summary of the steps that were followed to examine the curriculum changes that can be made at WPI Management Department for having an academic program in health management. To overview the changes that can be made, interviews were conducted among WPI alumni who are working in the health care industry. The questions were asked to the targeted audience by both phone calls and e-mails. This chapter includes all the methods that were used to collect and analyze these interview data. The chapter ends with a discussion of the methods used to collect and analyze data about health care management programs.

3.1. Study Subjects

The study subjects, also mentioned in the beginning of this chapter, were Worcester Polytechnic Institute alumni. The decision on choosing the study subjects and how we grouped them is discussed in this section.

3.1.1. Decision to study WPI Alumni

It was our goal to obtain reliable data about the ideas of the WPI alumni on health care management education. We want to find ways to incorporate information technology systems into the area by introducing a new academic curriculum in WPI's schedule.

We limited our research by WPI alumni because we wanted to retrieve the ideas of the people who have been educated by principles of WPI. We preferred to interview only alumni since they would know more accurately how the changes can be made in the system due to their experience on the education system at WPI. Members of our target group are highly educated and have great experience on the field of health care; therefore we expected them to have sophisticated opinions about our questions. Also it was easy to reach WPI alumni since their contact information was supplied to us by our advisors as well as their educational background at WPI.

3.1.2. Grouping Contacts

The list of potential contacts provided by our advisors included all people who were enrolled at or graduated from WPI for study of any sort and have been in the health care field at any position. The alumni list consisted of people from a great variety of positions. Considering who we needed to interview, it came with a few extras such as high school teachers. In order to reach our goal, we first needed to eliminate these extra contacts that we did not need.

After the elimination of unnecessary contacts, we wanted to group these contacts firstly according to their fields. We came up with 5 general categories which are:

1. Insurance: Those who work for health insurance companies (60 people)
2. Academic: Those who are affiliated with an academic health care institution (29 people)
3. Government: Those who work on health care at a government position (28 people)
4. Health care Provider: Those who provide direct health care to patients (109 people)
5. Health care Vendor: Those who work in companies that produce health care equipment (196 people)

In the light of these categories, we then started to form the interview questions which are to be discussed in the next section.

3.2 Interview Protocol Development

The majority of the project depended on the interviews with alumni and the feedback that came from them. Therefore, preparing a successful interview was a key factor for reaching our goals. We followed certain procedures regarding how to prepare, schedule and conduct the interview. We also needed to look at some methods of analyzing the outcomes of the interviews with the alumni. In the following sections, there is a discussion on some common procedures about setting up an interview protocol and also methods of analyzing the qualitative data that we gathered from the interviews.

3.2.1. Setting up the Interview

To establish a successful interview protocol we had to do an intensive research about the health care delivery industry. The background research on the health care industry helped us get a clear idea about how the system works and what flaws there are inside the whole delivery system. The research also helped us figure out what type of questions would be asked during the interviews. The information that we have gathered from our research enabled us to become

familiar with some technical terms and concepts. Therefore, whenever the interviewee mentioned a specific term or concept, we were easily able to identify and understand what the interviewee was trying to mention.

It is also essential to conduct an interview in a setting with little distraction such as lights or noises (BC Public Service Agency, 2004; Cannell, Miller, & Oksenberg, 1981; McNamara, 2007). Yet, since we interviewed the alumni through telephone calls and e-mails, the choice of the setting depended on the interviewee. This can affect the outcome of the interview if the interviewee is in a setting where he can be disturbed with outside factors such as lights, noises, phone calls, etc. On the other hand, it is also important for us to choose a setting with little distraction because we need to focus on the interview questions as much as possible to get the best results. Another important point that needs to be done during an interview protocol is to identify ourselves. We needed to let the interviewees know about who we are so that they can have a general idea about what they would be expecting from us (Allen, 2001 ; Bridget Johnson, 2007; McNamara, 2007).

It is also important that we briefly explain the purpose of our interview so that the interviewee can have a general idea about the basis of the interview. Confidentiality is also another key point in interviews since some of the interviewees would not want to be publicized. Therefore, it is a good idea to let the interviewee know beforehand that the interview data were not going to be used for a project where anyone would be able to see. Then, explaining the format of the interview is also helpful in enlightening the interviewee about how the interview would proceed. Duration of the interview is also an important factor because some of the interviewees may not think that they have sufficient time to answer all our questions. So, it is a good idea to let the interviewee know how long the interview would take. The expected duration of our interview would be between 15 to 30 minutes depending on the length of the response we would get from the interviewee. Some people may prefer to give short answers while others might want to be more elaborative and take the time to give more insightful feedback. It is also possible that the interviewees might want to get in touch with us later. Therefore, we could also give out our contact information to the interviewees if requested. It is also a good way to end the interview by asking if they have any questions about the interview or any other subject.

In terms of sequence of the interview, it is critical that we get the interviewees involved in the interview as soon as possible. It is also important we do not keep a very formal

conversation with the respondent because by making the respondent feel more comfortable during the interview, it would be easier to get better answers from them (Access Washington, 2007; Allen, 2001 ; BC Public Service Agency, 2004; Bridget Johnson, 2007). Before getting into controversial matters, it is often a good idea to ask about some facts. By doing that, the respondent would feel more engaged in the interview before warming up to more intensive questions. Spreading fact-based questions throughout the interview is generally a good idea to prevent the respondent from feeling disengaged during the interview. In terms of time-based questions, it is more practical to ask about questions that relate to present rather than past and the future. The reason is that, it is usually easier for a person to talk about the present than working their way into the past or future. Therefore, it is better to start with asking them about things such as their current position in the industry. Then, the very last questions would be the ones that would allow the interviewee to provide any additional information, recommendation, insight and impressions about the interview.

In terms of wording of the interview, it is usually a good idea to leave the wordings open-ended because this allows the interviewees to pick their own terms when answering questions. On the other hand, it is better to be more specific when asking about some fact-based questions so that you can get more specific and fact-based answers. It is also critical to avoid judgmental and evocative wording during the interview because the interview should be conducted in an environment that is as neutral as possible (Allen, 2001 ; McNamara, 2007; NIU English Department, 2006). The flow of the interview should also be perfect and questions should be asked one at a time. In addition to this, the wording of the interview should be very clear so that the respondent would easily understand what the questions mean and they would not have any hard time answering the questions.

3.2.2. Conducting the interview

For our interviews that were conducted by telephone it is essential that we take note of almost every word that is uttered during the interviews. That way, we can always go back to those notes and easily analyze the answers given by the respondents. It is better to ask one question at a time to the respondent because it would put less pressure on the interviewee and he/she would be able to give out better answers (Allen, 2001; Cannell et al., 1981; Bridget Johnson, 2007). Remaining neutral as much as possible is also another important point because by showing strong emotions to what the interview says would make him/her feel uncomfortable

and disengaged. Therefore, it is better to act like “you have heard it all before.” During face-to-face interviews it is always a good thing to nod what the respondent says because it makes the respondent feel more engaged and encouraged. In our case it might be a good idea to confirm what the interviewee says from time to time in order to encourage them. Also, transitions between the questions should be perfect so that the interviewee would feel more focused and engaged into the conversation (BC Public Service Agency, 2004; Bridget Johnson, 2007; McNamara, 2007). Therefore, the conversation should have well-built transition between the questions to maintain the concentration of the respondent during the interview. It is also essential not to lose control of the interview. That is, it is wise not to let the respondent stray to another topic and keep him/her focused on the subject. If the time is running out, it is always a good idea to nicely remind the interviewee about the time. In addition to all these, it is very essential that we take personal notes while we are interviewing the respondents because it would give us an insight about how we would interpret the answers from the respondents.

As for the e-mail interviews, the most important thing that we had to be careful about was to ask questions as clearly as possible so that the respondents can reply with the expected answers. We also had to clearly address who we are and who we were working with.

3.2.3. After the Interview

The first thing to do right after a telephone interview should be to write down initial thoughts and comments on a piece of paper. It is critical the notes are written down clearly, so that it would not be difficult to analyze the notes at a later time. After that it is also a good idea to make notes on any critical personal notes taken during the interview. Also, filling out any notes that do not make sense can be very helpful for future analysis of the data. Any note that is taken with hurry or left missing would most probably not make sense in the future. Therefore, making those notes right after the interview would help us make our qualitative data analysis much more easily. Another useful thing to do might be to write down any observations about the interview. For instance, if the respondent took too much time to answer the questions or answered the questions very shortly, etc. This would help us decide on the reliability of the data gathered from the interview because the data that would be used and analyzed in the project would solely depend on the answers from the respondents. Therefore, if the respondents do not focus or give importance to the interview then the outcome of the interview might be vague. Hence, writing

down any personal observations from the interview might be useful for deciding whether the data is reliable or not.

3.3. Interview Protocol

In the light of what we needed to ask our contacts, we created a method to address our contacts. We planned a phone call for reaching out to our contacts. We agreed to use the same set of questions for all of our contacts and schedule phone meeting times if necessary.

3.3.1. Scheduling the Phone Interview

Some contacts have higher positions in their companies as opposed to others therefore it was harder to get in touch with them. To make an appointment with them, we would need to speak to their secretary. The speech below was used to address the administrative assistant and schedule a phone meeting with our actual contact person.

- *Hello. I am calling from Worcester Polytechnic Institute. My name is _____ and I am a (junior/senior) working on my IQP. We are conducting a survey for our IQP on healthcare delivery management. Am I speaking to _____?*
- *We would like to schedule a time with _____ who is a WPI alumnus in order to ask (him/her) a few questions.*

3.3.2. Phone Interviewing

The interview script below was used to ask the questions for our research project. The first part of the script is the introduction where we establish a relationship with the participant and explain to them the reason for our call.

- *Hello. I am calling from Worcester Polytechnic Institute. My name is _____ and I am a (junior/senior) working on my IQP. We are conducting a survey for our IQP on healthcare delivery management. Am I speaking to _____?*
- *We would like to ask you a few questions about your educational background and your professional experience related to healthcare delivery management. Is now a good time to talk or should we call you at another time?*

After introducing ourselves, we address the questions that we developed. Question development methods were previously discussed.

- *As far as we know, you have pursued a (bachelor's/master's) degree in _____ at WPI. Could you tell us about your academic experience besides WPI?*

- *According to the information we were given, you currently work as _____, if not could you please tell us your current position in your career?*
- *We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?*
- *We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?*
- *If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?*

The third part of the interview is asking the contact for suggestions about our study.

- *We are trying to come up with a curriculum for the management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?*

After asking the questions, we thank the participant for his/her help and request an e-mail address for further communication.

- *Thank you very much for your help. We would like to get back to you with the results. Can we please have your e-mail address?*
- *It was a pleasure speaking with you. We really appreciate you taking the time to answer our questions. Have a great day!*

3.3.3. Follow up E-mail

After making the phone calls, we sent a follow up e-mail to the people who supplied us their e-mail addresses. In these mails, we briefly discussed the results of the research and present some recommendations that we have about health care education area.

3.3.4. E-mail Interviews

We also tried to reach many respondents through e-mail surveys in order to increase the number of responses. Therefore, we also prepared a template letter for our e-mail interviews. The template starts by introducing ourselves and why we are sending the e-mail. Then, we start talking about the main goal of our project. After that, we ask the respondents to answer the questions that we prepared for the interview. Below is the template letter that we sent out to all our e-mail contacts.

Hello,

We are two WPI undergraduates working on our IQP on health care delivery management. Our goal is to come up with a curriculum for the management department at WPI related to health care. As part of our IQP, we are conducting a survey of WPI alumni who are currently working in the health care industry.

We would be delighted if you could take 10 to 15 minutes of your time to answer our questions. Any kind of help would be much appreciated. The survey is both inserted below inside the e-mail and as a word document attachment.

If you have any questions or comments, please email us by responding to this email. If you wish to contact our IQP advisor, please send email to Professor Diane Strong at dstrong@wpi.edu or look at her website at <http://www.mgt.wpi.edu/People/ms.html>

Thank you for your time.

Regards,

*Ahmed Furkan Gul & Yusuf Ziya Aydin
ECE majors, Classes of 2008 & 2009
Worcester Polytechnic Institute*

In order to provide more convenience for our respondents we attached the questions both inside the e-mail and as a word document. Below are the questions that we asked to our e-mail respondents.

- Could you tell us about your academic experience besides WPI? (If applicable)*
- What is your current position in your career?*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?*
- We are trying to come up with a curriculum for the management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?*

3.4 Qualitative Data Analysis

In general, opposed to quantitative analysis, qualitative analysis does not include any numbers or statistics. They truly depend on human behaviors and thoughts. To be more precise, qualitative analysis is information gathered in a nonnumeric or in narrative form (Borgatti, 1997; Gold, May 2000). These types of data are often gathered from focus groups, interviews, open ended questionnaire items and some other structured situations. During the analysis of qualitative data, the data gathered is transformed into some form of explanation, understanding and interpretation of the people and the situations that is being investigated. The main approach to qualitative data analysis is interpretive philosophy.

In qualitative data analysis, the researcher tries to identify some certain information such as someone's interpretation of a particular situation, why they have that point of view, how they came up with that view, what they have been doing, how they explain their view on that particular situation and how they distinguish their thoughts from other people (Borgatti, 1997; National Science Foundation, 2003).

There are two major parts to qualitative data analysis. The first one is the writing/recording process. This process is really critical because without recorded data it is very difficult to come to some conclusion with the help of a person's memory. The second major process is the identification/coding part. After writing down or recording all the data from the interview, it is vital that all the gathered data is identified in some particular way and then all those identified data are coded or categorized under some titles so that it would be easier to come up with a reasonable analysis at the end. Since, qualitative data analysis mostly depends on interpretation of the information gathered from the respondents, it is essential that the researcher tries to stay as unbiased as possible so that reasonable conclusions are reached (Burke Johnson, 2002; National Science Foundation, 2003; Podesta, 2000). Therefore for our project we would be using this analysis technique to better understand the feedback from the respondents and assign each answer into logical categories. Then after categorizing all the data, a detailed analysis is made by looking at the collected data. We look at the number of times that the respondents came up with a particular idea or comment. After analyzing all the data, recommendation about the curriculum or educational programs on the topic is made.

3.5 Collecting Data about Health Care Management Programs

Another big portion of the paper depended on the data we collected from the research that we conducted about the existing educational programs in the United States. Our goal was to find as much information as possible regarding health care delivery management. Our only source on finding these data was the internet. We searched through online articles, journals and books to identify courses, programs or degrees offered in health care delivery management. While searching for these data, we used keywords such as health care administration, health care informatics and health information systems. We first began by looking at all the existing schools across the United States offering degrees in health care administration and health information systems. We collected our data on the list of schools through some online articles and websites that had a list of schools offering these courses, programs or degrees related to health care delivery management.¹ We made a list of these schools and the degrees that were offered in each school. Then, we conducted further research on the schools in New England area. Since, WPI is located in New England, we researched on all these schools that offered courses and degrees on health care delivery management. After finding information about all the schools in New England we made a list of all the degrees and courses offered in each of these schools. All these data on the existing educational programs were the basis of our analysis in chapter 5 and also the conclusions and recommendations in chapter 6.

¹Sources are from: 1) <http://www.allalliedhealthschools.com/featured/>

2) <http://www.elearners.com/campus/region/newengland/subject/51.0799.htm?page=1>

3) <http://education-portal.com/search/find.html?c1=312&c2=350&c3=0&q1=ALL&state=ALL&sf=1&zip=zip>

4. Interview Results and Analysis

This section will present the qualitative data gathered from the interviews conducted with WPI alumni who are currently working in the health care industry.

The interviews were conducted over a period of nearly a month, from March 17th- April 15th, 2008. The aim of the survey was to gather information from WPI alumni who are currently working in the health care industry. The questions required both short and long answers which in general focused on the interviewee's experience at WPI, related job experience after WPI and suggestions about future educational programs at WPI related to health care management. The first set of questions was composed of questions about educational background and job experience related to health care delivery. The second set consisted of questions related to WPI experience and recommendations about what can be improved or changed at WPI. The last question, which is the most important question of the interview, required interviewees to give their opinions on what can be offered at the Department of Management in WPI regarding health care delivery.

4.1 Response Rate

The list below shows an overall analysis of the survey results regarding the number of responses.

- *Number of alumni working in the industry: 639*
- *Number of alumni who would like to be contacted via phone: 491*
- *Number of alumni who would like to be contacted via e-mail: 362*
- *Number of alumni who do not prefer to be contacted: 72*
- *Number of alumni contacted via e-mail: 358*
- *Number of alumni contacted via phone: 143*
- *Number of alumni who cannot be reached due to inconsistent information, expired contact number, etc: 42*
- *Number of alumni answered the interview: 52 (of 501 contacted, 10.38%)*
- *Number of alumni answered via phone call: 17 (of 143 contacted, 11.89%)*
- *Number of alumni answered via e-mail: 35 (of 358 contacted, 9.78%)*

Looking at the data above, we can see that we maintained almost 10% response rate. We have tried to contact all the contacts who are willing to participate via e-mail which were 362

people. Only a small part of them, 35 of them, replied back with answers. Some people did not want to participate in the interview due to various reasons such as time constraints, irrelevant areas of study or career. Besides, some of the contact information on the given list was expired so we had to eliminate those people from the list as well. For example, 78 people were listed as working in the insurance industry; yet, some of them were actually working in property insurance and other areas that are not related to health care. In total, 35 people on the list did not work in the health care industry.

4.2 Participant Demographics

Out of the 501 people we contacted via phone (143 people) and e-mails (358 people), only 52 of them responded. Figure 1 is a summary of demographics of invited people, followed by the same type of statistics of the ones who actually responded to our survey.

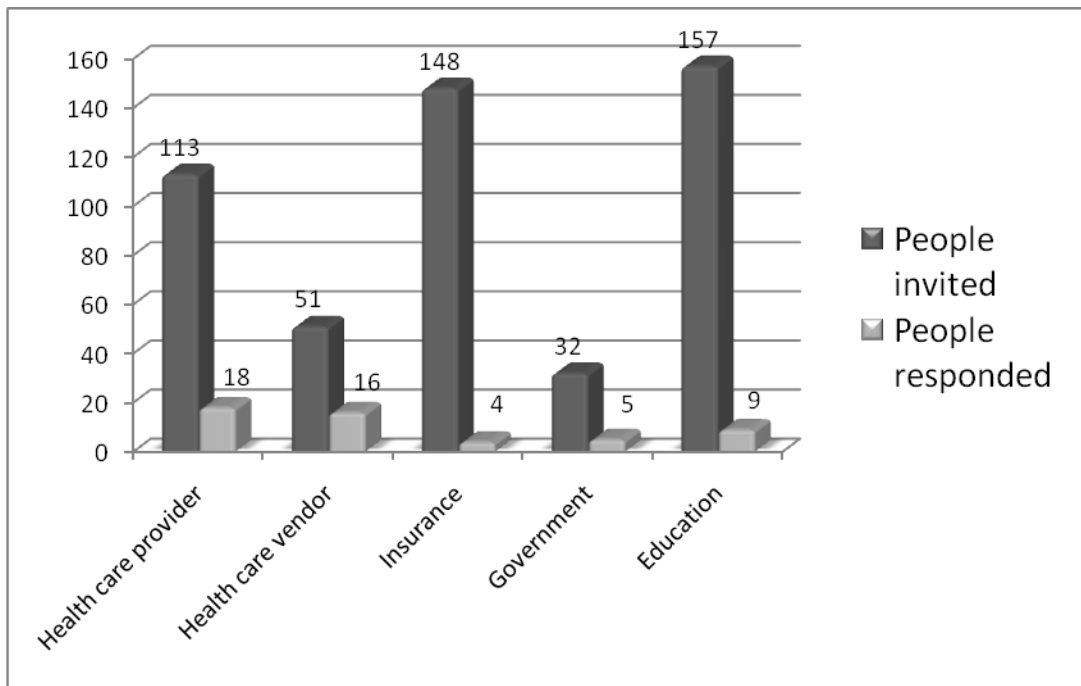


Figure 1 - Participant demographics

Looking at Figure 1, we see that the list of alumni contains more people working at insurance companies and educational institutions. Although, there are considerably more people working in those fields, the numbers of responses are almost indirectly proportional because majority of the people who responded to the surveys are from either health care providing institutions or health care vendors. Another interesting point to mention is that, the least amount of responses (only 4) came from the people who are working in the insurance industry. This was

due to either people not working in a health care related platform or reluctance to participate in the survey.

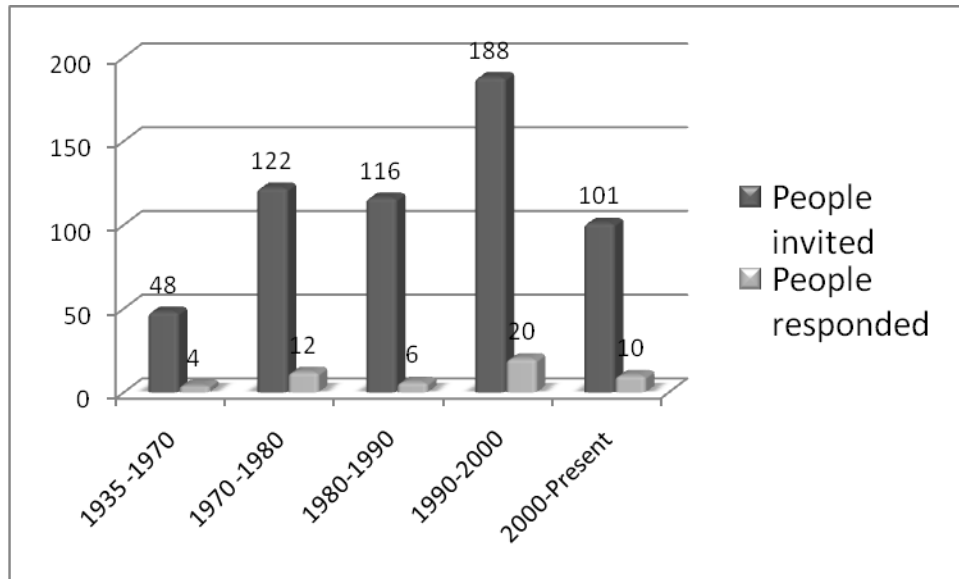


Figure 2 - Years of graduation from WPI

Figure 2 represents the graduation years of both people who are invited to the survey and people who responded to the survey. The statistics show us that most people who responded to the survey are generally from those who have graduated from WPI between 1990 and 2000.

4.3 Data Analysis for Each Question

This section is an in-depth analysis of each question that was asked in the interviews with the alumni. The analysis mainly consists of qualitative data that is gathered during the interviews. There is also some statistical information on the responses that we received from the participants. The statistics include the information about the responses on each question.

Question 1 – Academic experience besides WPI

This question was related to any educational experience besides WPI. Figure 3 shows the number of participants who answered this question. We also had a category called “not applicable” for the people who did not have any kind of educational training after their time at WPI. There were 17 people in total who did not receive any sort of education after they graduated from WPI.

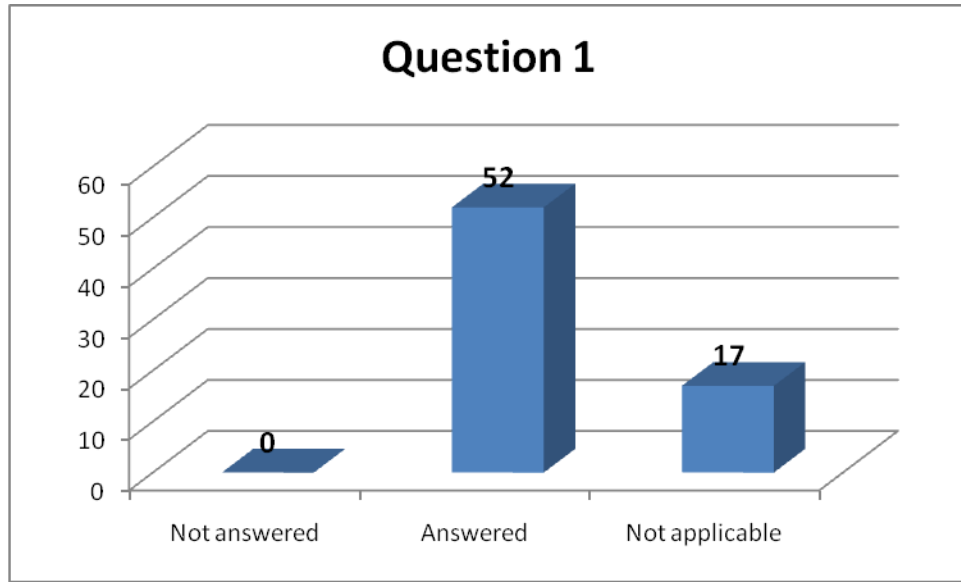


Figure 3 - Question 1 response statistics

This question had various types of answers in terms of detail. Since the list includes a variety of people with educational and professional experiences in the health care industry, the answers varied accordingly. Table 1 represents the results of our analysis for the type of academic experience besides WPI. Alumni who graduated between 2000 and 2006 seem to have pursued no other degrees after their WPI degree. Alumni who graduated before 2000 mostly have acquired other degrees after their WPI experience.

Table 1 - Experience besides WPI

Year of grad.	No other degrees	BS	MS	MBA	MD	Certificate	On-site job training	Total	Perc. (%)
2000 - Present	3	0	3	0	0	0	3	9	10
1990-2000	7	3	5	3	6	3	4	31	37
1980-1990	2	1	3	1	3	0	3	13	16
1970-1980	3	0	6	2	5	2	1	19	23
1935-1970	2	0	3	2	2	0	2	11	14
Total	17	4	20	8	16	5	13	83	100

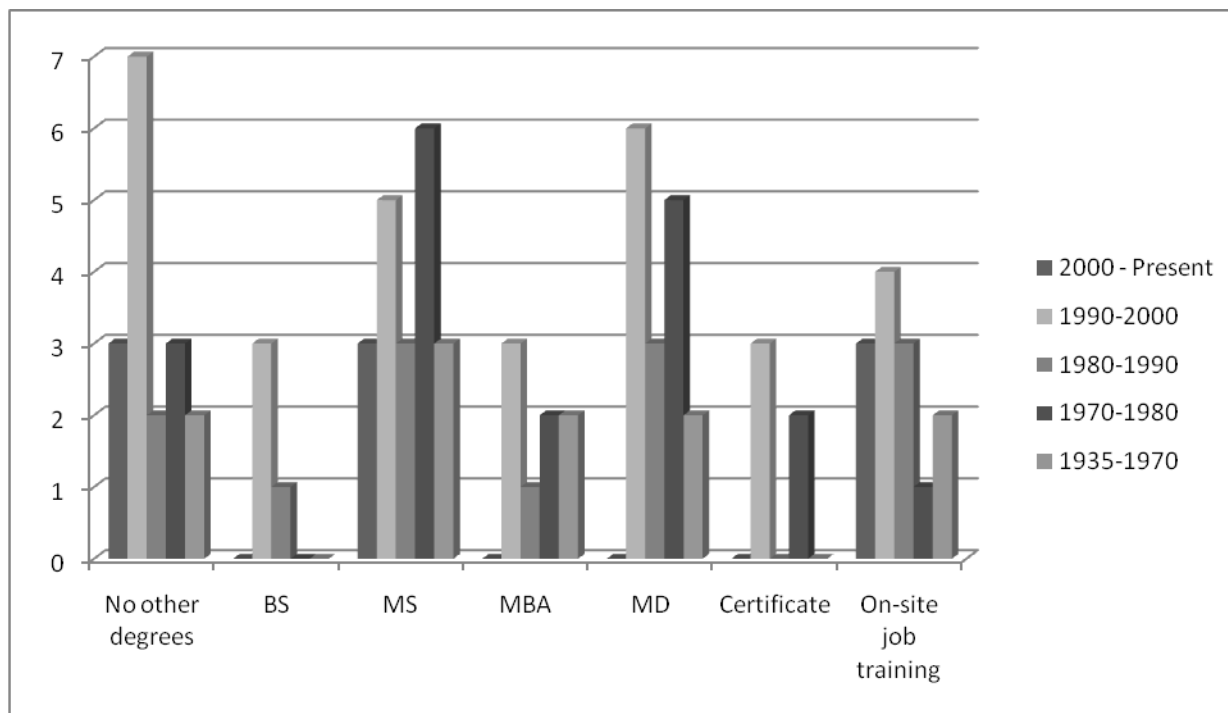


Figure 4 - Academic Experience besides WPI

As shown in Figure 4, we can claim that most graduates preferred to pursue at least a master’s degree after or before (bachelor’s degree or certificate programs at other schools) their WPI experience. There are also a significant number of alumni (17 people out of 52 people, almost 33%) who did not receive any other degrees or education upon their degree completion at WPI. In addition to these, there are quite a reasonable number of people (16 people out of 52, almost 31%) pursuing M.D. degrees after their WPI experience so as to become direct health care providers. There is a great variety of answers to this question due to multiple degree or programs that the alumni have taken. For instance, some alumni have both pursued an M.S. and M.D. degree after their education. Therefore, there is a greater number in total responses than the total number of respondents.

Question 2 – Current position in career

This question was intended to gather information about participants’ current positions in their field of study or work. All respondents answered this question.

This question also had various numbers of answers again depending on the educational and professional experience of the respondents. Some respondents had only one position throughout their career and some people had different positions.

Table 2 represents the statistics on the current positions of the participants during the interviews. Most of the participants who responded to the survey had typical WPI professions such as physicians, engineers, directors or managers, professors and research scientists. Table 2 shows the distribution of these professions among the respondents.

Table 2 - Current positions

Current Position	Number of respondents	Percentage
Director, Manager	17	33
Engineer	11	21
Physician	10	19
Research Scientist, Professor	8	15
Pursuing a degree	6	12
Total	52	100

Question 3 – Experience in health care industry

The question was based on the interest of gathering information about participants’ experience in the health care industry. Figure 5 shows the number of responses gathered from the participants. This question also had a number of not applicable responses due to the fact that some of the respondents have never worked in the health care industry. For instance, the three contacts currently working in insurance industry are related to property and commercial insurance. Therefore, those people do not have any relative experience to the health care industry.

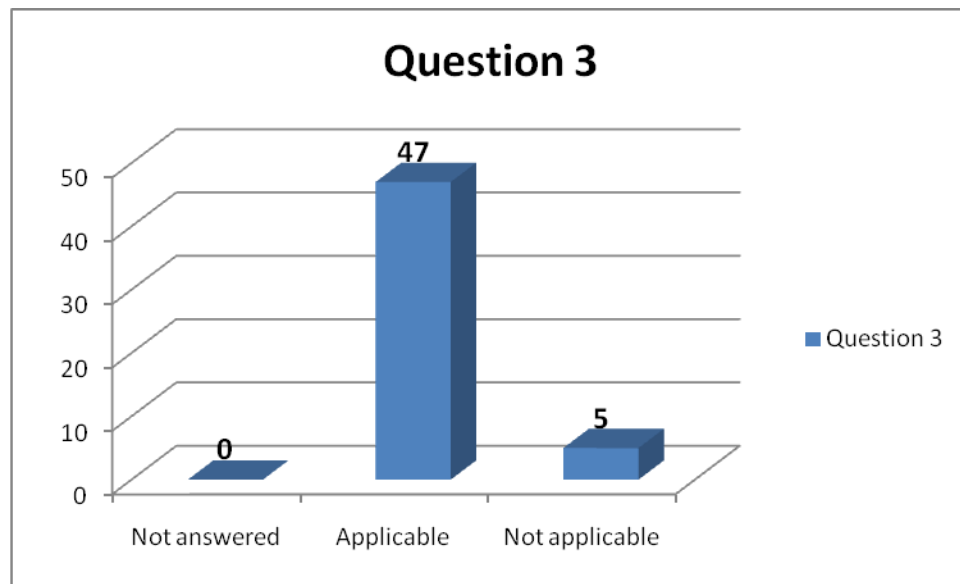


Figure 5 - Question 3 response statistics

This question provides information about the years of experience of the respondents. Table 3 represents the distribution of years spent by the respondents in the health care industry. Looking at Table 3, we can conclude that majority of the respondents have spent at least 5 years in the health care industry. Some of the alumni actually have vast experiences in the industry, spending more than 20 years in health care delivery.

Table 3 - Experience in health care industry

Years in health care industry	Number of respondents	Percentage (%)
30-35 years	6	12
25-30 years	5	9
20-25 years	6	12
15-20 years	5	9
10-15 years	12	29
5-10 years	9	17
0-5 years	9	12
Total	52	100

Question 4 – WPI experience

The aim of this question was to capture ideas of the participants’ on how WPI experience helped them get where they are at the moment. All the respondents answered this question as well.

This question also had various responses from the participants. Some participants suggested more than one thought on how WPI helped them get where they are right now. Table 4 represents the number of responses gathered from the participants. From Table 4, we conclude that WPI is considerably good at teaching problem solving and analytical thinking skills. Also, the projects such as MQPs, IQPs and course-related projects have made significant impacts in helping the respondents get where they are right now. WPI is also good at implementing some other variety of skills such as team-work, collaboration, basic science knowledge, ability to work independently and developing the habit of taking on responsibilities and challenges. Other than developing skills, WPI has also helped the respondents by getting them real-world experiences through co-ops and internships. Extracurricular activities also helped the students develop their social skills, as well as their team-work skills. Another benefit of receiving WPI education is the reputation of the school because WPI is known as one of the best engineering schools in New

England area and in the U.S. Therefore, getting a degree at WPI has helped the respondents find jobs easily and develop their career.

Table 4 - WPI experience

WPI's contribution	Number of responses	Percentage (%)
Problem solving, analytical thinking	23	21
Hands-on research, projects	16	14
Team-work	14	13
Basic sciences	13	12
Working independently	11	10
WPI Degree	10	9
Taking responsibilities	10	9
Co-ops, internship	8	7
Extracurricular activities	6	5
Total	111	100

Question 5 – Changes about past WPI experience

This question yields the thoughts of participants on what they would have changed or done differently if they had a chance to go back to their WPI years. Figure 6 shows the number of answers given by the participants. 15 of these 52 responses were not applicable because those 15 respondents claimed that they would not change anything about their experience at WPI.

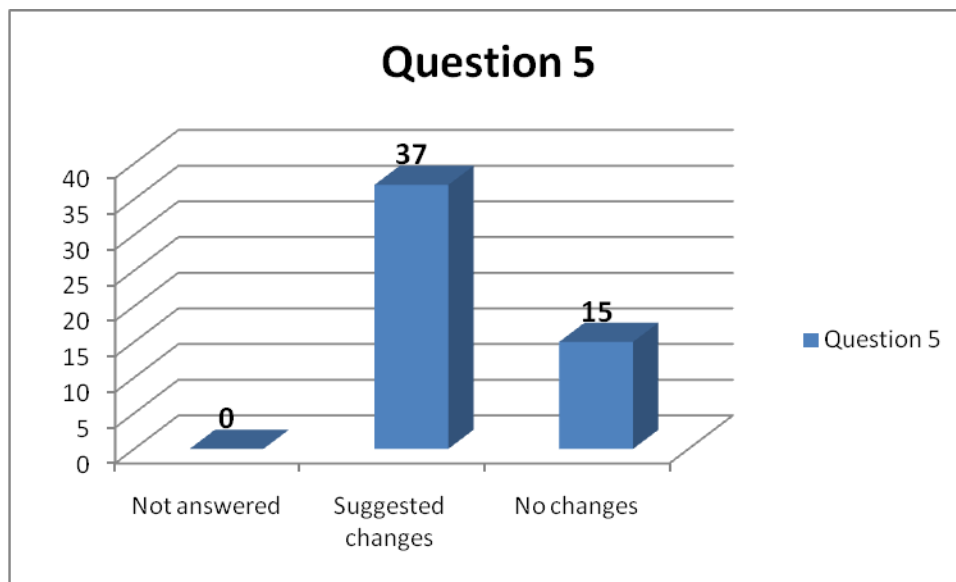


Figure 6 - Question 5 response statistics

This question is one of the most important ones in the interview because it touches on what the respondents could have changed about their educational experience during their time at WPI. This question is significant in the sense that it reflects their thoughts on what could be achieved or improved at WPI. Majority of the people were satisfied with the level education they had at WPI because 15 of the all respondents thought that their educational experience at WPI provided everything they needed to get where they are right now. Besides that, there were two different groups of answers because the respondents both mentioned changes about the courses they would have taken and also changes about their degree and concentration they pursued at WPI. Table 5 represent the data on what the respondents would have done differently in terms of courses they would have taken during their time at WPI. The majority of the respondents seem to share the same idea of taking management related courses at WPI. Overall, 53% of respondents would have taken courses in management, business or finance. Others have told that they would have taken courses related to programming, statistics, economics and foreign language.

Table 5 - Changes about past WPI experience (Courses)

Changes about WPI experience (Courses)	Number of responses	Percentage (%)
Management	15	21
Business	13	18
Finance	10	14
Sub Total	38	53
Economics	7	9
Statistics	8	11
Software and programming	8	11
Foreign Language	12	16
Total	73	100

There were also a group of answers from the respondents which were related to the area they studied during their WPI education, see Table 6. Six people said that they would have done their majors in different areas. Also, 5 of the respondents thought that they would have focused on a different concentration area in their major.

Table 6 - Changes about past WPI experience (Degree)

Changes about WPI experience (Degree)	Number of responses	Percentage (%)
Major change	6	55
Concentration change	5	45
Total	11	100

Question 6 – Recommendation for health care delivery management

Finally, this question aims to gather information and ideas from the participants on what WPI could offer in terms of educational programs at the Department of Management. This question also seeks answers on how WPI can establish these recommended programs. Figure 7 represents the number of participants who provided responses. We observe that there are 14 responses that are not applicable for this question. Among those 14 people, there were some people who could not think of anything that they would recommend about health care delivery management education. Others either did not prefer to give any recommendations or did not work in the health care industry.

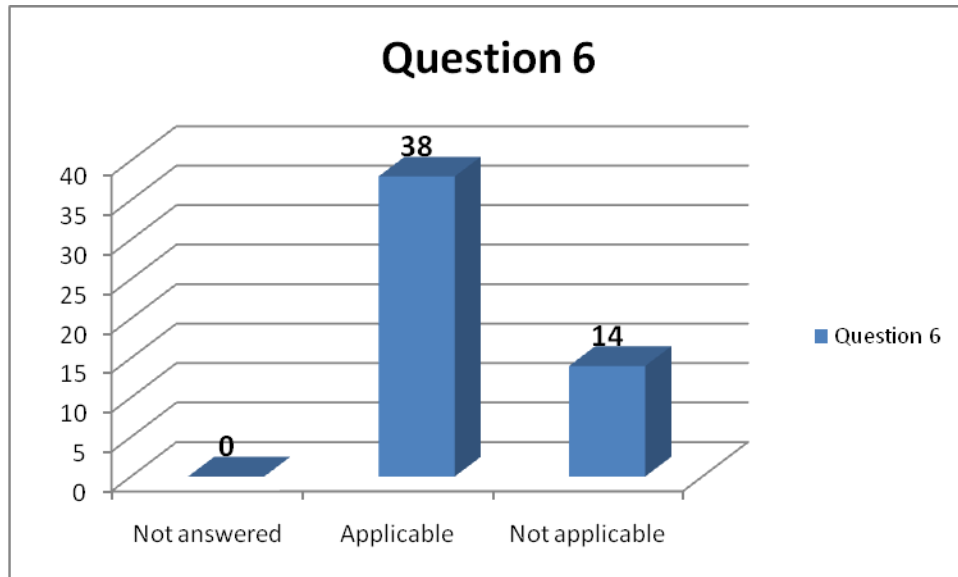


Figure 7 - Question 6 response statistics

The last and the most critical question of the survey, naturally had the most different sets of thoughts and responses from the participants, see Table 7. Looking at the results, we see that a large number of people (14 people out of 52, 27%) did not have any suggestions on what can be

accomplished at the Department of Management in WPI. Among the rest, majority of the participants recommended to have courses on information systems (15%), quality improvement (13%), health care economics (11%) and operations (9%). Some participants came up with really specific suggestions such as having courses on regulatory affairs (4%), practice based learning (5%) and policy development (5%). Other important suggestions were to offer courses on budgeting (6%), marketing (8%), biostatistics (3%) and epidemiology (3%).

Table 7 - Recommendations on health care delivery management

Suggestions for WPI	Number of responses	Percentage (%)
Informatics, information systems	16	15
Quality Improvement	14	13
Health care economics	12	11
Operations	10	9
Human resource management	9	8
Marketing	9	8
Budgeting	8	6
Medical Billing	6	5
Practice based learning and system based practice	6	5
Systems of delivery	5	5
Policy development	5	5
Regulatory affairs (FDA) and compliance to standards	4	4
Biostatistics	3	3
Epidemiology	3	3
Total	110	100

With the help of these analyses on the data we collected from the interviews, we will be able to make conclusions and recommendations on what could be accomplished at the Department of Management at WPI.

5. Educational Programs Research Results and Analysis

Before the twentieth century, rich people used to receive health care in their houses when they were sick. Whereas the hospitals were occupied by citizens who did not have enough money (Rosner, 1989). Due to the socio-economical status of the hospital occupants, these places were considered less effective than private nursing. Around the early 1900's, with the advances of technology and medicine, hospitals became more popular among rich people. Further improvements in the therapeutics, diagnosis and treatment techniques, increased the value of hospitals among the public. Thanks to the biomedical improvements, hospitals are now equipped with technological devices such as ultrasound, magnetic resonance imaging, tomography, x-ray machines and life support equipment. In addition to new equipment, the number of services offered by modern hospitals was increased. With the introduction of anesthesia, discovery of antibiotics and new surgical methods, hospitals became solutions to health problems for rich people as well as poor. In 1875, the number of hospital in the United States was only 170 whereas that number reached 7,000 in the next fifty years. Furthermore, the number of hospital beds was augmented from 35,000 to 860,000.

When people go to the hospitals, they are usually faced with physicians and nurses. Since they receive the medical care from them, these people stay in their mind (Haddock, McLean, & Chapman, 2002). Nevertheless, many other administrative careers are embedded in the health care delivery such as materials management, marketing and public relations, finance, patient care services and information systems. These careers are highly invisible to the patients when compared to physicians and nurses who frequently meet with patients. The hospitals, however cannot run properly in the absence of these managerial duties. According to the Education Center Organization, the duties of health care administrators include:

- “Administrative objectives and procedures;
- Personnel evaluation;
- Policy creation and implementation;
- Budget development and oversight;
- Activity coordination with health care management in other departments or facilities.”

(American College of Health Care Executives, 2008)

5.1 Educating Health Care Managers and IT Professionals

With the high demand on the health care industry, the amount of workforce on this area increased greatly over the past few years. Between 1996 and 2006, the health care services increased by 30%, meaning 3.1 million new employees. Initially, hospital administrators were nurses who took the responsibility of administrative duties. With the growth in hospitals, the need for managerially trained personal rose. In 1922, Marquette University in Wisconsin offered the first granted degree in hospital administration, but the program failed with only 2 graduates in 1928 (Neuhauser, 1983). After that date, different universities started offering degree programs on health care concerning topics of management, information technology, operations and etc.

Today, there are many schools in the United States that offer programs in Health Care Management or Health Care Information Technology. We overviewed 117 of these schools. Ten of the 117 are online schools and the others are in 40 states. The state-by-state break down of schools are presented in the Table 8 below.

Table 8 - Health Care Management Schools in the United States

States	Schools
Alabama	University of Phoenix
	Virginia College
Arizona	Apollo College
	Arizona College of Allied Health
	University of Phoenix
California	California College San Diego
	DeVry University
	Heald College
	University of Phoenix
	Western Career College
Colorado	CollegeAmerica
	Colorado Technical University
	University of Phoenix
Connecticut	University of Phoenix – Norwalk
	University of Connecticut
	Western Connecticut State University
	University of New Haven
Florida	Central Florida College - Largo
	City College
	Everest Institute

Table 8 - Health Care Management Schools in the United States (continued)

States	Schools
Florida	Everest University
	Gulf Coast College
	Herzing College - Orlando
	Rasmussen College
	Southwest Florida College
	University of Phoenix
Georgia	DeVry University
	University of Phoenix
Hawaii	Heald College
	University of Phoenix - Hawaii
Idaho	Stevens-Henager College
	University of Phoenix - Boise
Illinois	DeVry University - Chicago
	Northwestern Business College
	Rasmussen College
	University of Phoenix - Chicagoland
Indiana	Brown Mackie College
	Indiana Business College
	Kaplan College
	National College - Indianapolis
	University of Phoenix - Indianapolis
Kansas	University of Phoenix - Kansas City
Kentucky	Beckfield College
	National College - Danville
Louisiana	American Commercial College - Shreveport
	Career Technical College - Monroe
	University of Phoenix - Louisiana
Maine	Northeast Technical Institute: Hermon, Scarborough
	University of Southern Maine
	University of New England
Maryland	Kaplan College - Hagerstown
Massachusetts	University of Phoenix - Healthcare: Boston, Burlington, Westborough
	Northeast Technical Institute: Haverhill
	Boston University
	Harvard University
	Springfield College
	Simmons College
	Suffolk University
	Northern Essex Community College

Table 8 - Health Care Management Schools in the United States (continued)

States	Schools
Massachusetts	Framingham State College
	UMass Lowell
Michigan	University of Phoenix
Minnesota	DeVry University - Edina
	Herzing College - Minneapolis
	Rasmussen College
Mississippi	Antonelli College
Missouri	DeVry University - Kansas City
	Missouri College
	University of Phoenix - Springfield
Nevada	University of Phoenix - Las Vegas
New Hampshire	University of New Hampshire
New Jersey	Berkeley College
	DeVry University - North Brunswick
New Mexico	University of Phoenix - New Mexico
New York	Berkeley College
North Carolina	University of Phoenix
North Dakota	Rasmussen College
Ohio	Antonelli College - Cincinnati
	DeVry University - Columbus
	National College - Kettering
	Southwestern College
	University of Phoenix - Cleveland
Oklahoma	University of Phoenix
Oregon	University of Phoenix - Oregon
Pennsylvania	DeVry University - Fort Washington
	McCann School of Business & Technology
	Pennsylvania Institute of Technology
	Tri-State Business Institute
	University of Phoenix
Rhode Island	Salve Regina University
	Roger Williams University
Tennessee	National College - Bartlett
	University of Phoenix - Chattanooga
	Virginia College School of Business and Health
Texas	DeVry University - Irving

Table 8 - Health Care Management Schools in the United States (continued)

States	Schools
Texas	DeVry University - Houston
	International Business College
	University of Phoenix
Utah	Stevens-Henager College
	University of Phoenix - Utah
Virginia	Miller-Motte Technical Colleges – Lynchburg
	University of Phoenix
Washington	Apollo College – Spokane
	University of Phoenix – Spokane
Wisconsin	Rasmussen College – Green Bay
	University of Phoenix – Milwaukee
Wyoming	CollegeAmerica – Cheyenne
Online	American InterContinental University Online
	Bellevue University
	Capella University - School of Human Services
	Excelsior College - School of Health Sciences
	Hodges University - Online
	Northwestern Business College - Online
	Rasmussen College - Online
	University of Cincinnati - Online
	University of Illinois at Chicago - Online
	University of Phoenix - Online

Table 9 shows the percentages of the degrees offered in these 117 schools listed in Table 8. Of these schools, 12 offer certificate programs and 62 offer Associate’s degree. 59 of the 117 schools offer Bachelor’s degree and 38 offer Master’s degree. 25 of them offer a PhD. Because most of the schools offer more than one degree, the total number of schools in Table 9 exceeds 117 and the total percentage is not 100.

Table 9 - Degrees offered in Health Care Schools

Degrees	Number of Schools	Percent (%)
Associates	62	53
Bachelor's	59	50
Master's	38	32.5
PhD	25	21.3
Certificate	12	10.3
Total	196	167.1

5.2 New England Educational Offerings

Our educational program will be competing mainly in the New England area. Therefore, the schools in New England are more important to us about the degree level to be offered. Next, we will be over viewing the Health Care Management and Health Care Information Technology degrees offered in individual schools in the New England area. Table 10 presents 21 of the schools in the area and the degrees offered in each.

Table 10 - Degrees offered in New England

States	Schools	Degrees Offered				
		Certificate	Associate's	Bachelor's	Master's	PhD
CT	University of Phoenix - Norwalk			√	√	√
	University of Connecticut	√		√	√	
	University of New Haven			√		
	Western Connecticut State University				√	
ME	Northeast Technical Institute: Hermon, Scarborough			√	√	√
	University of Southern Maine	√			√	
	University of New England	√	√	√		
MA	University of Phoenix - Healthcare: Boston, Burlington, Westborough			√	√	√
	Northeast Technical Institute: Haverhill			√	√	√
	Boston University			√	√	
	Springfield College			√	√	
	Simmons College	√			√	
	Suffolk University				√	
	Northeastern University				√	
	Northern Essex Community College	√				
	Framingham State College				√	
	Harvard University	√			√	√
UMass Lowell				√		
NH	University of New Hampshire	√		√	√	
RI	Salve Regina University				√	
	Roger Williams University	√		√		
Total	21 schools	8	1	11	17	5
%	100	38.1	4.7	52.4	81	23.8

According to Table 10, we find out that 38% of the 21 schools offer certificate programs which is greater than national average presented in Table 9 before. Only 4.7% offer Associate's degree and this is very low compared to national average. 52.4% offer a Bachelor's degree which is around the national average. Only 32.5 of the national schools offer a Master's degree, but in New England, this increases to 81%. 23.8% of New England Schools offer a PhD and this is very close to the national average.

Our curricula for the management department of WPI will be competing in the New England area. Therefore, the schools in New England are more important to us. There is not a published list of schools in New England offering degrees in Health Care Management, so we had to look in each school until we identified the pattern of the courses offered. We limited it to 17 schools since we could not reach the curriculums of University of Phoenix and Northern Technical Institute. These schools were also listed in two different states, therefore we had to take those four schools out of our list. Next, we will be over viewing the curricula of 17 colleges in New England namely;²

- Boston University*
- Northeastern University*
- University of Connecticut*
- Springfield College
- Salve Regina University
- Simmons College
- Suffolk University
- UMass Lowell
- University of New Hampshire*
- University of Southern Maine
- University of New Haven
- Western Connecticut State University
- Northern Essex Community College
- Harvard University*
- Framingham State College
- University of New England
- Roger Williams University

² All the links to these 17 schools are included in Appendix C.

* Top 5 colleges selected according to America's Best Colleges 2008 list from USNews.com

Table 11 presents the common courses that are being offered at these universities in New England. The courses are in subject groups and they are listed in descending percentage in their groups.

Table 11 - Common courses offered in New England

Groups	Courses	Number of Schools	Percentage (%)
Management	Human Resources Management	16	94.1
	Organizational Behavior	15	88.2
	Management and Leadership (formerly Managerial Theory)	12	70.6
	US Health Care Systems	12	70.6
	Personnel Management in the Public Sector	11	64.7
	Health Policy	11	64.7
	Health Care Marketing	11	64.7
	Strategic Planning of Health Care Services	10	58.8
	Medical Office Administration	9	53
	Managerial Business Communications	8	47.1
Law & Ethics	Introduction to Business	6	35.3
	Health Law, Regulations, and Ethics	16	94.1
Finance & Economics & Accounting	Business Law I	12	70.6
	Budgeting in Health Care Facilities	14	82.3
	Financing Health Care Services	13	76.5
	Basic Accounting and Bookkeeping	13	76.5
Information Technology	Economic Issues in Health Care	12	70.6
	Health Information Management	13	76.5
	Computer Applications	11	64.7
Operation	Coding & Classification for Medical Billing	10	58.8
	Operations Management	15	88.2
	Total	17	100

Reviewing 17 schools from New England helped us find similar classes and group them in terms of subjects. In order to test the applicability of the percentages that we saw in Table 11 to WPI, we decided to review the top 5 schools in greater detail. From the 17 schools, we chose the top 5 according to America's Best Colleges 2008 list from USNews.com which are marked with an asterisk in the list of 17 schools (USNews, 2008). We first reviewed the curriculums of these 5 schools and found similar courses according to our groups. With descending order of ranking from USNews, these schools are:

- Harvard University
- Boston University
- University of Connecticut
- Northeastern University
- University of New Hampshire

Harvard University is the top rated among 5 schools reviewed. After eliminating the classes which are unrelated with our groups, the health care delivery education curriculum of Harvard University is presented in Table 12.

Table 12 - Grouped curriculum for Harvard University

Management	Law & Ethics	Finance & Economics & Accounting	IT	Operations
HCM 701 Organizational Behavior		HCM 719 Financial Transactions and Analysis	HCM 704 Managing Information in Health Care	HCM 732 Operations Management in Service Delivery Organizations
HCM 709 Communication Skills for Managers		HCM 720 Cost Accounting and Control Systems		
HCM 707 Health Care Management Practicum		HCM 722 Financial Management of Health Care Organizations		
HCM 706 Physician Leadership Seminar				
HCM 731 Competitive Strategy Determination				
HCM 702 Marketing				

We can see that Harvard University does not have any Law & Ethics courses in their program. Management topics are of greatest importance and the students are also educated in Finance and Accounting. Even if they are not as important as the previous ones, information technology and operations related courses are also offered.

Boston University is the second in ranking among the schools we reviewed. It has a greater variety of courses in our area of interest and Table 13 presents the group-by-group breakdown of the related courses offered at Boston University.

Table 13 - Grouped curriculum for Boston University

Management	Law & Ethics	Finance & Economics & Accounting	IT	Operations
HS855 Cost Effectiveness Analysis and Decision Analysis	HS834 Health Regulation and Planning	HS833 Health Economics	HS818 Health Information Systems	HS862 Health Care Quality Management
HS776 Solving Practical Problems in Health Service Administration	HS838 Politics and Public Policy	HS845 Health Econometrics	IH854 Using Excel for Health Program Decisions: Advanced Computer Modeling	HS882 Health Care Utilization and Quality Management
IH731 Leading Health Care Organizations	LW707 Essentials of Public Health Law	IH762 Essentials of Economics and Financing for International Health	PH710 Introduction to Public Health Informatics	
IH748 Managing Projects, People, and Resources for International Health	LW766 Genetics, Law, and Public Health	IH773 Financial Management for International Health		
PH860 Public Health Leadership	LW751 Public Health Law	HS735 Health Care Finance		
SB806 Communications Strategies for Public Health Organizations	LW830 Health Insurance, Managed Care and the Law	HS807 Cost Effectiveness Analysis		
PH853 Health Program Development and Management	LW852 Environmental Health Law	HS711 Disability, Aging, and Long-Term Care Finance		
HS827 Strategic Management of Healthcare Organizations	LW951 Directed Studies in Health Law	HC850 Management & Finance for International Health		
HS721 Organizational Behavior	LW952 Directed Research in Health Law	HC521 Essentials of Economics and Financing for International Health		

Table 13 - Grouped curriculum for Boston University (continued)

Management	Law & Ethics	Finance & Economics & Accounting	IT	Operations
HS755 Organization and Delivery of Health Care	LW840 Health Law, Bioethics, and Human Rights			
HS736 Human Resource Management in Public Health	PH856 Law & Ethics for Public Health Leadership			
HS733 Principles of Health Program Management				

The data from Table 13 shows that management, law & ethics and finance & economics & accounting related courses are of greatest importance. On the other hand, Boston University's courses are heavily focused on quality management and only a few classes are related to information technology.

The third school is the University of Connecticut. There are only 7 courses offered related to our groups. These are presented on Table 14.

Table 14 - Grouped curriculum for University of Connecticut

Management	Law & Ethics	Finance & Economics & Accounting	IT	Operations
HSMG 382: Decision Analysis in Health Care	HSMG 381: Health Care Law and Policy	HSMG 383: Health Care Economics		
HSMG 386: Health Insurance & Risk Management				
HSMG 385: Management of Long-Term Health Care Organizations				
HSMG 380: Health Care Organization and Management				
HSMG 384: Competitive Strategies for Health Care Organizations				

Looking at Table 14, it is obvious that University of Connecticut does not educate health care personnel on information technology or operations. The emphasis of its education is on management topics and it also gives a sense of law & ethics and finance & economics & accounting.

Fourth university that we performed detailed review on is Northeastern University. Its curriculum related to our subject groups is presented in Table 15.

Table 15 - Grouped curriculum for Northeastern University

Management	Law & Ethics	Finance & Economics & Accounting	IT	Operations
Project Management	Legal & Social Issues in Health		Health Information Systems Lab	Business of Healthcare
Organizational Behavior, Workflow Design and Change Management			Introduction to Health Informatics and Health Information Systems	
			Database Design, Access, Modeling & Security	
			Health Informatics Capstone Project	
			Health Informatics Internship	
			Emerging Technologies in Healthcare	
			Key Standards in Health Informatics	
			Management Issues in Healthcare IT	
			Public Health Surveillance and Informatics	
			Data Management in Healthcare	
			Introduction to Computing	

Table 15 shows us that Northeastern University pays most attention to educate health care personnel on information technology related subjects. It also offers 3 courses in management and only one in law & ethics, but it does not offer any course on the remaining two subjects.

The last university we reviewed is University of New Hampshire. Its curriculum on subject groups related to our study is presented in Table 16.

Table 16 - Grouped curriculum for University of New Hampshire

Management	Law & Ethics	Finance & Economics & Accounting	IT	Operations
HMP 402 - Health Management and Policy Critical Issues	HMP 734 - Health Law	HMP 642 - Health Economics		
HMP 401 - United States Health Care Systems	HMP 744 - Ethical Issues in Health Management and Medicine	HMP 740 - Health Care Financial Management		
HMP 721 - Managing Health Care Organizations		HMP 710 - Financial Management for Clinicians		
HMP 746 - Health Policy				
HMP 748 - Health Policy Analysis				
HMP 742 - Strategic Management for Health Care Organizations				
HMP 723 - Health Planning				
HMP 570 - Social Marketing				

According to Table 16, we can conclude that management is the most important topic for University of New Hampshire in educating health care personnel. The university also offers 4 courses in finance & economics & accounting and only one course in law & ethics. The university does not offer any course in the remaining two subjects.

The data gathered from the research on 5 top rated universities is presented in Table 17. The table shows the number of courses offered in each subject for each university.

Table 17 - Number of courses offered in top rated universities

	Harvard University	Boston University	University of Connecticut	Northeastern University	University of New Hampshire
Management	6	12	5	2	8
Law & Ethics	0	11	1	1	2
Finance & Economics & Accounting	3	9	1	0	3
IT	1	3	0	11	0
Operation	1	2	0	1	0
Total	11	37	7	15	13

The total number of courses is different at each university. Therefore, it is necessary to compare the percentages of each subject in each university in order to be able to draw results from the research, see Table 18.

Table 18 - Percentages of courses offered in top rated universities

	Harvard University	Boston University	University of Connecticut	Northeastern University	University of New Hampshire
Management	55	32	72	13	62
Law & Ethics	0	30	14	7	15
Finance & Economics & Accounting	27	25	14	0	23
IT	9	8	0	73	0
Operation	9	5	0	7	0
Total %	100	100	100	100	100

Comparing the percentages of the courses in subjects groups, we can get a better idea on which university gives most importance to each subject. In management related subjects, University of Connecticut is the first with 72%. Boston University is the one that pays most attention to law & ethics as part of their curriculum with 30%. In finance & economics & accounting, Harvard University is the first with 27% and Boston University is very close with 25%. Northeastern University is the only university that emphasizes information technology as

part of their curriculum. Harvard University is also the first in operations with 9%. Another way to examine each school's specialty is to note that each school has no classes in at least one of the areas. Thus, all these schools have chosen to focus rather than provide a balanced curriculum.

These data gathered from our research and the interviews will form a base for our recommendations and suggestions on what sort of programs, courses and degrees might be offered regarding health care delivery management at WPI.

6. Conclusions and Recommendations

In this chapter, we combined all the data that we gathered from sections 4 and 5. These data include the recommendations and suggestions that we gathered from phone and e-mail interviews with WPI alumni and also the data that we collected from the research on educational programs on health care delivery management in the United States. Then by analyzing these data, we drew some conclusions so as to offer some recommendations on courses and programs that could be offered at the Department of Management at WPI.

6.1 Conclusions

In terms of data on courses, we received a greater variety of information from the research on existing programs than we did with the interviews. Actually, the range of courses offered in the 17 New England Schools that we analyzed was quite high. While making the table for the common types of courses offered at these schools, we eliminated courses that were either unrelated to our subject or core courses in other departments than management.

Of the entire list of courses offered at these 17 schools, we found 21 final courses that would provide a sufficient variety of possible courses that could be offered at WPI. These 21 courses can also be categorized under five titles, namely management, law & ethics, finance & economics & accounting, information technology and operations. Table 19 represents all the courses that fall under these five categories. It also provides statistical information on the percentages of the schools that offer each course. Looking at Table 19, management is the most recommended aspect in all of the five categories because 11 of those 21 courses fall under the management group. Finance, economics and accounting are the second most suggested aspect of health care delivery management with four courses under its title. Information technology is another important group with three courses such as health information management, computer applications and coding & classification for medical billing. Following those, law & ethics contains two courses under it and operation only one course with operations management.

Table 19- Grouping of relevant courses offered in 17 New England schools

Groups	Courses	Number of Schools	Percentage (%)
<i>Management</i>	Human Resources Management	16	94
	Organizational Behavior	15	88
	Management and Leadership	12	71
	US Health Care Systems	12	71
	Personnel Management in the Public Sector	11	65
	Health Policy	11	65
	Health Care Marketing	11	65
	Strategic Planning of Health Care Services	10	59
	Medical Office Administration	9	53
	Managerial Business Communications	8	47
	Introduction to Business	6	35
<i>Law & Ethics</i>	Health Law, Regulations, and Ethics	16	94
	Business Law I	12	71
<i>Finance & Economics & Accounting</i>	Budgeting in Health Care Facilities	14	82
	Financing Health Care Services	13	77
	Basic Accounting and Bookkeeping	13	77
	Economic Issues in Health Care	12	71
<i>Information Technology</i>	Health Information Management	13	77
	Computer Applications	11	65
	Coding & Classification for Medical Billing	10	59
<i>Operation</i>	Operations Management	15	88

Although this grouping represents the most suggested courses from the research data, it does not necessarily mean that they are ranked according to their importance. For instance, there

is a greater need for health information technology than there is for law & ethics within the current health care system. In order to make a better analysis we should look at the percentages of these courses offered in these 17 schools. For instance, there are two courses, namely managerial business communications (47%) and introduction to business (35%) in the management category, that are offered by less than half of the schools. This shows that these classes are not the top priority in terms of meeting the educational needs of the existing system. On the other hand, there are eight courses which are offered in more than 75% of the schools in the list. Two of these fall under management, one under law and ethics, three under finance & economics & accounting, one under information technology and one under operation. In the management category, human resource management (94%) and organizational behavior (88%) seem to be of more importance in majority of the schools than the other courses. Also health law, regulations and ethics (94%) are considered as one of the most important subjects regarding health care delivery management. Operations management (88%) under operation category also has a higher percentage compared to other courses. The other courses with a percentage higher than 75% are budgeting in health care facilities (82%), financing health care services (77%) and basic accounting & bookkeeping (77%) under finance & economics & accounting along with health information management (77%) under health information technology category.

As a result of the interviews, participants suggested 11 courses that could be offered by the Department of Management at WPI. We eliminated biostatistics, epidemiology and practice based learning and system based practice from the list because they are not really related to health care delivery management. Table 20 shows the number and percentage of responses that mentioned each course and total number of responses that mention each category. The total number of responses exceeds 52 since many of the interviewees recommended more than one course. It is also the same case with the total percentage. From the total number of responses, we can assume that most interviewees recommended 2 courses in average.

As with the research data, we grouped all these courses under the same five categories. All categories had two courses except operations which had 3 courses. However, the number of courses in a category does not necessarily reflect its importance. To get a better idea about the importance of a category, we should look at the total number of responses received on all classes in a category. For instance although there is an equal number of courses that fall under all five categories, in terms of total feedback received for each group, information technology outweighs

the other groups except for operations. Therefore, while making recommendations on what could be offered at the Department of Management in WPI, we took the total number of responses in a category into consideration since it represents the level of importance for each respondent.

Table 20 - Grouping of 11 courses suggested by interview participants

Groups	Courses	Number of Responses	Percentage (%)	Total Responses
Management	Marketing	9	17	18
	Human resource management	9	17	
Law & Ethics	Policy development	5	10	9
	Regulatory affairs (FDA)	4	8	
Finance & Economics & Accounting	Health care economics	12	23	20
	Budgeting	8	15	
Information Technology	Informatics, information systems	16	31	22
	Medical Billing	6	12	
Operation	Quality Improvement	14	27	29
	Operations	10	19	
	Systems of delivery	5	10	

After making these conclusions on each set of data collected, we developed some recommendations for what could be offered at the Department of Management in WPI in terms of courses.

6.2 Recommendations

Having combined the results of the interviews and the educational programs research in the previous section, we will now present the five course groups that we recommend to the Department of Management at WPI. These course groups are:

6.2.1. Management

The management group is the broadest of all. It includes strategy, policy, human resources, marketing and organizational behavior as well as main management classes. In the process of managerial education of personnel, we recommend that WPI needs to offer courses introducing the main management concepts at the beginning, including office administration and

business communications. The next step in management group is educating students in organizational behavior. This is important for organizing the staff more efficiently in terms of responsibilities. It also involves concepts of leadership. The last two steps are marketing and policy. Including these two makes fully prepared graduates concerning the managerial studies.

6.2.2. Law & Ethics

In preparation for managerial positions, it is not enough for students to be ready in management concepts or have scientific knowledge. They should be able to handle bureaucratic situations as well. They should be comfortable in politics and law. They also need to follow the health regulations to keep their organization running in the best possible conditions of the day.

6.2.3. Finance & Economics & Accounting

The hospitals are built to help the people in need, but to survive they should be run like a business. As in managing a company, the managerial staff should know accounting subjects to keep track of income and spending. Knowledge in finance is also essential to make the accounting numbers meaningful. Lastly, economics is the subject that the personnel should be educated to be able to follow the trends in the market and prepare the organization according to the anticipated changes in the national economy.

6.2.4. Information Technology

As mentioned in section 2.2.6, health care industry is behind in utilizing information technology (IT). It was omitted from some of the curriculums we researched. Even small use of IT makes spectacular changes in the performance of an organization. Use of IT enables organizations to manage complex systems, keep better patient records and provide higher quality services. So, it is an inevitable fact that managerial personnel should be required to have the necessary knowledge in information technology as well as the other four course groups.

6.2.5. Operations

Operations Management can help organizations offer better services and ensure that provided services are efficient and effective. There are not numerous courses offered in this group, but nearly all schools we researched offered a course concerning operations. We also think that it is necessary for WPI to offer a course in the operations field in preparing managerially trained staff for health care industry.

6.2.6. Conclusion

Covering all five course groups presented in this section, we are hoping that the Department of Management at WPI should be able to develop a successful health care delivery education program. Alternatively, WPI's Department of Management may choose to focus on IT and Operations because of its expertise in these areas. Because the department has coverage in all five areas, it could offer a more balanced curriculum than found at the other New England Schools.

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Appendix A: Meeting Notes

IQP Meeting Notes: Nov 14,2007

Attendees:

Agenda:

1. Method of reaching alumni (e-mail/ telephone)
2. How to categorize alumni
 - Industry/ Insurance, Educational, HealthCare, Government, Animal HealthCare
 - Experience in industry according to year of graduation (How do we know if they are new to the industry?)
3. Relevant IQP
 - Patient Tracking in Emergency Department using RFID

Minutes:

1. Primarily reach by e-mail but also include the option of telephone conversation
 - Make a few phone calls to see how the answers come out (a broader survey maybe?)
2. Questionnaire: The length of experience in the subject?
 - More detail in educational
 - No high school teachers
 - Academic medical
 - Physician vs. non-physician. Private practice vs. no private practice. Ask about their specialty.
 - How to get phone numbers?
3. PQP (introduction, preface.. until methodology)
4. Different programs (online – face to face)
5. Ask what they would want to be educated on in college

Deliverables:

IQP Meeting Notes: Nov 21,2007

Attendees:

Agenda:

1. Review on introduction, preface
2. Questionnaire format review
3. Email & phone call

Minutes:

1. Test for the efficiency of the phone calls
2. Ask if they are experienced in the field
3. Ask about their specialty
4. Contact information: email, phone
5. Background: health industry, educational programs

Deliverables:

IQP Meeting Notes: Nov 28,2007

Attendees:

Agenda:

1. Detailed categorization:
 - Education: who are the faculty members other than the ones with private practice
 - Insurance: different types are available, what specialization areas are needed?
 - Healthcare: what specialization areas are needed for non-physician alumni?
2. Contact information for alumni
3. Health Related New England Schools
4. Methodology
5. Questionnaire

Minutes:

1. Send an e-mail on the minutes
2. Look at the departments at schools
3. Look for health care administration and health care information systems

Deliverables:

IQP Meeting Notes: Dec 05,2007

Attendees:

Agenda:

Discussion of the first draft

- Abstract
- Introduction
- Background

Minutes:

1. Keep abstract shorter
2. Revise the questionnaire according to the comments
3. Write a section for scheduling interviews on the phone

Deliverables: IQP First Draft

IQP Meeting Notes: Jan 15,2008

Attendees:

Agenda:

- 1- Feedback on the last draft for the IQP proposal
- 2- Issues with the last draft
- 3- Recommendations for the last draft
- 4- Contact information

Minutes:

- 1- Take care of PQP registration
- 2- Contact information achieved, check on availability to students
- 3- Finish writing the parts we couldn't get to
- 4- Write down the grouping for methodology

Deliverables:

IQP Meeting Notes: Jan 22,2008

Attendees:

Agenda:

- 1- Issues and comments on the last draft
- 2- Recommendations on the last draft
- 3- Educational program analysis
- 4- Citations, references, plagiarism
- 5- Outline of each chapter

Minutes:

- 1- Abstract (80 words) (problem – what we did – results)
- 2- Continue on and look back at introduction later
- 3- Citation (training session)
- 4- WPI library – databases – department and topics – management, healthcare industry, medical
- 5- Chapter 2 outline
- 6- Prepare interview script

Deliverables:

IQP Meeting Notes: Jan 29,2008

Attendees:

Agenda:

- 1- Second chapter (background) outline
 - a) Health care industry in the U.S.
 - b) Health care problems in the U.S.
 - c) Health care education in the U.S.
 - d) Educational programs in the U.S.
- 2- Importance and application of IT in the health care industry
- 3- Finding the right sources either online or from books, articles and journals
 - a) Finding the right sources on the specified subject

Minutes:

- 1- #2 goes into #1 (add between b-c)
- 2- Go through as many article as possible
- 3- Sub headings in the outline!
- 4- Take notes while reading to be able to reference
- 5- Endnotes!
- 6- Second chapter detailed outline with subnotes and references due
- 7- Draft of interview (methodology) due

Deliverables:

IQP Meeting Notes: Feb 05,2008

Attendees:

Agenda:

- 1- Chapter 2 outline overview
- 2- Chapter 2 outline recommendations
- 3- Interview format preparation

Minutes:

- 1- Health care industry – different levels of hospitals
- 2- 2.1 – make it shorter & focus on health care delivery industry. Who delivers HC? What type of institutions? Roles? (Physician, nurses, administration, etc.)
 - a. Out patient
 - b. In patient
 - c. Academic vs. non-academic
 - d. Primary care vs. specialist
 - e. Physician groups
 - f. Clinics
 - g. Emergency rooms
- 3- Google scholar
- 4- Umass Memorial HC / Fallon Clinic
- 5- American Medical Association
- 6- Health Affairs / Government Reports
- 7- Gao.org
- 8- Stay away from payment side (messy)
- 9- Interview Format
 - A. Current role (experience)
 - B. Educational history (WPI experience?)
 - C. Suggestions on what else they would like to learn (related to HC delivery)
- 10- Progress on roles in order to specify questions for survey
- 11- Data points for interviews
- 12- First draft of Ch2
- 13- Early draft of interview protocol
- 14- 3 weeks from now, start interviews

Deliverables:

IQP Meeting Notes: Feb 12, 2008

Attendees:

Agenda:

1. Chapter 2 First Draft Overview
2. Chapter2 First Draft Recommendations
3. Interview Format Preparation

Minutes:

1. Cite when you first use it
2. Send by e-mail
3. Focus on interview format + fill in the missing parts
4. Gantt Chart before meeting (come up with a timeline)

Deliverables:

Chapter 2 (First Draft)

IQP Meeting Notes: Feb 19,2008

Attendees:

Agenda:

- 1- Timeline Review
- 2- Interview Format Review
- 3- Recommendations on Chapter 2

Minutes:

1. Chapter 3 – How? ; Chapter 4 – Results?
2. Interviewing (3-4 weeks long) (after the spring break)
3. Write up methodology before interviewing
4. Methodology – how to do data analysis
5. Methodology & Background due before spring break
6. Chapter 2.2 needs introduction
7. Writing center
8. Chapter 2 draft, interview script and methodology draft for next week

Deliverables:

Timeline

Interview Format

IQP Meeting Notes: Feb 26, 2008

Attendees:

Agenda:

- 1- Contacting Denise Rowe Rodino in alumni office to reach contact information for interviewing
- 2- Interview Script Review
- 3- Review of Background (Chapter2)
- 4- Review of Methodology Outline (Chapter3)

Minutes:

1. Qualitative data collection (also need references in methodology)
2. Methodology
 - Study Subjects – groups, contacts
 - Question Development – finalize questions
 - Interview Protocol – talk about process
3. Contact info to be received
4. Ask for e-mail address (thank you letters – include results)
5. Meeting time – send schedules over the break

Deliverables:

Interview Script

Chapter 2 – Background

Outline of Chapter 3 – Methodology

IQP Meeting Notes: March 12,2008

Attendees:

Agenda:

1. Literature Review Overview
2. Methodology Overview
3. Setting up the interviews, recording, room, etc.
4. Timeline analysis

Minutes:

1. Put a comma at the end of the author if it's not a person
2. Format bibliography, APA (use names)
3. Writing Center (one session for background – will be reviewed again)
4. 3.1.2 Grouping – table – write down # of selected contacts
5. Analyze interviews as we get them
6. 3-4 writing center appointments
7. 20-25 participant of each category: e-mail first and then call
8. No recording
9. MTRF 10-11
10. Schedules (ready at interview)
11. Form for interview process

Deliverables:

Methodology

Gantt chart

IQP Meeting Notes: March 19,2008

Attendees:

Agenda:

1. Visit to Writing Center
2. Review of Background chapter is still in progress
3. Interview progress
4. Update on Methodology

Minutes:

1. Tie in the arguments with the projects
2. After introduction if no, ask another time. Is now a good time to talk, or should we call at another time?
3. Not Future!
4. Revise methodology and go to writing center
5. Finish background and send asap
6. Interview

Deliverables:

IQP Meeting Notes: March 26, 2008

Attendees:

Agenda:

1. Writing Center appointment and recommendations on methodology
2. Feedback on Background and Methodology sections
3. Interview Scheduling issues
4. Started working on Introduction

Minutes:

1. Citations – APA
2. Volume, DOI – use the right type
3. “the United States”
4. Capital letters in citations
5. Ex: McCarthy, Robert
6. Send a revised version of methodology and lit. review
7. Different number, interview during night, call after 5pm
8. Also try to call at lunch time
9. Abstract and introduction (4-5 pages) – concept & goal

Deliverables:

1. Chapter 2 – Background
2. Chapter 3 - Methodology

IQP Meeting Notes: April 02, 2008

Attendees:

Agenda:

- 1) Writing Center appointment for Friday 12-1pm to work on Introduction.
- 2) Interviews in progress
 - Called 64 people
 - 5 of 64 answered to survey
 - 12 of 64 are not reachable with the current contact information
 - 15 of 64 can be recalled
 - E-mailed 97 people who are not willing to talk on the phone
- 3) Background and Methodology Review

Minutes:

1. Call anytime if it is a home number
2. Ask when that another time is available
3. Methodology – external resources, data from health care programs(more detailed)
4. Interview, not survey
5. Participant, not contact person

Deliverables:

IQP Meeting Notes: April 09, 2008

Attendees:

Agenda:

1. Introduction overview and recommendations
2. Data collection & analysis overview and recommendations
3. Interview progress overview
4. Questions and scheduling about other remaining sections

Minutes:

1. Chapter 1 includes the layout for the rest of the report
2. Revise methodology by adding interviews by e-mails
3. Revise chapter 2&3
4. Finish chapter 4 after interviews
5. Chapter5 – educational programs
6. Chapter6 – conclusions and recommendations
7. Executive summary & abstract & acknowledgements
8. Agendas
9. Move to one single document

Deliverables:

Chapter 1 – Introduction

Chapter 4 – Data collection & analysis

Executive Summary

Abstract

IQP Meeting Notes: April 16,2008

Attendees:

Agenda:

1. Recommendations on the last draft
2. Discussion of Conclusions and Recommendations

Minutes:

1. MQP-DMS-ST07 and name under signature
2. Each chapter on new page
3. Educational programs needs a part in methodology, 3.5
4. Check on requirements of physician assistant
5. New England – expand tables to include degrees
6. Decide on 5 schools to review in detail (USNews)
7. Cite schools of 5 states
8. Law & Ethics / Finance & Accounting & Economics / IT / Operations / Management
9. Write group by group and include interview data in conclusion
10. Summary / Conclusions (1) / Recommendations (2)
11. Conclusion and Recommendations and Executive Summary due Friday
12. Revision of whole document die Monday

Deliverables:

IQP Meeting Notes: April 23,2008

Attendees:

Agenda:

1. Revision of the last draft
2. How to submit CDR forms?

Minutes:

1. Write subject 1 instead of names, include way of contact
2. Send a file with names + subject#
3. Send grouping
4. Send ch6 as pdf to participants as bcc and advisors as cc

Deliverables:

Appendix B: Interviews

1. Subject 1 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *MEd in Exercise Physiology from University of Virginia*
- What is your current position in your career?
- *- Senior Clinical Research Associate*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *I have been in clinical research for nearly 10 years. I started as a Clinical Research Coordinator in Geriatrics in 1998 and became a Clinical Research Associate in 2002. Prior that I was a Cardiac Stress Test Technician at a hospital.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *I think the most important part of my WPI experience was learning to take responsibility for my work.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *I probably would have looked more into the Biomedical Engineering major and career path instead of majoring in Biology.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *I'm not sure since I'm not directly involved in healthcare, but in Pharmaceutical Research.*

2. Subject 2 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)

1973- 1977 B.S. Worcester Polytechnic Institute

1978- 1982 M.D. University of Massachusetts

*2004 M.D. Friedrich Alexander University. Erlangen,
Germany (honoris causa)*

INTERNSHIP AND RESIDENCY

1982- 1983 Intern in Medicine, New England Deaconess Hospital

*1983- 1986 Resident in Radiation Therapy, Harvard Joint Center for
Radiation Therapy*

ACADEMIC APPOINTMENTS

7/82- 6/83 Clinical Fellow in Medicine, Harvard Medical School

*7/83- 6/85 Research Fellow in Radiation Therapy, Harvard Medical
School*

7/85- 6/86 Instructor (Radiation Therapy), Harvard Medical School

*1/88- 8/91 Assistant Professor of Radiation Oncology in Medicine,
Cornell University Medical College*

*9/91-12/98 Associate Professor of Radiation Oncology in Medicine,
Cornell University Medical College*

*1/99-1/07 Professor of Radiation Oncology in Medicine,
Cornell University Medical College*

1/07- Associate Dean and

Professor of Radiation and Cellular Oncology, WSLOT

(without specified limit of time)

*Biological Sciences Division, Pritzker School of
Medicine,*

- What is your current position in your career?
- *Associate Dean and Professor of Radiation and Cellular Oncology, Chief Quality Officer,
University of Chicago Medical Center*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *I have been in health care since 1978 (began medical school). See above for my prior positions.*

- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- ***WPI helped me by providing a solid research base and learning how to work in teams.***
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- ***Going back to my undergraduate days I wish there was a more formal program in health management & economics.***
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- ***The strength for WPI is training people to work in teams which is critical for success in today's health care environment. In addition understanding metrics and their interpretation.***

3. Subject 3 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *(BS) in WPI and no other degree, just company trainings*
- What is your current position in your career?
- *Engineer_improve existing machines and manufacturing processes*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *8 years in the healthcare industry. He had only one position in the HC industry.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *Besides a decent education, had co-op positions which helped him gain experience*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *He was fairly pleased*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *No idea*

4. Subject 4 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *ECE (BS) in WPI and no other degree*
- What is your current position in your career?
- *Principle Developer_ develop software*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *14 years in the insurance industry. He had only one position in the HC industry.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *Confidence! , extracurricular activities, gave capabilities talk to others in a professional manner*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *Not enough programming, would take more CS classes*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *No idea, she is a software engineer*

5. Subject 5 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- ***ECE (BS) in WPI and no other degree***
- What is your current position in your career?
- ***Senior Test Engineer_ responsible for manufacture testing& delivery for home monitoring of heart disease***
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- ***9 years in the healthcare industry. He had only one position in the HC industry. Allegro Microsystems for 3 years(got in by co-op) Analog Devices for 5 years.***
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- ***Had co-op positions which got him his first job***
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- ***Take more computer related classes. They're lacking people with good programming skills***
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- ***Have courses focused on market trends in healthcare. Trends are changing Courses also in HC spending. Courses for looking at different technologies to adopt.***

6. Subject 6 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *ME (BS) in WPI and no other degree afterwards*
- What is your current position in your career?
- *Senior Development Engineer*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *15 years in the medical device industry. Similar positions at other companies also.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *Having a degree got her first job. Experience led her afterwards .*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *Take a statistics class. It is so necessary in engineering*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *No idea*

7. Subject 7 (phone)

- Could you tell us about your academic experience besides WPI?
- *MSECE & MSBioE at U of Michigan, 1974, PhD in Biophysics (Medical College of Wisconsin) 1987 (If applicable)*
- What is your current position in your career?
- *Clinical Research and Marketing*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry?
- *31 years. Can you please tell us about your previous positions in healthcare? Systems engineering > Imaging Systems Design Leader > Imaging Systems Design Manager > Advanced Applications Manager > Present position.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *First and foremost: solid foundation in the basics: mathematics, physics, engineering / signal processing. Then some exposure to Biomedical engineering, with hands-on research, starting in junior year.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *I was there before the "WPI Plan" was instituted. Most work was solo, except for labs. I think a bit more work in a group setting might have been good, but not at the expense of learning the basics.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *I don't see much value in specializing or branching out to this level in the undergraduate level of engineering if it comes at the expense of learning the basics (broken record?) However, for a management degree, it could be useful to study the healthcare system for several reasons: it represents a big chunk of the economy, it's very complex, everyone cares about it, and it's very dynamic. So it is at once a good object of study from an academic standpoint, and would provide practical learning in its own right that would be useful career-wise.*

8. Subject 8 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *Bachelor's in EE, Minor in Mathematics (Villanova University, 1993). Master's in EE (WPI, 1996) - Not asked but thought it would help.*
- What is your current position in your career?
- *VP Engineering*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *I have been in the medical device industry since taking a position as a software developer for Visualization Technology, Inc. (VTI) in 1996. That company was purchased by GE Healthcare in 2002. I left GE Healthcare in 2004 and joined my current company, Image Stream Medical, Inc. I am presently employed by Image Stream Medical. We are a small company dedicated to delivering products related to video technologies for documentation & teaching in the healthcare industry.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *My Master's Degree in EE helped me understand more about medical image and signal processing. This was especially useful in my role as a software developer / technical manager at VTI and later GE.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *I quite possibly would have taken a business course (e.g. accounting). That certainly would have helped my career as the majority of it has been spent in a management role.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *Any management program in the healthcare industry should include courses in regulatory affairs (FDA) and compliance to applicable standards.*

9. Subject 9 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *MD University of Minnesota 1974, MS Otolaryngology 1980, Certificate in Health Care Management Case Western Reserve University 2004*
- What is your current position in your career?
- *Chair, Department of Otolaryngology - Head and Neck Surgery, Metro Health Medical Center, Associate Professor, Case Western Reserve University School of Medicine.*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *After leaving WPI I attended medical school and then did my residency in Otolaryngology - went into private practice with a part-time university appointment, eventually transitioning to full time academic practice, I have been in my present position for 8 years.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *Very good grounding in problem solving, good work / study habits but probably the most valuable thing I learned were the practical basic management techniques (time, money, people) I learned in Dr. Grogan's Intro Management course (may have been about the only undergrad management course in those days) - he was one of those extra-ordinary teachers who influenced my life/career.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *I'm not sure I would change anything - for that time it was just what I needed and has served me well.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
 - *Health care economics (assuming basic finance)*
 - *Systems of delivery - including disparities*
 - *"Quality issues / measures" e.g. Evidence based treatment, outcomes evaluations*
 - *Certification/ re-certification / lifelong learning*
 - *Basic marketing*

10. Subject 10 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *Academic experience is strictly WPI aside from GE training (which is fairly extensive in itself).*
- What is your current position in your career?
- *My title is Executive Account Manager with GE Healthcare. Essentially, it is Strategic Relations and Technical Sales for capital imaging equipment (e.g. CT scanners, MRI systems, Ultrasound, X-ray, etc.). Specifically working with Hospitals.*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *I have been in the industry for 9 years (as of July '08). I have actually been doing the same role for 7 years. It always changes, but generally the same role. The other 1.5-2 years were spent in the GE training program.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *I believe my time and experience at WPI provided several things: ability to work in teams, to work independently, as cliché as it is...to really "think outside the box" and know it's OK to be creative, I feel the balance of technical learning blended with real-world learning really made a difference as well. Really all the things that make WPI special...I believe contributed to the assets and skills I brought to the table when GE hired me...and I still use today.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *For my current career, I feel that WPI prepared me very well. I probably could have used an additional finance course. Maybe a few additional presentations (for public speaking purposes), but overall GE Healthcare was very much looking for what WPI did provide to graduating students like me (at that time).*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?

- *Honestly, that is a loaded question. So much is changing in the industry, I think a broad course on the healthcare industry and the dynamics that play into the financial health and struggles of hospitals, the government influence, the way physicians really practice medicine and the challenges facing them that will have a major impact on hospitals. We have great training at GE on a regular basis, and some of the best sessions have been with physicians. Physicians are now encouraged to seek additional education on the business aspects of the hospital (operations, finance, etc.) and even pursue MBAs in addition to their M.D. degree. We had one physician from an Academic center come to speak to us about the "real story" behind the scene at a hospital. It was eye opening. The reason Tylenol will cost \$20 in the Emergency Room, the thought process that a physician goes through when an emergency case comes in, the message hospital CEOs deliver to their managers about what drives their profitability, the Risk management systems within a hospital.....really so much that I never knew existed. So reflecting on my statement, I would almost suggest you also reach out to a local physician (maybe at Umass Worcester Medical Center), to find a VP of Operations or a COO or a Chief Medical Officer to see if they can provide some better structure to my comments and suggest particular "education tracks" that WPI may want to offer to divide Healthcare into courses in a way that makes sense.*

11. Subject 11 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *After graduation I attended UMass Medical School then went on to complete a residency in pediatrics at UMass and a fellowship in pediatric critical care medicine at the Children's Hospital of Philadelphia.*
- What is your current position in your career?
- *I am currently an attending physician in the pediatric critical care unit at Dartmouth-Hitchcock Medical Center in Lebanon, NH.*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *I have been in the health care industry as a direct provider of health care for 11 years.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *Being at WPI allowed me to complete my MQP project at UMass and helped me learn more about medical school and develop mentors that have been helpful to me throughout my medical career.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *I have no real regrets as I am completely happy with the education I received and where my professional life is currently. I do sometimes wish that I had taken some more 'off-science' classes just to have helped me make a more well-rounded person in general. I also regret not taking a foreign language as it would have been invaluable for my career to have taken Spanish and now it seems my schedule will never allow me to fit in.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *I think there is a crises coming to the health care field, where insurance companies and health care delivery facilities are going to meet head on. With decreasing reimbursement from insurance companies and increased cost to provide health care something is going to have to give in. I think educating future health care managers in these issues will be vital in finding creative solutions to this issue.*

12. Subject 12 (e-mail)

- Could you tell us about your academic experience besides WPI?
- *Doctor of Medicine, University of Texas Medical Branch, Medical Effects of Ionizing Radiation, Armed Forces Radiobiological Research Institute, Strategic Medical Readiness and Contingency, Naval School of Health Sciences, Fleet Hospital Operations Field Training, Fleet Hospital Operations Training Center, Medical Management of Chemical, Biological, Radiological and Environmental Casualties, Navy Environmental Health Center, Medicine in the Tropics, San Juan, Puerto Rico and Santo Domingo, Dominican Republic, Saturation Diving and Diver Equipment Systems, Naval School Deep Diving Systems, Undersea Medical Officer Training, Naval Undersea Medical Institute, Combat Casualty Care, Academy of Health Sciences, U. S. Army, Disaster Medicine, American Board of Disaster Medicine.*
- What is your current position in your career?
- *Medical Director, Core Laboratory, Naval Medical Center San Diego*
- We would like to learn more about your experience in healthcare industry.
- How long have you been in this industry?
- *26 years*
- Can you please tell us about your previous positions in healthcare?
- *Force Surgeon, Commander Submarine Force, U. S. Pacific Fleet, Pearl Harbor, Hawaii*
- *Force Undersea Medical Officer, Commander Joint Task Force Middle East, Persian Gulf-North Arabian Sea, Medical Director, Branch Medical Clinics Laboratory System, Naval Hospital Camp Pendleton, Medical Director, Blood Bank and Anatomic Pathology, Consultant Undersea Medical Officer, Naval Hospital Bremerton, Medical Director, Laboratory Department, Consultant Undersea Medical Officer, Naval Hospital Yokosuka Japan, Undersea Medical Officer/Saturation Diving Medical Officer, Commander Submarine Developing Group One, San Diego*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *Training in engineering is a very process and system oriented experience. Most of the weaknesses in medicine are due to an inability to clearly define integrated systems, understand the processes within those systems and successfully interface processes and*

systems. Also identifying critical control points and an inability to fully integrate ancillary support systems (e.g., information management) often makes the use of time and resources inefficient. A solid industrial/production engineering approach separates successful medical institutions from the rest.

- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *Absolutely nothing, I enjoyed my time at WPI.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *Medical informatics and information management; medical production engineering.*
- *Interestingly, some top notch hospital CEOs come from schools such as the Cornell School of Hotel Management. Incorporating service industry concepts with medical industrial engineering/management and informatics concepts would make an interesting IQP.*

13. Subject 13 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable).
- *Medical school at University of New England.*
- What is your current position in your career?
- *Fellowship training in vascular surgery.*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *10 years . Office based practice now hospital based.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *Excellent undergraduate training prepared me for medical school and project based learning has applied to the multidisciplinary approach of medicine.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *More training in statistics and management.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *Quality in healthcare is a very important topic at this point in time. Gearing education toward that area would be useful to the field. The process and development of quality and performance are key topics. Training in implementation and development of these systems would be useful as well.*

14. Subject 14 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- ***I am in an MBA program at UConn.***
- What is your current position in your career?
- ***Director of application development***
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- ***Since 1997***
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- ***WPI taught me how to learn. I then learned a lot after graduating, on the job, etc, to progress through a career. I am not using any hard skills learned at WPI.***
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- ***I should have been CS instead of EE.***
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- ***Try to get a affiliation with the local hospital to have students get involved in some way with their operations. Nothing is better than real world exposure.***

15. Subject 15 (e-mail)

- Could you tell us about your academic experience besides WPI?
- *None*
- What is your current position in your career?
- *I am a Principal Sanitary Engineer with the RI Department of Health, Office of Drinking Water Quality. This office regulates public drinking water suppliers, reviews applications for new suppliers as well as modifications to existing systems.*
- What is your current position in your career?
- *I am not in the health care industry*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *My academic courses at WPI were not related to what I am currently doing. However, WPI prepared me as an engineer to be able to adapt to varied engineering positions.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *If I could go back, I would take civil/Environmental courses instead of structural.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *I really cannot comment. I have no experience in this field.*

16. Subject 16 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *Masters degree in engineering management from Tufts University*
- What is your current position in your career?
- *Production Planning Manager at Wyeth Biotech*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *I've worked in healthcare for 8 years. I worked at Bayer Diagnostics as a process engineer for 4 years and Wyeth Biotech for 4 years as a Manager in Clinical Manufacturing Operations and production planning.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *I believe WPI has a strong reputation in the industry which helped open doors at the start of my career. The strong focus on mathematics and science provided me with the analytical capabilities required to process and manage complex budgets and manufacturing process data.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *I don't think WPI had nearly enough focus on preparing students to be great communicators and leaders. Emotional intelligence is a critical asset for those interested in advancing one's career.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *I would start by clearly defining what your vision of healthcare delivery management is. I'm not really sure I can effectively answer this question because your objectives and scope are vague. Healthcare is a very big market space and it requires focused segmentation. As for the core curriculum, I believe there should be continued focus on science, mathematics, and projects but communication and leadership skills training needs to be integrated more effectively.*

17. Subject 17 (e-mail)

- *Could you tell us about your academic experience besides WPI? (If applicable)*
- ***Completed 7 classes towards a Masters in Finance at RPI***
- *What is your current position in your career?*
- ***Senior Director, Operations, United Health Group***
- *We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?*
- ***I started at Travelers in the summer between my junior and senior years. I stayed with Travelers after college in a Management Development Program. Through industry consolidations my employer change from Travelers to Metro Health to United Healthcare but we still use much of the corporate infrastructure that came with us from Travelers' days. My jobs have ranged from underwriting leadership positions to operations leadership positions. I'm currently in an area that is heavily involved in business systems development and the creation of health ID cards, member contract documents, claim models that enable claims to be paid in an automated manner, and a host of other "back-office" functions.***
- *We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?*
- ***It provided a great technical basis for my entry into a management training program in our "Data Processing" department in the mid-1980s. As this department became more integrated with the business, the disciplined rigor that was part of my training enabled me to understand the business from the ground up.***
- *If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?*
- ***Take more chances late in my WPI career and early in work career. Get in involved in entrepreneurial endeavors while at school. Gain sales and debate skills while at school. My technical education at WPI was spectacular. My sales and debate skills really were self-taught, primarily through work experience.***

- *We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?*
- *I'm not sure. Is WPI hoping to concentrate on the actual delivery of healthcare or the financing of healthcare or both? Will it have a technical concentration? Given that healthcare is consuming an ever-increasing portion of our GDP, I do think that it is wise for WPI to be directly engaged but I just don't know enough about the current healthcare education market to offer meaningful advice.*

18. Subject 18 (e-mail)

- What is your current position in your career?
- *Physician assistant in Internal medicine in a private practice in Corning NY*
- We would like to learn more about your experience in health care industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *10 years. 1997 PA in an ER. 1998 PA in Internal Medicine for AMS (Arnot Medical Services, division of Arnot Ogden Hosp). 2004-present PA in Int Med in private practice*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *Biology major, went for graduate work thinking I would be a college professor. Didn't care for research or writing papers/grants. Didn't want to invest in the time or money of medical school*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *Take a management course or two, better statistics course.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in
- *Health care education, Medicare, Medicaid, billing, overhead (rising malpractice)*

19. Subject 19 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *I went to Framingham State College for my undergraduate degree.*
- What is your current position in your career?
- *I am a senior biostatistician*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *I have been in health care industry for 10 years, 7 years at UMass Medical School and 3 years at Harvard School of Public Health.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *My WPI degree has definitely helped me with my career, WPI has a great reputation and I am proud to have it on my resume.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *I wish I could do an internship while I was at WPI, working on real life projects when you are still in school gives you the opportunity to experience the fact that not everything in real world is text book!*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *Research, methodology, study design, sampling theory... basically, you cannot be an effective healthcare manager if you are lacking understanding of basic research methodology.*

20. Subject 20 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *Physician Assistant Program Albany Medical College 1982-84. Master's Emergency Medical Services, NY Medical College 1993. Doctor of Health Science, Nova Southeastern U, 2004.*
- What is your current position in your career?
- *Director, Asst Professor, Center for Physician Assistant Studies, Albany Medical College*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *Physician assistant (various clinical settings ED, Family Practice, College Health, Infectious Disease) 84-95, Administrative Director, College Health Service, 88-93 PA Educator, Associate director, Director 1993-2008.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *Preparation in basic sciences (life science, chemistry) has been the most valuable. Problem -solving construct of the "WPI Plan"*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *More preparation in administration and education, both areas required extensive post-graduate coursework.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *I would suggest you look at the competencies for physicians and physician assistants in the areas of "practice based learning and improvement" and "systems based practice". I will attach the document for PAs. You will find that the physician document is nearly identical (you can Google this)*

21. Subject 21 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *I have two Master's degrees; one in Public Health (MPH, SUNY Albany '96) and one in Business Administration (MBA, Rochester Institute of Technology '97).*
- What is your current position in your career?
- *I am Director of Channel Sales for a \$2.5B health care technology named Carestream Health, Inc.*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry?
- *I have spent most of my career in healthcare, except for 2 years in telecommunications. I have attached a recent copy of resume for more detailed experience. Basically, its been over 14 years in healthcare. Can you please tell us about your previous positions in healthcare? I have been involved and founded a start-up in Electronic Medical Records, done research in Orthopedic Oncology, worked in hospital and Managed Care organizations and for the last 5 years been part of the Health Imaging Division of Kodak (before we were divested last May to become Carestream Health). I have held a variety of roles from Marketing to Service to General Management. I am currently an executive at Carestream.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *I learned a variety of things at WPI, most focus on the project work and necessity to work with groups on solving problems and delivering results. I think my critical thinking skills and necessity to ask "why" were developed at WPI but not honed until I went into the working world or graduate school. There is a tremendous amount of knowledge to absorb in 4 years and would recommend that students take longer to to build the necessary life/work skills to make them successful. WPI taught me that but could certainly focus on that even more.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career? *I think WPI has evolved significantly in the life sciences. I almost went to medical school and I would have been even more prepared if WPI had the programs then like they do now. I would have gone away for my IQP and*

focused on blending business development skills with a project that focuses on technology and innovation. I would have spent more time focusing on developing my business and entrepreneurial skills as well and steered away from Biotechnology and focused more on the Information Technology application of healthcare. For WPI to be different and successful, it needs to foster non-traditional opportunities even more so through the technology transfer programs, entrepreneurial programs and connection with industry opportunities that are different than the mainstream engineering companies. I hope that WPI is building those relationships with Biotech/Pharma, Healthcare IT and Life Sciences organizations to drive further development of the WPI student population.

- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *This is probably worth a conversation vs. putting it in writing. I would be interested in hearing where you are in the process.*

22. Subject 22 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *Not applicable.*
- What is your current position in your career?
- *I am an Account Manager of Radiology for GE Healthcare selling Radiology equipment to hospitals.*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *I have been in healthcare for 7 years (starting right after WPI). I have only worked in sales for GE Healthcare.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *I did a summer internship with GE Healthcare in Wisconsin when I was a junior at WPI. I was an engineering intern at GE. At the end of the summer I interviewed at GE for a permanent position in their new graduate program for sales. Majoring in Biomedical and Mechanical Engineering got me prepared for my career. I also took courses in Management Engineering.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *That's a tough question because I am really happy where I am today, so I don't think I would change anything.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *Perhaps Hospital Economics courses would be helpful.*

23. Subject 23 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *I have participated in a few MBA level courses over the years. The most applicable (and interesting) was Strategic Planning for Healthcare. The course instructor was a consultant in his day job and he arranged with a local hospital for our class to plan and execute a strategic planning exercise for them. The final was the preparation and presentation of our report to the Board and Management team of the hospital.*
- What is your current position in your career?
- *I am one of five directors in the Information Technology Division of an Integrated Delivery Network consisting of three acute care facilities, three nursing homes, about fifteen physician practices (total of about 70 physicians associated with those practices), Home Health, outpatient behavioral health, Alzheimers care (both day and inpatient) and a remote urgent care facility. We also provide management and IT services to an independent organization that operates 11 community health centers providing both medical and dental care. The facilities are widely dispersed geographically across central Maine. The straight line distance between the most widely separated is about 120 miles. My current role in the organization is Director of Information Security. I have held only that title for about 3 years. For the prior 2, I was also Director of Applications Development.*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *My career in healthcare began after completing my MS at WPI in 1976. I joined one part of the current organization as their only application programmer. Over the next several years, I rose to be Manager of Programming and then, when the need arose, Manager of Systems engineering (with a staff of one). From that position I left the Medical Center for one and a half years to work at a local power utility. I found I did not like the environment at that employer and, at the same time, the Medical Center needed someone to help design and build a system to manage the organization's case mix (this was at the very beginning of payment by DRGs). I rejoined the applications development staff and held the position that I had written the job description for for the next 13 years. During that time I participated in the development and deployment of a new financial system, our first clinical system and also provided interim support when the organization's Director of*

Planning left. In 1997, the Medical Center for which I worked merged with another 20 miles distant. This was the first of two mergers that have occurred since I rejoined the organization. At that time, I stepped into a Director role reporting to the CIO and managing the entire staff of my original organization. Since that time, I have been Director of something or other (the title has changed about 5 times). In my role in information security, I am also responsible for compliance and change management within the Division. I also am a member of the organization's Quality Council and Regulatory Compliance workgroups. I have also maintained my interest in planning and have on occasion provided my unasked for ideas and opinions in that area. In addition, I have long held an interest in practicing medicine. This I did as a member and, at times, director of the volunteer EMS team for my local fire department. I joined this organization shortly after its formation in 1978 and let my license lapse in 2001 after participating in the last call our team responded to before ceasing operation.

- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *My WPI experience was diverse and solid. In addition to the core curriculum for math (BS, '73) and computer science (MS, '76), I was able to take several accounting and finance courses. This background gave me the knowledge base I needed to tackle the various technical challenges as well as to speak the language of those folks in finance with whom I worked in developing and supporting financial and planning applications. I was also able to indulge my interest in medicine by taking anatomy and physiology and working on projects at the UMass Med School.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *I think the broad offerings from which I was able to select as well as the opportunity to interact with people in a variety of environments prepared me about as well as anything could. The key element of my career has been flexibility and enough general knowledge in diverse areas to be effective while I developed the specialized knowledge needed for a specific project.*

- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *The key areas I think anyone looking at general management in healthcare are a solid understanding of healthcare financing and policy development. The other knowledge is common to all types of management - project management, human resources management, planning (both strategic and tactical). For those folks seeking additional education that are involved in a clinical specialty already, they will need to understand how the clinical knowledge of their area supports and enhances the entire organization. They will need to be flexible enough to move from management within their specialty to a broader scope.*

24. Subject 24 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *I graduated from WPI with a degree in Biotechnology in 1997, and graduated from the University of Iowa College of Medicine in 2001. I completed my medical residency in Family Medicine in 2004, at Moses Cone Hospital, in Greensboro NC.*
- What is your current position in your career?
- *I am a board-certified Family Physician, in a small single-specialty practice. We have 3 physicians, 2 physician assistants, a nurse practitioner, a naturopath and a PharmD in our group. I am an employee, not a partner/owner – at this point in my career, I want the flexibility of working part-time because I have two young children, so the employee arrangement suits me well.*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *After residency, I took a year off to stay home with my infant son, but during that time I worked as a locum tenens (fancy word for a physician temp). I worked for two months in a medical office in Liberty NC while the solo practitioner took vacation time – I saw his patients until he returned. I also worked as a resident preceptor for three months, covering for an attending physician who was out on sabbatical. It was a teaching position, supervising resident physicians.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *Well, if you're asking about my degree and whether I've actually USED everything I learned at WPI, the answer is...not much. I did take all the med school prerequisite classes at WPI – organic chemistry, biochemistry, biology, genetics. In med school you do repeat biochem, genetics, and quite a bit of human biology (anatomy and physiology) so it was helpful to have the fundamentals, but medicine has a completely different emphasis than what I learned at WPI – much more detail, more emphasis on how everything affects the human body. And then of course unless you're going into academia, you immediately forget most of it, because so much of what is taught during the first two didactic years of med school is about theory, whereas the practice of medicine is more about hands-on application. And of course much of my degree program focused on genetics, and that has*

very little bearing on what I actually do on a daily basis – although I still feel that I got a world-class education at WPI, and would absolutely choose to do it the same way again. One thing that was helpful – when I was a student, WPI had a pre-health program within the Biology department, which at that time was headed by Jill Rulfs. She and Phil Robakiewich (who I believe is no longer working at WPI, but he taught in the biology dept at the time) set up a physician shadowing program and offered several elective opportunities in the healthcare field, which were absolutely invaluable to me. It really cemented my desire to pursue medicine, and it was helpful to have had that experience when it came time to fill out applications. Jill also arranged for an MCAT prep course (the MCAT is the med school admissions exam, like the GMAT or LSAT) and that was immensely helpful. So I would say that the efforts of the pre-health program were EXTREMELY valuable in helping me to get where I am now, because without that support and the opportunities afforded, the med school admissions process would have been much more difficult. One of my classmates in the MCAT prep class was Mike Remley, class of '97 – he's also practicing as a physician – you might want to include him in your survey if you didn't already contact him. He worked at Pfizer for a few years and then went to DO school, I think he is practicing in Michigan now. Oh, and I was also an EMT and served as Chief of the campus EMS squad, so that was a great opportunity for a lot of hands-on medical experience.

- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *I actually felt very well-prepared, and there isn't much that I would change. I tried to get as broad an education as possible, because I knew that once I started med school, there would be a laser-sharp focus on doing just one thing – medicine – and very little time or energy for anything else. At the time I attended WPI, it was possible to enroll for additional credit hours for somewhere between \$50-75/term, and I took advantage of that and usually took 5 or 6 classes each term. (Yeah, I know – super geek, right?) I didn't double up on tough classes – you can only take so much chemistry at one time! – but I would take my core requirements in chemistry and biology, and then take extras in math, statistics, or liberal arts. It was actually a lot of fun. Unfortunately, WPI decided to change that policy during my senior year and hiked the “overload fee” to something*

ridiculously high, but by then I'd taken every class offered within the biology department and most of the biotech stuff, so I was ready for a break anyway. By credit hours I met the requirements for degrees in both Biology and Biotechnology, but they had just changed the rules and would no longer allow coursework to count toward two degrees, so I had to pick one. My husband, who graduated WPI in '95, actually has degrees in both Bio and Biotech. So...things I would have changed were mostly administrative (keeping course overload fees lower, allowing dual degrees) but within my department, I was actually pretty satisfied with how well I was prepared from an educational perspective. Major props to the pre-health program!

- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *That is outside my professional experience physicians don't receive ANY formal management training, we're expected to learn it on the job, and as a result most docs are notoriously bad at it. Healthcare management is a pretty broad field anyway – encompassing human resources, financial planning, patient care, marketing, information systems... I'm assuming that you're envisioning a program that would be encompassed by the WPI management department, and including much of the same core curriculum? At a practice level, the issues we are dealing with right now that affect how we operate include finances (ever-decreasing insurance reimbursements from insurance companies and Medicare); integrating technology into the office including electronic medical records and scheduling/billing software, and how to make those systems inter-operable; pay-for-performance programs, in which insurers set certain quality indicators and practices that meet the benchmarks are rewarded with financial incentives; quality improvement programs to enhance patient care; regulatory compliance with increasing demands issued by federal and state governments (especially Medicare and Medicaid programs); and of course risk management and trying not to get sued for malpractice. It's enough to make your head spin.*

25. Subject 25 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- ***No other experience besides WPI.***
- What is your current position in your career?
- ***My current position is Director of Facilities Planning and Development for five skilled nursing homes the Diocese of Fall River runs (approximately 900 beds).***
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- ***I have worked for the diocese about 7.5 years. Before this position I worked in the project management departments at Brown University and Exxon Research and Engineering.***
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- ***I received a civil engineering degree from WPI in 1978 and have used my civil engineering background in all of my previous positions. Because of my experience in project management and facilities i have been able to diversify from the energy field into institutional and healthcare markets.***
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- ***Nothing I would change.***
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- ***No idea***

26. Subject 26 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
 - *BS (EE/MechE) from WPI '99.5, MS (EE) from WPI '02, almost done with med school at UMass Med (graduate this June). Also did post-baccalaurate pre-med program at Worcester State College (the bare premed essentials - two semesters each of general chem, organic chem, and bio)*
 - What is your current position in your career?
 - *an about-to-graduate medical student, going into emergency medicine*
 - We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
 - *Been in med school four years; before that, I've been an EMT since '97 (and a paramedic since '02).*
 - We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
 - *The academic portion of WPI didn't affect it; in fact, I had to do my pre-med prerequisites at Worcester State College since I didn't do any in undergrad (and WSC is one hell of a lot cheaper than WPI for such things). On the other hand, I got started in EMS on the WPI EMS squad which led to me getting my EMT ticket which in turn led me to getting sucked into med school.*
 - If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
 - *Problem solving is problem solving, whether it be in circuits or physiology, and it's a lot harder to learn that on the fly than it is to memorize a few (nearly useless) biochemical pathways; unfortunately, many (possibly even most) of my classmates are much better at the latter than the former.*
 - We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- Honestly, I'd stick to WPI's core competency of engineering, but that's just me.*

27. Subject 27 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *During my 4 years at WPI I studied Mechanical Engineering and only decided to do medicine my last year. After WPI I spent a year working for GE (since I didn't get into medical school the first attempt). Then I spent 4 years at Albany Medical College. After Medical school I did 3 years of an emergency medicine residency at Baystate Medical Center (Springfield, MA). The EXPERIENCE at Albany Med was much different than WPI. In truth I didn't like it as much. There was a lot of pressure and competition to do well (I'm a pretty relaxed person). A lot of medical school is memorization of facts which is a lot different than engineering which revolves more around critical thinking and problem solving.*
- What is your current position in your career?
I'm an emergency medicine physician at Baystate Franklin Medical Center in Greenfield, MA.
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *As I said above I did 3 years of residency at Baystate Medical Center. After that I spent about a year at Holyoke Medical Center's emergency department. I moved to Baystate Franklin's ER about 8 months ago. All of my positions have been as a direct health care provider in the emergency department.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *WPI helped me to think critically and to problem solve. These skills are still invaluable to me. Getting an MD initially requires memorization of a lot facts...but after this you need to learn how to apply these to different situations and how to use them to solve problems you have never seen before, WPI helped me excel in this area. WPI also helped me learn how to work with other people and how to work as a team. One of the most important things in medicine (and in any job I'd imagine), is being able to work well with other people and creating a team atmosphere.*

- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *I would have used my sufficiency to study a second language. I arrived at WPI with some rudimentary Spanish skills...and left with the same skills. If I had to go back I would have done my sufficiency in Spanish (instead of foreign policy). I would be greatly benefited now if I knew how to speak a second language (Spanish being the most common second language in western, MA).*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *This is a tough one that I have some definite opinions on. If anything I think WPI should have a class that stresses complex systems (which the health care system is) and the the laws of unintended consequences. Hospitals and the healthcare system are both very complex. In my short time as a doctor I've seen healthcare management (at a hospital level and as a governmental / national level) make decisions to try an improve the care of patients that are often not well thought out at a direct provider level. The outcomes of these decisions are often much different than expected.*

28. Subject 28 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- ***BA -- Stonehill College, North Easton, MA (Major in Pre-Engineering, Liberal Arts, Minor in Biology), BS -- University of Notre Dame, IN (Mechanical Engineering), ME -- WPI, Worcester, MA (Biomedical Engineering)***
- What is your current position in your career?
- ***Director, Clinical Engineering, Umass Memorial Medical Center, Worcester, MA***
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- ***Throughout my Master's program at WPI, I worked as a Biomedical Engineering technician at St. Vincent's Hospital -- now known as Medical City. That was btwn the yrs. Of 1988-1990. My 1st job out of WPI was as a Clinical Engineer for Brigham and Women's Hospital, 1990-1994. I then began as Director of Clinical Engineering for The Medical Center (Memorial Hospital), Worcester, MA from 1994-1998 when we merged w/Univeristy of MA medical center. I was awarded the Director position for Umass Memorial Medical Center for the merged entity, and have held this position from 1998-2008. My career in Healthcare has spanned approx. 20yrs. to date.***
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- ***My WPI experience brought me into the field of Biomedical Engineering. I was originally planning to enter into the field of prosthetic design. My experience in the Healthcare environment...seeing the end-user's perspective on the use of instrumentation, and how hospital technical staff can improve the overall patient safety and satisfaction throughout their stay in the hospital...directly affected my long term career choice.***
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- ***Due to moving more toward the end-user side of instrumentation, more electrical engineering emphasis would have better prepared me. Because I thought that I would be working in the prosthetic design side of Biomedical Eng., I did not anicipate needing as much electronics for equipment issue troubleshooting, etc.***

- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *Healthcare management -- ie: budgeting, insurance/gov't healthcare programs, benchmarks, reimbursement -- pay for performance programs, etc. Biostatistics (how to validate data collected in clinical enviro) Epidemiology. Occupational/Environmental Health Sciences*

29. Subject 29 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *Emory University, Rollins School of Public Health (Masters of Public Health in Epidemiology)*
- What is your current position in your career?
- *Epidemiologist / Research Scientist for the NYC Dept. of Health, in the Division of Environmental Health*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *I began working in the field of public health as a graduate student at Emory. During my two years there, I gained experience with the American Cancer Society (helped put together the Tobacco Control Country Profiles annual report) as well as the Centers for Disease Control and Prevention (CDC) – there I worked with the National Center for Environmental Health as a research fellow; experience included analyses of data collected during a childhood leukemia cluster investigation, and assistance with a water-sampling study to map and estimate trihalomethane exposure. Upon graduation I received a CSTE Applied Epidemiology fellowship to work with the NYC-DOH (beginning August 2004), where I completed a study on asthma diagnosed in rescue and recovery workers after 9/11 (<http://www.ehponline.org/members/2007/10248/10248.pdf>), and expanded surveillance for carbon monoxide exposure and poisoning, documenting the impact of 2004 legislation making CO detectors mandatory in all dwelling spaces. Since the fellowship I have continued to work with the Bureau of Environmental Surveillance and Policy, as a research scientist/epidemiologist.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *The Epidemiology program at Emory is extremely analytical, and I was able to place into an advanced biostatistics track thanks to my scientific and mathematical foundation at WPI. Specifically, Dr. Liz Ryder's introductory biostatistics course at WPI was extremely useful. More generally, I found my way to public health as a result of my dual interests in biomedical sciences and in the social sciences; at WPI I was able to explore both of these areas via a double major in Biology and International Studies.*

- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *I might have taken an additional microbiology course in lieu of some of the biochemistry; a toxicology course would also have been interesting but I'm not sure that was offered – then again all the biochem certainly has given me a leg-up in understanding toxicology, a component of the work I do in environmental health.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *I'm not sure exactly what you mean by healthcare education – that seems a bit broad. If you mean healthcare-related management education – there are a number of avenues. You can look at it from the micro-perspective of managing a healthcare facility, or the macro-perspective of how healthcare access is managed (terribly, if we are talking about the United States) at the population level – the insurance industry, etc. Or you could think of it as health policy and management in the public health sense, which I am most familiar with – for example, the NYC DOH regulates a number of entities for the health and safety of New Yorkers (everything from restaurant inspections to flu clinics, condom dispensing to healthy-newborn home visits). I think it would be helpful to offer a little bit of the micro and the macro perspectives – and I would certainly advocate for some eye towards public health (be it an entire course or just a chapter).*

30. Subject 30 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *I am currently a second year Masters student in Clinical Epidemiology at the Johns Hopkins Bloomberg School of Public Health, and I will be attending medical school next year (either at Johns Hopkins, Georgetown, University of California at San Diego, or Albert Einstein College of Medicine).*
- What is your current position in your career?
- *As mentioned above, I am a second year Masters student and I will be attending medical school next year.*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *I have worked in healthcare since my freshman year at WPI. For summers while at WPI, I worked as a research assistant in Clinical Neurophysiology at the Massachusetts General Hospital. My IQP was entitled "Effects of the built environment on patient health outcomes and staff satisfaction," which I completed at the Department of Human Services in Melbourne, Victoria, Australia. I did my MQP in neuromuscular biophysics at the University of Massachusetts Medical School on Amyotrophic Lateral Sclerosis (ALS, or Lou Gehrig's Disease).*
- *In my Masters program, I have completed many projects in clinical and epidemiology research, mostly involving HIV-associated neurocognitive disorders.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *My IQP and MQP were major experiences in my undergraduate career, and at graduate/medical school interviews, they were always common topics of conversation. I think that the projects, particularly the IQP, are very unique and set WPI students apart from other undergraduates.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *I think that the pre-health curriculum is in need of some reform, and that stronger humanities requirements would benefit medical school applicants from WPI. I also think*

that biostatistics classes would be especially helpful – the math department’s statistics classes were not particularly helpful for healthcare purposes.

- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- ***Biostatistics/epidemiology training is crucial for high performance in the field of healthcare; more practical statistics classes should be offered at WPI. Also, writing classes should be improved and required. Students should be made more aware of the field of public health and the many opportunities for which the WPI curriculum prepares them. I think the field of public health would be very fitting for many WPI students.***

31. Subject 31 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)

During my 4 years at WPI I studied Mechanical Engineering and only decided to do medicine my last year. After WPI I spent a year working for GE (since I didn't get into medical school the first attempt). Then I spent 4 years at Albany Medical College. After Medical school I did 3 years of an emergency medicine residency at Baystate Medical Center (Springfield, MA). The EXPERIENCE at Albany Med was much different than WPI. In truth I didn't like it as much. There was a lot of pressure and competition to do well (I'm a pretty relaxed person). A lot of medical school is memorization of facts which is a lot different than engineering which revolves more around critical thinking and problem solving.

- What is your current position in your career?

I'm an emergency medicine physician at Baystate Franklin Medical Center in Greenfield, MA.

- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?

As I said above I did 3 years of residency at Baystate Medical Center. After that I spent about a year at Holyoke Medical Center's emergency department. I moved to Baystate Franklin's ER about 8 months ago. All of my positions have been as a direct health care provider in the emergency department.

- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?

WPI helped me to think critically and to problem solve. These skills are still invaluable to me. Getting an MD initially requires memorization of a lot of facts...but after this you need to learn how to apply these to different situations and how to use them to solve problems you have never seen before, WPI helped me excel in this area. WPI also helped me learn how to work with other people and how to work as a team. One of the most important things in medicine (and in any job I'd imagine), is being able to work well with other people and creating a team atmosphere.

- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?

I would have used my sufficiency to study a second language. I arrived at WPI with some rudimentary Spanish skills...and left with the same skills. If I had to go back I would have

done my sufficiency in Spanish (instead of foreign policy). I would be greatly benefited now if I knew how to speak a second language (Spanish being the most common second language in western, MA).

- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?

This is a tough one that I have some definite opinions on. If anything I think WPI should have a class that stresses complex systems (which the health care system is) and the the laws of unintended consequences. Hospitals and the healthcare system are both very complex. In my short time as a doctor I've seen healthcare management (at a hospital level and as a governmental / national level) make decisions to try an improve the care of patients that are often not well thought out at a direct provider level. The outcomes of these decisions are often much different than expected.

32. Subject 32 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)

Obtained my M.S. and Ph.D. in BME at WPI. For my Ph.D. I took Physiology, Biochemistry and Pharmacology at UMass Medical School. My B.A. was from Harvard and I spend three years in the U.S. Army (during Vietnam) between Harvard and W.P.I.

Subsequently studied Japanese for two years at Assumption because of my job. Worked with the Mitsui conglomerate that set up Holter analysis services throughout Japan.

- What is your current position in your career?

Clinical Research Associate for Philips Healthcare. Work in R&D and arrange and supervise the clinical testing of prototype unreleased medical systems, software and monitoring in hospitals around the world.

- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?

Four years experience validating prototype medical devices and systems in the clinical environment. 20+ years marketing experience with Ph.D. on Cardiovascular Instrumentation; Board Certified Clinical Engineer. Philips/Agilent/HP Product Manager for fifteen years; electrocardiography, arrhythmia, ischemia (ST), monitoring full disclosure review system, and cardiac catheterization/electrophysiology laboratory products. Managed all international business for Holter manufacturer; 6 years. Worked in hospital 10 years; 4 years in Cardiology Department (ICU/CCU, Non-Invasive Lab, Cath Lab) and 6 years on-site clinical evaluation of monitoring and cath lab products employed by major manufacturer.

- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?

While working on my Ph.D. thesis I did some statistical analysis for the Chief of Cardiology at St. Vincent Hospital. This led to a job as a cath lab technician, then supervisor of Non-Invasive Cardiology and finally Technical and Administrative Assistant to the Chief of Cardiology. Left the hospital to take a job working for the company of a WPI professor, Dr. Charles Feldman, and tested prototype monitoring and computer systems at the newly opened UMass Hospital.

- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?

I wouldn't change a thing. It was the best time of my life. There was an intimate working relationship among the professors and grad students. A number of us, professors and former graduate students) get together each year on Memorial Day or Labor Day weekend.

- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?

From what I have experienced it is the hospital's Chief Information Officer that has become the key individual in managing healthcare delivery. Curriculum should include study of the issues and successes in networking and integrating monitoring, electronic charting, laboratory, billing, admissions and decision support computer systems.

33. Subject 33 (e-mail)

- *Could you tell us about your academic experience besides WPI? (If applicable)*
- *Lots of seminars and training sessions – no formal academic classes.*
- *What is your current position in your career?*
- ***Physical Plant Director for a 1,000,000 sq ft state psychiatric facility***
- *We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?*
- ***This is my first position in the healthcare industry – I have been here 21 years.***
- *We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?*
- ***An engineering degree was required for the job. Frankly, mechanical engineering is not directly applicable. Previous experience in physical plant positions was paramount.***
- *If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?*
- ***For physical plant specifically, one needs much more practical, down to earth, day to day knowledge. I can't recall the last time I used a differential equation. The class we called "trips" which was actually called something like introduction to manufacturing processes (or similar) turns out to be one of the more valuable experiences in college.***
- *We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?*
- ***It is CRITICAL in my opinion that hospital management be very familiar with the life safety code (NFPA 101) as regards hospitals as well as Joint Commission (JCAHO) requirements. In addition, specifically from NFPA 101 they need to know what "smoke partitions", "smoke compartments", "rated walls", "Rated doors", "Means of egress" and lots of other features of fire protection are. Knowing these items will help greatly in daily decisions regarding changes of use for any area, modifications to buildings, and how long repairs may take on large systems. Far too often, hospital administrators are medical staff or management personnel, and normally have no idea of features of their buildings or equipment. They do not need to be experts, but do need to know ramifications of their decisions.***

34. Subject 34 (e-mail)

-Could you tell us about your academic experience besides WPI? (If applicable) - *I attended some classes at a state college for elementary education after WPI and felt like I went back to elementary/junior high school, not one of my professors treated me, or any of the students, like they were adults. You could fail a class with an A average if you had too many absences from class.*

- What is your current position in your career? *I am currently only working part-time for a family owned water service company. Only part-time because I decided I wanted more time with my two children. I didn't want to just wake them up and put them to bed, I wanted quality time with them. Prior to this I worked full-time as a Chemical Safety Assistant. I was responsible for supervising 6 staff members, all safety training curriculum, and ensuring all waste rules and regulations were adhered to*

- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare? *I was in the business for 6+ years and felt that it is an ever growing, ever challenging field. The minute you think you know and understand all of the rules and regulations, they change, which I am sure probably happens in all industries.*

- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that? *If I did not have the degree I had from WPI I never would have been hired for my original position at my previous company. My degree helped me get in the door and as positions with more responsibility and finally my supervisory position became available I was able to advance my career because of my degree from WPI. I also feel I earned more respect from specific departments and/or personnel or managers because I had a degree from WPI. Some people would even defer to my opinions on certain matters because I had a WPI degree.*

- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career? *I would probably have liked to have had several internships versus the one co-op position I had. This would have allowed for a wider experience and also allowed me to have a better understanding of what I would like more or less. For example having to do a term in an inpatient setting, a term in out patient setting, etc because the only way to know what you want to do is to actually do it, not just learn about it.*

- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?

- *Courses related to management such as budgeting, marketing and human resources. Also , finance and economics related to health care delivery is vital.*

35. Subject 35 (e-mail)

- *Could you tell us about your academic experience besides WPI? (If applicable)*
- *None*
- *What is your current position in your career?*
- **System Analyst/ Report Writer**
- *We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?*
- ***I have been in the healthcare field for 3 years now working in 2 hospital IT groups. Most of the work consists of information systems integration, database analysis and report writing.***
- *We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?*
- ***After graduating from WPI I joined a small consulting firm that specialized in Semiconductor Equipment Automation Systems. I then spent almost 11 years in the semiconductor industry working on all aspects of automation systems. From interfaces between various equipment to user Interfaces for the equipment. These systems were multi-threaded programs that often used databases and communicated to other systems within a factory. A few years ago I got married and my wife is a director of Nursing at the hospital at which I work. My experience with databases, communications, user interface (information presentation) has all been very helpful.***
- *If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?*
- ***A class taught by Professor Hardell called Software Engineering in the sophomore year helped educate me to how life is as a consultant. Specs Specs Specs they are very necessary as a consultant for billing, but often overlooked as full time employee of a large organization. Work centers around projects – in both industries I have experience in. Semiconductor and Healthcare. Prioritization is a skill that must be learned, as well as understanding customer needs / motivations for changes or problems.***
- *We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?*

- *My experience in the software engineering class was quite helpful – the class was divided into several groups of people each formed a company. Each company had an idea – and needed to generate requirement specifications, those requirements were turned over to another group (company) to be implemented. The first step of implementation was to create a functional specification of how a solution would work. This functional spec was then reviewed and negotiated by both companies until an agreement was reached. Both groups then used the functional specification to create a testing specifications to test the solution and these specifications were compared and agreed upon. This activity of specifications formalizes a number of steps useful in implementing any system. It represents agreements between client and service provider about what exactly is the client’s goal. My background is technical (with heavy experience from a different industry). However by following the simple steps of discussing, documenting and agreeing upon deliverables is required in any service position. I often meet with physicians and discuss what information they are looking for within a database, or how they are entering information into the system, or how to they expect it to work. I recently had a physician say ‘It does not work’ and would not give me sufficient information to debug whatever was not working. I then asked the physician to help the patient in the hospital who is in pain – without giving any patient name, patient location, description of the pain – no details what so ever. I asked if the physician could please help that patient. The physician saw my point of view and then proceeded to slowly step me through the process that was being followed, so that I could assist. In the end it was a simple mis-communication. The physician had an expectation of how a report should work and did not understand how it was working. After seeing the physicians’ expectations I made some adjustments to the reports prompts (user interface) and adjusted how information was pulled from the databases. The problem was not technical it was communication. When managing projects, employees, or clients the first priority should always be communication.*

36. Subject 36 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- ***B.S. in Bioengineering, Ph.D. in Biomedical Science, Postdoctoral Research Fellow
Biomedical research, MBA - (WPI)***
- What is your current position in your career?
- **Life science researcher and entrepreneur**
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- ***I am not a clinician but I have been involved in healthcare related research since 2000.
Previous I worked exclusively at the bench as a biomedical research scientist***
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- ***The MBA program gave me the background I needed to apply my life science and
technology background towards developing and launching life science related ventures***
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- ***I would have liked to have had the opportunity to do an internship at a start up or venture
firm to get some firsthand experience***
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- ***From the biomedical research/biotechnology/pharmaceutical end more of an introduction
to the biology underlying the products and services in these industries, this will help
industry professionals gauge opportunities, develop more accurate time lines, and
potentially be more successful in life science related ventures***

37. Subject 37 (e-mail)

- *Could you tell us about your academic experience besides WPI? (If applicable)*

Took a few graduate level courses at Northeastern University, following graduation from WPI with degree in Math in 1976.

Intensive self-study course in actuarial science. Basically consisted of studying the Society of Actuaries syllabus for its examinations and passing them all. Finished this in 1980.

- *What is your current position in your career?*

I have been working in the actuarial field for over 30 years. 18 with what was then State Mutual in Worcester (subsequently Allmerica Financial and now called the Hanover Group), here I spent most of my time in the pension and retirement services area, but was the Chief Actuary when I left, responsible for life, health, retirement, casualty actuarial departments. Then spent 3 years consulting with Milliman in Boston, doing life, health and annuity work. I have been Chief Actuary of Mutual of America in New York for 11 years, primarily in the pension area, but also responsible for all actuarial departments.

- *We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?*

Most of my experience has not been in the health care area, but I am very aware of what is going on here through my basic education, continuing education, trade press, work experience, and being in the insurance business. My direct health care work was included financial reporting and product development work for State Mutual, managed care consulting for hospitals and medical clinics at Milliman, and managing Mutual of America's Disability business. I am also involved in the product design and cost-sharing arrangements for my employer's health care plan for our employees.

- *We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?*

My WPI experience taught me basic mathematics (calculus, probability, statistics, numerical analysis, linear algebra, and differential equations) that I needed to pass actuarial exams. I also learned to program computers, pretty much before the days of PCs, which made programming PCs easy once they were available.

Basically, at WPI, I learned to think logically, learned to research, and learned to understand numbers. I didn't have much of a humanities background, but I learned to write and to make presentations once I was working.

- *If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?*

Oh, I would change a lot all right! But that's the advantage of hindsight. I think WPI fully prepared me to assume an entry level actuarial position, and prepared me well to quickly advance in that field.

- *We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?*

I don't know what I can tell you here, but I would start with basic education in employee benefits, how it works, what benefits are typically offered, why insurers do things like exclude preexisting conditions, how insurers protect themselves from antiselection, basic underwriting, etc. Look at a book called Group Insurance, with William F Bluhm as principal editor – even reading the Table of Contents will help you here. You need this as basic background to understand everything else.

Then you need to cover managed care, how it works, why it doesn't work like it's supposed to, etc. There are plenty of books on this subject. Milliman is a noted expert in this field, Bob Beal (bob.beal@milliman.com) who graduated from WPI before I did has been there for about 15 years, and could probably point you to specific resources.

Obviously you need to cover delivery systems, privately paid, and publicly funded. HMOs, PPOs, etc. and how they differ from indemnity plans.

38. Subject 38 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *I also obtained a MS degree in Operations Management from RPI. While working in CT I attended the Hartford Graduate Center in the evenings where RPI had a satellite campus.*
- What is your current position in your career?
- *I am currently a Principal Quality Engineer for Cardinal Health which is a very large company that bought us (Alaris) a few years back. Our division is known as Clinical Technologies and Services. Specifically, we work on R&D and manufacturing of disposable medical devices such as IV sets and related components. Our offices in CA produce the IV pumps which are sold to hospitals. I am the most senior quality engineer and also supervise the Reliability Lab which does testing for both R&D and manufacturing engineering.*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *I have been here for 14 years and did not work in the healthcare industry prior to this position.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *I believe that my WPI degree in Industrial Engineering was good preparation for work as a Quality Engineer (QE) - even though I can honestly say that Quality Engineering was not a career I really heard of while at WPI. My first job after graduating WPI was as a Facilities Engineer for a defense contractor. Two years later I moved to CT to be a QE for a company that was a prime contractor for NASA. At that point I realized that being a QE was the right career for me and I have stayed in Quality Engineering since then. I don't know that I would have changed many of the courses I chose to take.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *Healthcare delivery management can mean a lot of things. From my perspective it applies to the equipment and devices necessary to deliver medication to a patient. I work with a lot of Mechanical Engineers and some Biomedical Engineers. I still think Industrial*

Engineering is a good degree for a QE to have. However, I would like to see WPI offer a degree in Quality Engineering as some other schools do. We have had a hard time over the years finding candidates to even interview for open QE positions at our facility. Basic mechanical engineering skills are important - most of our products are very high volumes and produced on automation. Statistical skills are also important along with a knowledge of FDA and ISO requirements.

39. Subject 39 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *None.*
- What is your current position in your career?
- *Mechanical Engineer, Philips Healthcare - Nuclear Medicine Division*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *In this industry for ~4 years: Mechanical/Process Engineer, BD Biosciences - Immunocytometry Systems Group Customer Service Engineer, Siemens Medical Solutions - Oncology Care Systems Group.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *The project-oriented approach to major projects at WPI was very helpful in learning to work in teams towards a common goal under a strict deadline. It also taught me how to "wear different hats" in the course of a project, which has been very helpful in getting those little (but important) things done that tend to stall a project.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *When I was at WPI (1994 thru 1998), CAD was not a big part of the curriculum, and when it was the software was already obsolete. There were opportunities to learn more useful software (such as PRO-E) in an extracurricular setting, but I did not take advantage of that. It seemed like WPI was behind the curve in that regard, but that was 10 years ago, and things have hopefully changed since then....*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *I can only speak from the standpoint of a Mechanical Engineer in the Healthcare Sector, dealing with the design and manufacture of medical devices. I haven't had much experience with the clinical/hospital care side, but one thing I would recommend is making an internship a requirement, whether it is at a hospital, clinic, or support organization.*

40. Subject 40 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *Only place*
- What is your current position in your career?
- *Infrastructure eng., system prog.*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *Not in healthcare*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *Learn new things fast*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *Little more business, accounting, budgeting*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *No idea*

41. Subject 41 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- ***6 college courses after graduation, no formal master's, 2 courses at Motorola(Florida Atlantic), 2 at Umass Lowell(Communications, C programming, Radar),***
- What is your current position in your career?
- ***RF engineer support, wireless communications***
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- ***5 years, defense & commercial***
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- ***The ability to get things done on time, MQP(hands on), show how to set up testing devices***
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- ***Psychology, financial accounting, management***
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- ***Make sure engineers do not neglect core subjects.***

42. Subject 42 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- ***Only degree CS at WPI***
- What is your current position in your career?
- ***Application Architect***
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- ***Not in healthcare***
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- ***Group work, projects, hands-on approach***
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- ***More finance and business related courses***
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- ***No idea***

43. Subject 43 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- ***MATH (BS) in WPI and no other degree***
- What is your current position in your career?
- ***Senior System Analyst_ support sales illustrations for a life insurance company***
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- ***32 years in the life insurance industry. He had been in the same company, but several positions***
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- ***Actuarial courses at WPI. Recruited by passing 3 actuarial exams while a student***
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- ***more computer courses***
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- ***No idea***

44. Subject 44 (e-mail)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *N/A – No additional schooling after WPI.*
- What is your current position in your career?
- *I am a part owner of a medical billing and consulting company that specializes in Massachusetts Medicaid billing and Medicaid billing to all 50 states and Canada. My position includes all facets of the company that deals with technology including IT, systems and electronic claims processing. Because our company is small, I'm also partly responsible for some of the operations and project management.*
- *We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?*
- *I started in healthcare as an IT systems manager in 1995 for a medium size business that specialized in Hospital billing, collections and all facets of consulting. My primary responsibility was electronic claims processing, systems and networks.*
- *We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?*
- *I feel WPI more than anything taught me the work ethic needed to be successful in business. To always work hard and diligently to the best of your ability. I also feel my problem solving skills we greatly enhanced by my educational experience.*
- *If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?*
- *I would probably take more Management courses. Being part owner of a business, I feel it would have helped me understand the "business" and non-technical sides how a company operates.*
- *We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?*
- *I feel the healthcare industry is very different that other industries. The world will always need healthcare services, whether its insurance companies, hospitals, doctors, pharmacists, etc. People will always get sick and will need attention and new technologies*

will always need to be developed in order to advance the industry. Unlike other industries where the need for a particular service or product can have a limited shelf life and not be needed in the future. I believe there will always be a need for healthcare because everyone needs it, regardless of geographic location, race, economic status, etc. It's something that the whole human race is dependent on. And management of this industry can be very difficult because of all these factors.

45. Subject 45 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *None-*
- What is your current position in your career?
- *I am currently a Senior Consultant in Healthcare Informatics for Premier, Inc.*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *I started in 1992 as a Process management Engineer for a Level 1 Trauma Center in Savannah, GA. I began as a trainer in process management/process improvement and team facilitator. It was quickly apparent that my strength was in data collection and analysis, so my focus became providing data analysis support at all levels of the organization. I worked for the hospital for 13 years, and for the past three I have been providing similar type of support as a travelling consultant for a multinational healthcare consulting firm.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *I think the WPI approach of project management and problem solving provided the necessary basis for me to be innovative and flexible in the way I approach a project/problem and utilize the data available to me to formulate and present results and conclusions*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *More computer classes, some management engineering background.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *I recommend classes in healthcare economics and labor management, an overview of healthcare processes, an introduction to healthcare informatics, and a basic medical terminology class.*

46. Subject 46 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- ***Industrial Engineering degree from WPI, no other degrees***
- What is your current position in your career?
- ***Working as business analyst at Hanover Insurance Group, Inc.***
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- ***2 years experience in health care.***
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- ***Team-based projects, taking responsibilities, internships***
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- ***More software courses such software engineering***
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- ***Marketing, budgeting, operations and a course related to human resource.***

47. Subject 47 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- ***Graduated from WPI with a mechanical engineering degree in 97.***
- What is your current position in your career?
- ***Is now working as a project manager at Novartis.***
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- ***Has worked in health care industry for about 8 years.***
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- ***Problem solving, good knowledge of basic sciences, extracurricular activities.***
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- ***More business related courses such as management, economics and finance.***
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- ***It would be beneficial to teach courses related to budgeting, marketing and information systems regarding health care.***

48. Subject 48 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *Math degree at WPI, did not involve any other educational programs*
- What is your current position in your career?
- *Senior Systems Consultant at The Hanover Insurance Group*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *18 years in the field.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *Projects such as MQP and IQP, ability to work independently co-ops and extracurricular activities.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *Would have changed his concentration to actuarial math, more software programming*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *Health informatics and health information systems education, Also management courses on marketing, budgeting and quality improvement.*

49. Subject 49 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *No other degrees.*
- What is your current position in your career?
- *Operations Manager at Hartford Steam Boiler I&I*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *Have worked in this industry for 5 years.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *WPI degree was the main reason. Also working in team projects and developing hands-on approach.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *Would have taken courses related to economics and finance.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *Courses on health care policy development, regulations and law. Also, medical billing and coding courses would be useful.*

50. Subject 50 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *No other degrees than WPI (actuarial math)*
- What is your current position in your career?
- *Assistant Actuary at Liberty Mutual Insurance Co.*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *Have worked in health care for only a year.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *WPI degree and strong knowledge of basic sciences, team-work mentality*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *Courses related to economics and finance and management.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *Quality improvement, operations, health care economics and development of practice based learning skills.*

51. Subject 51 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- ***Graduated with an MIS degree in 05. No further education.***
- What is your current position in your career?
- ***I.T. Support Technician***
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- ***Worked for two years in health care.***
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- ***Projects helped him develop his team-work skills and also analytical thinking skills.***
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- ***Would have taken courses related management and business and some computer science courses as well.***
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- ***Health care informatics and information systems. In addition, courses on health care law & ethics***

52. Subject 52 (phone)

- Could you tell us about your academic experience besides WPI? (If applicable)
- *CS is the only degree*
- What is your current position in your career?
- *He is working as a programmer, writing software at HEALTH vision*
- We would like to learn more about your experience in healthcare industry. How long have you been in this industry? Can you please tell us about your previous positions in healthcare?
- *3 years of experience in the field.*
- We would also like to learn about how your WPI experience helped you to get where you are right now. Could you please elaborate on that?
- *WPI degree has helped him a lot. Also his internships during summers helped him gain first-hand experience. Other than that the extracurricular activities he was involved in, helped him improve his team-work skills.*
- If you could go back to your WPI years, what are the things that you would like to change in your educational preparation for your career?
- *Wishes he had taken courses in finance and economics and maybe foreign language courses such as Spanish.*
- We are trying to come up with a curriculum for management department at WPI regarding healthcare delivery management. We are looking for your suggestions about what WPI should offer in healthcare education?
- *No idea*

Appendix C: Internet Addresses of Reviewed Schools

Table 21 – Internet Addresses of Reviewed Schools

Schools	URL
Boston University	http://sph.bu.edu/index.php?option=com_courselist&task=view&deptid=3&id=168&right=0&Itemid=465
Framingham State College	http://www.framingham.edu/dgce/ma_hca.htm
Harvard University	http://www.hsph.harvard.edu/mhcm/course_descriptions.html
Northeastern University	http://www.ccs.neu.edu/graduate/mshi.html
Northern Essex Community College	http://www.necc.mass.edu/programsassociatedegree/busmgthealthcare.shtml
Roger Williams University	http://www.rwu.edu/academics/departments/health_care_admin_major.htm
Salve Regina University	http://www.salve.edu/graduatestudies/programs/hsa/curriculum.cfm
Simmons College	http://www.simmons.edu/shs/academics/hca/curriculum.shtml
Springfield College	http://catalog.spfldcol.edu/content.php?catoid=29&navoid=416
Suffolk University	http://www.suffolk.edu/business/8944.html
UMass Lowell	http://www.uml.edu/catalog/graduate/colleges/health_environment/community_health_sustainability/master.htm#Program%20Requirements
University of Connecticut	http://www.business.uconn.edu/healthcare/mba.html
University of Southern Maine	http://www.usm.maine.edu/catalogs/graduate/pdfs/muskie.pdf
University of New England	http://www.une.edu/registrar/catalog/0708/undergrad/hsm4.asp
University of New Hampshire	http://www.undergradcat.unh.edu/0708/ug-hmp-0708.htm
University of New Haven	http://www.newhaven.edu/academics/151/
Western Connecticut State University	http://www.wcsu.edu/graduate/degrees/moahareq.asp