

UNDERSTANDING INFLUENZA VACCINE BEHAVIOR IN HEALTHCARE  
WORKERS: THE ROLE OF INFORMATION SEEKING AND PROCESSING

A Thesis

Presented to the Faculty of the Graduate School  
of Cornell University

In Partial Fulfillment of the Requirements for the Degree of  
Masters of Science (M.S.).

By

Christopher Ernest Clarke

August 2007

© 2007 Christopher Ernest Clarke

## ABSTRACT

In the United States, annual influenza epidemics kill approximately 36,000 people, seriously hospitalize 200,000, and cause substantial social and economic disruption. Fortunately, vaccination is considered an effective prevention method. However, despite recommendations by the Centers for Disease Control and Prevention (CDC), annually only 40% of healthcare workers are immunized against influenza. Such low rates present challenges not only to patient health, but also the delivery of medical services.

There is no magic formula for increasing influenza vaccine uptake among healthcare workers. Only a multi-faceted approach involving communication, cost controls and supply stability will achieve the desired result. This thesis focuses specifically on the role of vaccine communication in facilitating changes in immunization behavior. It argues that public health officials need to understand how healthcare workers make personal vaccine decisions and what informs those choices. Moreover, it provides commentary on the logistical, social and ethical issues this approach raises.

Overall, this thesis's guiding question is as follows: What are the determinants of vaccine behavior among healthcare workers in various settings? Specifically, it focuses on how vaccine information is sought and cognitively interpreted, and how these actions influence immunization decisions. A model of risk information seeking and processing (RISP) is used as a guiding framework. This model explores motivations for information seeking and processing (i.e. systematic and heuristic), and their relationships to various components of behavior (e.g., attitudes, beliefs, and intentions). It posits that systematic processing, when paired with information seeking, is associated with a higher number of beliefs one considers, as well as (ultimately) attitudinal stability and enduring behavior change. Given that influenza

vaccination is a behavior repeated throughout one's life, the focus on enduring change is particularly appealing.

This thesis is a "first step" in exploring the relationship among vaccine information seeking and processing, and the aforementioned components of behavior. One hundred twenty-one in-person, telephone, and online interviews were conducted with physicians, nurses, paramedics and other groups within an urban community in central New York. Research goals included: (1) providing preliminary data on these cognitive behaviors, (2) developing measurements for several RISP model variables in need of further exploration, and (3) creating a foundation for future research with healthcare workers or other population groups. Study variables, derived from the RISP model, included: (a) information processing/seeking indicators, (b) preferred information sources, (c) perceived ability to find information, (d) salient beliefs about vaccination and (e) attitudes towards vaccine sources.

Overall, the data suggest that healthcare workers consider a variety of beliefs in deciding whether to be immunized. Beliefs associated with vaccination included the protection of personal health and patient well-being. Beliefs against immunization included lack of perceived risk for influenza, time constraints, and concern about side effects. Regarding information seeking, interviewees tended to favor health-related sources for vaccine information, including the CDC and their local health department.

Additionally, several measurements for heuristic and systematic processing were developed. Measures for systematic processing included relating the information to one's responsibilities as a healthcare worker and considering one's existing vaccine-related attitudes. Those for heuristic processing included: focusing on the length, clarity, and visual aspects of vaccine information. Finally, several theoretical and practical implications were discussed. Theoretically, two new variables were identified which may help delineate various gradients of information seeking beyond

mere presence or absence. Practically, the data suggest that perceptions of information quality likely interact with vaccine-specific judgments in informing immunization decisions. Vaccine information that addresses key vaccine-related concerns and questions, as well as provides clear rationale for recommendations, will likely be most effective in achieving effectiveness and legitimacy.

## BIOGRAPHICAL SKETCH

**Chris Clarke** received a B.S. degree from Rutgers University in the area of Health and Environmental Policy. His research focuses on how acute health risks (such as infectious diseases and bioterrorism) are communicated to the public and other stakeholders. He is interested in how people make risk-related decisions, how health behaviors develop, media coverage of risk issues and the role of theory and practice in preparing for the communication challenges of public health crises. He has published articles on how universities communicated during the fall 2001 anthrax crisis, and has given professional presentations on (1) media coverage of vaccine safety issues, (2) communicating about pandemic influenza and (3) communication lessons learned from the September 11<sup>th</sup> and anthrax crises.

Chris wishes to work at the Centers for Disease Control and Prevention (CDC), or an academic setting, in a health/risk communication capacity. However, he first plans to pursue a Ph.D. in Communication and continue his current research interests and teaching responsibilities. In his spare time, he enjoys running/athletics, Latin dancing, hiking and spending time with family and good friends.

## ACKNOWLEDGMENTS

I am deeply indebted to a number of individuals, whose continuous support made this thesis possible:

\* To my outstanding Committee, for providing invaluable guidance over the last year. I have truly worked with the best.

\* To my family, for always encouraging me to work to the best of my abilities – and beyond.

\* To my fellow graduate students, for reminding me that doing research and having fun can always go together. Friends are a precious commodity in life – I hope to always keep these special people close to my heart.

\* To the participants in this thesis, for their invaluable insight and perspective.

I am grateful to all these individuals for making this thesis possible. I have enjoyed this research tremendously and look forward to future endeavors in the risk communication field. I have tried my best and surely worked with the best. The work isn't always easy, but is nonetheless important to do. Theodore Roosevelt once said that there can be no greater joy in life than being given "the chance to work hard at work worth doing." He could not be more correct.

## TABLE OF CONTENTS

<b>Biographical Sketch</b>	<b>iii</b>
<b>Acknowledgments</b>	<b>iv</b>
<b>List of Figures</b>	<b>viii</b>
<b>List of Tables</b>	<b>ix</b>
<b>List of Abbreviations</b>	<b>x</b>
<b>Chapter 1: Introduction</b>	<b>1</b>
<i>The specter of influenza epidemics</i>	1
<i>The importance of immunization</i>	1
<i>Influenza vaccination and healthcare workers (HCW): The current dilemma</i>	2
<i>Identifying the audience</i>	4
<i>Strategies for increasing immunization rates among healthcare workers</i>	6
<i>Vaccine risk communication: Towards a focus on vaccine behavior</i>	7
<i>Ethics of persuasion: The complex nature of vaccination</i>	8
<i>The threat of pandemic influenza: Why vaccination matters</i>	10
<i>Thesis overview</i>	12
<b>Chapter 2: Theoretical Perspective on Vaccine Behavior</b>	<b>14</b>
<i>Health behavior and risk communication</i>	14
<i>Communicating about vaccination: Beyond information</i>	15
<i>Influenza vaccination behavior and healthcare workers:</i>	-
What we currently know and what's left to discover	16
<i>Understanding health behavior: the role of information seeking and processing</i>	17
<i>Theoretical background: Information seeking and processing, and health behavior</i>	18

<b>Chapter 3: Applying a Model of Risk Information Seeking and Processing (RISP)</b>	
<b>To Understanding Vaccine Behavior in Healthcare Workers</b>	<b>23</b>
<i>Overview of the RISP model</i>	23
<i>Applying the RISP model to influenza vaccine behavior</i>	32
<i>Research questions</i>	33
<b>Chapter 4: Methods</b>	<b>34</b>
<i>Overview of research approach</i>	34
<i>A mixed methods approach</i>	35
<i>Validity and reliability: Two key methodological challenges</i>	36
<i>Data collection overview</i>	38
<i>Data analysis – Coding categories</i>	41
<i>Data analysis – Timetable and process</i>	42
<b>Chapter 5: Results</b>	<b>43</b>
<i>Overview</i>	43
<i>Part 1: Interviewee background information</i>	44
<i>Part 2: Beliefs regarding vaccination</i>	46
<i>Part 3: Information seeking and processing</i>	52
<i>Part 4: Perceived information gathering capacity</i>	66
<b>Chapter 6: Discussion and Implications</b>	<b>69</b>
<i>Part 1: Commentary: Information demographics</i>	69
<i>Part 2: Commentary: Beliefs regarding vaccination</i>	72
<i>Part 3: Commentary: Information seeking</i>	76

<i>Part 3: Commentary: Systematic and heuristic processing</i>	83
<i>Part 4: Commentary: Perceived information gathering capacity</i>	89
<i>Research implications</i>	91
<i>Future research directions</i>	95
<i>Limitations</i>	97
<i>Conclusion</i>	99
<b>Appendix A: Human Subjects Approval Information</b>	<b>102</b>
<b>Appendix B: Influenza Vaccination Brochure</b>	<b>107</b>
<b>References</b>	<b>108</b>

## LIST OF FIGURES

<b><u>Figure 1</u></b> – Overview of the RISP model	24
<b><u>Figure 2</u></b> – Relationship between information seeking.....	29
<b><u>Figure 3</u></b> – Influenza vaccine beliefs	75
<b><u>Figure 4</u></b> – Proposed measurements for information personalization	80
<b><u>Figure 5</u></b> – Proposed (novel) measurements for systematic processing	86
<b><u>Figure 6</u></b> – Proposed (novel) measurements for heuristic processing	88
<b><u>Figure 7</u></b> – Proposed (novel) measurements for perceived.....	90
<b><u>Figure 8</u></b> – Proposed extensions of the RISP model	92

## LIST OF TABLES

<b><u>Table 1:</u></b> - Years of employment in the healthcare field	45
<b><u>Table 2:</u></b> - National influenza vaccination rates by group (U.S.)	96

## LIST OF ABBREVIATIONS

ACIP – Advisory Committee on Immunization Practices

CDC – Centers for Disease Control and Prevention

ELM – Elaboration-Likelihood Model

HSM – Heuristic-Systematic Model

IAC – Immunization Action Coalition

RISP – Risk Information Seeking and Processing (model)

TPB – Theory of Planned Behavior

## CHAPTER 1: INTRODUCTION - INFLUENZA VACCINATION AND HEALTHCARE WORKERS

### *The specter of influenza epidemics*

Influenza is the sixth leading cause of death in the U.S. (Backer, 2006). It kills approximately 36,000 people each year, hospitalizes another 110,000-200,000, infects between 5-20% of the population, and is responsible for upwards of 200 million days of restricted activity, 75 million work absentee days, and 22 million health care facility visits (Bartlett, 2006; Centers for Disease Control and Prevention [CDC], 2005a, 2006a; Hoffmann & Perl, 2005; King, Woolhandler, Brown, Jiang, Kevorkian, Himmelstein, et al., 2006; Lester, McGeer, Tomlinson, & Detsky, 2003). Worldwide, the disease kills between 250,000 and 500,000 people per year (Poland, Tosh & Jacobson, 2005). In addition, Backer (p. 1144) observes that “deaths due to influenza and pneumonia greatly exceed the death toll from AIDS and these [two] illnesses rank in the top 10 causes of death for every decade of life.” Economically-speaking, influenza epidemics cost the U.S. economy approximately \$12 billion a year, most of which is “manifested in indirect costs associated with losses in productivity and work absenteeism” (Mair, Grow, Mair, & Radonovich, 2006, p. 2).

### *The importance of immunization*

Immunization is considered the safest and most effective method of preventing influenza (Backer, 2006). The vaccine has extremely low incidents of side effects and high rates of immunological response in recipients (70-90%) (Poland et al., 2005; Mendelman, Cordova, & Cho, 2001). Consequently, each year the CDC issues vaccine recommendations for at-risk groups – that is, those individuals especially susceptible to influenza complications and who would benefit most from vaccination. These individuals include (1) elderly individuals over 65 years of age, (2) children age 6-23 months, (3) pregnant women, (4) people with anemia and diabetes, (5) people

with chronic lung, heart or kidney ailments and (6) those with diseases that suppress the immune system (CDC, 2005a). Furthermore, these groups are often given priority in the event of a vaccine shortage (American College of Physicians, 2006; Heining, Bachler, & Schaad, 2003).

For the 2006-2007 influenza season, approximately 110-115 million vaccine doses were produced for U.S. consumption (CDC, 2006b). However, there are numerous challenges to ensuring adequate vaccine supply during influenza epidemics, irrespective of actual demand. These include: decreasing numbers of manufacturers, outright shortages (e.g., during the 2004-2005 flu season), and concerns over a potential flu pandemic (American College of Physicians, 2006; Bartlett, 2006; Desroches, Blendon & Benson, 2005; Gronvall & Borio, 2006; Mair et al., 2006; Offit, 2005; Oreinstein, Douglas, Rodewald & Hinman, 2005; Sloan, Berman, Rosenbaum, Chalk & Griffin, 2004; United States Government Accountability Office, 2005a, 2005b, 2005c, 2001; University of Pittsburgh Center for Biosecurity, 2005).

***Influenza vaccination and health care workers: The current dilemma***

CDC's Advisory Committee on Immunization Practices (ACIP) is charged with setting U.S. vaccine policy. Each year since 1984, ACIP has recommended that all healthcare workers be immunized annually against influenza, due to the high risk of provider-patient transmission in hospitals, nursing homes and other care settings (Backer, 2006; Carman, Elder, Wallace, McAulay, Walker, Murray et al., 2000; Hoffmann & Perl, 2005; King et al., 2006; Lester et al., 2003; Manuel, Henry, Hockin, & Naus, 2002; Martinello, Jones, & Topal, 2003; Pearson, Bridges & Harper, 2006; Simeonsson, Summer-Bean, & Connolly, 2004; Steiner, Vermeulen, Mullahy, & Hayney, 2002; Tapiainen, Bar, Schaad, & Heining, 2005). These recommendations apply to providers in "acute care hospitals, nursing homes, skilled nursing facilities, physician's offices, urgent care centers and outpatient clinics, and to

persons who provide home health care and emergency medical services” (Pearson et al., 2006, p. 1).

Influenza transmission in healthcare settings presents ongoing challenges for disease control professionals (Hoey, 1998; Rea & Upshur, 2001). Goldstein, Kincade, Gamble and Bearman (2004, p. 908) observe that “healthcare facilities are an ideal environment for the rapid spread of influenza.” Lester et al. (2003, p. 839) observe, moreover, that “healthcare workers pose a potential risk for transmission of communicable disease in the hospitals and clinics in which they work...the healthcare setting has a high concentration of those at greatest risk of complications for influenza infection (i.e., the elderly and those with co-morbid conditions).” Similarly, Steiner et al. (2002, p. 625) state that “healthcare workers warrant particular focus because they are at risk of contracting influenza from patients and transmitting [it] to their patients.” Finally, Martinello et al. (2003, p. 846) argue that healthcare care workers “may act as potential vectors for nosocomial [hospital-based] transmission of influenza [because of] close contacts.”

Despite these risks and recommendations, influenza vaccination rates among healthcare workers remains chronically low, *averaging between 15-40% nationwide* (Heininger et al., 2003; Hoffmann & Perl, 2005; King et al., 2006; Lester et al., 2003; Manuel et al., 2002; Nuzzo, D’Esposito, Toner, Smith, Mair, & Hitchcock, 2006; Simeonsson et al., 2004; Steiner et al., 2002; Tapiainen et al., 2005; The Compliance Resource Center, 2006). This is despite efforts to encourage greater adherence to recommendations (King et al., 2006). This problem is not just limited to the United States; similar rates have been observed in Australia, New Zealand and Europe (Halliday, Thomson, Roberts, Bowen & Mead, 2003; Jordan, Wake, Hawker, Boxall, Fry-Smith, Chen et al., 2004; Murray & Skull, 2002). Within the United States, the CDC has made increasing rates an important priority, with Director Julie Gerberding

stating that “when people who work in hospitals and healthcare facilities don’t get vaccinated, they can pose a serious health risk to their patients; these recommendations are designed to highlight the importance of healthcare personnel getting vaccinated each year” (The Compliance Resource Center, 2006, p. 1).

### ***Identifying the audience***

ACIP recommendations for influenza immunization apply to all healthcare workers with at least minimal patient contact. However, some groups are especially important by virtue of their place within the public health system - emergency and primary care physicians, nurses and first responders (e.g., paramedics) (Sokol, 2006). For CDC, immunizing these individuals is a top priority.

Emergency physicians are often on the front lines of medical emergencies, being the first to receive patients upon their arrival at hospitals. These individuals are responsible for prompt and accurate disease diagnosis, treatment and reporting (American College of Physicians, 2006; M’Ikanatha, Lautenbach, Kunselman, Julian, Southwell, Allswede, et al., 2003; Woods, McCarthy, Barry & Mahon, 2004). Furthermore, family physicians, given their familiarity and possible close relationship with their patients, may serve as valuable sources of information and treatment at times of sickness (Stein, Tanielian, Ryan, Rhodes, Young & Blanchard, 2004). In some instances, these physicians may even be the primary source of emergency medical care (Marshall, Begier, Griffith, Adams, & Hadler, 2005; Quinn, Thomas & McAllister, 2005).

Case-based research and anecdotal evidence highlight the valuable role both emergency and primary care physicians undertake during times of crisis (American College of Physicians, 2006; American College of Emergency Physicians, 2006; College of Family Physicians of Canada, 2005; RAND Corporation, 2006; Wray & Jupka, 2004). For example, during the fall 2001 anthrax attacks, private (family)

physicians emerged as a key source of health information. Quinn et al. (2005, p. 210), in focus groups with postal workers employed at facilities contaminated by anthrax, found that many consulted personal physicians when “making health and safety decisions.” This parallels work by Stein et al. (2004), which found that Capitol Hill and Washington D.C. postal employees relied heavily on their private physicians in deciding whether to adhere to prophylactic antibiotics. Similarly, in survey research on public perceptions of smallpox, Marshall et al. (2005) found a strong public preference for emergency and family physicians as treatment sources.

For similar reasons, nurses and paramedics are also valuable healthcare professionals. Although emergency physicians are often the first to diagnose and treat patients upon arrival at hospital, paramedics are often true first responders, arriving on the scene to treat and stabilize victims (Markenson, Reilly, & DiMaggio, 2005, for example). In addition, nurses are important sources of patient care and physician assistance. In particular, the nurse practitioner – who can provide basic care without physician supervision – has emerged as an important resource in instances of limited physician availability (Chang, Hawkins, McGirr, Fielding, Hemmings, O’Donoghue et al., 1999; Tye, 1997). Furthermore, research has focused on the potential role of nurses in responding to infectious disease outbreaks such as bioterrorism, not to mention actual examples in which nurses found themselves on the front lines of major public crises (e.g., SARS in 2003) (Guillon, 2004).

Taken together, these groups of healthcare workers are vital sources of medical care. However, their positions put them at risk for the very diseases they aim to treat (American College of Physicians, 2006; Henderson, 1999). During the 2003 SARS outbreak and the 1918 influenza pandemic, for example, healthcare workers accounted for a significant portion of the dead and incapacitated (Bartlett, 2006; Guillon, 2004; Schoch-Spana, 2000). Their conspicuous absence can hinder an effective health

response. They also risk spreading disease to patients and colleagues (Carman et al., 2000; King et al., 2006; Pearson et al., 2006; Simeonsson et al., 2004). Therefore, it becomes especially crucial that they take all necessary protective measures, including receiving vaccines where recommended.

### ***Strategies for increasing immunization rates among healthcare workers***

Currently, healthcare workers are not required to receive an influenza vaccine. Moreover, facilitating higher immunization rates is difficult (Finch, 2006). Campaigns to immunize healthcare workers against other diseases have encountered similar challenges. For example, shortly after the September 11<sup>th</sup> attacks, President George W. Bush initiated a voluntary smallpox vaccination program for all healthcare workers, with the goal of immunizing 500,000 individuals (Bartlett, Borio, Radonovich, Mair, O'Toole, Mair, et al., 2003). Although the program was voluntary and research suggested many workers were willing to be vaccinated (Yih, Lieu, Rego, O'Brien, Shay, Yokoe, et al., 2003), rates varied tremendously by state and region, with some health facilities (e.g., hospitals) and individuals refusing to participate. By week 10 of the program (April 4<sup>th</sup>, 2003), only 6 percent of the 500,000 workers had been immunized. Several obstacles affected progress – the heavy demands the program placed on CDC and other agencies, healthcare providers' reluctance to receive a vaccine that had not been administered in the U.S. since 1972, and hesitation on the part of local/state health departments and hospitals to participate (US Government Accountability Office, 2003).

Despite these experiences, CDC has proposed a number of strategies for increasing influenza vaccination rates among healthcare workers. From a supply-side perspective are recommendations for increasing the availability of vaccines and offering them at free or reduced prices. From a demand-side perspective are recommendations related to the following:

- Framing vaccination as an ethical responsibility (“do no harm”), in which healthcare workers are obliged to do everything possible to safeguard their own health and the health of their patients (Backer, 2006; Poland et al., 2005; Rea & Upshur, 2001).
- Stressing that the vaccination is safe and effective (Backer, 2006).
- Emphasizing the cost-effectiveness of vaccination - “[Healthcare] facilities are almost always short-staffed and short-bedded during the influenza season, so it is clearly to employer’s benefit to keep their employees in healthy, working condition [via vaccination] (Backer, 2006, p. 1145).

***Vaccine risk communication: Towards a focus on vaccine behavior***

Risk communication is a social science discipline that focuses on disseminating information about perceived hazards in times of stress, crisis or emergency (Morgan, Fischhoff, Bostrom & Atman, 2002). The aforementioned demand-side strategies for increasing vaccine uptake imply a strong role for risk communication in persuading individuals to be immunized. Pearson et al. (2006, p. 2) state that vaccine risk communication involves information “regarding the benefits of influenza vaccination and the potential health consequences of influenza illness for [healthcare workers] and their patients, the epidemiology and modes of transmission, diagnosis, treatment, and non-vaccine infection control strategies, in accordance with their level of responsibility in preventing health-care-associated influenza.”

However, communicating about vaccination is a challenging proposition. First, it is a decision involving both individual and societal considerations. It provides a clear benefit to the individual (avoiding disease) and an even larger, abstract benefit to society (preventing disease transmission to others). However, communicating about abstract benefits that extend beyond the individual (patient health, in the case of influenza vaccination) is notoriously difficult (Kahlor, Dunwoody, Griffin &

Neuwirth, 2006). Second, communication is more than just providing information; it also involves developing messages that address salient beliefs and attitudes. To change behavior, communicators must understand what informs such behavior in the first place. To affect risk decisions, one must understand how they are made. Education is not akin to persuasion. Instead, just as public relations and marketing stress the importance of ‘knowing your audience,’ so too should risk communication develop more effective messages that address the salient attitudes of healthcare providers. Specifically, this involves exploring the theoretical determinants of vaccine behavior and decision-making.

***Ethics of persuasion: The complex nature of vaccination***

The attention afforded to influenza vaccination among healthcare workers is indicative of the status immunization has gained in our society. It has emerged as a powerful social norm, as well as a cornerstone of preventive medicine. Consequently, arguing in favor of increasing rates is not a simple open and shut case. Despite the problems associated with low rates and the efficacy of immunization, there are also ethical considerations that must be addressed. Adding communication to the mix only complicates things further.

Ethical issues arise whenever risk communication is used to facilitate behavior change (Bostrom & Lofstedt, 2003; McComas, 2006). As a result, this thesis is placed in a difficult position: arguing in favor of vaccine communication while also acknowledging its potential limitations. However, it argues that these challenges are not an excuse for inaction. The risks associated with low vaccination rates among healthcare workers are clear. Vaccine communication has an important role to play, so long as it acknowledges and respects these challenges. This section briefly summarizes some of the more notable issues at stake.

Perhaps the biggest challenge relates to personal freedom - the right of the individual to choose vaccination versus the 'public good' immunization provides (e.g., protecting patient health) (Clements & Ratzan, 2003; Petts & Neimeyer, 2004). How can we aim to both protect public health and safeguard personal choice? Moreover, some may view persuasion as a thin-veiled attempt at coercion. Bostrom and Lofstedt (2003), for example, warn that well-intentioned communication efforts designed to reduce health risks may run into trouble if they are seen as infringing on personal liberties. They observe that "it is all too easy to lose civil liberties and equal treatment of citizens in our eagerness to reduce risks" (p. 243).

Another issue relates to policy. Currently, neither influenza vaccine nor any other immunization is mandatory for healthcare workers. Is communication a precursor to mandatory vaccination? Should this approach be considered? What are the advantages and disadvantages? How should communication fit into this debate? Is it a strategy to persuade or a method to ensure compliance? A related concern, moreover, is that a focus on vaccine communication may distract attention from other potentially effective strategies, such as increasing vaccine supply and improving access. Communication may indeed change behavior, but if people demand a vaccine that is not readily available, the benefits are not realized. In addition, there is concern that increasing rates among healthcare workers neglects focusing on other, equally at-risk groups (such as the elderly and children) (Finch, 2006).

Lastly are potential interpersonal implications. For example, how might persuasion impact healthcare worker-supervisor relations? If vaccination has truly become part of the medical institution's fabric, how should individuals who decline it be treated? Is their refusal part of the process of individual choice, or are they violating an unwritten norm?

### ***The threat of pandemic influenza: Why vaccination matters***

Low vaccination rates among healthcare workers present challenges that extend beyond yearly influenza epidemics. They can also impact ongoing preparedness efforts related to a potential influenza pandemic.

#### *The specter of a pandemic*

Influenza pandemics are rare occurrences. Unlike the viruses that cause seasonal flu outbreaks and which change relatively little from year to year (via a process called antigenic drift), pandemic strains occur as a result of significant changes in the structure of the influenza virus (known as antigenic shift) (Bartlett, 2006). In antigenic shift, the surface proteins of the influenza virus are significantly altered so as to impede the body's immunological response. Moreover, while residual immunity may persist in regards to epidemic strains (by virtue of the limited genetic change they undergo), people are unlikely to have appreciable immunity to a pandemic virus (Bartlett, 2006; Kilbourne, 2006). As a result, these viruses can be extremely virulent and infect a greater proportion of the population, when compared to epidemic strains.

In modern times, flu pandemics have occurred in 1918, 1957, and 1968 (Kilbourne, 2006; Taubenberger & Morens, 2006). The pandemic of 1918 (so called "Spanish flu") is considered the greatest single disease outbreak of the 20<sup>th</sup> century, involving 500 million infections (half the world population), 20-50 million deaths, and widespread political, social and economic upheaval (Bartlett, 2006; Hoffmann & Perl, 2005; Kilbourne, 2006; Schoch-Spana, 2000; Taubenberger & Morens, 2006). In light of this severity, influenza 1918 has become the model against which current pandemic planning efforts are based (Bartlett, 2006).

A future pandemic is considered inevitable, but determining time, location and severity is impossible (Bartlett, 2006). Bartlett (p. 141) notes that "the problem for planners is that a pandemic like that of 1918 has unimaginable consequences, and yet

we can't calculate its probability.” However, it is feared that the current H5N1 avian influenza outbreak among poultry (and some individuals) in Asia, Africa, and Europe may represent the beginnings of the next pandemic (CDC, 2006c, United States Department of Health and Human Services [DHHS], 2006a; Fauci, 2006; World Health Organization [WHO], 2006a). Currently, the H5N1 strain has infected millions of domestic and wild birds and led to the destruction of millions of additional commercial fowl (Fauci, 2006). Although human cases are significantly fewer, the mortality rate is exceptionally high. As of December 2006, there had been 258 reported human cases and approximately 154 confirmed deaths (WHO, 2006b). This mortality rate of >50% is more than 500 times greater than that of seasonal flu (< 0.1%).

Planning for avian influenza, as well as a future pandemic, is ongoing on both the international and domestic levels. For example, CDC has recently published guidelines related to non-medical interventions for a potential pandemic (i.e., quarantine, isolation, closing public facilities, etc.) (CDC, 2007). Also, DHHS released its draft *National Implementation Plan for Pandemic Influenza* in November 2005 (DHHS, 2006b). This plan outlines the federal government's responsibilities at various stages of a pandemic. These stages reflect the current location, transmissibility, and virulence of a pandemic virus. Similarly, the World Health Organization (WHO) released an updated version of its *Global Influenza Preparedness Plan* in 2005.

Both plans provide varying estimates of the severity of a pandemic. Scenarios range from relatively mild to severe. The DHHS plan outlines two possible scenarios within the United States (DHHS, 2006b). The first (termed “moderate effects”) assumes 90 million cases (30% attack rate amongst the population), as well as 45 million outpatient medical care requests (50% of those infected), 865,000 in-patient

hospitalizations and 209,000 deaths. The second (“severe – 1918 like”) involves the same level number of cases and outpatient care requests but 9.9 million hospitalizations and 1.903 million deaths.

Worldwide, according to the WHO plan, the death toll could range from 2-7.4 million, with 134-233 million outpatient medical visits and 1.5-5.2 million hospitalizations (WHO, 2006b).

#### *Vaccination and pandemic response*

A pandemic of even mild form would present numerous challenges related to vaccination (American College of Physicians, 2006; Bartlett, 2006; Gronvall & Borio, 2006; King, 2005; Taylor & Faden, 2003). When would a viable vaccine become available? Who would produce it? Which groups of people would receive it if supplies were scarce? Most experts agree that healthcare workers would be near the top of vaccine priority lists (Emanuel & Wertheimer, 2006). Bartlett (p. 143) notes that “caring for victims of an influenza pandemic will endanger healthcare workers....[they] and their families need to receive the highest priority for vaccination, assuming a vaccine exists.” However, one question remains: Would healthcare workers be willing to be immunized, given the uncertainties of a pandemic, past experiences with immunizing workers against other infectious diseases, and low vaccination rates for annual influenza epidemics?

#### ***Thesis overview***

Provider-patient transmission of influenza in care settings, coupled with the low vaccination rates within this group, represent two potent public health challenges. Clearly there is no magic formula for increasing immunization rates. Only a combination of strategies would potentially work - increasing vaccine supply (e.g., the amount produced by pharmaceutical companies), lowering barriers to access (e.g., making the vaccine more available at care locations), reducing or eliminating costs

and providing information on the benefits of immunization for both provider and patient. However, vaccine communication can only be effective if it addresses the beliefs and concerns workers have about the vaccine. To change behavior, one must first understand it. This thesis uses health behavior theory to outline a strategy for effective vaccine communication with healthcare workers. Through interviews with various groups of workers, it highlights common reasons for vaccine acceptance/refusal, important vaccine sources and how immunization information is interpreted. Theoretical implications regarding health behavior and practical recommendations regarding influenza vaccination are both discussed.

Chapter 2 provides general theoretical background on the role of communication in facilitating behavior change. Chapter 3 outlines the specific health behavior framework used in this research. Chapter 4 discusses methods used to collect data, while Chapter 5 presents results related to vaccine beliefs, sources and information evaluative behaviors. Finally, Chapter 6 provides commentary on these findings, relating them to previous research on vaccine communication and health behavior theory. The chapter concludes with theoretical and practical implications.

## CHAPTER 2

### THEORETICAL PERSPECTIVES ON VACCINE BEHAVIOR

If receiving (or declining) the influenza vaccine can be considered a health behavior, then applying theoretical frameworks that integrate behavioral determinants would be most appropriate in developing effective risk communication strategies.

This chapter:

- outlines the relationship between health behavior and risk communication;
- argues that providing risk information alone is not sufficient to encourage changes in vaccine behavior;
- provides a brief overview of major health behavior theories that are relevant to this issue.

Throughout this chapter, special emphasis is given to the role of risk information seeking and processing in shaping vaccine behavior.

#### ***Health behavior and risk communication***

Using risk communication to persuade people to voluntarily change their behavior is not a novel concept. Numerous health behavior theories within psychology, sociology, and communication provide guidance on how this can be accomplished (Neurwirth, Dunwoody & Griffin, 2000). Neurwirth et al. (p. 722) observe that “health and risk communication researchers have employed a variety of behavioral models, often borrowing from ancillary fields such as public health and cognitive and social psychology.” Such frameworks include the Health Belief Model (Becker, 1974), Protection Motivation Theory (Rogers, 1983), Extended Parallel Process Model (Witte, 1992, 1994, 1997; Witte, Cameron, Lapinski, & Nzyuko, 1998), Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1981) and the Heuristic-Systematic Model (HSM) (Eagly & Chaiken, 1993). Although similar in many respects, these

frameworks differ “in their choice of and emphasis on the principle variables used to explain behaviors” (Neuwirth et al., 2000, p. 722).

### ***Communicating about vaccination: Beyond information***

Communicating with healthcare workers about vaccination involves providing facts that, hopefully, will bring about a desired effect (i.e., greater vaccine uptake). However, risk communication is said to suffer from two fundamental, related problems in this area. First is the implicit assumption that providing information alone will lead to behavior change. However, risk communication researchers caution that it is dangerous to assume that “information ‘does’ something to individuals” (Griffin, Dunwoody & Neuwirth, 1999, p. S230; Johnson, 2005). Similarly, educating people is not synonymous with persuasion (Chess, 1998). Instead, the audience exerts considerable influence over a communication interaction, in terms of the degree to which they attend to, and interpret, the information provided (Bauer, 1971).

Second is the assumption that risk information affects all individuals equally, in terms of producing a desired effect. Within the risk communication field, considerable emphasis has been placed on audience segmentation. However, the view persists that within each audience group, people will react to risk information in similar ways. However, risk researchers caution against this belief and argue that peoples’ responses to risk information are as diverse as the perceptions, values, beliefs, and attitudes that inform them. This diversity may be the result of individual differences (such as age and sex) (Grunig, 1997), as well as one’s social interactions (e.g., membership in a social network) (Scherer & Cho, 2003).

Despite these challenges, risk researchers stress that information can be a catalyst for behavior change; what is needed are methods for “exploring the intention and behavior of the audience” (Bauer, 1971, p. 345). Similarly, Griffin, Neuwirth, Dunwoody, and Giese (2004, p. 24) observe that “to develop a truly useful

understanding of the role and effects of risk communication, researchers and practitioners must pay more attention to the communication and information-evaluative behaviors of audiences for risk messages.” This involves careful attention to the determinants of health behavior.

Understanding health behavior can assist in developing risk communication strategies that are more attune to peoples’ beliefs and attitudes and which may (as a result) be more successful in facilitating behavior change. It comes as no surprise, therefore, that this approach has been advocated as part of vaccine risk communication involving healthcare workers (Manuel et al., 2002). Among the important questions that need answering: How do healthcare workers make decisions regarding personal influenza vaccination? What criteria inform these choices? Fortunately, research has begun to answer these questions.

***Influenza vaccine behavior and healthcare workers: What we currently know and what’s left to discover***

Considerable research exists on why healthcare workers do (or do not) receive a yearly influenza vaccine. This research parallels similar work on patient adherence to health recommendations (DiGiovanni, Conley, Chiu, & Zaborski, 2004; Halliday et al., 2003; Heininger et al., 2003; Jones, Ingram, Craig, & Shaffner, 2004; Lester et al., 2003; Manuel et al., 2002; Martinello et al., 2003; Murray & Skull, 2002; Stein et al., 2004; Steiner et al., 2002).

First, vaccine decisions appear to be made irrespective of knowledge about either the disease or the vaccine itself. For example, Manuel et al. (2002, p. 610) note that, in their sample of Canadian healthcare workers, “knowledge of vaccine side effects was the same for both vaccinated and unvaccinated staff members.” However, other studies suggest that knowledge is (slightly) positively correlated with vaccine uptake (Martinello et al., 2003). Second, vaccinated individuals tend to share the following

beliefs that factor into their decision (Backer, 2006; Heininger et al., 2003; Hoffmann & Perl, 2005; Lester et al., 2003; Manuel et al., 2002; Martinello et al., 2003; Steiner et al., 2002; Tapiainen et al., 2005):

- the vaccine prevents influenza;
- past experience with contracting influenza and the desire to avoid re-infection;
- getting vaccinated will enable one to avoid missing work;
- convenience of getting vaccinated;
- vaccination will not cost anything;
- a desire to protect oneself and one's patients from illness.

Third, non-vaccinated individuals tend to share largely different beliefs (see aforementioned citations):

- one is too busy to be vaccinated;
- it is inconvenient to get vaccinated;
- a fear of vaccine side effects; concern that one could contract influenza if vaccinated;
- lack of confidence in the ability of the vaccine to prevent influenza;
- getting vaccinated will be painful (e.g., fear of needles);
- perceived low risk of contracting influenza;
- other measures (hand washing, homeopathic remedies, etc) are more effective.

However, despite the breadth of data discussed here, little attention has (to date) been given to describing these beliefs in greater detail. How are they formed? Can they change over time? How? This thesis begins to answer these questions.

### ***Understanding health behavior: The role of information seeking and processing***

This thesis explores the relationship between risk information seeking and processing and vaccine behavior in healthcare workers (specifically, beliefs, attitudes, and intentions). Information seeking and processing are the central variables in

several important health behavior theories, including the ELM (ELM) (Petty & Cacioppo, 1981) and HSM frameworks (Eagly & Chaiken, 1993; Kahlor, Dunwoody, Griffin, Neuwirth, & Giese, 2003; Trumbo, 1999, 2002). These theories are relevant for several reasons:

- Effective communication with healthcare workers is predicated on an understanding of how they seek and process vaccine-related risk information (or simply vaccine information).
- Previous research on vaccine beliefs can be applied to these frameworks.

Research on risk information seeking and processing and health behavior involves a rich theoretical tradition, beginning with early work on persuasive communication (Petty & Cacioppo, 1981). This seminal research first explored how attitudes about issues are developed, modified, and reinforced over time, with implications for the efficacy of persuasive messages. Subsequent research applied these concepts to health behavior. This research has implications for ongoing and future vaccine risk communication strategies for healthcare workers. By understanding how personal vaccine decisions are made, and what informs these choices, health officials can develop more effective and targeted communication interventions. The following sections provide an overview of the aforementioned behavior theories.

***Theoretical background: Information seeking and processing, and health behavior***

Health behavior theories that emphasize the role of information seeking and processing are based around the concept of *dual processing* of information. Dual processing operates on the following assumptions: First, there is nearly an infinite amount of information and stimuli in the surrounding world. Second, people cannot attend to all this information with equal cognitive effort. Third, there are two principal ways people can perceive, interpret, and react to information - one 'superficial' and the other 'in depth.' Fourth, people are 'cognitive misers,' in that they will prefer

‘superficial’ methods unless otherwise motivated. Finally, both methods exert powerful influences on one’s behavior.

*Systematic vs. heuristic processing*

The ELM framework (Petty & Cacioppo, 1981) was developed over two decades ago as one of the first dual processing models. ELM was designed to explore “two distinct routes to attitude change” as they relate to persuasive messages (p. 255). These routes were termed the *central* and *peripheral* routes. When processing via the central route, one concentrates specifically on the content of a persuasive message. Petty and Cacioppo (p. 256) observe that, under such circumstances, “the message recipient attends to the message arguments, attempts to understand them, and then evaluates them...the person then integrates all of this information into a coherent and reasoned position.”

By contrast, the peripheral route involves less reliance on what is said and more on *how* it is said (e.g., message style, presentation format, etc). Petty and Cacioppo (p. 256) state that when processing peripherally, attitude change is determined by such factors as “the rewards or punishments with which the message is associated, or judgmental distortions that take place, or the simple inferences that a person draws about why a speaker advocated a certain position.” However, the authors are careful to note that these differences do not make one route more rational (and thus better) than the other. Instead, “the differences...[have] to do with the extent to which the attitude change that results is due to active-thinking about either the issue or the object-relevant information provided by the message” (p. 256).

The HSM approach (Eagly & Chaiken, 1993; Kahlor et al., 2003; Trumbo, 1999, 2002) modified and renamed the central and peripheral routes. What followed was *heuristic processing* (less ‘thoughtful’) and *systematic processing* (more ‘thoughtful’). According to the model, when people process information systematically, they “are

said to ‘exert considerable cognitive effort...[and] actively attempt to comprehend and evaluate the message’s arguments’” (Kahlor et al., 2003, p. 356). Johnson (2005, p. 632) likewise argues that systematic processing “is deliberative, attends to detail, weighs alternative views, and assesses argument quality in judging the validity of persuasive messages.” By contrast, heuristic processing involves the investment of “comparatively little effort...[and] may rely on (typically) more accessible information, such as a source’s identity and other non-context cues” (Kahlor et al., 2003, p. 356).

*What motivates information processing?*

Both ELM and HSM argue that people’s ‘default style’ of information processing is the heuristic (or peripheral) route; they must be *motivated* (in some way) to engage in systematic (or central) processing (Johnson, 2005). ELM, for example, states that this motivation involves the *personal relevance* of the message, as well as the *ability* to process the information contained therein. Does the information discuss an issue (or perspective) that one considers of high consequence or value? How this question is answered directly informs the type of processing method used:

The primary determinant of attitude change when a persuasive communication is presented depends on whether the issue under consideration is of high or low personal relevance....under high relevance, factors central to the issue are more important; under low relevance, peripheral factors become more potent. (Petty & Cacioppo, 1981, p. 259)

Similarly, ability also determines the type of method. For example, if a person finds an issue personally relevant, but lacks sufficient knowledge or familiarity to think about it via the central route, then the peripheral route is preferred. Petty and Cacioppo (p. 265) write that “if the message is incomprehensible...or if the person has

no schema or framework for relating the message to his or her existing beliefs, then no processing can occur, even if sufficient motivation was present.”

Like ELM, HSM relies on motivation as the determinant of information processing. However, HSM provides slightly different conceptual definitions, perhaps the most-researched of which is *perceived information sufficiency*. Kahlor et al. (2003, p. 358) observe that “the sufficiency principle states that individuals will continue to actively engage in [systematic] processing until they have reached the depth or breadth of understanding that they perceive to be necessary.” In other words, the wider the gap between *perceived* knowledge and the *desired* knowledge about a given issue, the greater the amount of systematic processing that will occur for issue-specific information. This continues (at least theoretically) until the desired amount of knowledge is attained.

*Information processing, beliefs, attitudes, and behavior*

Although the aforementioned theories provide slightly different views on information processing and motivation, they all tend to share one important premise: that the method of information processing directly influences one’s response to a message, including behavioral attitudes and beliefs. Given that both are important elements of the decision-making process (Griffin et al., 1999), this relationship speaks directly to how people make risk-related judgments and form behaviors.

Johnson (2005, p. 631), for example, observes that “different patterns of information processing affect responses to persuasion or other messages.” Similarly, Petty and Cacioppo (1981, p. 266) argue that processing information via the central route produces “enduring attitude change” that is more resistant to future persuasion. Similarly, they also state that “if the new attitude results from effortful issue-relevant cognitive activity (central route), the new attitude is likely to be relatively enduring...but if the new attitude results from various persuasion cues in the situation

(peripheral route), the attitude change is likely to exist so long as the cues remain salient” (p. 266). Moreover, Kahlor et al. (2003, p. 355) observe that “the kind of information processing people employ might eventually affect their behaviors, both in terms of...stability over time...and in terms of the goodness-of-fit between their attitudes and behaviors” (Kahlor et al., 2003, p. 355).

From a risk communication perspective, people’s attitudes and behaviors are difficult to change once they have made up their minds. The aforementioned relationships posited by the HSM and ELM models challenge risk communicators to develop a clearer understanding of how risk decisions are made and risk behaviors formed, as a way to develop more effective risk messages and communications strategies. The next chapter outlines how this can be accomplished in regards to influenza vaccination and healthcare workers.

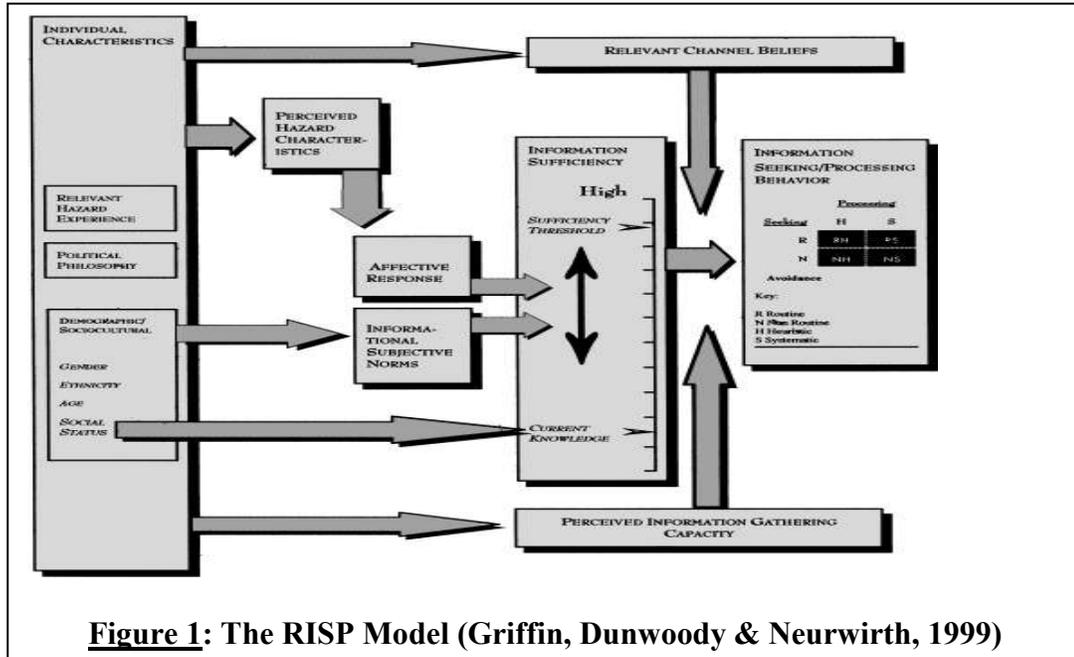
CHAPTER 3  
APPLYING A MODEL OF RISK INFORMATION SEEKING AND PROCESSING  
(RISP) TO UNDERSTANDING VACCINE BEHAVIOR IN HEALTHCARE  
WORKERS

*Overview of the RISP model (see Figure 1, next page)*

Chapter 2 provided an overview of dual processing research as it relates to health behavior. This thesis applies a more contemporary model of risk information seeking and processing (RISP) to understanding how healthcare workers make personal influenza vaccine decisions (Griffin et al., 1999; Griffin, Neurwirth, Giese & Dunwoody, 2002; Griffin et al., 2004; Kahlor et al., 2003; Novotny, Clark, Griffin & Booth, 2000). The RISP model offers several important advantages:

- (1) It emphasizes information seeking and processing and the development of *health* behaviors (as opposed to attitudes towards persuasive non-health messages).
- (2) It focuses not only on determinants of health behavior but also what informs these determinants.
- (3) It has received strong empirical support in a number of risk contexts, including fish consumption behavior (e.g., how people decide whether and how much fish to eat from potentially contaminated sources) (Griffin et al., 2004) and floodwater risks (e.g., how people decide whether and how much they should pay for strategies designed to control flooding) (Novotny et al., 2000).

This research uses the RISP model to explore vaccine behavior in healthcare workers. Specifically, it seeks to test for hypothesized relationships between information seeking and processing, beliefs, attitudes, and behavioral intentions.



In speaking to previous work with the model, it also argues the following:

- Information seeking and processing influence the number of beliefs one considers in deciding whether to adopt a particular behavior, as well as the strength which with they are held.
- Behavioral beliefs factor into one’s attitudes and can increase (or decrease) the likelihood of performing the behavior.

This thesis argues that the RISP model is an important part of the process of understanding influenza vaccine behavior in healthcare workers and, by extension, improving vaccine risk communication.

Griffin et al. (1999, p. S230) originally proposed the RISP model as a framework that “focuses on characteristics of individuals that might predispose them to seek and process information about health in different ways.” The authors argue that the model can help risk communication researchers and practitioners “better understand individuals’ use of information in risky situations” (Griffin et al., 2004, p. 23). The

model focuses on several areas, including: determinants of information seeking and processing, factors associated with these determinants, and the relationship between information processing and behavior.

Despite similarities shared with previous dual processing theories – specifically, the HSM and ELM frameworks - Johnson (2005) argues that the RISP model operates in a greater variety of contexts. For example, ELM explores how people attend to and interpret persuasive messages directed at them. The RISP model, on the other hand, “is concerned more with chronic responses to information, including information that is not necessarily directed specifically towards its users, nor intended to be persuasive” (p. 634). This observation is particularly important when focusing on influenza vaccination. In addition to materials provided by CDC and other organizations, healthcare workers undoubtedly encounter information from other sources that likewise factor into their vaccine decision. These sources may not necessarily be persuasive in nature. Collectively exploring the influence of these information sources on behavior, and the implications for vaccine risk communication, is essential.

#### *Information seeking and processing – Conceptual definitions*

The RISP model’s definitions of systematic and heuristic processing mirror those of the ELM and HSM approaches. Those who process information *systematically* devote more cognitive effort to understanding messages. Specifically, they “actively attempt to comprehend and evaluate the message’s arguments” (Kahlor et al., 2003; p. 356). Systematic processing is most likely to occur when information is perceived as personally relevant or important (the RISP model defines this as *information sufficiency*). In other words, if information sufficiency is low and one does not feel that s/he has enough information to make a decision about the issue, one may systematically process issue-relevant information when encountered.

By contrast, those who process information *heuristically* are more likely to “rely on (typically) more accessible information, such as the source’s identity and other non-content clues” (p. 356). This type of processing involves less attention to actual message content and a greater focus on other aspects, such as message presentation and attitudes towards the source (e.g., perceived trustworthiness or credibility).

Regarding information seeking, the RISP model assumes that people use a variety of mass and interpersonal sources when searching for, and processing, issue-relevant information. These sources can be broadly defined as routine (e.g., used on a regular basis) or non-routine (used infrequently, or not at all). Whether one decides to use routine or non-routine sources depends on the *style* of information seeking that is occurring. *Passive seeking* is associated with routine source use. In this scenario, individuals are not searching for information but merely encountering it as a result of habitual source use. An example would be reading the newspaper each morning at breakfast. By contrast, *active seeking* is associated with non-routine source use. Unlike its counterpart, active seeking is a “goal-driven behavior” – one is searching for information to achieve a particular objective (Kahlor et al., 2006, p. 168). As such, all sources (including non-routine channels) are in play.

Whether one actively or passively seeks information depends on the degree of motivation. Motivation, in turn, could be comprised of any number of factors. However, from the RISP model’s perspective, information sufficiency is a key determinant, in that higher levels of *insufficiency* makes one more likely to actively seek information via non-routine sources. Lower levels decrease the likelihood of non-routine seeking.

Information seeking and processing form a nexus, in that heuristic and systematic processing can occur regardless of whether risk information is actively sought via non-routine sources or passively encountered via routine sources. Specifically, if

information seeking and processing were plotted on a 2 (routine and non-routine) by 2 (heuristic and systematic) matrix, 4 combinations would result. Routine/heuristic is probably the most common (“individuals...superficially attend to risk messages they encounter through habitual use”), while non-routine/systematic is probably the rarest (“individual expend extra effort to go beyond their routine information channels...whose message they plan to process...critically”) (p. S238).

*What influences heuristic vs. systematic processing?*

The RISP model outlines several determinants of heuristic and systematic processing. The primary factor is *information sufficiency*, defined as “a person’s sense of how much information he or she needs to cope with a risk,” in terms of being able to make an informed decision about it (Griffin et al., 2004, p. 23). Information sufficiency is comprised of two elements - one’s desired level of knowledge and one’s actual (or perceived) level of knowledge. The model predicts, and research supports, that higher levels of information insufficiency (i.e., a greater gap) is a driving force behind systematic processing of issue-related information. In other words, people who perceive a need for more information are more likely to seek and process it in a ‘thoughtful’ manner than those who feel that their current level of knowledge is sufficient.

However, information sufficiency only goes so far. It can only predict *whether* systematic or heuristic processing will occur. Other factors in the model help predict *the extent* to which each will occur, including *relevant channel beliefs* and *perceived information gathering capacity*. Relevant channel beliefs are one’s perceptions of a particular information source. Is it trustworthy? Does it provide useful information? Also, perceived information gathering capacity is defined as one’s perceived ability to find information about the issue if so desired.

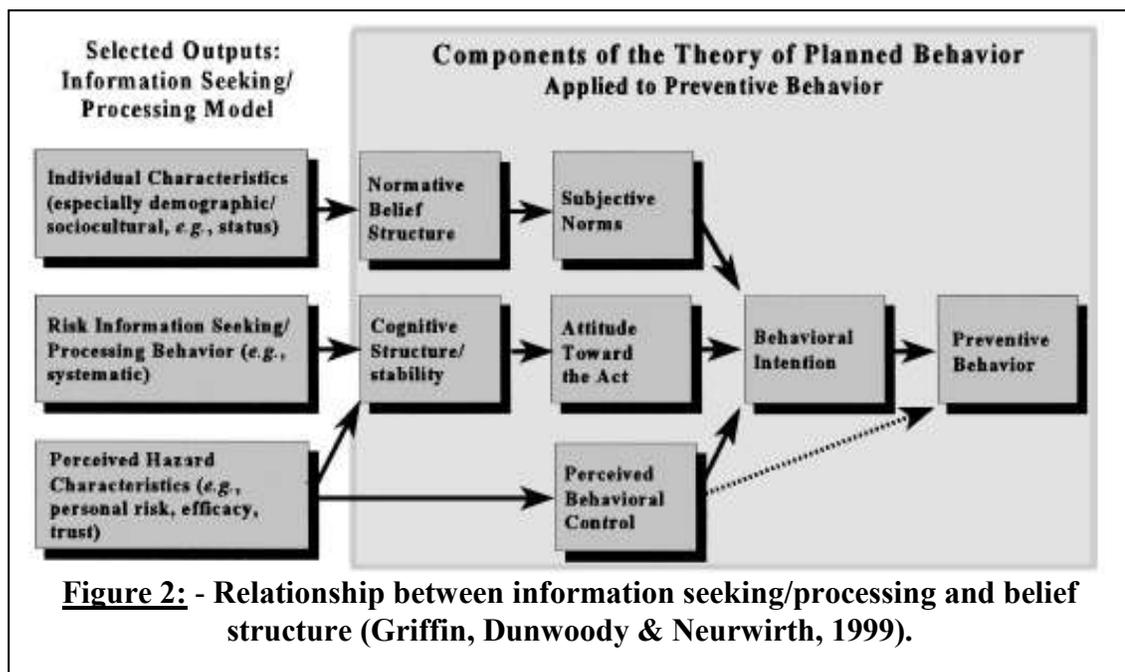
### *Information sufficiency – determinants*

The RISP model proposes that *affective response to a hazard* and *information subjective norms* influence one's perceived sense of information sufficiency. Griffin and colleagues posit that if one feels worried about an issue and/or believes that others important to them expect them to remain informed about it, they are more likely to perceive their current level of knowledge as inadequate. For example, in researching fish consumption behavior in the Great Lakes, Griffin et al. (2004, p. 46) found that “persons who were more worried about the risk and persons who perceived pressures from others to stay informed about the risk were more likely to believe that their current knowledge...was not sufficient to allow them to deal effectively with the risk in their daily lives.” The authors concluded that the results validated the model's view on the role of affect and information subjective norms in shaping information sufficiency. Moreover, it indirectly addressed the relationship between affect and information seeking. Given that information sufficiency, according to the model, is a key motivator for information seeking, increasing levels of worry indirectly influence seeking behavior – the more worry one feels about a risk, the less likely one is to consider current knowledge levels sufficient and the more likely one will be to seek information to achieve greater sufficiency levels. This finding parallels other research on the role of affect in facilitating information seeking behavior (McComas, 2006).

### *Information processing and behavior*

The final component of the RISP model integrates information processing with behavioral attitudes and beliefs. Specifically, the model combines HSM with the Theory of Planned Behavior (TPB) (Fishbein & Ajzen, 1975; Ajzen, 1988).

As shown in Figure 2, according to TPB, one's *actual* behavior is a product of one's *intention* to perform that behavior. Intention, furthermore, is influenced by three elements: attitudes towards a behavior, perceived behavior control and subjective norms.



Griffin et al., (1999, p. S239) believe that “some variables [in the RISP model] that might affect the precursors of risk information seeking and processing.....will also affect the performance of....behaviors.” In particular, three constructs from the RISP model are posited to influence the aforementioned TPB elements:

- Individual characteristics (demographics, socioeconomic status, social status, etc), which influence subjective norms. Specifically, the degree to which one considers him/herself part of a particular social group may influence the extent to which one believes that group has an influence on personal decision-making;
- Risk information/seeking, which influences attitudes towards a behavior;

- Perceived hazard characteristics (e.g., how personal one perceives the risk to be, experience with the hazard, etc), which influence perceived behavior control.

This thesis focuses specifically on information seeking and processing and their collective influence on behavior. TPB conceptualizes behavioral *attitudes* as consisting of one's *cognitive structure* towards a behavior. Cognitive structure, moreover, is comprised of *beliefs* regarding that behavior. Griffin et al., (1999, p. S240) observe that “a behavioral belief associates performance of the behavior with a specific outcome or attribute.” Healthcare workers undoubtedly hold numerous beliefs that either increase or decrease their likelihood of receiving influenza vaccine. Some of these beliefs are *enabling*, in that they make one more likely to get vaccinated (e.g., belief that the vaccine is safe and effective in preventing influenza). Others, however, are *disabling*, in that they make one *less* likely to receive the vaccine (e.g., belief that the shot will be painful; fear of needles; belief that it will take too much time to get vaccinated; or belief that the vaccine is not an effective method of preventing disease).

The RISP model proposes information seeking and processing as key determinants of one's behavioral beliefs and, by extension, attitudes and intentions. This relationship is based on the notion that beliefs are not static – they can change depending on, among other things, how risk information is sought and processed. Specifically, the model posits that when one processes issue-relevant information systematically, exposure to new messages may increase the salience of certain beliefs and/or may alter the strength of existing ones. These messages arise when routine sources are scrutinized more heavily, or entirely novel sources are consulted. In the case of influenza vaccination, for example, one may change his/her belief that the vaccine is not effective in preventing influenza after systematically processing

efficacy figures from a CDC pamphlet (perhaps a non-routine source) or newspaper article (perhaps a more routine source).

In total, Griffin et al. (1999, p. 241) observe, “The style of information seeking and especially processing that a person employs in regard to a risk affects (1) the number of beliefs people consider to be important to their judgments about performing the risk-related behavior and (2) the stability (resistance to change) of the beliefs.” This statement builds on arguments presented in the HSM and ELM frameworks - mainly, that information processing is correlated with attitude structure and stability.

In subsequent empirical research, Griffin and colleagues found support for these propositions:

- “Individuals who actively seek information about risk-related behaviors and who process these messages more intensively [systematic processing] will bring more behavior beliefs....to their judgments about performing the behavior” (p. 241).
- Systematic processing leads one to “ultimately develop attitudes and even behaviors in regards to the risk that are more resistant to change” (p. 233).

#### *Model applications and limitations*

The RISP model was originally designed as a framework for understanding determinants of health behavior. As such, it has been applied to several case studies. For example, Griffin et al. (2002, 2004) examined how residents of Milwaukee and Cleveland made decisions regarding consuming fish caught from the Great Lakes. This behavior involves potential exposure to environmental toxins within the fish (such as polychlorinated biphenyls – PCBs). It also has positive attributes (e.g., the nutrition fish provides).

In telephone surveys conducted in both cities, researchers tested the impact of individual worry/affect and social norms on perceived information sufficiency

regarding fish consumption (Griffin et al., 2004). They also explored the relationship between information processing and the number, and strength, of beliefs one considers in deciding whether to eat fish (Griffin et al., 2002). Empirical support was found for both propositions. First, the more worry one felt about eating fish and the more one believed that others wanted them to remain informed about fish consumption issues, the wider the observed gap between current and desired knowledge of the topic. Second, the more systematically one processed information about this issue, the greater the number and strength of beliefs one held in deciding whether or not to consume fish.

At the same time, however, these aforementioned studies relate to one noteworthy limitation of the model: *size*. Its comprehensive design makes empirical testing difficult, as not all components can be examined at one time. As a result, research has mostly tested individual components due to logistical constraints:

- antecedents of information sufficiency and their relationship to information seeking and processing (Griffin et al., 2004);
- information seeking and processing, and behavioral beliefs/cognitive structure (Griffin et al., 2002).

### ***Applying the RISP model to influenza vaccine behavior***

Low influenza vaccination rates among healthcare workers are both a public health challenge and risk communication opportunity. Vaccine communication strategies, if used, should be developed with an understanding of vaccine behavior determinants in mind: specifically, beliefs about vaccination and peoples' information evaluative behaviors (e.g., seeking and processing). The RISP model can assist in this process.

This thesis uses qualitative methods to explore vaccine behavior in healthcare workers. Through in-depth interviews, this research addresses the following goals:

- *Goal 1:* Provide preliminary data on the influenza vaccine behavior of healthcare workers within a suburban, upstate New York town (henceforth known as Town A).
- *Goal 2:* Discuss these data in relation to existing literature on vaccine behavior among healthcare workers.
- *Goal 3:* Develop measurements for relevant RISP model variables (information seeking, information processing, and behavior beliefs) as they relate to vaccination. These measurements may assist in future research on vaccine behavior within this particular group.
- *Goal 4:* Discuss theoretical and practical implications of this research.

### ***Research questions***

The following research questions were developed in reference to Goal 1. Goals 2-4 were designed to provide commentary on the implications of Goal 1 data.

- *RQ 1 (Belief structure):* What beliefs do healthcare workers hold in deciding whether to receive the vaccine? Why do they make these choices?
- *RQ 2 (Information seeking) -* How do healthcare workers seek vaccine information? Where do they look for it? What are their preferred sources (e.g., passive seeking)? If they had questions, where would they go (e.g., active seeking)? What are their attitudes towards these sources overall?
- *RQ 3 (Information processing) -* How do healthcare workers process information about influenza vaccination? In other words, how do they interpret the information they receive?
- *RQ 4 (Perceived information gathering capacity) –* Are healthcare workers confident in their ability to find vaccine information when needed? Why or why not?

Chapter 4 outlines the methods by which these questions were answered.

## CHAPTER 4

### METHODS

#### *Overview of research approach*

Research with the RISP model typically involves two phases – qualitative data gathering, followed by survey-based research. This thesis focuses on the first phase: using qualitative methods (e.g., in-depth interviews) to “gather information about various components of RISP and TPB [Theory of Planned Behavior] that [need] exploratory investigation, including participants’ self-reports of information processing activities and relevant, salient behavior beliefs” as they relate to vaccination (Griffin et al., 2002, p. 712; Griffin et al., 1999). By enabling individuals to describe health behavior in their own words, one can develop more accurate variable measurements.

It can be argued that existing variable measurements are sufficient for this research. However, health behaviors vary tremendously between contexts and audiences. First, behavioral beliefs regarding vaccination likely differ from those of fish consumption, as these two issues are inherently different. Whereas the latter is largely a personal choice (in that consuming fish provides benefits, and risks, that are confined to the individual – nutrition or possible illness), vaccination is a decision with both individual and societal implications. That is, an immunized person is not only avoiding illness themselves, but also preventing transmission of a disease to others. Likewise, when one is not vaccinated, they risk inadvertently spreading disease to close contacts. Second, what constitutes systematic versus heuristic processing may vary depending on the audience. For example, members of the public may evaluate risk information differently than healthcare workers (the former often the recipient of health information, the latter often the provider). Consequently,

several model variables (information seeking and processing and behavioral beliefs) are in need of further exploration.

### ***A mixed methods approach***

The nature of healthcare work presents challenges to any researcher seeking to collect data from medical providers. Time constraints are an especially formidable challenge. The fact that questions generated for this thesis were open-ended further complicated matters. As a result, a mixed method approach was used, involving in-person (in-depth) interviews, telephone conversations and a computer-based, online survey. Each individual could participate in the project via a method of his/her choice. Also, all questions (see section below on data collection) were similar across methods. Thus, interviewees interested in participating, but unavailable for an interview, could nonetheless have their perspectives heard.

Keyton (2006, p. 269) defines in-depth interviews as “a semi-directed form of discourse or conversation with a goal of uncovering the participant’s point of view.” Through mutual interaction, the researcher can more clearly understand interviewee views on the issue(s) of interest. These interviews have been used in previous research that has explored healthcare worker perceptions of and/or awareness about various health issues (Woods et al., 2004; M’Ikanatha et al., 2003; DiMaggio, Markenson, Loo, & Redlener, 2005).

The online survey was run through Qualtrics, an Internet-based data collection company (direct URL: <http://www.surveyz.com/TakeSurvey?id=54505&responseCheck=false>). Questions were listed verbatim and in the same order as the other methods. Participants also agreed to an online consent form. Most importantly, they did not have to complete the survey in one sitting; instead, they could save responses and return at their leisure.

Advantages aside, using mixed methods can also be troublesome, in that the researcher must acknowledge the inherent limitations of *each* method (i.e., potential recall bias for in-depth interviews, possibility that Internet communications may not be entirely secure, whether online surveys will yield as much open-ended data as an in-person conversation, etc). However, this thesis argues that – in such an instance as healthcare research – the advantages outweigh potential drawbacks.

#### *Research area*

This research involved structured interviews with healthcare providers in an urban, central New York town, population approximately 30,000 (town A). From a healthcare perspective, town A is served by a large medical center, a large university health center, a clinic at a smaller college, a local (county-level) Department of Health, several long term care facilities (including nursing homes), and a private ambulance service.

#### ***Validity and reliability: Two key methodological challenges***

Given its qualitative approach, this thesis needed to address concerns related to validity and reliability. How do these two concepts relate to qualitative inquiry? How are they defined? How can they be achieved? The literature suggests that there is no clear answer.

#### *Defining validity and reliability*

Reliability is defined as “the extent to which results are consistent over time [and whether] results can be reproduced under a similar methodology” (Golafshani, 2003, p. 598). Validity is the means to determine “whether the research truly measures that which [it] intended to measure.[as well as] how truthful results are” (p. 599). For many years, debate persisted as to whether validity and reliability even mattered in qualitative research, the belief being that it was too different to be bounded by such considerations (Golafshani, 2003). In a general sense, “unlike quantitative researchers

who seek causal determination, prediction, and generalization of findings, qualitative researchers seek instead illumination, understanding and extrapolation to similar situations” (p. 600). Morse, Barrett, Mayan, Olson and Spiers (2002, p. 2) note that “a number of leading qualitative researchers argued that reliability and validity were terms pertaining to the quantitative paradigm and were not pertinent to qualitative inquiry.”

However, recent arguments have centered on the applicability (indeed, necessity) of validity and reliability as part of qualitative research. Morse et al. (2002, p. 4) express concern that “by refusing to acknowledge the centrality of reliability and validity in qualitative methods, qualitative methodologists have inadvertently fostered the default notion that qualitative research must therefore be unreliable and invalid, lacking in rigor, and unscientific.” The issue then becomes how to develop effective methods for assessing validity and reliability in qualitative research.

#### *Combining validity and reliability*

A compelling case has certainly been made as to the applicability of validity and reliability to qualitative research. Exactly *how* to incorporate these two concepts, however, is another story. Lincoln and Guba (1985) propose combining the two into a single measure, which they call *trustworthiness*. Trustworthiness refers to data quality – that is, whether an observer is convinced that the “research findings are worth paying attention to” (Golafshani, 2003, p. 601). To enhance trustworthiness, the researcher must ponder one important question: Are the ‘realities’ of study participants (e.g., their views, perceptions, and attitudes) both adequately described (validity) and consistently represented across different settings or scenarios (reliability)?

#### *Separating validity and reliability*

However, others caution against this approach. Morse et al. (2002), for example, argue in favor of separating validity and reliability. They also propose new names for

each. For reliability, they substitute the term *dependability* - a process by which the researcher examines data collection methods and makes changes where appropriate to ensure consistent representation of participant realities. They state that “it is essential that the investigator remain open, use sensitivity, creativity and insight, and be willing to relinquish any ideas that are poorly supported regardless of the excitement and [their] potential” (p. 11).

Morse et al. also propose *verification* to replace validity – a process by which the researcher seeks to adequately represent the data gathered. Qualitative researchers inherently believe that interviewee attitudes, beliefs, and perceptions can be studied and represented if we know what to do, how to do it and where to look (Weiss, 1994). These realities are socially constructed by the individual – they already make sense to him or her. However, through careful analysis a researcher can also begin to ‘make sense’ of this reality and explain it to others (Weiss, 1994).

Morse et al. (2002, pp. 8-9) argue that the search for truth must be subject to verification, not only at the conclusion of research, but also throughout the data collection process: “there has been a tendency for qualitative researchers to focus on the tangible outcomes of the research rather than demonstrating how verification strategies were used to shape and direct the research.” Strategies include: researcher flexibility, methodological coherence, and an appropriate study sample, among others.

### ***Data collection overview***

Whether validity and reliability measures can (or even should) be combined depends very much on one’s belief as a researcher. This thesis argues for a hybrid approach, given its reliance on mixed methods. It acknowledges the strengths of separating validity and reliability (e.g., not assuming that having one present is sufficient for the other), as well as the benefits of considering the two mutually connected and able to yield consistent data.

### *Question development*

To achieve methodological coherence (e.g., methods that match research design), interview questions were derived from the aforementioned research questions. This was supplemented by reviewing existing literature on the RISP model, the Theory of Planned Behavior, and the Heuristic-Systematic Model. Conversations with some of the original RISP model developers (e.g., Robert J. Griffin) complemented these activities. The Cornell University Committee on Human Subjects (UCHS) reviewed and approved all questions (Protocol ID # 06-08-025). See Appendix A for the complete set of questions, as well as the UCHS approval letter.

### *Interviewee selection*

To ensure an appropriate sample, various groups of healthcare workers were invited to participate, including physicians (general practitioners, primary care practitioners and pediatricians), nurses, support personnel, public health professionals, and paramedics. The focus was on eliciting as diverse an array of perspectives on influenza vaccination as possible. Interview sites include university/college health centers, the Department of Health, a local ambulance service, and long-term care facilities.

For each research location, relevant supervisors and/or administrators were contacted and asked if their facility was interested in participating. These individuals were also asked if they personally wished to be interviewed. Once an interview was conducted at a location, snowball sampling was then used, by which individuals would recommend other colleagues to contact, either within or external to their own organization..

To help facilitate trust with all potential participants, a copy of the interview questions was forwarded ahead of time to those requesting an in-person or telephone interview. Participants were also provided with a link to the project website, which

itself allowed direct access to the online survey. They were also assured of confidentiality, as well as anonymity in any published materials.

#### *Data collection strategies*

Questions were asked in a set order, beginning with background demographic information (job title, description), followed by whether they receive the vaccine each year, reasons for acceptance/declination, types of information they receive about vaccination, and information processing strategies.

One variable deserves special attention. In discussing information processing strategies, the following approach was used. Each interviewee was shown a 1-page brochure about influenza vaccination and healthcare workers (see Appendix B). They were asked to read the brochure and self-report on what they thought of it, how they interpreted the information given and “what went through their minds” as they examined it. A follow-up question focused on how they tend to interpret other information they may receive about vaccination. This approach for developing measurements of information processing was similar to previous research with the RISP model. In addition, for the online survey, a separate link was provided to the brochure; the same questions were subsequently asked.

#### *Data collection timetable*

In-person and telephone interviews took approximately 20 minutes to complete and were tape recorded and transcribed to ensure information accuracy. Data collection took place from September 2006 through February 2007. To ensure data dependability and validity, transcripts were consistently reviewed throughout the collection process. Changes in question format and survey design were made based on emergent themes in transcripts, as well as direct interviewee suggestions. This approach reflects the fact that data analysis occurs throughout the research process, not just at the end of data collection (Morse et al., 2002; Weiss, 1994).

### ***Data analysis – Coding categories***

Data analysis involved identifying emergent themes across transcripts and organizing them into over-arching categories. Weiss (1994, p. 154) states that coding involves linking “what the respondent says in his or her interview to the concepts and categories that will appear in the report.” In some cases, categories are developed prior to actual coding; in others they emerge as part of the interview process.

This research involved pre-existing coding categories developed from the aforementioned research questions and literature review. The first two categories were background information on interviewees:

- *Interviewee demographics* (job affiliation, years in the healthcare field, etc);
- *Background data on vaccine behavior* (general views on vaccination; whether one intends to be, or already has been, vaccinated this past year).

Subsequent categories reflected relevant constructs from the RISP model and the Theory of Planned Behavior:

- *Beliefs regarding vaccination* (reasons interviewee are, or are not, vaccinated);
- *Information seeking (active and passive)*;
- *Information processing (heuristic and systematic)*;
- *Perceived information gathering capacity*.

These categories were designed to compare interviewee comments to pre-existing RISP model constructs. In some cases, the process was relatively simple – interviewee responses to a question were simply grouped under the related category (for example: responses to the ‘gathering capacity’ question were organized under that particular heading). In other cases, however, responses to one question were indicative of another category. For example, a response to the ‘information seeking’ question may have involved elements of information processing.

### ***Data analysis – Timetable and process***

Each interview, after transcription, was individually coded, with categories written in the margins next to a particular statement or phrase. A separate document was then developed, in which responses were grouped across all transcripts and sorted appropriately. Relevant quotes were provided for illustrative purposes. Coding took approximately two weeks to complete. All gender and job affiliations were left purposely anonymous.

Data collected regarding information seeking, information processing, vaccine beliefs and perceived information gathering capacity are presented in Chapter 5.

## CHAPTER 5

### RESULTS

#### *Overview*

The research goals were designed to not only to provide preliminary data on influenza vaccine behavior concerning healthcare workers, but also to allow for comparison with previous studies and an opportunity to outline future research directions. The Result, Discussion and Future Directions chapters of this thesis reflect these goals.

The Results chapter is divided into several parts:

- Part 1: Background information on interviewees (demographics, job description/responsibilities, and general attitudes towards vaccination);
- Part 2: Beliefs regarding vaccination (e.g., why interviewees choose to receive or decline immunization). This is in reference to Research Question #1;
- Part 3: Self-report data on information seeking and processing, as well as attitudes towards vaccine information sources. These are in reference to Research Questions 2 and 3;
- Part 4: Data related to perceived information gathering capacity. This is in reference to Research Question 4.

The Results section provides data in each of these areas. The Discussion section provides commentary, as well as proposed measurements for relevant RISP model constructs. Such measurements may form the foundation for future research on vaccine behavior in healthcare workers.

Finally, two items related to data presentation are worth noting. First, interviewees directly quoted are identified according to their generic affiliation (e.g., “hospital,” “university clinic”) and method of data collection (“online” or “in-depth”). Second, all references to gender are ambiguous. No names will be used.

### ***Part 1: Interviewee background information***

In total, 42 individuals completed either an online (n=25) or in-person/telephone interview (n=17). In addition, 79 online interviews were started but not completed, yielding a combined sample of 121 responses. Non-completed responses likely were a result of participants electing the “save and continue later” option, but failing to return to the survey. As a result, some questions have higher numbers of responses than others. Moreover, although partial responses were included so as to provide a more robust data set with which to draw conclusions, one must be careful in generalizing findings to other localities or care settings.

Interviewee affiliations included the local health department (n=5), physicians in private practice (n=5), the local Department of Human Services (n=3), two university health clinics (one a larger university, the other a smaller college) (n=38), a local nursing home facility (n=2), school nurses (in this case, from the various elementary schools) (n=3) and the local ambulance service (n=5).

Time spent in one’s current job also varied (note: this question was only asked on the online survey). Fifty-one respondents answered the question. Table 1 (next page) provides a breakdown by years of employment:

**Table 1: Years of employment in the healthcare field (n=51)**

<b><u>Duration</u></b>	<b><u># of interviewees</u></b>	<b><u>% of interviewees</u></b>
<1 year	6	12%
1-5 years	14	27%
6-10 years	9	17%
11-15 years	6	12%
16-20 years	12	24%
>20 years	4	8%
<b>Totals</b>	<b>51</b>	<b>100%</b>

Finally, interviewee responsibilities were equally diverse. Direct patient care (e.g., medical treatment, supportive care, and counseling) was the most often-cited responsibility (65% of responses across both methods). Specific titles included health education, patient counseling, infection control, senior care, disease diagnosis/treatment, and general nursing care.

Administrative responsibilities were the second most-common responsibility (22% of respondents). Specific titles included administrator, associate director, policy oversight, supervisor, and continuing education professionals. Other, less-mentioned responsibilities included medical research (5%), support responsibilities (e.g., administrative assistants) (5%), public information (2%), and work in the non-profit sector (specifically, patient advocacy and medical assistance) (2%).

*Reported vaccination rates and vaccine attitudes*

Most interviewees felt that it was important for healthcare workers ‘in their line of work’ to be vaccinated each year for influenza. Specific comments culled from in-depth interviews included: “extremely important,” “very important”, “crucial,”

“essential” and “useful.” For the online survey (in which pre-developed categories were used), 35 of 47 respondents (74%) rated vaccination as “very important,” while 23% considered it “somewhat important” and 2% as “not very important.” No interviewees selected the “not at all important” option.

Regarding actual vaccine uptake (online and in-depth interviewees combined), 51 out of 65 respondents (78%) said they had received the vaccine at the time of the interview, or intended to do so before the end of the influenza season. Seventeen percent (17%) had not been immunized (or did not plan to do so) and 5% had not yet made a decision. This observed rate of uptake was nearly twice the national average for healthcare workers. However, it is important to note that the figure represents both actual vaccine behavior, as well as *intention*.

### ***Part 2: Beliefs regarding vaccination (Research Question 1)***

Vaccination ‘reasons’ are arguably synonymous with beliefs, in that they link vaccine behavior with a particular outcome that either can facilitate, or impede, one’s decision to be immunized. For example, if one declines vaccination because of concern over side effects, the belief could be stated as “flu vaccination will have unwanted side effects.” This synthesis combines a potential outcome (side effect) with its perceived desirability (in this case, that it is unwanted). Consequently, the reasons discussed in this section can potentially provide useful measurements for vaccine behavioral beliefs.

Both the online survey and in-depth interviews asked interviewees about the reasons they chose to receive (or decline) the vaccine. This question was divided into two parts – personal reasons and those of ‘others’ (e.g., colleagues and co-workers). This division was meant to elicit as wide an array of perspectives as possible. For each reason discussed below, the number of interviewees (across both collection methods) who mentioned it is provided in parentheses.

*Personal reasons for getting vaccinated*

(1) Personal safety - *Perceived risk of influenza; prior illness; the desire to protect personal health; avoiding potential exposure to influenza (n=30)*

These statements are grouped under the general heading of “personal safety.” Some interviewees who previously contracted influenza chose vaccination to avoid re-infection. Others who have never become ill were vaccinated to reduce the likelihood of exposure. Both reasons speak to the importance these interviewees attach to personal health, regardless of whether they involve prior influenza illness or a general desire to avoid infection:

“[I get vaccinated] because I’m a healthcare worker and also have a chronic medical condition, [so] I actively seek flu vaccination and have [done so] since 1985.” (Online interview)

“The only year I didn’t get a flu shot was the year my daughter was born...and, of course, I got the flu that year and I thought I was going to die. I mean, when they say that even your hair hurts, it truly [does]. (In-depth interview, university clinic)

(2) Patient safety - *Protecting patients who may be susceptible to influenza; healthcare workers as “vehicles” for influenza; reducing disease burden on patients (n=15)*

The second most-cited reason for receiving the vaccine was the desire to protect patients who may be susceptible to influenza complications. Some interviewees, for example, work with vulnerable populations, such as the elderly. One interviewee from a nursing home remarked that “we are working with compromised patients, not only with the elderly in general, [so] if they get sick, it’s because we brought it” (in-depth

interview). Other interviewees, while perhaps not working directly with such groups, nonetheless reiterated their concern about inadvertently transmitted influenza:

“[Vaccination] is important, because you have contact with people. Not only are you protecting yourself, but you’re protecting your patients.” (In-depth interview, local Department of Health)

“I think it’s pretty important for me to get a flu shot, since I don’t want to either pick up something from [patients] or transmit something to them.” (In-depth interview, non-profit health agency)

“The other thing is that, with flu, it’s so terribly contagious, you know, granted it’s the Hippocratic Oath. The first thing you do is ‘do no harm’ and if you’re carrying around flu germs from patient to patient, you’re doing harm.” (In-depth interview, university clinic)

In addition, one interviewee who described himself/herself as a vaccine educator (e.g., responsible for promoting vaccination in medical facilities) emphasized that appealing to patient responsibility is an important strategy for increasing uptake:

“I think I finally got through to a couple of stalwarts this year. [I said], “If you’re not going to do it yourself, then you really need to do it for your patients and for us as nurses, that’s a soft spot that we can really milk.” (In-depth interview, local Department of Health)

(3) *Protecting one’s family, friends and colleagues* (n=6). This reason was similar to safeguarding patient health. Interviewees expressed concern that illnesses contracted at work (such as influenza) could potentially spread to family members, friends, and colleagues:

“[I receive the vaccine because] I have a friend with a compromised immune system and [an] elderly family [member as well].” (Online interview)

(4) *Avoiding work absences* (n=6). Interviewees also stated that vaccination involved economic considerations. Several themes emerged, including: avoiding work absences that may adversely affect patient care (e.g., if a doctor is sick and unable to care for patients), as well as avoiding having other individuals care for patients in their stead. For example, one school nurse felt that a “replacement” nurse would not have the same dynamic nurse-student or nurse-faculty relationship as the regular nurse:

“For a school nurse to be out is really detrimental to the school as a whole, because then you don’t get the kind of interaction with teachers as the other support staff, that really lets you know what’s going on with the staff, so I don’t want to be sick.” (In-depth interview, school nurse)

(5) *One’s responsibility as a healthcare worker; “setting an example”* (n=6). Several interviewees stressed the importance of “leading by example-” – that is, to facilitate greater vaccine uptake among co-workers, colleagues or even the public, they should themselves be immunized:

“We need to practice what we preach; we’re preaching immunization, so we best do it ourselves.” (Online interview)

(6) *Availability of, and proximity to, the vaccine* (n=3). Only three interviewees specifically mentioned access to the vaccine as a reason for being immunized. It is worth mentioning, however, because of a vaccine clinic held in town during the 2006 influenza season. This clinic was organized by the local Department of Health and open to all county employees. Although its primary purpose was to test the Department’s ability to effectively provide vaccine in the event of a major public health crisis, it also doubled as a venue for distributing influenza vaccines free of

charge to all interested employees. Several interviewees commented that they were vaccinated at this location:

“In the beginning of December, [the Department of Health was] doing a mass immunization clinic. It [was] downtown [and was offered] through the CDC. They [were] offering flu vaccine to all county employees for free, and they [invited] county employees to come and attend the drill, and either just attend as recipient [of vaccine] or to participate in the drill itself.” (In-depth interview, elderly care professional)

In addition to the clinic, other interviewees made general references to vaccine proximity, in that they were more likely to be vaccinated if it was available at their place of employment:

“I think it’s, largely, proximity to the vaccine; the easier that one can simply have the nurse give it to them [the better].” (In-depth interview, primary care physician)

“I get the vaccine because it can be administered at my office at no charge. If I were working in a place with less activity and [with little] risk [to] family and friends, I might consider not getting one if I had to pay \$25.” (Online interview)

(7) *The vaccine is safe (n=2) and effective (n=1).* Only two interviewees and one interviewee, respectfully, commented that they receive the vaccine because they feel it is safe and effective. Whether other interviewees implicitly agreed with this perception, or whether they simply failed to mention it as reason, was not clear.

*Personal reasons for not getting vaccinated*

As mentioned earlier, the majority of interviewees had already been immunized at the time of data collection (or at least *intended* to do so). Consequently, data on

reasons for *not* getting vaccinated were not as extensive. The three most-common reasons discussed included: (1) presence of a contraindication (respondents did not specify), (2) cost, and (3) use of other methods that are believed to strengthen the immune system. Regarding the third reason, one online respondent noted the following: “I keep my immune system strong with adequate rest, good nutrition, and regular exercise.”

Other infrequently mentioned reasons included:

- Have never contracted influenza; not ‘at risk’

“I hardly ever fall ill, so I just never felt the need for [the vaccine]; And I’ve been around students for 12 years.” (In-depth interview, school nurse)
- Concern about side effects:

“I am concerned about the potential auto immune disorders from vaccination. I still remember the flu vaccine of 1976, where many people suffered from Guillian Barre [syndrome].” (Online interview)
- Lack of vaccine availability.
- Concern that it may be prudent to vaccinate other groups first, before healthcare workers (such as the elderly or children).
- Skepticism about the severity of influenza epidemics, at least as stated by health authorities:

“I guess I’ve developed a little skepticism about public health people always telling us that this is going to be the worst health epidemic of flu we’ve ever seen, [but] I don’t see those epidemics sweeping through [Town A] and when people do get sick, they usually are elderly and infirmed and I almost never see young, healthy people coming down with influenza. I guess I’ve just been unimpressed that it didn’t

represent the significant health risk to a healthy doctor.” (In-depth interview, primary care physician)

*Reasons why others are not vaccinated*

Interviewee data on why other individuals (e.g., co-workers, colleagues, etc) do not get vaccinated was far more abundant. Many of these reasons were similar to those mentioned above:

- Had a bad reaction to the vaccine previously; got sick from the vaccine; concern about side effects (n=21 respondents);
- Fear of needles (n=15 respondents);
- Never contracted influenza; lack of perceived risk (n=13 respondents):  
“[They say things like] “I never get the flu, so why bother.” That’s another common one, to which my response back to them...is, “gee, you’ve been pretty fortunate up to this point, but you may not be that fortunate this season.”(In-depth interview, nursing home);
- Cost of vaccination (n=4 respondents);
- Inconvenient to get vaccinated; no time (n=4 respondents);
- Desire to save the vaccine for other “at risk” groups (n=2 respondents).

***Part 3: Information seeking and processing (Research Questions 2 and 3)***

*Information seeking (RQ 2)*

This part of the interviews explored respondents’ information seeking strategies. Specifically, it focused on the RISP model concepts of “routine” and “non-routine” sources. Routine sources are those from which an individual regularly receives information. They were identified by asking interviewees whether they encounter influenza vaccine information while on the job and, if so, from which sources (e.g., “passive” information seeking). This question was designed to establish a pattern of familiar source use. By contrast, non-routine sources are those an individual may not

normally consult unless specifically *motivated* in some way. To identify these sources, interviewees were asked where they would go if they had a question or concern about influenza vaccination (e.g., “active” information seeking). Responses to both questions were subsequently compared.

However, these questions – while establishing a framework of information seeking – may not necessarily be effective in denoting routine versus non-routine sources. For example, one may consult the same source both passively and actively. To help address this issue, interviewees were asked about their perceptions of these sources. Responses may indicate not only the criteria interviewees use in evaluating a source but also the conditions under which they may seek information beyond the routine.

#### General data

Fifty-four of 62 interviewees for which data were available (88%) commented that they receive vaccine-related information while on the job. Online respondents (n=40) were also asked the *frequency* that such information “comes across their desk” - 38% said “often,” 40% said “sometimes” and 22% said “occasionally.” Also, in-depth interviewees were asked if they had a *preferred* source.

The following sections provide data related to passive and active seeking, as well as attitudes towards various information sources.

#### “Passive seeking” sources

This question was worded as follows: “For information that comes across your desk, or you encounter at work, from what sources do they tend to originate?” The phrase “comes across your desk” was meant to emphasize information that an interviewee may passively encounter, as opposed to actively seek.

The CDC emerged as a key source (n=31 respondents) and was preferred by two of 15 in-depth interviewees. A second key source was one’s place of employment (n=30 respondents), which included several ‘sub-sources:’ posters, flyers, and vaccine

'reminders' from one's superiors. For example, one interviewee from a university health clinic commented on the role of the Occupational Nurse in issuing these reminders:

“Our Occupational Nurse [sends] directed e-mails to the [staff]. She's actually taking her flu shots on the road this year, so what she asked departments to do was to set up a time this week when she [could] come talk to their department [and give people the vaccine there]. Once she gets to the bulk of people [vaccinated], she will take [a more direct approach to outreach]. [For example, she might say], ‘Ann, I noticed you didn't get your flu shot. Do you want to set up a special time or do you want to talk to me about why you may not want to get a flu shot?’” (In-depth interview, university clinic)

“Other federal agencies” (n=9 respondents) and the State Department of Health (n=15) were also mentioned. In addition, the non-profit Immunization Action Coalition (IAC) was mentioned by two interviewees (both of which regarded it as their preferred source). The IAC, while an independent entity, is funded by health agencies for the purpose of promoting influenza vaccination and other immunizations:

“[The IAC information has] all kinds of stuff about all kinds of immunization, but they will give pointed information [on] special things [related to] this year's flu shots: what you need to know, how you can market it to the public, myths about flu so you can be aware of the myths. [For example], if somebody says, “I can't get a flu shot because I always get the flu from it,” [you can explain to them] why you can't get the flu [from the vaccine.]” (In-depth interview, elderly care professional)

However, the local Department of Health (DOH) was, by far, the most commonly-cited source (n=33 respondents). It was also preferred by four of 15 in-depth interviewees. Several reasons account for this:

- “Breadth” of the information provided, including facts about the circulating influenza virus, vaccine type and availability:
 

“[The local DOH sends] us information about the flu [and] the particular strain that’s going around; they send us information about the vaccine, the availability of them. They [also] send, again, their recommendations of who they think should be #1 on the list to receive vaccination, the most important to the last important, and [whether] they feel that there’s going to be enough vaccine to vaccinate the entire population that might be interested.” (In-depth interview, primary care physician)
- The fact that it serves as an information link between federal/state health agencies and local municipalities:
 

“I’m the local immunization coordinator for the [local DOH], so things funnel down from national organizations, down to a local level; I’m the conduit for the [information] here, and then I disseminate it to our community and to my colleagues here within the health department.” (In-depth interview, local DOH)
- Accessibility – all county employees are on a local DOH e-mail list serve, on which vaccine information is often sent:
 

“[The list serve is] available to anybody who works in health and human services in [the] county, or has some connection to it. There are over 900 people on it. So, the Health Department posts something on there about the flu clinic and about risk factors and things like that, so that’s been very helpful” (In-depth interview, human services organization).

Rounding out the list of passive sources were the Internet/websites (unspecified) (n=16 respondents), newspapers, other traditional media (n=8 respondents), and professional medical journals and associations (n=1 respondent for each).

Interviewees were also asked about the *channels* from which they receive information. Channels were defined as the information medium – the method by which a source disseminates messages to its intended recipients. The most common channels included e-mail, bulletins, faxes, and pamphlets. In commenting on the pamphlets, one interviewee observed the following:

“[They sometimes come in the form of] seasonal releases, updating hospitals and nursing homes and private care practitioners [about] the indications for influenza vaccine, the current listing of who [is in] the high risk groups and strategies for increasing penetration of our target groups, and of course an admonition to get vaccinated yourself [as an HCW.]” (In-depth interview, nursing home)

#### Perceptions of “passive” sources

Both the online and in-depth interviews asked respondents about their perceptions of these aforementioned sources. No pre-determined categories were developed. Instead, interviewee responses were open-ended and subsequently coded according to theme.

The majority of the comments were positive: “reliable,” “accurate,” “informative,” “thorough,” “succinct,” and “useful.” Two specific findings emerged:

- Information disseminated by healthcare-related sources (e.g., CDC, local DOH, etc) were rated more favorably than the mass media. One online respondent noted:

“I receive information from the healthcare community rather than the mass media; I consider [the former to be] credible and [I] take it seriously”

- “In-house” healthcare sources were rated more favorably than ‘external’ healthcare sources (such as CDC). These “in house” sources included information from one’s supervisor, colleagues, or other employment-based entities:

“The information we receive regarding the flu vaccine usually [comes] either comes from the Assistant Director [of the clinic] or the Health Department. I always trust [that] these sources are reliable. They often provide materials that they have gathered through their research, [which] further support the dependability of the information.” (Online interview)

Interviewees also discussed several criteria used to evaluate both the quality of a source and the information it provides:

- (1) Does the information target them specifically (as healthcare workers), or is targeted to the public or other ‘general’ groups?
- (2) Is one familiar with the source(s) providing the information? Is it considered reputable? Is it biased in some way? Is one personally familiar with it?

“I really think the CDC and the government [have] a pretty strong, specific agenda aimed at flu shots, and I just wonder if other avenues are being neglected because of all the emphasis on the flu shot, and I’m [also] wondering about drug companies contract[ing] with the government.” (In-depth interview, nursing home)

“I used to work [at the local DOH] and I still know people who do, so I trust [that] they are giving out the best information possible as soon as they are permitted to disseminate it.” (In-depth interview, school nurse)

- (3) Does the source provide figures/statistics to “back up” its claims and assertions?
- (4) Does the source use personal testimony to enhance its message (e.g., testimonies of people who have foregone vaccination and contracted influenza)?
- (5) Does the source provide information that answers key vaccine-related questions, such as efficacy, cost, and other concerns?

“I want a source that will answer [the] questions I have about why it’s needed, about how well it works, and I want to know, you know, where I can get [the vaccine] and how much it costs.” (In-depth interview, human services organization)

#### Active information seeking

The “active seeking” question was originally worded so as to ask interviewees where they would turn for information if they were “otherwise motivated” to “go beyond” the sources they described previously. However, this wording was found to be too confusing. As a result, it was reworded to ask where they would “turn to” if they “had a question or concern about anything [they] read.”

The CDC once again emerged as an important source, with 23 respondents stating they would consult the agency if they had a question or concern about information encountered previously. Some interviewees mentioned “the CDC website” and the “the CDC influenza webpage,” while others simply mentioned the agency itself. The second most-cited source was the local Department of Health. The third was one’s place of employment. Other sources mentioned intermittently mentioned included:

IAC (n=2), state Department of Health (n=2), professional medical organizations/journals (n=3), and the Internet/websites in general (n=1).

*Information processing (RQ 3)*

Interviewees were presented with a one-page brochure (see Appendix B), developed by the Immunization Action Coalition (IAC), which discussed influenza vaccination for healthcare workers. It was organized in the form of a professional letter, written by the IAC Executive Director and addressed to the reader.

Interviewees were asked to read the letter and self-report on what they thought about it, how they interpreted the information it provided, and what feelings/perceptions “went through their minds” as they examined it. Responses were coded as indicators of either systematic or heuristic processing.

As discussed earlier, information processing is not absolute. People can process different aspects of a message using either strategy, although only one method is likely to be used when attending to one *particular* element. In other words, one could process one message element heuristically and another systematically, thus providing a blend when examining responses to the message in its entirety. Moreover, heuristic and systematic processing, in their purest form, exist only in theory – the actual strategies afforded to a message only suggest that “more heuristic” or “more systematic” processing is at work.

To code interviewee responses, the researcher reviewed literature on the RISP, ELM and HSM frameworks, as well as the Theory of Planned Behavior. This was done to identify previous measurements of heuristic and systematic processing. Moreover, informal conversations with one of the RISP model developers helped clarify areas of uncertainty (Robert J. Griffin, personal communication, 22 February 2007). The actual coding process did not involve top-down, pre-existing categories. Instead, it reflected an amalgamation of emergent themes across transcripts that, when

compared to processing measurements from previous research, were sorted into “more heuristic” or “more systematic” indicators.

### Systematic processing

Systematic processing involves careful attention the central arguments of a message (e.g., what is presented and how it is discussed). It may include, for example, restating the message, relating the information to one’s personal experience or thinking about the implications of the facts provided.

Interviewee responses suggested several systematic processing indicators:

- *Reasons for receiving/declining the vaccine (n=14 respondents)* – Interviewees commented that they thought about the reasons they (or their friends or colleagues) chose to receive, or decline, vaccination. They also considered whether the pamphlet addressed their beliefs, questions or concerns regarding the vaccine:

“Well, you know, it doesn’t really address the one issue that I mentioned to you, [which is], ‘well, I’m allergic to eggs, or I have trouble with eggs,’ and things like that [note: severe allergy to egg products – i.e., anaphylactic shock – is a contraindication for influenza vaccination.]” (In-depth interview, primary care physician)

“Number one [on the pamphlet] is right, because it’s the number one reason [healthcare workers] don’t get [vaccinated]: ‘I don’t get sick, so I don’t need it,’ [as well as] side effects.” (In-depth interview, university clinic)

“I was surprised that the primary statement was about healthcare workers causing others to get the flu. That wouldn’t have been my

primary thought for getting the vaccine myself. I wouldn't want to miss work.” (In-depth interview, school nurse)

“The format of addressing common reasons for not getting vaccinated is an effective way to organize the information. (In-depth interview, primary care physician)

“One of the things that I was struck [by] was the fact that this #2 [second bullet in the pamphlet], when it says, ‘I’m not in a risk group.’ I think that, you know, [healthcare workers] may not be, but that whole notion that they’re still carriers [is important to consider]. Most people don’t think of it that way.” (In-depth interview, elderly care professional)

“I thought, ‘okay, here [are] a few more reasons why healthcare workers don’t [get vaccinated]’ and it’s good for us to be aware of all those reasons.” (In-depth interview, local Department of Health)

“[I focused on] what’s bolded in [the brochure, specifically the phrase that says that] ‘Health professionals can spread disease.’ [This] is the one [reason] that’s sort of a positive message. The other ones, [such as the phrases that say,] ‘I don’t get sick and never get influenza, I’m not in a risk group, I forgot to get vaccinated,’ they’re all the negatives - why you shouldn’t do it.” (In-depth interview, human services organization)

“The first point does answer a question that I’ve had on my mind and [which] I didn’t necessarily know the answer to, which is: can you be a carrier for influenza and not get it as severely as others; you [can indeed] pass it on to others, so that answers that question.” (In-depth interview, human services organization)

“I was looking for side-effects, information on efficacy, when it would take effect and for how long, and other information. It generally provided the information I wanted.” (Online interview)

- *Vaccine policy (n=3)* - Thinking about the vaccine policy at one’s place of employment:

“I do have a problem with the word ‘required.’ [The brochure] says [that] all clinics, hospitals and long-term care facilities should require their employees to receive the flu vaccine, and provide it free of charge, [but] we do provide it free of charge. The hospital doesn’t [do so].” (In-depth interview, nursing home)

“The ‘free of charge’ idea [about] offering shots seems appropriate only if the person reading the brochure has some control over this.” (In-depth interview, school nurse)

- *Supporting evidence (n=3)* - Does the message contain supporting evidence? Does it provide relevant statistics to bolster its claims?

“I think the one thing I would look for in this, as a critical thinker, is: what’s the evidence that flu vaccine actually reduces transmission [of influenza] from healthcare workers to patients? I believe that that’s true, but when I’m looking at a brochure like this, I’m thinking, ‘well,

maybe flu vaccination prevents me from getting sick personally, but maybe I still shed virus and would pass it on to other people anyway,’ but if there was something in here that said, ‘There’s a 75% reduction I person-to-person transmission when you’re vaccinated,’ [I think] that would carry more weight.” (In-depth interview, primary care physician)

“I look for something that can give me percentages, because numbers talk when you look at performance improvement and quality assurance and all [that] kind of stuff. If you can put something into numbers, [such as] ‘we saved \$47, 000,’ that means a lot more than saying this or that happened. Another example would be, ‘the number of lost days for nurses that didn’t get a flu shot and ended up getting the flu came up to this many days, at an estimated cost of x number of thousand of dollars,’ that kind of thing.’ (In-depth interview, university clinic)

- *Central messages (n=2)* - Focusing on the central message(s) of the document – what is it trying to say?

[When I look at the brochure, I realize that] not enough healthcare workers get the vaccine and that they could help prevent spreading the virus [if they did get it.” (Online interview)

- *Improving the message (n=1)* - Considering ways in which the message could be further improved or enhanced:

“I would say instead of [using the phrase] ‘make sure you’re vaccinated,’ you can do something like, ‘Get vaccinated to protect your patients.’ That underscores the basic message of what you’re trying to do. [Also] the first [point that] says, ‘I don’t get sick and never get influenza,’ it could [instead] say something like, ‘Even if you don’t get

the flu, you could still be a carrier, you can still give it to your patients.” (In-depth interview, human services organization)

“There’s a point [in the brochure] about cutting down on absenteeism, which isn’t mentioned at all here and it [should] be, because [the vaccine] does cut down on absenteeism. [It] is something that I think is worth [putting] in [to the brochure] somewhere.” (In-depth interview, human services organization)

- *Personal experience (n=1)* - Relating the information to one’s personal experiences as a healthcare worker:

“I guess [I think about] how [the information relates] to me personally, or relates to the staff that I work with. [The message] needs to somehow be personalized for me. Why me, why should I personally get [the] flu shot?” (In-depth interview, university clinic)

### Heuristic processing

Heuristic processing involves attention to “peripherals” of the message. It implies lack of focus on the message itself (what is said) in favor of *how* the information is presented (e.g., format, design, perceptions of ‘readability, etc.).

Among the indicators found:

- *Visuals (n=7)* – Some interviewees commented (both positively and negatively) on the cartoon (or other images) present in the document:

“I’m a big fan of cartoons, so I really like the cartoon.” (Online interview)

“I would like to see something colorful and eye catching, but not cute. [The cartoon] was a little bit too cute, you know, the little picture of the

doctor talking. There are a lot of patient education things out there [like this] and they irritate me personally.” (In-depth interview, university clinic)

“Whenever I see anything with little cartoons, I have this feeling that it’s talking down at me, which [has] nothing to do with the content.” (In-depth interview, nursing home)

- *Length (n=6)* – Comments that the document was too long, too short or about right:

“You definitely want a one-pager.” (In-depth interview, human services organization)

“Well, I think the headline is important. As you know, most people tend not to read all the way through something.” (In-depth interview, primary care physician)

- *Organization (n=5)* – Was it easy to read? Was it “direct and to the point.” Was it organized in a way that made it easy to follow?

“Well, there’s a lot of print on the page and I think [that] the big ideas don’t pop out as well as they might. When I looked at it, I thought, ‘Okay, I [have] to read this whole thing,’ and if I’m a professional and I’m getting [lots] of pieces of information thrown at me everyday. I would make the ideas pop [out] more easily.” (In-depth interview, human services organization)

- *Attitudes toward the source(s) (n=3)* – What are one’s perceptions of, or attitudes towards, the source(s) of the pamphlet’s information? This can

include judgments about the IAC itself, or its funding institutions (whose names were listed on the pamphlet – CDC, pharmaceutical companies, etc):

“The information about corporate sponsorship could raise some concerns.” (In-depth, primary care physician)

- *Focusing on the statistics in the message (n=2)* – This relates to comments such as “nice statistics,” in which the interviewee points out the statistics without making any further comment on their relevance. This indicator is different than the statistics discussed for systematic processing. In the latter, interviewees emphasized the information they thought was *missing* from the message and felt should be included - specifically, statistics and other supporting evidence. By contrast, this heuristic processing indicator only involved a general mentioning of “statistics:”

“I was really shocked about the number of healthcare professionals that don’t get immunized. I can see the need for such a brochure with this number.” (In-depth interview, school nurse)

“It’s got the tables you can refer to about the latest vaccine recommendations.” (In-depth interview, primary care physician)

- *Familiarity with the information (n=1)* – Has one encountered the information before? Some interviewees commented that they were less inclined to read the pamphlet because they had seen the information previously.

#### ***Part 4: Perceived information gathering capacity (Research Question 4)***

This question asked respondents about their perceived ability to find sufficient information about influenza vaccination so as to make an informed decision about it. Previous measurements of this construct have included statements such as: “If I want, I can readily find all the information I would need about this issue to feel comfortable

about it.” The online survey used this same format with a Likert scale. In-depth interviews allowed for open-ended comments. For both methods, however, interviewees were asked: (a) how confident they felt in their ability to locate vaccine-related information and (b) why they felt this way.

Overall, 35 of 36 online respondents (97%) indicated that they were “very confident” in their gathering capabilities. No individuals stated that they were “not very confident” or “not at all confident.” For the in-depth interview, most respondents likewise indicated a high degree of perceived confidence. Eight of the 15 interviewees *explicitly* mentioned the phrases “very confident” or “pretty confident.”

When asked why they felt confident, the following themes emerged:

- *Familiarity with vaccine information sources (n=7)* – Many interviewees considered themselves already well-informed about influenza vaccine. Specifically, they knew which sources to consult to find relevant information, especially if they had questions or concerns.
- *Accessibility of information (n=5)* – Most interviewee believed that vaccine information was accessible and easy to find. However, some expressed concerns related to the volume of information currently available and whether they believed one could effectively “sort through” all of it. In other words, finding information was not the problem; identifying information one *needed* was sometimes challenging:

“There’s some stuff out there that I’ll have trouble finding, [such as] what kind of studies have been done, those kinds of things.” (In-depth interview, nursing home)

“It is [sometimes] difficult to find statistics, so I don’t know if [other] nurses or healthcare workers would [be able to find them. They may] get frustrated at searching.” (In-depth interview, university clinic)

“As far as trying to make heads or tails of sometimes-differing recommendations and going back to the original source and finding the data those recommendations are based on, it’s a heck of a lot of work, and this is the case with almost every vaccine.” (In-depth interview, primary care physician)

- *Concern as to whether source will provide the “right” data (n=1)*

“It’s all [about] trusting that the people who are giving you data are giving you the right data, because you don’t develop personal experience in preventative healthcare, because you don’t see the outcome, you don’t see people getting better or sick.” (In-depth interview, primary care physician)

Chapter 6 provides commentary on the aforementioned findings related to information seeking, information processing, vaccine beliefs and perceived information gathering capacity. Both theoretical and practical implications of this research are also discussed.

## CHAPTER 6

### DISCUSSION & IMPLICATIONS

This chapter provides commentary on findings from both the in-depth and online interviews. It also uses these data to propose potential measurements for the following RISP model variables: heuristic/systematic processing, channel beliefs, and information gathering capacity. These measurements may be of use in the course of future research. Finally, the chapter concludes by discussing potential theoretical and practical implications of this research.

#### ***Part 1 Commentary: Interviewee demographics***

##### *Interviewee affiliations*

This research explored perceptions of influenza vaccination from a wide array of healthcare workers in various care settings. Previous research has, to a large extent, focused on individual healthcare settings (e.g., a hospital) within a particular geographic setting (such as a town or city). However, this research focused on the healthcare *system* of an urban, central New York town. The facilities contacted varied in size and scope – from smaller physician private practices to the local Department of Health to large university clinics. Some of these locations may not ‘fit the bill’ of a traditional healthcare settings (such as a hospital, for example). However, the fact that patients visit, and receive care, at these locations makes influenza vaccination a potentially important issue.

##### *Interviewee responsibilities*

Influenza vaccination is recommended for any healthcare worker with some form of direct patient contact. For the majority of interviewees (especially nurses and physicians), patient contact comprised at least part of their responsibilities. Moreover, other responsibilities – administration, support and medical research – may also entail

patient contact to some extent. For example, support personnel at a clinic may come into contact with potentially ill patients as they wait to see a care provider.

*Implications for communicating with diverse audiences*

In selecting this diverse group of interviewees, this research sought to branch out from traditional notions of a ‘healthcare setting,’ as well as what constituted ‘direct patient contact.’ However, one may argue that the perspectives discussed in this thesis are diluted in a sense, in that they do not emanate entirely from direct care providers such as nurses and physicians. A counterpoint would be that all personnel at a healthcare facility are potentially at risk for exposure to influenza, in which case vaccination then becomes a priority for all.

Finally, this research, by virtue of the diverse pool of individuals interviewed and the myriad perspectives represented, has implications for vaccine risk communication efforts. Specifically, it can assist in developing strategies to reach the various types of healthcare workers who comprise a particular care setting, including those who may not necessarily consider themselves at-risk for disease exposure, transmission or infection.

*Behavioral intentions: Attitudes towards influenza vaccination*

Most interviewees (both online and in-depth) considered it important to receive a yearly influenza vaccine, and 78% were vaccinated during the 2006-2007 season (or intended to do so). This observed rate is significantly higher than nationwide averages of 35-40%.

However, this figure may be inflated for one simple reason: behavioral intention does not always equate with physical action. As a result, some individuals who intended to be immunized may not have actually done so. Moreover, the online survey did not allow for determining rates within a particular setting or among a *type* of healthcare worker (e.g., how many individuals at the university clinic were

immunized, or how many physicians were vaccinated). Moreover, no follow-up was performed (clinical or otherwise) to verify an interviewee's immunization status. It was possible, therefore, that recall bias also influenced findings, in that a participant thought s/he was immunized when in fact that was not the case.

The issue of intention versus behavior, however, extends beyond methodological considerations. It also speaks to the role of logistics and social norms. From a logistical perspective, an interviewee who intended to be vaccinated might not have done so due to time constraints, lack of vaccine availability or other reasons. From a social norm perspective, the social desirability of vaccination may have played a role. As evidenced by the opening paragraphs of the Introduction, vaccination has become a powerful norm in the medical field. The RISP model, moreover, emphasizes the key role of norms in influencing health behavior (i.e. what other people we know tell us about a behavior). As a result, interviewees may have been affected by this perceived norm when interacting with the researcher. That is, there may have been an urge to speak in favor of immunization, even if one's perceptions were not as clear-cut.

Also, self-selection was another potential concern, both on the institutional and individual level. That is, institutions with lower rates may not have been inclined to participate, perhaps out of concern that such figures would reflect poorly on that particular location. Likewise, non-immunized individuals may not have participated for similar reasons. While self-selection cannot be discounted, this research used multiple strategies to encourage participation and diversity of opinion. In addition, nearly 20% of the sample consisted of those who either were not vaccinated or did not intend to do so, suggesting that such individuals were willing to consent to an interview. Moreover, only one individual refused a request for an in-depth interview. However, others indirectly refused by not returning calls or responding to mail/e-mail solicitations.

Finally, this figure may not be a methodological or social artifact at all. Instead, it may be a testament to town A's efforts to increase healthcare worker vaccination rates. For example, it may reflect the activities of the local Department of Health, including: (1) in-person visits to other care settings, (2) an influenza vaccine planning committee (which meets periodically to develop strategies for increasing vaccine rates among healthcare workers and other groups), and (3) a free influenza vaccine clinic offered during the winter 2006 season.

***Part 2 Commentary: Beliefs regarding vaccination (Research Question 1)***

Interviewees were asked to report on the reasons for their vaccine decision. These reasons speak to the beliefs they hold about immunization. From a healthcare worker's perspective, influenza vaccination involves elements of personal health, individual choice, and group benefit (e.g., reducing transmission to patients, friends or colleagues). Consequently, interviewees considered numerous beliefs in deciding whether or not to be immunized. According to the RISP model, behavioral beliefs link a particular outcome with its perceived desirability. Actual behavior is, in part, informed by the number of beliefs one considers and the strength with which they are held.

*Reasons for vaccination*

The most common reason interviewees gave for why they are vaccinated centered on protecting personal health and avoiding influenza infection. Some individuals had previously contracted influenza and wished to avoid re-infection. Others who had never contracted the disease simply wished to continue this good fortune. Furthermore, personal health was likewise a key reason interviewees gave as to why *other* healthcare workers "in their line of work" (such as colleagues) also get vaccinated.

Protecting one's patients was a second key reason. In a sense, it relates to the Hippocratic Oath and the adage of "doing no harm" to those for whom one cares. This perception appeared especially salient for interviewees who worked with (or otherwise are exposed to) vulnerable populations, such as the elderly, young children and the immune-compromised.

The third reason involved protecting one's family and friends. Several interviewees commented that they have elderly parents or immuno-compromised individuals at home, for which vaccination is warranted in their view.

By contrast, availability of and proximity to the vaccine were relatively minor reasons (in terms of frequency of mention). This may have been due to an abundant supply of vaccine during the most recent flu season. For example, the flu clinic organized by the local Department of Health may have made the vaccine especially plentiful and accessible. Time constraints may be a salient concern for many healthcare workers, especially physicians seeing patients on a consistent basis. As a result, these individuals may forego vaccination purely because of logistical constraints.

#### *Reasons against vaccination*

There was no clear consensus on the reasons for declining vaccination. Some interviewees had an existing contraindication, although the exact malady was not specified. Concerns about cost, low perceived risk of influenza (e.g., "never had the flu, never gotten sick"), and concern about side effects also emerged.

Interestingly, interviewees were more forthcoming about the reasons why *colleagues or co-workers* are not immunized. In this instance, the most common reason was lack of concern about influenza. Other reasons centered on concern over side effects, cost, fear of needles, and convenience (e.g., time constraints). However, not all of these reasons could be ascribed to a lack of concern or insufficient vaccine

awareness. A small minority of interviewees commented that, in their view, it would be most prudent to immunize other at-risk groups (such as children or the elderly) before healthcare workers. These individuals felt that this approach would actually be more effective in limiting the spread of influenza. In a more general sense, they framed vaccination not as a personal sacrifice to protect personal health, but a societal-level behavior in which responsibility did not lay squarely with one particular group of people (healthcare workers or otherwise).

*Towards a focus on vaccine beliefs*

According to the RISP model, beliefs are an integral component of behavior. They pair a behavior's outcome with its perceived desirability (positive or negative). Previous research has asked respondents the extent to which they consider various beliefs in deciding whether to adopt a particular behavior. For example, in focusing on fish consumption on the Great Lakes, Griffin et al. (2004) provided a list of beliefs (identified from previous research) and asked respondents to degree to which they consider each in deciding whether to eat fish caught from the lakes. A Likert Scale was used that ranged from "strongly agree" to "strongly disagree," in which "strongly agree" meant that the individual definitely held this belief and "strongly disagree" meant that the individual definitely *did not* hold this belief. The number of beliefs was derived by simply counting the number of answers, whereas the number of *strongly-held* beliefs was derived by grouping those rated as "strongly agree."

However, the model also introduces the construct of *belief evaluation strength* – the perceived desirability of the outcome (positive or negative) associated with a particular belief. For example, a person may consider vaccine cost in their decision. The actual evaluation would be whether cost is perceived as positive or negative - in other words, whether it would make one more or less likely to get vaccinated.

Based on the data collected regarding vaccine beliefs, the following measurements (see Figure 3) could be used as part of future research involving influenza vaccination and the RISP model. These beliefs were synthesized from the aforementioned reasons in favor of, and against, vaccination:

*The following are statements healthcare workers have made about what they think is important to consider when deciding to be vaccinated. Please indicate the extent to which you agree with each item (“Strongly agree,” “slightly agree,” “neutral,” “slightly disagree,” “strongly disagree” or “no opinion.”).*

*\*\* In deciding whether or not to be vaccinated, I personally take into account: \*\**

- (1) Any personal medical condition that may motivate me to be vaccinated
- (2) Any personal medical condition that may prevent me from being vaccinated
- (3) Whether I think I am at risk for contracting influenza
- (4) Not losing time from work should I become sick
- (5) The health of any patients I may care for
- (6) The health of my colleagues, family and/or friends
- (7) Whether I think the vaccine prevents influenza
- (8) Whether I think the vaccine is safe
- (9) Whether I may have had a reaction to previous immunizations
- (10) The cost (or availability) of the vaccine
- (11) How easy it is for me to get vaccinated
- (12) Whether I think there are other effective influenza prevention methods besides vaccination
- (13) Fear of needles

**Figure 3: Influenza Vaccine Beliefs**

### ***Part 3 Commentary: Information seeking (Research Question 2)***

The two questions related to information seeking (both passive and active) were designed to address several goals:

- First, to identify passive sources – those from which individuals receive vaccine information while at work.
- Second, to identify active sources – where they would go if they were motivated to search for information (e.g., if they had a question or concern).
- Third, to elicit interviewee perceptions on both passive and active sources, in terms of quality, effectiveness, clarity, and other dimensions.
- Fourth, to suggest potential measurements for existing RISP model variables that focus both on perceptions of risk information sources and the determinants of routine versus non-routine information seeking.

#### *Passive/active information seeking*

Eighty-eight percent (n=37) of interviewees reported passively receiving at least some information, with the majority indicating that they do so “often” or “sometimes.” In retrospect, the emergence of CDC as a key source was not surprising, given the agency’s focus on immunizing healthcare workers against influenza. By contrast, a somewhat unexpected finding was the central role played by the local Department of Health. The Department’s involvement in vaccine communication was multifold. First, it directly provided vaccine information to a majority of care facilities in town. Second, it synthesized health recommendations from CDC and other health agencies, making them more readily available to facility staff. Third, it was an advocacy resource. The immunization coordinator at the Department was intensely involved in promoting vaccine awareness, having visited numerous care settings during the 2006-

2007 influenza season. Finally, it was (at least for the 2006-2007 influenza season) an actual vaccine source, by virtue of the free clinic it ran in December 2006.

One's place of employment emerged as another key source, although (like the local Department of Health) it often distributed information developed by other entities (such as the CDC). Finally, more mainstream media (Internet, newspapers and other sources) were mentioned less frequently than more health-oriented resources.

Finally, interviewees were asked about their active seeking habits: the sources they would potentially consult if motivated to proactively seek information. This motivation may stem from questions or concerns one has about vaccine-related information received previously. In many cases, the same sources mentioned previously were discussed - specifically, the local Department of Health and the CDC. This suggests a strong preference for health-oriented sources in meeting one's vaccine information needs.

#### *Perceptions of active/passive sources*

Most source comments tended to be positive ("reliable," "accurate," "credible," etc). However, there clearly was a preference for more health-oriented sources. When interviewees were asked why this was the case – and, more generally, what criteria they use to evaluate a source - several themes emerged:

- *Is the information targeted to them specifically (as healthcare workers)?*
- *Does it contain personal testimony or appeals?* This is especially applicable to individuals who contracted influenza in the past and wish to avoid re-infection.
- *Does it answer key questions related to vaccine safety, efficacy and other issues?*
- *Does it have statistics or other data to 'back up' vaccine-related assertions?*

Vaccine information provided from health resources (CDC, local DOH, and place of employment) may be more likely to address these four concerns than those that target a more general segment of the population (i.e., the public), such as the mass media.

*Determinants of information seeking: Two proposed variables*

According to the RISP model, the information sources people consult play a large role in informing their health behavior, in terms of the messages to which they are exposed. Source usage, moreover, is influenced by perceptions of quality.

According to the model, when people systematically process risk messages (due to information insufficiency), they are confronted with two choices. The first choice relates to *how* they intend to find relevant information. Specifically, they can either engage in *active* seeking (i.e., making an effort to locate information they otherwise would not normally come across) or *passive* seeking (simply paying attention to information they encounter in daily life). In the case of influenza vaccination, a healthcare worker could (for example) simply pay attention to a flyer they happen to notice on the job, or actively visit the CDC webpage for additional information. Most interviewees stated that, in the case of the latter, the CDC website is where they would go. The second choice, furthermore, relates to *where* they intend to look. This choice likewise presents two options: scrutinize familiar, routine sources or consult entirely new, non-routine sources.

However, the RISP model is not clear on the determinants of active/passive and routine/non-routine information seeking; this thesis argues that merely considering them an outcome of systematic processing is insufficient. First, people can also consult routine or non-routine sources when processing heuristically. Second, information seeking and processing complement each other, in which information insufficiency motivates both activities. It would be incorrect, then, to assume that one

drives the other. Third, and perhaps most important, one's judgments of information quality likely drives source usage, beyond whether one is motivated to process information systematically or heuristically. Why process information from one sources and not another?

This thesis proposes two new variables to help answer the two questions stated above. Whereas information sufficiency tells us *whether* information seeking will occur, these variables suggest *where* and *how* that might happen.

#### Routine vs. non-routine sources

To help answer the first question, the RISP model introduces the concept of “channel beliefs” - the perceptions people have about risk information sources. Such perceptions can, for example, facilitate the use of routine sources or motivate people to consult non-routine sources. However, until now, this construct has tended to focus solely on the mass media. Griffin and colleagues specify two dimensions. One involves “media beliefs” that focus on coverage; specifically, do media tend to exaggerate or sensationalize the news? Is media coverage biased? Do the media tend to run stories that appear unconnected? The other dimension is “validity cues” that measure peoples’ use of media, as well as general attitudes towards the information presented – namely, do people tend to believe information that appears in more than one place? Do they prefer stories with statistics? Does media coverage tend to fit into “meaningful patterns” in the end, even though shorts-term coverage may appear unconnected?

Channel beliefs, however, may not be sufficient when focusing on healthcare workers. Several reasons account for this:

- Media are not the only source workers may consult when seeking vaccine information (in fact, they are not even a *preferred* source).

- ‘Sensationalism’ and ‘exaggeration’ did not emerge as key themes mentioned by interviewees, in terms of how they evaluate information sources.

Consequently, future research involving healthcare workers, influenza vaccination, and the RISP model should focus on attitudes towards other, more-commonly used sources. This section outlines a new variable – Information Personalization – to address this issue. In using this variable, the researcher is not asking the respondent to evaluate one particular source but instead to consider *all* the sources from which they receive information (and for which the researcher may not necessarily be aware).

Information personalization (see Figure 4) is defined as the judgments people make about the quality of information coming from a source. Are the messages personally relevant? Do they answer key questions or concerns one has about a risk? From a healthcare worker’s perspective, this may involve concerns related to vaccine side efficacy and safety.

*The following are statements that other healthcare workers have made about sources from which they most-often receive information about influenza vaccination. Please think about any vaccine-related information you may encounter, and where it comes from. Then, please indicate the extent you agree with each of the following statements (“strongly agree,” “slightly agree,” “neutral,” “slightly disagree,” “strongly disagree” or “no opinion.”*

1. I feel that information I receive is targeted towards (or applies directly) to me.
2. Information contains personalized information I feel I can relate to.
3. Information answers key questions or concerns I may have about the vaccine.

**Figure 4: Proposed Measurements for Information Personalization**

Information personalization may predict one's satisfaction with a particular source, in that higher satisfaction leads to continued usage and lower satisfaction motivates one to consult others.

Moreover, the likelihood of behavior change may partly rest on this perception of satisfaction. For example, the framework of procedural justice (Besley & McComas, 2005) argues that people care about the perceived fairness of a decision-making process, beyond whether they consider the outcome favorable or unfavorable. Perceived fairness is associated, moreover, with confidence in authorities, satisfaction with a deliberative process and acceptance of decisions reached. A key component of procedural justice is *informational justice* – “how well procedures [such as policy decisions] are explained and communicated, in terms of quality and timeliness” (Besley & McComas, 2005, p. 419).

In the case of influenza vaccination, much attention has focused both on ongoing educational interventions targeted towards healthcare workers, as well as (potentially) mandatory immunization programs (Finch, 2006). Both approaches aim to change behavior. Both seek to use information as a persuasive tool, either to suggest behavior change or justify a mandatory program. However, if healthcare workers are skeptical of the quality of the information, the sources that provide the messages, and/or the process used to make vaccine policy decisions, behavior change is unlikely. Equally unlikely is the possibility of accepting any mandatory program. Interviewees from this research were clear on this point. The best type of vaccine information is that which answers key question/concerns, is targeted directly towards healthcare workers and contains personal appeals. The first point is essential. Does the information provide rationale for influenza decisions reached (voluntary or mandatory)? Is this rationale respectful of pre-existing questions and concerns? In general, does the

information meet the needs of its audience? Future research should further explore the nexus between information personalization and informational justice.

#### Active versus passive seeking

This thesis proposes Channel Sufficiency as a determinant of active versus passive information seeking. This variable is defined as the perceived ability of a source to meet one's information needs on a particular issue. It operates similar to *information* sufficiency, in that the higher the level of source *insufficiency*, the greater the likelihood one will engage in some form of active seeking.

This variable is comprised of two parts: (1) The source's actual ability to meet information needs and (2) How high this ability *would need to be* so an individual would keep using it. Higher levels of congruence between these two parts (source sufficiency) would likely encourage an individual to passively seek information, but otherwise expend no additional effort to actively search for messages. There would simply be no need. However, in a case of channel *insufficiency* – that is, incongruence – one would likely be motivated to actively search, given that a source is seen as unable to meet one's needs. Some effort, therefore, will need to be expended in order to locate 'better' information

Channel sufficiency could be measured in one of several ways:

- *Comparisons*: Asking people to self-report on how sufficient they currently think their routine sources are, as compared to the *ideal* sufficiency level they would need in times of crisis or if a question or concern emerged. This measurement is similar to that for information sufficiency (e.g., current and desired level of knowledge about a risk).
- *Single measure*: Asking respondents to rate the extent to which they perceive their current sources to be sufficient in responding to questions or concerns. For example: *I feel that my current vaccine information sources would be*

*sufficient to enable to me to answer any questions or concerns I have about vaccination.” Responses would be measured via a Likert scale (Strongly agree, agree, neutral, disagree and strongly disagree).*

*Problems with potential variables*

Both information personalization and channel sufficiency explore how perceptions of information sources inform people’s information seeking tendencies. However, these variables are not without limitations. First, active/passive seeking is a difficult concept to define and few risk studies have attempted to measure it. As a result, it is possible that channel sufficiency may not be a suitable indicator. Second, given the aforementioned linkages between active/passive and routine/non-routine seeking, they actually may be two sides of the same conceptual coin. As a result, one variable could measure both. Third, the variables themselves may be the issue. Could they actually be measured in real time? For example, active/passive or routine/non-routine decisions may only be made in the so-called “heat of the moment.” That is, in a situation were: (1) A risk is present, (2) one has a question or concern about it, and (3) several routine and novel sources are potentially available. Consequently, asking someone how they would search for information - as well as where they would go- in the absence of these conditions may produce findings that do not equate to their actual information seeking behavior.

***Part 3 Commentary: Systematic and heuristic processing (Research Question 3)***

*Commentary: Systematic processing*

When processing information systematically, one focuses on the messages presented and how they relate to personal experience with, or perceptions of, the issue in question. For this research, interviewees were asked to review a one-page brochure that discussed influenza vaccination and healthcare workers. They were then asked to self-report on what they thought of the brochure, how they interpreted the information

provided, and ‘what things went through their mind’ as they examined it. Responses were subsequently coded and compared to processing measurements from existing RISP model research.

Several systematic indicators emerged:

- *Thinking about reasons for receiving/declining the vaccine.* Interviewees commented that the brochure made them think about the reasons why they personally (or their fellow colleagues) chose to receive, or decline, vaccination.
- *Determining whether the brochure addressed key concerns or questions about the vaccine.* Some interviewees focused not only on the data provided in the pamphlet but also on information that was not present but which they felt was important to include. For example, some interviewees expressed a desire for statistical figures and other data related to vaccine efficacy, compliance rates, and institutional costs savings.
- *Focusing specifically on the messages in the brochure.* Some interviewees simply restated the central arguments of the pamphlet (e.g., “it is important for healthcare workers to be vaccinated”).
- *Personal appeals in the message.* Some interviewees – specifically those who contracted influenza in prior years – focused on whether the brochure contained references to personal experience or included personal appeals. They felt that such appeals are useful in reaching out to those who experienced influenza firsthand.

#### *Proposed measurements for future research*

Previous work with the RISP model used a similar process in developing measurements of systematic and heuristic processing. However, owing to the fact that

risks differ tremendously in scope and context, those measurements differ from the themes that emerged in this research.

In one study, Griffin et al (2002) developed the following measurements:

- Thinking about actions one should take after reading the messages
- Making connections between the messages and what one might have seen, or heard about, elsewhere;
- Considering the practical applications of the information;
- Considering what actions policy makers should make in dealing with the risk.

In a second study, the following measurements were used (Griffin et al, 2004):

- “When I encounter risk-related information, I am likely to stop and think about it”;
- “If I need information, the more viewpoints I get, the better”;
- “It is important for me to interpret information in a way that applies directly to my life”;
- “After thinking about the information, I have a broader understanding of the issues”;
- “I am inclined to read the entire message, even though I may not agree with its perspective(s).”

While systematic processing measures from previous research may be applicable to influenza vaccination, this thesis also identified several novel measurements (see Figure 5, next page). Future research is needed to determine exactly which ones are, in fact, the most accurate indicators of this action:

*The following statements are about how other healthcare workers said they interpret information about influenza vaccination. Please indicate the extent (“strongly agree,” “agree,” “neutral,” “disagree,” “strongly disagree” or “no opinion”) you agree with each statement:*

*\*\* When I encounter information about influenza vaccination: \*\**

1. I think about the reasons I receive (or decline) the vaccine.
2. I think about the reasons other people I know are (or are not) vaccinated.
3. I look for whether any concerns I have about the vaccine are addressed.
4. I look for whether any questions I have about the vaccine are addressed.
5. I look for ways that, in my view, the information could be improved in terms of quality.
6. I look for ways that, in my view, the information could be improved in terms of effectiveness.
7. I think about the vaccine policy at my place of employment.
8. I relate the information to my own personal experience with influenza
9. I relate the information to my own personal experience with the vaccine.

**Figure 5: Proposed (Novel) Measurements for Systematic Processing**

*Commentary: Heuristic Processing*

Like systematic processing, previous measurements for heuristic processing involving the RISP model were more generic than the aforementioned themes in this research. As a result, such measurements may not be appropriate when focusing on healthcare workers – a group whose attitudes and knowledge may be somewhat more ‘refined’ than the ‘average’ person, at least concerning influenza vaccination.

Among the previous self-report measurements used:

- Skimming through information,
- Not spending too much time reading the information; not thinking about it afterwards,
- Believing that there are too many conflicting view points,
- Focusing on only a few key points,
- Believing that the advice of one expert is good enough,
- Believing that there is far more information than what one feels is personally necessary or important to know.

For this research, heuristic processing indicators were identified via the same process as those for systematic processing. Interviewee responses were analyzed for comments suggesting that the respondent was focusing on ‘non-message’ components of the pamphlet (e.g., graphics, pictures, organization of material).

Several themes emerged:

- *Comments on visual aspects of the pamphlet* – specifically, comments on the cartoon featured in the upper left-hand corner. Interviewees expressed mixed attitudes – some considered it ‘cute,’ others somewhat childish.
- *Comments on length/organization* – pamphlet length; whether it appeared ‘wordy;’ how easy (or difficult) it was for the respondent to read it; whether the main arguments were presented in an organized manner.
- *Attitudes towards the source(s) of the information* – Who were the sources? What were one’s perceptions of them? Some interviewees, for example, expressed mistrust of the CDC and other sources listed on the pamphlet – namely, that the agency had an “agenda” in promoting influenza vaccination.
- *References to statistics* - phrases such as “nice statistics” or “alarming statistics.” This suggests that respondents, while noticing these numbers,

were not thinking about how they related to the message. That is, they only mentioned their presence, while failing to discuss potential relevance. This was different from the statistics discussed in regards to systematic processing. In that situation, interviewees were focusing on what statistics were *absent* but which, if present, could further reinforce the message. In other words, interviewees were actively thinking about the message and how it could be improved.

- *Whether one has encountered the information before* – Several interviewees commented that they had seen the information in the pamphlet before and thus felt no need to read through it again.

Figure 6 synthesizes these themes into novel indicators of heuristic processing:

*The following statements are about how other healthcare workers said they interpret information about influenza vaccination. Please indicate the extent (“strongly agree,” “agree,” “neutral,” “disagree,” “strongly disagree” or “no opinion”) you agree with each statement:*

*\*\* When I encounter information about influenza vaccination: \*\**

1. I am likely to pay attention to visual aspects of the message (e.g., pictures).
2. I am less likely to read something that I think is too long (or wordy).
3. I focus on the source(s) providing the information and what I think about them.
4. I am less (or more likely) to pay attention to information I have encountered before.
5. Any statistics or numbers discussed in the message are important to me.

**Figure 6: Proposed (Novel) Measurements for Heuristic Processing**

### *Potential limitations*

The pamphlet used to develop these measurements, although brief, contained much of the information CDC aims to communicate to healthcare workers. It could be argued that there was a ‘medium-specific’ priming effect for this particular pamphlet, in that it catalyzed thought processes that otherwise may not have occurred if other materials were shown (for example: a brochure from a group opposed to influenza vaccination for healthcare workers). However, this is arguably not an issue for several reasons:

- (1) This method was used successfully as part of previous research with the RISP model.
- (2) It would be impractical, due to time constraints, to provide interviewees with information longer than one or two pages.
- (3) The focus is on identifying cognitive information processing strategies, which ultimately involves some kind of priming effect (e.g., the goal is getting respondents to think about the messages and self-report on processing methods).
- (4) Interviewees were also asked how they interpret *other* vaccine-related information they may encounter. As such, the pamphlet was designed to stimulate thought not only about the messages contained therein, but also other vaccine information in general.

### ***Part 4 Commentary: Perceived information gathering capacity***

#### ***(Research Question 4)***

Previous research with this model has included both general and specific measurements for perceived information gathering capacity. Generic measurements involved asking respondents to rate (via a Likert Scale) the extent of their agreement with the following question: “If I wanted to, I could get all the information I need

about this topic.” Specific measurements involved asking respondents about a *particular* piece of risk-related information they were asked to read. Questions included: “the [information] was difficult to read” and “it took a lot of mental effort on my part to understand how the [different messages] fit together.” This study was more in-line with the generic measurement, as the “gathering capacity” question used referred to “vaccine information in general.”

The themes that emerged suggest potentially useful, novel measurements of gathering capacity (see Figure 7). As was the case with information processing, future research combining both previous and novel measures is needed to determine the most accurate indicators of this concept.

*The following are statements healthcare workers have made regarding information about influenza vaccination. For each statement, please indicate whether you “strongly agree,” “agree,” “feel neutral,” “disagree,” “strongly disagree” or have “no opinion.”*

1. I consider myself well-informed about this issue.
2. If I wanted to find information about influenza vaccination, I know exactly where to look.
3. I consider the information about influenza vaccination to be accessible (or not accessible).

**Figure 7: Proposed (Novel) Measurements for Perceived Info. Gathering Capacity**

Overall, interviewees expressed a high degree of perceived confidence in being able to find sufficient information about influenza vaccination so as to make an informed decision. Key reasons included: knowing where to go for information (e.g., having trusted information sources) and considering information to be readily available or accessible. For those who were not as confident, this feeling appeared to have little to do with their own perceived gathering capabilities; instead, it related to volume of information and whether the data they needed could easily be located.

### ***Research implications***

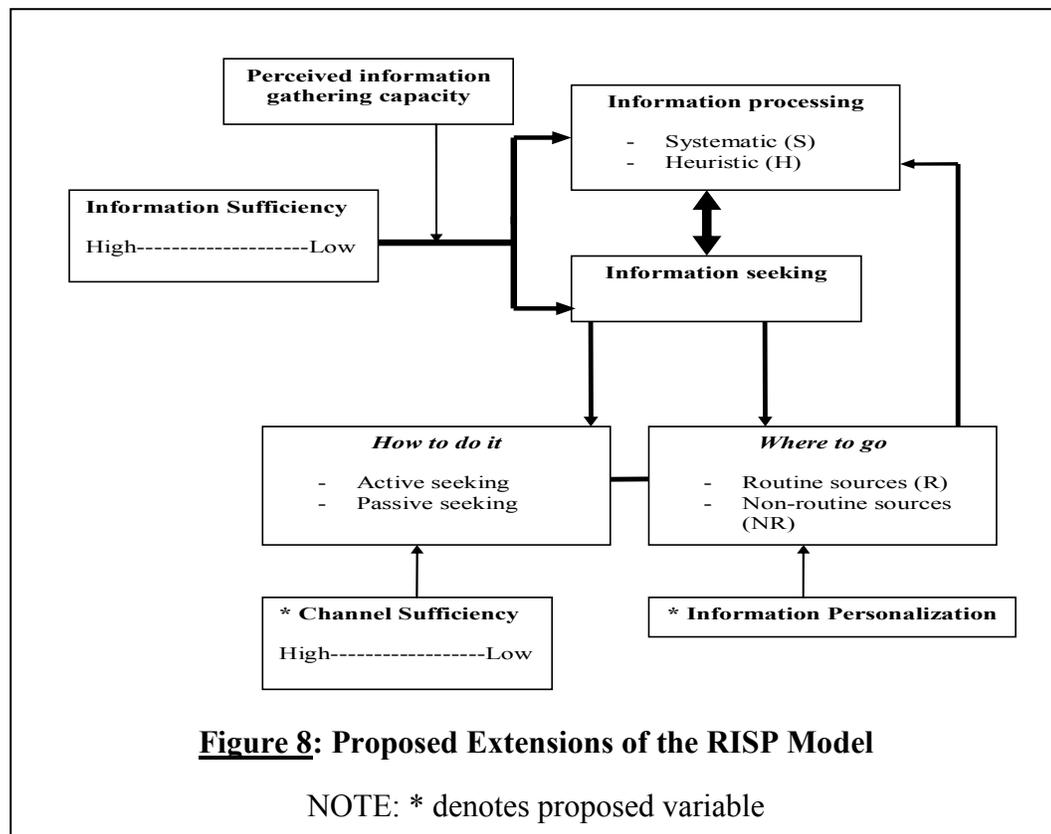
This research has both theoretical and practical implications. From a theoretical perspective, it outlines a potential extension of the RISP model in regard to influenza vaccination. Specifically, it proposes several novel variable measurements for channel beliefs, information gathering capacity, information seeking and heuristic/systematic processing. From a practical perspective, it provides guidance on how to better communicate with healthcare workers about vaccination, not only by addressing salient beliefs/concerns, but also by focusing on how information is sought, perceived and processed.

#### *Theoretical implications: Commentary*

This research proposes an extension of the RISP model, with a focus on understanding the role of information seeking and processing in informing healthcare workers' vaccine decisions. First, using in-depth and online interview data, it outlined potential measurements for heuristic and systematic processing, and perceived information gathering capacity. Some of these measurements speak to existing conceptualizations of RISP model variables; others are novel and in need of further elaboration. Second, it proposed two new variables related to information seeking – *information personalization* (which focuses on how effective, in terms of quality, people perceive their current information sources to be) and *channel sufficiency*

(whether these sources would be able to answer questions or concerns that may arise). It also suggests that information personalization may be related to informational justice (a component of procedural justice research). Both these proposed variables address a relatively unexplored area of the RISP model – determinants of routine versus non-routine, as well as active versus passive information seeking. Whereas the information sufficiency component of the model tells us *when* information seeking is likely to occur, these two variables suggest *how* and *where* that is likely to happen.

All of these proposed measurements suggest a slightly re-worked version of the RISP model. Figure 8 outlines proposed changes. First, Information personalization replaces channel beliefs. This, in turn, determines the type of sources people will consult - familiar (routine seeking) or novel (non-routine seeking). Second, channel sufficiency relates to active/passive seeking, in that higher levels of insufficiency are associated with a greater likelihood of active seeking taking place.



*Practical implications: Commentary*

This thesis has argued that low rates of influenza vaccination among healthcare workers are a potent public health challenge. Unfortunately, there is no magic formula for increasing these figures. However, there are steps health officials can take to better communicate about vaccine benefits, risks, efficacy, and necessity, and in the process help facilitate changes in behavior.

At the same time, increasing vaccination rates is far from an open and shut argument. First, it overlooks the social implications of vaccine policy. How can we balance the desire to protect patients and care providers with a person's right to accept (or refuse) a medical intervention? Is mandatory vaccination a viable solution? What are the implications of such an approach? Do we risk creating a "culture of compliance" when it comes to influenza vaccination in the healthcare field? Is this desirable?

Second, it masks the difficulties in actually attempting to increase immunization rates in the first place. What combination of strategies – both supply and demand-oriented – should be used? Third, it ignores the ethical dilemmas related to vaccine communication in particular. What does communication mean for provider-supervisor relations? Could communication be viewed as both persuasion and coercion? Where is the boundary between information and public relations (i.e. promoting vaccination)?

However, this thesis argues that the public health implications of low immunization rates should not be overlooked. Solutions designed to increase rates (especially communication) should acknowledge potential challenges. However, these challenges should ultimately not be a reason for inaction.

In focusing specifically on vaccine risk communication, therefore, the data gathered in this thesis offer the following perspectives and lessons. To ensure maximum effectiveness, risk information should address the following areas:

- *Primary reasons healthcare workers are, or are not, vaccinated* - Existing vaccine communication materials tend to emphasize one's responsibilities as a healthcare worker (e.g., getting vaccinated to protect patients). Clearly this remains an important reason why providers are vaccinated. However, appealing to one's sense of *personal* health may be an underutilized and underappreciated element of current communication efforts. In other words, communicators should discuss vaccination as a behavior with personal implications, in addition to societal benefits. For example, personal testimonies of healthcare workers who declined immunization and subsequently contracted influenza may resonate with some individuals who find themselves in a similar situation.
- *The sources they use to obtain vaccine-related information* – Health officials must appreciate the important roles played by local Departments of Health and places of employment in disseminating vaccine information. It can be argued that the best way to reach healthcare workers is to proceed through these entities - the essence of thinking globally (e.g., increasing vaccine uptake throughout the country) yet acting locally (e.g., on the local level).
- *How they interpret and react to the information received* – Based on interviewee comments, it would be prudent for vaccine information to provide statistical data on efficacy rates and cost savings. Many healthcare workers interviewed appeared to take a “numbers talk approach” – looking for data to ‘back up’ assertions about the vaccine. These comments related to systematic processing, in that interviewees were actively searching for “gaps” in the information as they read over the pamphlet. By filling in these gaps, vaccine information will be better able to respond to key

questions and concerns. However, this assumes that healthcare workers attend to vaccine information systematically. However desirable this may be (given the relationship between beliefs and systematic processing posited earlier), it is far from guaranteed. Methods for promoting systematic processing, moreover, are beyond the scope of this thesis.

### ***Future research directions***

#### *Research in other healthcare settings – The need for more data*

The thesis interviewed a diverse group of healthcare workers, with a focus on identifying determinants of vaccine behavior and the “truths” that underline vaccine decisions. However, it was unable to concentrate specifically on one particular group (such as physicians or nurses). Further research should perhaps concentrate on one group and, in the process, apply results from this research to other settings and situations. This can be accomplished from several angles.

First, research may focus on one group of healthcare workers across various settings (e.g., all physicians within local hospitals, clinics, and private practices). Such discipline-specific research has been conducted in the past, with positive results (for example, Manuel et al., 2002). Second, research may instead center on one particular care setting and the individuals employed therein (e.g., the entire medical staff of a hospital). Finally, research may even involve more large-scale (e.g., national) surveys of healthcare workers. This would help enhance generalizability, as well as provide data on the vaccine behavior of a large segment of the U.S. healthcare system. However, this method would face challenges. First, there are few, if any, national surveys of ‘healthcare workers’ in general. Moreover, participation can be difficult to attain, as this thesis describes.

However, there are routine national surveys of *specific* groups of workers, often conducted by oversight entities. For example, the American Medical Association - as

part of its MasterFile - maintains a comprehensive database of physician contact information (both historical and current) (American Medical Association, 2006). Moreover, entities such as the American Board of Emergency Physicians routinely conduct representative surveys of their respective constituents on everything from professional interests, training/certification status and professional experience, to well-being and demographics (American Board of Emergency Medicine, 2006).

*Applicability to the public?*

Obviously, healthcare workers are not the only group for which routine influenza vaccination is recommended. Various groups among the general public (young children, elderly and the immune-compromised) are also the focus of vaccine communication efforts. However, health authorities report mixed results in regards to uptake. The 2003 National Health Interview Survey (the most recent year for which data are available) reported the following national immunization rates by ‘at risk’ group:

**Table 2: National Influenza Vaccination Rates by Group**

<b>Group</b>	<b>Rate (% of group population in U.S)</b>
<b>Ages 18-49, High-risk</b>	<b>24.2</b>
<b>Ages 50-64, High-risk</b>	<b>46.3</b>
<b>Ages 50-64, Total</b>	<b>36.8</b>
<b>Ages 65 and older</b>	<b>65.5</b>
<b>Pregnant women</b>	<b>12.8</b>
<b>Healthcare workers</b>	<b>40.1</b>
<b>Household contacts</b>	<b>18.9</b>

Furthermore, during the most recent vaccine shortage (2004-2005), rates varied tremendously among the various ‘priority’ groups – from 60% in the elderly to 36% in young, at-risk adult (Centers for Disease Control and Prevention, 2005b). As is the case for healthcare workers, myriad factors inform the vaccine behavior of these publics, such as vaccine supply (Orenstein et al., 2005) and risk awareness (Brewer & Hallman, 2006; Jones et al., 2004). This research provides the impetus for exploring vaccine behavior in these groups using the RISP model and other health behavior frameworks. Existing research in this area is sparse, yet the implications are profound.

### ***Limitations***

#### *Generalizability*

This thesis presented data on influenza vaccine behavior collected via a sample of healthcare workers in a suburban town in central New York. Given such a relatively small collection area, it can be argued that the data may not be generalizable to healthcare workers in different care settings or geographic localities. Specifically, the individuals interviewed may not be demographically representative of all healthcare workers state-wide, region-wide or nation-wide. Nor are these behavior data necessarily applicable to larger groups. In one respect, this critique is accurate. One must be cautious in applying these results to other care settings, or in regards to other medical professionals.

However, this research approaches this criticism from several other angles. In one sense, it was not designed (at this stage) to be generalizable. Instead, it focused on exploring the determinants of influenza vaccine behavior *among a group of care providers within a particular locality*. The primary goals were to develop more rigorous methodology, contribute to theory development, and outline future research directions that extend beyond this collection site.

However, it can also be argued that generalizability does indeed play an important role in this research, but beyond demographic considerations. First, the data collected speak directly to previous research on influenza vaccine behavior. Second, the data help identify the ‘truths’ (e.g., determinants) that underlie such behavior. Weiss (1994) argues that aim of qualitative research (especially interviews) is to explore an individual’s perceptions, views, and attitudes towards a particular issue. If ‘truth’ is manifested in the subjective meaning people give to these actions, then the researcher achieves generalizability through adequate representation of these truths. This is the essence of identifying underlying social meaning – that is, the factors that inform workers’ vaccine behavior (Shapiro, 2002). The extent to which these determinants can be identified and adequately explained relates to the “confidence we [can] have in our practical interventions and in our understanding of [peoples’] behavior” (Shapiro, 2002, p. 491).

Taken together, generalizability (in this instance) does not involve focusing on whether healthcare workers interviewed are similar demographically to those in other localities. Instead, it involves focusing on whether the behavior determinants discussed in this thesis cut across different healthcare settings and professions. Achieving a firm grasp on underlying social meaning is an important step in this process.

#### *Online surveys and incomplete data*

Weiss (1994) argues that in-depth, in-person interviews can yield rich and insightful data. For this research, however, interviews were not the only method used. Telephone and online methods were also employed. The online survey, in particular, emerged as a preferred choice for physicians and other providers, in that they could complete the questions at their leisure and save responses where necessary. However, logistical problems meant that some data from the online survey were incomplete.

Some individuals, for example, were unable to view the one-page document and answer the information processing question. Still others could not return to the survey once they finished reading the pamphlet. However, despite these challenges, the online survey was an important resource in interviewing individuals who otherwise might not have had the time to participate.

*Social desirability and the vaccine “culture”*

Regardless of how one feels about influenza vaccination as it applies to healthcare workers, it is difficult to argue that it is *not* becoming a significant public health issue. From vaccine communication to mandatory immunization, there are many facets to this debate. Even more importantly, vaccination has become a new cause celebre (of sorts) within the medical community, as care professionals come under increased scrutiny as to why they do not receive the same intervention they advocate for patients. Consequently, what we see now is the emergence of a vaccine “culture” within the medical field – one that treats vaccination as a socially desirable behavior.

This thesis encountered the challenges of social desirability in several areas. For example, as mentioned in the Discussion section of Part 1, the high number of interviewees who either were already vaccinated, or intended to do so, may not have truly represented actual behavior. That is, interviewees may have been conscious of the attention afforded to vaccination and, as a result, desired to conform to a powerful social norm. However, those individuals may not have followed up on this sentiment.

***Conclusion***

Low rates of influenza vaccination among healthcare workers present both potential challenges and opportunities. A combination of supply-side (vaccine availability and access) and demand-side strategies (vaccine advocacy, education, and communication) is needed to facilitate changes in immunization behavior.

Communication is an important part of these efforts. The data from this thesis, moreover, suggest that vaccine communication is likely to be most effective when it uses local health entities as sources (e.g., local Departments of Health), provides numerical data to support vaccine claims, addresses key concerns related to side effects, emphasizes both a care provider's sense of personal health and patient responsibility, and includes messages that are relatively succinct and easy to read.

However, one must remember that there is no one solution for facilitating changes in vaccine behavior and, by extension, higher immunization rates. Simply put, vaccination is a process involving ethical, social and logistical considerations. Communication, despite its benefits, cannot solve them alone. For example, volatile vaccine supply means that, in some years, vaccine is abundant, whereas in others shortages occur. The mere mention of mandatory vaccination can generate resentment in the healthcare field as an infringement on personal rights. The vaccine "culture" presents a powerful social norm that can be seen as punishing those who go against it.

At the same time, the dangers of influenza transmission in care settings are clear, and the benefits of immunization apparent. The presence of ethical, logistical or social concerns should not be a cause for inaction, whether regarding vaccine communication or any other proposed intervention.

## APPENDIX A: HUMAN SUBJECTS APPROVAL INFORMATION

### CONSENT FORM

Thank for your taking time out of your busy schedule to meet with me today. My name is Chris Clarke and I'm from the Department of Communication at Cornell University. You have been asked to participate in an interview, as part of research for a Masters thesis that explores how healthcare workers make flu vaccine decisions.

Please allow me to provide you a short consent statement, which contains background information on this research thesis, as well as describes the exact nature of your participation.

**\* What this study is about:**

This study is titled: *Understanding influenza vaccination behavior in healthcare workers: The role of information seeking and processing*

This research focuses on how healthcare workers make decisions about flu vaccination. Specifically, I am applying a model of Risk Information Seeking and Processing as it relates to flu vaccine behavior. This will involve, as part of our conversation, elaborating on some key areas, including: preferred vaccine information sources, attitudes towards these sources and how people react to the information they receive.

This project has several goals:

- (a) Using interview data to develop a survey of healthcare workers, as part of future research. The data collected here will assist in question development.
- (b) Present preliminary findings on how healthcare workers make flu vaccine decisions.
- (c) Complement existing and future flu vaccine communication efforts targeted towards healthcare workers.

\* **What I will ask you to do.** If you agree to participate, I will interview you on this topic for approximately 20-30 minutes. You are free to answer as many questions as you feel comfortable. The interview can be done in person or via telephone or e-mail – whatever is most convenient for you and your schedule.

\* **Your participation is strictly voluntary.** You may stop the interview at any time and for any reason, with no negative consequences of any sort. You are welcome to ask me questions about the project at any time during the interview.

\* **I will be tape recording our conversation** so I don't have to take a lot of notes and can listen to what you have to say. These tapes will be available only to researchers working on this project. Your participation will be kept strictly confidential. This means that all transcripts and participant lists will be kept in a locked filing cabinet in my office, as well as on a password-protected computer.

\* **Your participation is strictly anonymous.** Nothing you say will be connected in any way with your name on any published material relating to this project.

\* **Risks and Benefits.** There are no anticipated risks for participation, other than those involved in daily life. However, you should also know that our previous correspondences via e-mail (like e-mail in general) are not entirely secure. Others may know you are participating in this research, although they will not know any of your answers from our discussion here today. However, if you choose to answer the questions via e-mail, please realize that confidentiality cannot be guaranteed 100%.

There are no direct benefits of participation, other than assisting in research that could complement existing vaccine communication efforts and, indirectly, possibly increase flu vaccine uptake among healthcare workers.

\* **If you have questions.** Here is a sheet that has contact information for me, my Thesis Advisor, and the Cornell University Committee on Human Subjects, should

you have any additional questions. The researchers conducting this study are Chris Clarke and Katherine McComas.

You will be given a copy of this form to keep for your records.

**\* Statement of Consent**

I have read the above information and have received answers to any questions I asked. I consent to take part in the study.

Your signature: \_\_\_\_\_ Date \_\_\_\_\_

I agree to have this interview tape recorded and transcribed for information accuracy.

Your signature: \_\_\_\_\_ Date \_\_\_\_\_

**\*\* Do you have any questions before we start? Is there anything I can clarify? \*\***

### Interview Questions

1. What is your title/position? Can you tell me a little bit about what you do in that capacity?
2. In your view, how important do you think getting a flu shot is to healthcare workers/physicians in your line of work? Why do you think that?
3. Do you plan to receive a flu shot this year? Have you done so in years past? To what extent would you say you consider getting vaccinated each year (e.g., a lot, a little, none at all, etc)?
4. What things do you consider in deciding whether to get a flu shot? In other words, what are some of the reasons you receive or decline the vaccine?  
\* Which reason(s) do you consider the most important? Why?
5. To your knowledge, do your colleagues (co-workers) receive flu shots?  
\* In your view, what are some of the reasons why they would (or would not) decide to get vaccinated? Which reasons do you think they consider most important, in your opinion?
6. Do you receive information concerning flu vaccination as it relates to healthcare workers? If so, from what sources? How often do you receive it? What do they tend to say? Can you give me examples?
7. In regards to the sources you just mentioned, what is your view/opinion of them? What are your perceptions of the information you receive from them? Why? What are some of the things you look for in making this judgment?
8. Let's assume for a moment that you are also motivated to *actively seek* flu vaccination information as well, for whatever reason. In such a scenario, where would you likely go? Why? Can you give me specific examples of information you would seek?
9. \* ***Please refer to the brief 1-page pamphlet attached with the earlier e-mail***

I am now going to give you a very short, 1 page document that discusses flu vaccination for healthcare workers. Please take a moment to read it.

*After reading it:* What did you think of it? As you read it, what were you thinking? In what way(s) did you interpret the information given? In what way(s) did you think about the article and the information it presented?

\* How do you think other healthcare workers might interpret the information given?

10. Overall, how confident are you that you could seek out and find relevant and important information on this issue if you wanted to?
11. Is there anything else you would like to add, or felt was left out?
12. Who else would you recommend we speak to, as part of this project?

APPENDIX B: INFLUENZA VACCINE BROCHURE

Adobe Reader - [HCW - Get Vaccinated!.pdf]

File Edit View Document Tools Window Help

Open Save a Copy Print Email Search Select Text

YAHOO! TOOLBAR Get it free

118%

400 editors

---

## Health professionals can spread disease. Make sure you're vaccinated!

Dear Colleagues,

If you're like most people who work in medicine, your patients' well-being is of primary concern to you. Yet every year more than 200,000 MDs and RNs needlessly expose their patients to the influenza virus. Are you one of them?

According to CDC, only 34% of MDs and RNs get vaccinated annually against influenza. This means that over 2.3 million MDs and RNs are unvaccinated and at risk not only for contracting influenza but also for passing it on to others. On average, 20,000 people die annually in the U.S. from influenza or its complications. Some of these cases are unwittingly passed from health professionals to their patients.

Why are so many of us unvaccinated? According to surveys, here are some reasons:

- 1. I don't get sick and I never get influenza.**  
About 10-25% of people get influenza each year, and health professionals are not exempt. Many of us develop only mild symptoms of the disease, so we often don't get a florid influenza syndrome. But even with minimal symptoms, we can still transmit the full-blown illness to our patients. Health professionals are notorious for going to work even when sick. With mild illness—scratchy throats, muscle aches—we talk with patients, check blood pressures, examine throats. We breathe the air. We infect others with respiratory viruses.
- 2. I'm not in a risk group.**  
If you are a healthy person under the age of 50, you might not be in an influenza risk group, but as a health professional, you put other people at risk. Unvaccinated health care workers put hundreds of others at risk for influenza. Our patients can get infected, need to be hospitalized, and even die from influenza. The only acceptable reason for your not being vaccinated is a valid medical contraindication. By not getting vaccinated against influenza, you endanger the lives of others.
- 3. I forget to get vaccinated or don't have time.**



Doc, I know it's important for me to get a flu shot each year, but do you get one too?

Yes, I do—it's the policy in our practice that everyone gets a flu shot unless they have a valid medical contraindication.

8.5 x 11 in

1 of 1

start Intel - Neural Reader Microsoft Word Microsoft Excel Adobe Reader...

11:14 AM

## REFERENCES

- Ajzen, I. (1988). *Attitudes, personality and behavior*. Milton Keynes, UK: Open University Press.
- American Board of Emergency Medicine. (2006). Longitudinal study of emergency physicians overview. Retrieved March 29, 2006, from [http://www.abem.org/public/portal/alias\\_Rainbow/lang\\_en-US/tabID\\_3370/DesktopDefault.aspx](http://www.abem.org/public/portal/alias_Rainbow/lang_en-US/tabID_3370/DesktopDefault.aspx).
- American College of Physicians. (2006). The health care response to pandemic influenza. *Annals of Internal Medicine*, 145, 135-137.
- American College of Emergency Physicians. (2006). The role of the emergency physician in injury prevention and control. Retrieved March 30, 2006, from <http://www.acep.org/webportal/PracticeResources/PolicyStatements/injprev/RoleEmergencyPhysicianInjuryPreventionControl.htm>.
- American Medical Association. (2006). AMA physician masterfile. Retrieved March 29, 2006, from <http://www.ama-assn.org/ama/pub/category/2673.html>.
- Backer, H. (2006). Counterpoint: In favor of mandatory influenza vaccine for all health care workers. *Clinical Infectious Diseases*, 42(15), 1144-1147.
- Bartlett, J., Borio, L., Radonovich, L., Mair, J.S., O'Toole, T., Mair, M., et al. (2003). Smallpox vaccination in 2003: Key information for clinicians. *Clinical Infectious Diseases*, 36, 883-902.
- Bartlett, J.G. (2006). Planning for avian influenza. *Annals of Internal Medicine*, 145, 141-144.
- Bauer, R.A. (1971). The obstinate audience: The influence process from the point of view of social communication. In W. Schrahm & D.F. Roberts (Eds.), *The process and effects of mass communication* (pp. 326-346). Chicago: University of Illinois Press.

- Becker, H.M. (1974). The health belief model and personal health behavior. *Health Education Monographs*, 2(4), 1-42.
- Besley, J.C., & McComas, K.A. (2005). Framing justice: Using the concept of procedural justice to advance political communication research. *Communication Theory*, 15(4), 414-436.
- Bostrom, A., & Lofstedt, R.E. (2003). Communicating risk: Wireless and hardwired. *Risk Analysis*, 23(2), 241-248.
- Brewer, N.T., & Hallman, W.K. (2006). Subjective and objective risks as predictors of influenza vaccination during the vaccine shortage of 2004-2005. *Clinical Infectious Diseases*, 43, 1379-1386.
- Carman, W.F., Elder, A.G., Wallace, L.A., McAulay, K., Walker, A., Murray, G., et al. (2000). Effects of influenza vaccination of health-care workers on mortality of elderly people in long-term care: A randomized controlled trial. *Lancet*, 355(9198), 93-97.
- Centers for Disease Control and Prevention. (2005a). Background on influenza. Retrieved March 24, 2006, from <http://www.cdc.gov/flu/professionals/background.htm>.
- Centers for Disease Control and Prevention. (2005b). Influenza vaccine bulletin #1. Retrieved January 15, 2007, from [http://www.cdc.gov/flu/professionals/bulletin/2005-06/bulletin1\\_062905.htm](http://www.cdc.gov/flu/professionals/bulletin/2005-06/bulletin1_062905.htm).
- Centers for Disease Control and Prevention. (2006a). Influenza vaccination of healthcare personnel. Retrieved March 24, 2006, from <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5502a1.htm>.
- Centers for Disease Control and Prevention. (2006b). Questions & answers: Influenza vaccine production, supply and distribution in the United States. Retrieved April 13, 2007 from, <http://www.cdc.gov/flu/about/qa/vaxsupply.htm>.

- Centers for Disease Control and Prevention. (2006c). Avian influenza: Current situation. Retrieved May 1, 2006, from <http://www.cdc.gov/flu/avian/outbreaks/current.htm>.
- Centers for Disease Control and Prevention. (2007). Interim Pre-pandemic Planning Guidance: Community Strategy for Pandemic Influenza Mitigation in the United States. Retrieved March 21, 2007 from, <http://www.pandemicflu.gov/plan/community/mitigation.html>.
- Chang, D.J., Hawkins, A., McGirr, J., Fielding, K., Hemmings, L., O'Donoghue, A. et al. (1999). An evaluation of the nurse practitioner role in a major rural emergency department. *Journal of Advanced Nursing*, 30(1), 260-268.
- Chess, C. (1998). Fearing fear: Communicating about agricultural biotechnology. *AgBioForum*, 1(1), 17-21.
- Clements, C.J. & Ratzan, S. (2003). Misled and confused? Telling the public about MMR vaccine safety. *Journal of Medical Ethics*, 29, 22-26.
- College of Family Physicians of Canada. (2005). The role of the family doctor in public health and emergency preparedness. Retrieved March 30, 2006, from [http://www.cfpc.ca/local/files/Communications/Role\\_Fam\\_Doc\\_Dec05.pdf](http://www.cfpc.ca/local/files/Communications/Role_Fam_Doc_Dec05.pdf).
- Desroches, C.M., Blendon, R.J., & Benson, J.M. (2005). Americans' responses to the 2004 influenza vaccine shortage. *Health Affairs*, 24(3), 822-831.
- DiGiovanni, C., Conley, J., Chiu, D., & Zaborski, J. (2004). Factors influencing compliance with quarantine in Toronto during the 2003 SARS outbreak. *Biosecurity and Bioterrorism*, 2(4), 265-272.
- DiMaggio, C., Markenson, D., Loo, G.T., & Redlener, I. (2005). The willingness of U.S. emergency medical technicians to respond to terrorist incidents. *Biosecurity and Bioterrorism*, 3(4), 331-337.

- Eagley, A., & Chaiken, S. (1993). *The psychology of attitudes*. San Diego, CA: Harcourt Brace.
- Emanuel, E.J., & Wertheimer, A. (2006). Who should get influenza vaccine when not all can? *Science*, *312*, 854-855.
- Fauci, A. (2006). Pandemic influenza threat and preparedness. *Emerging Infectious Diseases*, *12*(1), 73-77.
- Finch, M. (2006). Point: Mandatory influenza immunization for all healthcare workers? Seven reasons to say “no.” *Clinical Infectious Diseases*, *42*, 1141-1143.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Glick, D., Harrison, K., Davoudi, M., & Riopelle, D. (2004). Public perceptions and risk communications for botulism. *Biosecurity and Bioterrorism*, *2*(3), 1-8.
- Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report*, *8*(4), 597-607.
- Goldstein, A.O., Kincade, J.E., Gamble, G., & Bearman, R.S. (2004). Policies and practices for improving influenza immunization rates among healthcare workers. *Infection Control and Hospital Epidemiology*, *25*(11), 908-911.
- Griffin, R.J., Dunwoody, S., & Neuwirth, K. (1999). Proposed model of the relationship of risk information seeking and processing to the development of preventive behaviors. *Environmental Research*, *80*, S230-S245.
- Griffin, R.J., Neuwirth, K., Giese, J., & Dunwoody, S. (2002). Linking the heuristic-systematic model and depth of processing. *Communication Research*, *29*(6), 705-732.
- Griffin, R.J., Neuwirth, K., Dunwoody, S., & Giese, J. (2004). Information sufficiency and risk communication. *Media Psychology*, *6*, 23-61.

- Gronvall, G.K., & Borio, L.L. (2006). Removing barriers to global pandemic influenza vaccination. *Biosecurity and Bioterrorism*, 4(2), 168-175.
- Grunig, J.E. (1997). A Situational Theory of Publics: Conceptual history, recent challenges and new research. In D. Moss, T. MacManus, & D. Vercic (Eds.), *Public relations research: An international perspective* (pp. 3-48, 282-288). London, UK: International Thomas Publishing.
- Gullion, J.S. (2004). Schools nurses as volunteers in a bioterrorism event. *Biosecurity and Bioterrorism*, 2(2), 112-117.
- Halliday, L., Thomson, J.A., Roberts, L., Bowen, S., & Mead, C. (2003). Influenza vaccination of staff in aged care facilities in the ACT: How can we improve the uptake of influenza vaccine? *Australian and New Zealand Journal of Public Health*, 27(1), 70-75.
- Heininger, U., Bachler, M., & Schaad, U.B. (2003). Attitudes of pediatricians regarding influenza self-immunization: A survey in a Swiss university children's hospital. *The Pediatric Infectious Disease Journal*, 22, 391-394.
- Henderson, D.A. (1999). The looming threat of bioterrorism. *Science*, 283, 1279-1282.
- Hoey, J. (1998). When the physician is the vector. *Journal of the Canadian Medical Association*, 159(1), 45-46.
- Hoffmann, C.J., & Perl, T.M. (2005). The next battleground for patient safety: Influenza immunization for healthcare workers. *Infection Control and Hospital Epidemiologists*, 26(11), 850-851.
- Johnson, B.B. (2005). Testing and expanding a model of cognitive processing of risk information. *Risk Analysis*, 25(3), 631-650.
- Jones, T.F., Ingram, L.A., Craig, A.S., & Schaffner, W. (2004). Determinants of influenza vaccination, 2003-2004: Shortages, fallacies and disparities. *Clinical Infectious Diseases*, 39, 1824-1828.

- Jordan, R., Wake, B., Hawker, J., Boxall, E., Fry-Smith, A., Chen, Y.F. et al. (2004). *Influenza vaccination of healthcare workers (HCW) to reduce influenza-related outcomes in high-risk patients: A systematic review of clinical and cost-effectiveness*. Birmingham (U.K.): University of Birmingham. (DPHE No. 48).
- Kahlor, L., Dunwoody, S., Griffin, R.J., Neuwirth, K., & Giese, J. (2003). Studying heuristic-systematic processing of risk communication. *Risk Analysis*, 23(2), 355-368.
- Kahlor, L., Dunwoody, S., Griffin, R.J., & Neuwirth, K. (2006). Seeking and processing information about impersonal risk. *Science Communication*, 28(2), 163-194.
- Keyton, J. (2006). *Communication research: Asking questions, finding answers*. New York, NY: McGraw-Hill.
- Kilbourne, E.D. (2006). Influenza pandemics in the 20<sup>th</sup> century. *Emerging Infectious Diseases*, 12(1), 9-14.
- King, N.B. (2005). The ethics of biodefense. *Bioethics*, 19(4), 432-446.
- King, W.D., Woolhandler, S.J., Brown, A.F., Jiang, L., Kevorkian, K., Himmelstein, D.U., et al. (2006). Brief report: Influenza vaccination and health care workers in the United States. *Journal of General Internal Medicine*, 21, 181-184.
- Lester, R.T., McGeer, A., Tomlinson, G., & Detsky. (2003). Use of, effectiveness of, and attitudes regarding influenza vaccine among house staff. *Infection Control and Hospital Epidemiology*, 24(11), 839-844.
- Lincoln, Y.S., & Guba, E.G., (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage.
- Mair, M., Grow, R.W., Mair, J.S., & Radonovich, L.J. (2006). Universal influenza vaccination: The time to act is now. *Biosecurity and Bioterrorism*, 4(1), 1-21.

- Manuel, D.G., Henry, B., Hockin, J., & Naus, M. (2002). Health behavior associated with influenza vaccination among healthcare workers in long-term care facilities. *Infection Control and Hospital Epidemiology*, 23(10), 609-614.
- Markenson, D., Reilly, M., & DiMaggio, C. (2005). Public health department training of emergency medical technicians for bioterrorism and public health emergencies: Results of a national assessment. *Journal of Public Health Management and Practice*, 11(6), S68-S74.
- Marshall, K.M., Begier, E.M., Griffith, K.S., Adams, M.L., & Hadler, J.L. (2005). A population survey of smallpox knowledge, perceptions, and healthcare-seeking behaviors surrounding the Iraq invasion – Connecticut 2002-03. *Biosecurity and Bioterrorism*, 3(3), 246-255.
- Martinello, R.A., Jones, L., & Topal, J.E. (2003). Correlation between healthcare workers' knowledge of influenza vaccine and vaccine receipt. *Infection Control and Hospital Epidemiology*, 24(11), 845-847.
- McComas, K.A. (2006). Defining moments in risk communication research: 1996-2005. *Journal of Health Communication*, 11, 75-91.
- Mendelman, P.M., Cordova, J., & Cho, I. (2001). Safety, efficacy and effectiveness of the influenza vaccine, trivalent, types A and B, cold-adapted (CAIV-T) in health children and healthy adults. *Vaccine*, 21(19): 2221-2226.
- M'Ikanatha, N.M., Lautenbach, E., Kunselman, A.R., Julian, K.G., Southwell, B.G., Allswede, M., et al. (2003). Sources of bioterrorism information among emergency physicians during the 2001 anthrax outbreak. *Biosecurity and Bioterrorism*, 1(4), 259-265.
- Morgan, M. G., Fischhoff, B., Bostrom, A., & Atman, C.J. (2002). *Risk communication: A mental models approach*. Cambridge, UK: Cambridge University Press.

- Morse, J.M., Barrett, M.B., Mayan, M., Olson, K., & Spiers, J. (2002). Verifications strategies for establishing reliability and validity in qualitative research. *International Journal of Qualitative Methods*, 1(2), 1-19.
- Murray, S.B., & Skull, S.A. (2002). Poor health care worker vaccination coverage and knowledge of vaccination recommendations in a tertiary Australian hospital. *Australian and New Zealand Journal of Public Health*, 26(1), 65-68.
- Neuwirth, K., Dunwoody, S., & Griffin, R.J. (2000). Protection motivation and risk communication. *Risk Analysis*, 20(5), 721-734.
- Novotny, V., Clark, D., Griffin, R.J., & Booth, D. (2000). Risk based urban watershed management under conflicting objectives. *Paper presented at 1<sup>st</sup> World Water Congress of the International Water Association (IWA)*. Paris, France: 3-7 July, 2000.
- Nuzzo, J.B., D'Esposito, M., Toner, E., Smith, B., Mair, M., & Hitchcock, P. (2006). Go figure. *Biosecurity and Bioterrorism*, 3(4), 368-369
- Offit, P.A. (2005). Why are pharmaceutical companies gradually abandoning vaccines? *Health Affairs*, 24(3), 622-630.
- Orenstein, W.A., Douglass, R.G., Rodewald, L.E., & Hinman, A.R. (2005). Immunizations in the United States: Success, structure and stress. *Health Affairs*, 24(3), 599-610.
- Pearson, M.L., Bridges, C.B., & Harper, S.A. (2006). Influenza vaccination of healthcare personnel: Recommendations of the Health Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP). *Mortality and Morbidity Weekly Report*, 55(RR-2), 1-16.

- Petts, J. & Niemeier, S. (2004). Health risk communication and amplification: Learning from the MMR vaccination controversy. *Health, Risk & Society*, 6(1), 7-23.
- Petty, R., & Cacioppo, J. (1981). Epilog: A general framework for understanding attitude change. *Attitudes and persuasion: Classic and contemporary approaches*, (pp. 255-270). Boulder: Westview Press.
- Poland, G.A., Tosh, P., & Jacobson, R.M. (2005). Requiring influenza vaccination for healthcare workers: Seven truths we must accept. *Vaccine*, 23, 2251-2255.
- Quinn, S.C., Thomas, T., & McAllister, C. (2005). Postal workers' perceptions on communication during the anthrax attacks. *Biosecurity and Bioterrorism*, 3(3), 207-215.
- RAND Corporation. (2006). Role of doctors critical in effective public health. Retrieved March 30, 2006, from [http://www.rand.org/pubs/research\\_briefs/RB9094/index1.html](http://www.rand.org/pubs/research_briefs/RB9094/index1.html).
- Rea, E., & Upshur, R. (2001). Semmelweis revisited: The ethics of infection prevention among healthcare workers. *Journal of the Canadian Medical Association*, 164(10), 1447-1448.
- Rogers, R.W. (1983). Cognitive and psychological processes in fear appeals and attitude change: A revised theory of protection motivation. In J.T. Cacioppo & R.E. Petty (Eds.), *Social psychology* (pp. 153-176). New York: Guilford Press.
- Shapiro, M.A. (2002). Generalizability in communication research. *Human Communication Research*, 28(4), 491-500.
- Scherer, C.W., & Cho, H. (2003). A social network contagion theory of risk perception. *Risk Analysis*, 23(2), 261-267.
- Schoch-Spana, M. (2000). Implications of pandemic influenza for bioterrorism response. *Clinical Infectious Diseases*, 31, 1009-1013.

- Simeonsson, K., Summer-Bean, C., & Connolly, A. (2004). Influenza vaccination of healthcare workers: Institutional Strategies for improving rates. *North Carolina Journal of Medicine*, 65(6), 323-329.
- Sloan, F.A., Berman, S., Rosenbaum, S., Chalk, R.A., & Griffin R.B. (2004). The fragility of the U.S. vaccine supply. *The New England Journal of Medicine*, 351(23), 2443-2447.
- Sokol, D.K. (2006). Virulent epidemics and scope of healthcare workers' duty of care. *Emerging Infectious Diseases*, 12(8), 1238-1241.
- Stein, B.D., Tanielian, T.L., Ryan, G.W., Rhodes, H.J., Young, S.D., & Blanchard, J.C. (2004). A bitter pill to swallow: Nonadherence with prophylactic antibiotics during the anthrax attacks and the role of private physicians. *Biosecurity and Bioterrorism*, 2(3), 175-185.
- Steiner, M.A., Vermeulen, L.C., Mullahy, J., & Hayney, M.S. (2002). Factors influencing decisions regarding influenza vaccination and treatment: A survey of healthcare workers. *Infection Control and Hospital Epidemiology*, 23(10), 625-627.
- Tapianinen, T., Bar, G., Schaad, U.B., & Heininger, U. (2005). Influenza vaccination among healthcare workers in a university children's hospital. *Infection Control and Hospital Epidemiology*, 26(11), 855-858.
- Taubenberger, J.K., & Morens, D.M. (2006). 1918 influenza: The mother of all pandemics. *Emerging Infectious Diseases*, 12(1), 15-22.
- Taylor, H.A., & Faden, R.R. (2003). Ethical considerations in the formation of smallpox vaccine policy. *Biosecurity and Bioterrorism*, 1(1), 47-52.
- The Compliance Center. (2006). CDC committees issue recommendations to improve healthcare worker vaccination rates. Retrieved March 24, 2006, from

<http://www.thecrcenter.com/archives/2006/02/13/cdc-committees-issue-recommendations-to-improve-healthcare-worker-vaccination-rates/>.

Trumbo, C.W. (1999). Heuristic-systematic information processing and risk judgment. *Risk Analysis*, 19(3), 391-400.

Trumbo, C.W. (2002). Information processing and risk perception: An adaptation of the heuristic-systematic model. *Journal of Communication*, 52, 367-382.

Tye, C.C. (1997). The emergency nurse practitioner role in major accident and emergency departments: Professional issues and the research agenda. *Journal of Advanced Nursing*, 26(2), 364-370.

University of Pittsburgh Center for Biosecurity. (2005). Commentary: National Strategy for Pandemic Influenza and the HHS Pandemic Influenza Plan – Thoughts and comments. *Biosecurity and Bioterrorism*, 3(4), 292-294.

United States Government Accountability Office. (2005a). Influenza pandemic: Challenges remain in preparedness. Retrieved March 24, 2006, from <http://www.gao.gov/cgi-bin/getrpt?GAO-05-760T>

United States Government Accountability Office. (2005b). Influenza vaccine: Shortages in 2004-2005 season underscore need for better preparation. Retrieved March 24, 2006, from <http://www.gao.gov/new.items/d05984.pdf>.

United States Government Accountability Office. (2005c). Influenza pandemic: Applying lesson learned from the 2004-2005 influenza vaccine shortage. Retrieved March 24, 2006, from <http://www.gao.gov/new.items/d06221t.pdf>.

United States Government Accountability Office. (2003). Implementation of national program faces challenges. Retrieved June 7, 2006, from <http://www.gao.gov/new.items/d03578.pdf>.

- United States Government Accountability Office. (2001). Flu vaccine: Supply problems heighten need to ensure access for high-risk people. Retrieved March 24, 2006, from <http://www.gao.gov/new.items/d01624.pdf>.
- United States Department of Health and Human Services. (2006a). Understanding flu terms. Retrieved May 1, 2006, from <http://www.pandemicflu.gov/>.
- United States Department of Health and Human Services. (2006b). Pandemic planning assumptions. Retrieved May 1, 2006, from <http://www.pandemicflu.gov/plan/pandplan.html>.
- Weiss, R. S. (1994). *Learning from strangers: The art and method of qualitative interview studies*. New York, NY: Free Press.
- Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs*, 59, 329-349.
- Witte, K. (1994). Generating effective risk messages: How scary should your risk communication be? *Communication Yearbook*, 18, pp. 229-254.
- Witte, K. (1997). Preventing teen pregnancy through persuasive communications: Realities, myths, and the hard-face truths. *Journal of Community Health*, 22(2), 137-154.
- Witte, K., Cameron, K.A., Lapinski, M.K. & Nzyuko, S. (1998). A theoretically based evaluation of HIV/AIDS prevention campaigns along the Trans-Africa Highway in Kenya. *Journal of Health Communication*, 3, 345-363.
- Woods, R., McCarthy, T., Barry, A., & Mahon, B. (2004). Diagnosing smallpox: Would you know it if you saw it? *Biosecurity and Bioterrorism*, 2(3), 157-163.
- World Health Organization. (2006a). Cumulative number of confirmed human cases of avian influenza AH5N1 reported to WHO. Retrieved May 1, 2006, from [http://www.who.int/csr/disease/avian\\_influenza/country/cases\\_table\\_2006\\_04\\_27/en/index.html](http://www.who.int/csr/disease/avian_influenza/country/cases_table_2006_04_27/en/index.html).

World Health Organization. (2006b). Pandemic preparedness. Retrieved May 1, 2006, from <http://www.who.int/csr/disease/influenza/pandemic/en/>

Wray, J. & Jupka, K. (2004). What does the public want to know in the event of a terrorist attack using plague? *Biosecurity and Bioterrorism*, 2(3), 2

Yih, W.K., Lieu, T.A., Rego, V.H., O'Brien, M.A., Shay, D.K., Yokoe, D.S., et al. (2003). Attitudes of healthcare workers in U.S. hospitals regarding smallpox vaccination. *BMC Public Health*, 3, 20-28.