D1.3

Segmentation and Specific Communication Needs of Target Groups

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EXECUTIVE SUMMARY

Part 1. Compliance with influenza vaccination and factors affecting the compliance

Introduction

Historically, compliance with vaccination against seasonal influenza has been extremely variable. A number of factors have affected compliance. In part 1 of this report we reviewed the literature on the compliance of healthcare workers, the elderly, the chronically ill, pregnant women and the pediatric population with vaccination against influenza and to identify the main factors affecting compliance.

Methods

Relevant articles were identified by an electronic search. The key words we used for the search included: Influenza, seasonal, pandemic, vaccination, immunization, vaccine, adjuvants, adverse events, compliance, coverage, acceptance, barriers, refusal, risk groups and their different combinations. The primary search yielded 59 articles and documents concerning health care workers' compliance, 25 articles and documents concerning elderly people's compliance, 43 articles and documents concerning chronically ill people's compliance, 7 articles and documents concerning pregnant women's compliance and 26 articles and documents concerning the pediatric population's compliance.

Results

The compliance rates vary widely by HCW category (physicians, nurses, ancillary workers, medical students etc.), from very low (less than 10%) to around 40-50%. No clear pattern can be distinguished. In general, compliance rates in the United States are somewhat higher than in other countries reviewed. Factors affecting vaccination compliance among HCWs include desire for self-protection, desire to avoid infecting patients, desire to avoid infecting family members, perceived safety of the vaccine, perceived efficacy of the vaccine, perceived seriousness of the disease, perceived risk of the disease, perceived seriousness of complications from the disease, access to the vaccine (convenience- for example the existents of mobile carts), cost of the vaccine, fear that the vaccine could cause disease.

Interventions implemented in order to increase the compliance with influenza vaccination among HCWs include educational and media campaigns, providing easy access to vaccines, using people from within the staff as vaccination leaders, mandatory vaccination and use of vaccine declination forms. Since 1973, there has been a constant increase in the compliance rates of elderly (over 65 years of age) in the United States and varies by population group. The main factors affecting compliance rates in both Europe and the U.S. is the number of

physician visits per year. Reasons for non-compliance include lack of belief in the efficacy and safety of the vaccine and fear of side-effect or influenza resulting from the vaccine.

Compliance rates of the chronically ill with influenza vaccine in the U.S. have been increasing over the years. In contrast, compliance rates among the chronically ill in Europe are relatively low. Most of the factors affecting the compliance with influenza vaccinations among the chronically ill are identical to the factors effecting compliance among the healthy elderly population. Pregnant women tend to comply better with the seasonal influenza vaccine than with the pandemic vaccine. The main reasons for pregnant women not to receive the influenza vaccination were lack of knowledge of the importance of the vaccine and concerns for effects of the vaccine on fetal and maternal health and recommendations from their health care providers. Vaccination compliance among children is measured both on those who received two doses and those who received only one dose. Factors found to have a positive effect on compliance include the child's influenza vaccination in the previous year, receipt of all recommended immunizations, uninterrupted health insurance coverage, and the mother's marital status. Factors that were found to have a negative effect include using a family doctor rather than a pediatrician for well-child visits, parents' belief that the vaccine was unneeded or that their child was getting too many shots, and parents' difficulty in obtaining the vaccine.

Conclusions

Compliance with influenza vaccination is highly variable, both between target groups, within the target groups and between countries. Communication strategies to improve the compliance should take into account these wide variations. It is likely that different strategies will be needed for different target groups and sub-populations in different countries. The health belief model is a traditional model used to explain attitudes and behavior regarding vaccine compliance and could e a good basis for exploring the basis for these wide variations in compliance. Clearly, there is a need for more standardized surveys that should be carried out periodically. This need is particularly evident in Europe, where the data on compliance are more limited that in the United States.

Part 2. Efficacy of and compliance with non-pharmacological interventions to prevent the spread of influenza

Introduction

A number of non-pharmacological interventions (NPIs) are recommended both for primary prevention of influenza and as a complement to vaccination to prevent the spread of the disease. These include personal hygiene, social distancing, the use of face masks, respiratory etiquette, staying away from work, school closures, workplace closures, voluntary isolation of patients and limitation of travel. In order to convey credible messages to enhance compliance, there is a need for good evidence to support the efficacy the various interventions proposed. Since some of the interventions are perceived to have more of a benefit to the society in general than to the individual, the messages have to be even more persuasive.

In part 2 of this report, we reviewed the literature for evidence on the efficacy of NPI's to prevent the spread of influenza in different target groups, the compliance with NPI's and the factors affecting the compliance. The evaluation is complex due to the numerous factors involved. In addition to the seven target groups, as many as ten NPI's should be considered. Thus potentially, up to seventy types of studies need to be considered for each of the efficacy of the interventions, compliance with the interventions and factors associated with compliance. Furthermore, some of the interventions have a dual purpose – one for self-protection and the other for protection of others.

Methods

Relevant articles were identified by a search of electronic databases for studies of efficacy of and compliance with non-pharmacological interventions against influenza. The search was conducted during April 2012. We included all studies, irrespective of publication year. The key words we used for the search included: Influenza, seasonal, pandemic, non-pharmacological, personal hygiene, face masks, compliance, coverage, acceptance, barriers, refusal, risk groups and their different combinations.

Results

In general, only a few of the non-pharmacological methods have been systematically evaluated. Other than for healthcare workers, very few focus specifically on target groups. The most prominent interventions that have been evaluated are hand-washing and the use of face-masks. The quality of the studies tend to be poor or of mixed quality. In case-control studies, hand washing and wearing face masks appear to reduce the spread of influenza. In some randomised trials, there is evidence that hygienic measures in younger children can

reduce the spread in households. There is no good evidence that global measures such as screening at entry ports are effective. Evidence is limited for social distancing being effective. In randomized trials, there appeared to be a trend in lower rates of infection in the hand washing groups, although the evidence is not clear-cut. In trials of the efficacy of face masks in the general population in reducing the spread of influenza, there is no clear evidence of a reduction of influenza in the face masks groups. In studies of community mitigation programs, most received mitigation messages and adopted one or more although many found some messages confusing. The most commonly adopted preventive measures were respiratory hygiene and hand washing. Factors independently associated with the adoption of the preventive measures include education, perceived susceptibility to infection, perceived effectiveness of the measures and perceived usefulness of the information available. In one study during the H1N1 pandemic, perceived susceptibility to infection and perceived severity of H1N1 were initially high but declined early in the epidemic. Knowledge that H1N1 could be spread by indirect contact was associated with greater use of hygiene measures and social distancing. There does not appear to have been evidence of panic reactions and the public appears to have a perception of high efficacy of self-protection. Nevertheless, there were misconceptions. Trust in medical organizations is a factor that has predicted perceived efficacy of officially recommended protection measures.

Conclusions

The evidence for the efficacy of non-pharmacological interventions to prevent influenza is very limited. This is partly due to a lack of studies and the difficulty in carrying out controlled studies. The study of the efficacy of non-pharmacological interventions in the protection of others is particularly complex. Individual interventions, such as hand washing and the use of masks are more amenable to controlled trials, although they are technically difficult to carry out. Other non-pharmaceutical interventions, including mask-use and other personal protective equipment for the general public, school and workplace closures early in an epidemic, and mandatory travel restrictions remain questionable and difficult to evaluate in controlled studies. Factors that affect compliance with vaccination may also be applicable to non-pharmacological measures. Among healthcare workers, hand washing is considered to be essential in the control of infectious diseases in general. The type of face mask remains controversial. Interventions such as school closures can only be evaluated in studies such as “before-after”. The numerous biases such as confounding and selection bias are extremely difficult to control either at the design or analysis stage. Due to the large number of variables need to be assessed, one can only make cautious generalizations on the basis of

the limited number studies available. Compliance is highly variable, both within and between countries. Despite the lack of clear evidence, there are almost universal recommendations on the importance of hand washing. This may be due to the relative ease of implementation, low cost and apparent usefulness for the prevention of the spread of other diseases. There is a need for more coordinated, focused trials to assess the efficacy of hand washing and mask use. There is also a need for more standardized studies to assess the compliance with different non-pharmacological interventions.

Part 3. Communication and compliance

Introduction

During a disease outbreak the media plays a key role in moving the public to action. However, in light of the large gaps discovered in various health crises between the intentions and plans of the WHO and its extensions and the way the public in different countries receives their health messages, the role of the media does not appear to be given adequate attention. Nor do overall flu prevention and treatment efforts in the various countries appear to include the role of the media adequately into their plans. In part 3 of this report, we reviewed the literature for the roles played by the media during infectious disease crises, with emphasis on epidemics and pandemics of influenza.

Objectives and Methods

A systematic review of English-language studies from 1974 to 2012 yielded 118articles that fulfilled established criteria. The analysis was guided by the main objective to examine how the professional literature studies the various roles played by the media in relation to these specifics questions: How does the media convey information to the public and influences its perceptions and behavior? What is the cooperation of professionals and the public in media coverage during crises? Furthermore, beyond its exposure of the "use" of the various channels of communication, how does the literature analyze the theoretical concepts and rhetorical strategies of the channels of communication? Does the professional literature raise ethical questions related to the issue of the flu and the vaccine? Beyond theoretical studies of risk communication and crisis communication during epidemics, are there also empirical studies? To answer those questions we sorted the articles into four main areas that cover the subject of the media and the epidemic: social marketing; risk communication; participation, planning and constructing a communications campaign; and channels of communication and their influence.

Results

Most of the studies that appear in the professional literature today focus on the evaluation of why compliance with vaccines is low. However, there are few empirical studies of the risk communication of flu at times of crisis and emergency, and most of them are theoretical. Furthermore, there were hardly any studies on ways the public, health experts and media professionals participated in the communication circle. It has been demonstrated that the most studied communication medium is the “mass media,” mainly the television and press. Few studies in the literature have focused on the role and influence of new media technologies during crises.

Conclusions

Most of the studies in the literature are summative evaluation studies aimed at "explaining" and analyzing the barriers that explain non-compliance. Furthermore, few of the existing studies in the literature provide deep analysis of the contents and rhetorical strategies that characterize the way the media covers epidemics for the public. The literature clearly indicates a gap between models and theories of risk communication during crises, such as the inclusive-interactive media approach, and the failure of governments and organizations to utilize them. The question is how the research can be integrated in the planning stages of media campaigns so that existing knowledge is implemented.

1. INTRODUCTION - COMPLIANCE WITH SEASONAL AND PANDEMIC INFLUENZA VACCINES

The first trials of an inactivated influenza vaccine started in 1937 (Francis T). Inactivated vaccines were first used in the US military during in the 1940's during World War II. Efficacy of the vaccine in reducing morbidity and mortality was demonstrated in 1943. In the late 1940's, in order to improve the immunogenicity of the vaccine, adjuvants were added to the vaccine formulation. The current seasonal vaccine usually contains three influenza viruses – H1N1, H3N2 & B. Due to antigenic drift and occasional antigenic shifts in the viruses, the vaccine composition changes regularly. In addition, the inactivated vaccine has relatively low immunogenicity. As a result, the vaccine must be given annually in order to ensure protective efficacy. The protective efficacy of the influenza vaccines ranges from under 50% to around 70% and declines with age. In order to improve the immunogenicity of the vaccines, occasionally an adjuvant is added to the formulation. The vaccine can produce side-effects which are usually mild and transient, and include pain at the vaccination site, short-term fever and nausea. Recently, narcolepsy has been reported to be a rare side-effect of one of the adjuvanted vaccines.

Initially, annual vaccination was recommended primarily for the elderly and those with chronic diseases. Later this recommendation was extended to include healthcare workers. Subsequently, the vaccination was recommended for infants. During the last few years, universal annual vaccination has been recommended in many countries. Historically, compliance with vaccination against seasonal influenza has been extremely variable. A number of factors have affected compliance. These include the lack of clear-cut recommendations, concern about the actual efficacy of the vaccine, the difficulty to distinguish the efficacy of the vaccine against a background of morbidity from other respiratory viruses, concern about the safety of the vaccine (particularly after the increase in Guilliane Barre syndrome following the swine flu vaccine campaign in 1976) and the perception of influenza as a mild disease. The media appears to have played a major role in affecting the compliance with the vaccine. This has been both positive, in terms of promoting the vaccine and negative due to occasional reports providing misinformation.

An influenza pandemic is essentially a different scenario from that of seasonal influenza. Since the genetic composition of the virus varies markedly from previous circulating influenza viruses, the whole population lacks immunity, and threat of severe disease is expected to be somewhat greater. In addition, vaccines are usually available relatively late in the course of the pandemic. Also, since seasonal vaccines usually differ only slightly from

previous vaccines, there is more experience with their usage and possible side-effects. The virus strain in a pandemic vaccine results from antigenic shift and differs substantially from those in previous vaccines. Thus at the time that it becomes available for general large scale use, there is usually very limited experience with the pandemic vaccine. Consequently, there may be greater concern about adverse effects and scepticism about efficacy than for seasonal vaccines. In addition, at least in the past, pandemic vaccines were offered to the whole population, thus including major subgroups which had not generally been included in the seasonal influenza vaccination recommendations, and exposing a greater number of individuals to the possible side-effects of the vaccine.

In this paper, we present the findings of a systematic review of the compliance with influenza vaccination in general and in selected sub-groups. These include health-care workers, the chronically ill, the elderly, pregnant woman and children. The present systematic review was conducted according to a written protocol (see appendix 1). The main objective was to assess the compliance rate of influenza vaccination before and after the 2009 H1N1 pandemic, and to identify the main factors affecting complains to seasonal and pandemic influenza vaccination in different target groups (health care workers, the elderly, the chronically ill, pregnant women and the paediatric population).

1.1. Methodological background

Search strategy for identification of relevant articles

Relevant articles were identified by an electronic search. For the electronic searches, we reviewed Pubmed and the CDC website. We did not make any primary restrictions regarding the trials' language or year of publication. The search was conducted during April 2012.

We included all studies found, irrespective of publication year. We placed special emphasis on articles related to the 2009 H1N1 influenza pandemic. The key words we used for the search included: Influenza, seasonal, pandemic, vaccination, immunization, vaccine, adjuvant, adverse events, compliance, coverage, acceptance, barriers, refusal, risk groups and their different combinations.

Review methods and selection criteria

Eligible studies were listed and sorted into master tables displaying the name of the first author, year of publication, study type, place of the study (country), setting (if mentioned), study population and findings according to the abstract. Studies that were not in English, did not have an on-line available abstract or did not discuss influenza vaccination were excluded from the review. The remaining articles were divided by one researcher into sub-tables, categorized by the article's subject (compliance rate, factors affecting compliance, interventions impact on compliance rate, economic influence of the vaccine and the effect of the 2009 H1N1 pandemic on vaccination rate). The tables were constructed separately for articles concerning health care workers, elderly people, chronically ill people, pregnant women and children. The sorted tables were reviewed by a second researcher to assess the relevance and quality of the articles included in the review.

Studies identified

The primary search yielded 59 articles and documents concerning health care workers' compliance, 25 articles and documents concerning elderly people's compliance, 43 articles and documents concerning chronically ill people's compliance, 7 articles and documents concerning pregnant women's compliance and 26 articles and documents concerning the paediatric population's compliance. A number of articles were added to the final lists after the performance of repeated searches.

Data synthesis

Findings from the remaining selected articles were extracted and summarized graphically. Data were grouped and presented according to country and year of the study performance. A summary of all the data together was not possible due to the great variety of study populations and methods.

1.2. Compliance with seasonal and pandemic influenza vaccines

1.2.1. Compliance among healthcare workers (HCWs)

The countries represented in the studies include Australia, Brazil, Canada, China, France, Germany, Israel, Italy, Morocco, Saudi Arabia, Spain and the United States. Compliance among HCWs varied widely between and within countries. The compliance rates also vary widely by HCW category (physicians, nurses, ancillary workers, medical students etc.). The

compliance rates varied from very low (less than 10%) to around 40-50%. No clear pattern can be distinguished.

In France, compliance was highest among medical students, followed by physicians and nurses (Sartor et al 2004). In Germany, physicians had higher compliance than nurses (Wicker et al 2011). In Israel, a study showed greater compliance in the paediatric departments than other departments (Nativ et al., 2010). A study in Saudi Arabia found that only 5.9% of HCWs were vaccinated (Madani and Ghabrah 2007). However, a later study of multi-national HCWs in Saudi Arabia (Al-Tawfiq et al 2009) found that as many as 69% were vaccinated. A study in Spain found that men HCWs were more likely to be vaccinated than women HCWs (Garcia de Codes Ilario et al 2009). Other studies in Spain found that compliance with the seasonal vaccination was much higher than that for the pandemic vaccine (Virseda et al 2010, Del Campo et al 2011, Ortiz et al 2011).

In a study from the United States, the compliance rates among HCWs increased dramatically from around 4% in 1987-8 to 67% in 2000 (Salgado et al 2004). Higher compliance rates were found in the neonatal intensive care units compared with other departments (Shah and Caprio, 2008). A CDC study found higher rates of vaccination in hospital HCWs compared to those working in ambulatory facilities (CDC, 2011). In general, compliance rates in the United States are somewhat higher than in other countries reviewed. Some organizations in the U.S. mandated vaccination of HCWs unless there were medical or religious exemptions (Karanfil et al, 2011). In one study (Hakim et al., 2011), 36.6% of HCWs opposed mandating influenza vaccination; 88.2% and 59.9% of whom reported receiving the seasonal and 2009 H1N1 influenza vaccines, respectively. Violation of freedom of choice and personal autonomy were the most frequently reported reasons for opposition.

In certain cases, physicians who refused to be vaccinated had their admitting privileges for the hospital terminated (Karanfil et al, 2011). The mandatory vaccination policy brought on very high compliance rates with vaccinations (over 90%) among healthcare workers (Hakim et al., 2011; Rebmann et al., 2012a; 2012b; Karanfil et al, 2011; Quam et al., 2012).

1.2.2. Factors affecting compliance among HCWs

A number of factors have been found to affect vaccination compliance among HCWs.

- Desire for self-protection
- Desire to avoid infecting patients
- Desire to avoid infecting family members

- Perceived safety of the vaccine
- Perceived efficacy of the vaccine
- Perceived seriousness of the disease
- Perceived risk of the disease
- Perceived seriousness of complications from the disease
- Access to the vaccine (convenience- for example the existents of mobile carts)
- Cost of the vaccine
- Fear that the vaccine could cause disease (A negative effect).

In a study of HCWs in Brazil (Takayanagi et al, 2007), older age, believing that most departmental colleagues had been vaccinated and having cared for patients suffering from severe influenza, were all associated with greater compliance with vaccination. Another study in Brazil, found that working in a paediatric unit and years in the job significantly increased compliance (Cavalcante Rde et al, 2010). Factors such as age and sex were shown to be associated with compliance in several studies (CDC, 2011). In a study performed at Australia, Seale et al (2010a) reported that 81% of physicians and 68% of allied and ancillary workers felt that the vaccine was safe. 74% felt it was important to get vaccinated to protect patients, and 68% that it was important to protect their families. Despite this, only 22.5% were vaccinated.

In France, Kelly et al (2008) found that five of the six reasons for being vaccinated were altruistic, such as avoiding transmission to patients and to family. The same study also found a strong correlation between compliance and previous influenza infection. The reasons for not receiving the vaccine included a feeling of invulnerability, being too young and in good health. Van den Hoven and Verweii, (2003), from the Netherlands, discussed the moral reasons for nursing home professionals to accept vaccination. In another study from the Netherlands, (Hopman et al 2011), predictors of compliance included a sense of duty to do no harm and to ensure continuity of care. Virseda et al, (2010), found in a study in Spain that self-protection and protection of the patients were the most common reasons for compliance. In the same study, compliance with the seasonal vaccine predicted compliance with the pandemic vaccine. In the U.S. beliefs in the safety and effectiveness of the vaccine, as well as believing that HCWs should be vaccinated each year, were factors associated with greater compliance (Hakim et al., 2011; Rebmann et al., 2012a; 2012b).

In a study in Israel, (Nativ et al 2010), found that compliance was strongly associated with knowledge related to the vaccine. A CDC study in 2011 found that beliefs that the time and expense of being vaccinated were worthwhile, was strongly associated with compliance, as

well as beliefs in the effectiveness if the vaccine in protecting the HCW itself and the people around (CDC, 2011). Rebmann et al (2012a) in a study in the U.S. found that determinants of compliance include occupational health encouragement and on-site access.

In Germany, Wicker et al., (2011), found that predictors of non-compliance included a belief of a low risk of infection, fear of side-effects, the belief that the vaccine may trigger an infection and scepticism about the effectiveness of the vaccine. Piccirillo and Gaeta, (2006), found that concern that the vaccine could cause illness was a significant factor causing refusal of vaccination. According to Cavalcante Rde et al, (2010), compliance may decline with time at work. Baron-Eppel et al., (2012), in a study in Israel, found that trust in the health authorities after the H1N1 pandemic was low and affected the willingness to be vaccinated.

Esposito et al., (2007), found a low level of knowledge among Italian HCWs regarding the vaccine. In a study in Morocco, Tagajdid et al., (2011), found that media controversy during the influenza pandemic reduced compliance with the seasonal vaccine. In China, only 13.3% planned to receive the pandemic vaccine compared with 37.5% for the seasonal vaccine. The main reason for receiving H1N1 vaccine was for self-protection and the reasons for rejection included fear of side-effects, and belief in the ineffectiveness of the vaccine and the mild nature of the disease (To et al 2010).

Interventions to increase compliance among HCWs

A review of publications reporting on interventions implemented in order to increase the compliance with influenza vaccination among HCWs is presented in table 3. Interventions that were implemented in different states in the United States to increase the compliance to influenza vaccination among HCWs included educational and media campaigns (CDC, 2005; Takayanagi, 2007; Hallauer and Neuschaefer-Rube, 2005; Hofmann et al., 2006), providing an easy access to vaccines by giving them for free, in the institutions or by mobile carts and on special days (Helms et al., 2011; CDC, 2005; Seale and McCintyre, 2011; Sartor et al, 2004; Vaux et al., 2010; Hallauer and Neuschaefer-Rube, 2005; Hofmann et al., 2006), using people from within the stuff as vaccination leaders (Helms et al., 2011; Slaunwhite et al., 2009), mandatory vaccination and use of vaccine declination forms (Wicker et al, 2009) and other intervention programs. The interventions were usually more successful when several intervention techniques were implemented simultaneously (CDC, 2005; Hofmann et al., 2006; Wicker et al., 2009).

1.2.3. Compliance among the elderly

Most of the studies concerning elderly compliance to influenza vaccination were conducted by the CDC, and discuss the compliance rates in the U.S. According to those studies there has been a constant increase in the compliance rates of elderly (over 65 years of age) in the United States starting 1973 and continuing at least until 2004 (CDC, 1995; 2005; 2006). When data were examined according to race and ethnicity it was found that the increase was constant for non-Hispanic whites and blacks, but that for Hispanics the trend was opposite (CDC, 2005). A gradual increase in compliance with influenza vaccination among the elderly was also demonstrated in Israel in the 2000/2001 and 2001/2002 winter seasons compared to the previous two seasons. This increase was not constant throughout previous years (Kaufman and Green, 2003). As for compliance rates among the elderly in Europe, according to Evens and Watson, (2003), vaccine coverage in the UK for the 1998–1999 season was 50.5%.

1.2.4. Factors affecting compliance among the elderly

The main factors effecting compliance rates with influenza vaccines among the elderly in both Europe and the U.S. is the number of visits the person pays to a physician during the year (Avelino-Silva et al., 2011; CDC, 1995; 2003a; 2005). One reason for the major effect of this factor on compliance is the advice given to the elderly by their physicians (Avelino-Silva et al, 2011; Evans and Watson, 2003; Kaufman and Green, 2003).

Major reasons for non-compliance with influenza vaccination among the elderly include disbelief of this group in the efficiency and safety of the vaccine and fear of side-effect or influenza resulting from the vaccine (CDC, 2004b; Avelino-Silva et al, 2011; Evans and Watson, 2003).

1.2.5. Compliance among the chronically ill

Compliance rates of the chronically ill with influenza vaccine in the U.S. are greater than those of healthy people and have been increasing over the years (CDC, 2007; 2008). In contrast, compliance rates among the chronically ill in Europe are relatively low (Fernandez-Ibiea et al., 2007). For example, in a study conducted in France by Mohseni-Zadeh et al., (2010), it was found that only 21.4% of AIDS patients who participated in the study were vaccinated.

It is also important to note that there is a wide difference in the compliance rates of groups of people with different chronic diseases (Printza et al., 2010), and in each group there a differences in the compliance rates in different age groups (Naseem & Saravana, 2011; Jimenez-Garcia et al., 2005).

1.2.6. Factors affecting compliance among the chronically ill

A Most of the factors effecting the compliance with influenza vaccinations among the chronically ill are identical to the factors effecting compliance among the healthy elderly population, and include the number of physician visits and the acceptance of their advice as positive factors, and the fear of side effects and disbelief in the vaccine effectiveness as negative factors (CDC, 2007; 2008; Jimenez-Garcia et al., 2005; Mohseni-Zedeh et al., 2010; Naseem & Saravana, 2011; Printza et al., 2010, Stavroulopoulos et al., 2010).

1.2.7. Compliance among pregnant women

Most of the studies we found, concerning the compliance of pregnant women with influenza vaccines, were performed in the United States. According to a study by Rasmussen, (2008), planning for a future influenza pandemic should include specific considerations for pregnant women, as they are at increased risk for influenza-associated illness and death, and there might be severe effects on the fetus health of maternal influenza infection, associated fever, and agents used for prophylaxis and treatment. The same study assumes that pregnant women might be reluctant to comply with public health recommendations during a pandemic because of concerns regarding effects of vaccines or medications on the fetus.

In accordance with those assumptions, a number of studies in the U.S. have found that pregnant women tend to comply better with the seasonal influenza vaccine than with the pandemic vaccine (CDC, 2010; 2011; Fisher et al., 2011). The rates of compliance with the seasonal influenza vaccination among pregnant women in the U.S. are increasing yearly.

For example, in Georgia, the prevalence of influenza vaccination during the woman's most recent pregnancy increased from 10.4% in 2004 to 15.5% in 2006. In Rhode Island, vaccination prevalence increased from 21.9% in 2004 to 33.4% in 2007 (CDC, 2009).

1.2.8. Factors affecting compliance among pregnant women

According to a study conducted in the U.S. by Fisher et al., (2011), the main reasons for pregnant women not to receive the influenza vaccination were lack of knowledge as for the

importance of the vaccine and where to get it, and concerns for effects of the vaccine on fetal and maternal health. Another factor found to influence vaccine uptake by pregnant women is their health care provider recommendation (CDC, 2010; 2011; 2012).

1.2.9. Compliance in the paediatric population

Most of the studies we found concerning the compliance of the paediatric population with influenza vaccination were conducted by the CDC and concern the compliance rates in the United States. It should be noted that children vaccinated for the first time need to be vaccinated twice within one month to reach a full immunization. As a result, the account of children's compliance rates is done by taking two measures- one of the fully vaccinated children, (those who received two doses of the vaccine for the first time or one dose if they were vaccinated in the past), and another of the partly vaccinated children (those who received only one vaccine dose in their first year of vaccination). Taking the mentioned note into mind, the studies we found are pointing towards a few important issues.

First, there is a big difference in the compliance rates to influenza vaccines between the different countries in the United States and throughout the years. If this trend also exists in Europe it may point to a need in state specific programs to enhance compliance rates (CDC, 2004a; 2007a). Second, the compliance of chronically ill children with the vaccine is greater than that of healthy children (CDC, 2004b). This may point to a need to emphasise the importance of vaccination to the population of healthy children's parents. Third, the percentage of children getting one dose of the vaccine is greater than the percentage of fully vaccinated children. This may point to a need in enhancing the adherence of children and their parents with to the full immunization program.

1.2.10. Factors affecting compliance among the paediatric population

Factors that affect the rates of children's influenza vaccination in the U.S. are mostly connected to their parents' health behaviour. Factors that were found to have a positive effect on vaccination rates of children include the child’s influenza vaccination in the previous year, the child’s receipt of all recommended immunizations, the child’s uninterrupted health insurance coverage, and the mother’s unmarried status (CDC, 2011b).

Factors that were found to have a negative effect on vaccination rates of children include using a family doctor rather than a paediatrician for well-child visits, parents belief that the

vaccine was unneeded or that their child was getting too many shots, and parents having a hard time obtaining the vaccine (CDC, 2004b; 2011b).

Table 1: Summary of factors associated with the compliance with influenza vaccination by target group

Target group	Compliance characteristic	Positive factors associated with compliance	Negatively factors associated with compliance
Health care workers	• Compliance varied from very low (less than 10%) to around 40-50% • Compliance varied widely between and within countries • Compliance varies widely by professional category	• Self-protection • Desire to avoid infecting patients • Desire to protect family members • Perceived safety of the vaccine • Perceived efficacy of the vaccine • Perceived seriousness of disease • Perceived risk of the disease • Perceived seriousness of complications from disease • Access to vaccine • Cost of vaccine	• Fear that vaccine could cause disease
Elderly	• A trend towards increasing compliance rates among those over 65 years of age	• Number of visits to a physician during the year	• Disbelief in the efficacy and safety of the vaccine • Fear of side-effects or influenza resulting from the vaccine
Chronically ill	• Compliance is greater than for healthy people • Compliance is increasing over the years • Compliance in Europe is relatively low • A wide difference in compliance of people with different diseases	• Number of physician visits and acceptance of their advice	• Fear of side effects • Disbelief in vaccine efficacy

Pregnant women	• Compliance tends to be better with seasonal influenza vaccines than with pandemic vaccine • Compliance with seasonal influenza vaccination in the U.S. is increasing yearly	• Health care provider recommendation	• Lack of knowledge of the importance of vaccine and where to get it • Concerns for the effects of vaccine on fetal and maternal health
Pediatric population	• A big difference in compliance between different countries and over the years • Compliance of chronically ill children is greater than that for healthy children • Relatively high percentage of children getting only one dose of the vaccine	• Child's influenza vaccination in previous year • Child's receipt of all recommended immunizations • Child's uninterrupted health insurance coverage • Mother's marital	• Using a family doctor rather than a pediatrician • Parents belief that the vaccine was unneeded or that the child was getting too many shots • Parents having a hard time obtaining the vaccine

1.3. Discussion

In this report we reviewed the literature on the compliance of healthcare workers, the elderly, the chronically ill, pregnant women and the paediatric population to vaccination against influenza. One of the difficulties in drawing conclusions is the large number of variables to be considered. In the United States, surveys on vaccination compliance are conducted periodically by the CDC. However, information from other countries is less standard and frequently not available. Thus it should be noted that at the outset that the literature review tends to be dominated by studies from the United States. Even in the United States there is great variation due to factors such as geographical location (variation by state) and population group also affect the compliance rates. Clearly, compliance rates also vary by year.

In general compliance among HCWs tends to be low. The main factors affecting refusal are fear of side-effects, lack of belief in the effectiveness of the vaccine and a lack of knowledge of the vaccine. Compliance between countries and within countries varies widely. Factors that have been associated with increased compliance include a sense of duty to protect patients and family and occupational health services encouragement as well as easy access to the vaccine. Compliance with seasonal vaccine predicted compliance with pandemic vaccine. A number of interventions have been found to be effective in increasing the compliance such as educational campaigns among HCW's and the use of mobile carts to bring the vaccine to the HCWs at their workplace.

Compliance among the elderly tends to be highest among the target groups, followed by the chronically ill, pregnant women and the paediatric population. Among the elderly, a recommendation from the personal physician appears to be the dominant factor affecting compliance. Thus it is clear that in order to increase compliance among the elderly, the community physicians need to be convinced of the need to recommend vaccination to their elderly patient population.

There are specific factors that are affecting the vaccine compliance rates among the chronically ill. For example, different studies conducted around Europe and the U.S. found that a longer illness period, the existence of other risk factors for influenza, compliance with a preventive route of care and age over 50 years, all have a positive influence on compliance rates with influenza vaccination among the chronically ill (Cotte et al., 2011; Jimenez-Garcia et al., 2009; Tran and Pitts, 2007; Van Essen et al., 1997).

In the paediatric population the compliance remains low. There is evidence that the compliance is higher among children attending paediatricians for well-child visits rather than family practitioners. The low compliance may also be due to a concern among parents that the child may be receiving too many vaccinations in general (CDC, 2004b; 2011b).

There appears to be a large difference in the compliance rates for influenza vaccination between the different states in the United States and over the years. If this trend also exists in Europe it may point to a need for tailored programs to enhance compliance rates in different countries and within countries (CDC, 2004a; 2007a). The compliance of chronically ill children with the vaccine is greater than that of healthy children (CDC, 2004b). This may suggest that parents (and perhaps physicians) are still not convinced of the importance of vaccination for healthy children. It should also be noted that a fairly high percentage of children fail to get the second vaccine dose. Thus there is a need for programs among parents and physicians to increase the compliance with the second vaccine dose.

1.4. Conclusions

Compliance with influenza vaccination is highly variable, both between target groups and within the target groups. Communication strategies to improve the compliance should take into account these wide variations. It is likely that different strategies will be need for different target groups and there is likely to be a need for tailored strategies according to variables such as geographical location and socio-demographic variables. The health belief model is a traditional model used to explain attitudes and behaviour regarding vaccine compliance and could e a good basis for exploring the basis for these wide variations in compliance. Clearly, there is a need for more standardized surveys that should be carried out periodically. This need is particularly evident in Europe, where the data on compliance are more limited that in the United States.

2. INTRODUCTION - THE EFFICACY AND COMPLIANCE WITH NON-PHARMACOLOGICAL INTERVENTIONS TO PREVENT THE SPREAD OF INFLUENZA

While vaccination is the mainstay in the prevention of influenza, several factors limit its efficacy in the spread of the disease. These include the moderate protective efficacy of the vaccine, frequent low compliance with vaccination and the limited availability of vaccine prior to and during epidemics. This is particularly true in the case of pandemic influenza, where the vaccine may become available late in the course of the pandemic.

A number of non-pharmacological interventions (NPIs) are recommended both for primary prevention of influenza and as a complement to vaccination to prevent the spread of the disease. The non-pharmacological interventions include personal hygiene, social distancing, the use of face masks, school closures and limitation of travel. Effective risk communication is a priority in order to achieve high compliance with these interventions. In order to convey credible messages to enhance compliance, there is a need for good evidence to support the efficacy the various interventions proposed. In addition, since some of the interventions are perceived to have more of a benefit to the society in general than to the individual, the messages have to be even more persuasive. The information conveyed to the different target groups must be clear and unambiguous.

The WHO recommendations on measures to be adopted during the influenza pandemic alert period have included isolation of patients and quarantine of contacts (Bell et al, 2006), and that during the pandemic period, the focus should shift to delaying spread and reducing effects through population-based measures. One of the key recommendations is that people with flu-like symptoms should stay at home. Depending on the severity of the pandemic, social distancing measures should be considered and non-essential domestic travel should be limited. Personal hygiene, such as hand washing and respiratory etiquette, are considered to be basic. There is no clear-cut recommendation on the use of face masks.

In a review of recommendations on non-pharmacological measures to prevent the spread of influenza during pandemics, Aledorf et al (2007) pointed out that there was scant evidence on the efficacy or effectiveness of most non-pharmaceutical interventions. Based on consensus among experts they recommended hand hygiene and respiratory etiquette, surveillance and case reporting, and rapid viral diagnosis in all settings and during all pandemic phases without strong scientific evidence. They also encouraged patient and provider use of masks and other personal protective equipment as well as voluntary self-

isolation of patients during all pandemic phases. They rejected other non-pharmaceutical interventions, including mask-use and other personal protective equipment for the general public, school and workplace closures early in an epidemic, and mandatory travel restrictions were rejected as likely to be ineffective, infeasible, or unacceptable to the public.

In a review of the literature on the efficacy of physical interventions on the spread of influenza, Carlson et al (2010) observed that the modes of influenza transmission and their contributions to the development of infections remain unclear. They pointed out that while some studies in guinea pigs model have demonstrated airborne transmission, there are no convincing data in humans. Thus they felt that based on physical data, the use of hand hygiene, gowns, gloves, face shields and respiratory protection should reduce transmission. They also pointed to some evidence that surgical masks may be equally efficacious to N95 respirators in preventing infection.

The American Academy of Paediatrics (2007) has emphasized that healthcare personnel be educated regarding the routes of transmission and techniques used to prevent transmission of infectious agents. They stressed that policies for infection prevention and control should be written, readily available, updated annually, and enforced. These include hand hygiene, respiratory hygiene and cough-etiquette strategies for patients with suspected influenza and separation of infected children from uninfected children when feasible. Becler et al (2011) pointed out that the WHO guidelines stressed observance of personal hygiene rules, use of appropriate preventive measures and suitable administrative and technical actions. They indicated a need to improve the compliance of healthcare workers with recommendations for personal hygiene and use of PPE when appropriate.

Factors that affect compliance with vaccination may also be applicable to non-pharmacological measures. They include desire for self-protection, desire to avoid infecting patients, desire to avoid infecting family members, perceived seriousness of the disease, perceived risk of the disease and perceived seriousness of complications from the disease. In this paper, we present the findings of a systematic review of the efficacy and compliance with non-pharmacological measures to limit the spread of influenza in specific target groups, such as health-care workers, the chronically ill, the elderly, pregnant woman and children. The present systematic review was conducted according to a written protocol. One of the objectives as was to assess the compliance rate before and after the 2009 H1N1 pandemic, and to identify the main factors affecting compliance in the different target groups.

2.1. Methodological background

Search strategy for identification of relevant articles

Relevant articles were identified by a search of electronic databases. We reviewed Pubmed and the CDC website for studies of efficacy of and compliance with non-pharmacological interventions against influenza. We did not make any primary restrictions regarding the trials' language or year of publication. The search was conducted during April 2012.

We included all studies, irrespective of publication year. We placed special emphasis on articles related to the 2009 H1N1 influenza pandemic. The key words we used for the search included: Influenza, seasonal, pandemic, non-pharmacological, personal hygiene, face masks, compliance, coverage, acceptance, barriers, refusal, risk groups and their different combinations.

Review methods and selection criteria

Eligible studies were listed and sorted into master tables displaying the name of the first author, year of publication, intervention, study type, place of the study (country), setting (if mentioned), study population and findings according to the abstract. Studies that were not in English or did not have an on-line available abstract or did not discuss efficacy or compliance with the non-pharmacological prevention of influenza were excluded from the review. The remaining articles were divided by one researcher into sub-tables, categorized by the article's subject (efficacy, compliance rate, factors affecting compliance, interventions impact on compliance rate). The sorted tables were reviewed by a second researcher to assess the relevance and quality of the articles included in the review.

Studies identified

The primary search yielded 59 articles and documents concerning health care workers' compliance, 24 articles and documents concerning elderly people's compliance, 44 articles and documents concerning chronically ill people's compliance, 8 articles and documents concerning pregnant women's compliance and 27 articles and documents concerning the paediatric population's compliance. A number of articles were added to the final lists after the performance of repeated searches. The final list of articles and documents included in the review consisted of 50 articles concerning health care workers' compliance, 16 articles concerning elderly people's compliance, 25 articles concerning chronically ill people's compliance, 7 articles concerning pregnant women's compliance and 17 articles concerning children's compliance.

Data synthesis

Findings from the remaining selected articles were extracted and summarized graphically. Data were grouped and presented according to country and year of the study performance. A summary of all the data together was not possible due to the great variety of study populations and methods.

2.2. The efficacy and compliance with non-pharmacological interventions to prevent the spread of influenza

2.2.1. Studies of the efficacy of non-pharmacological interventions to prevent influenza transmission in different target groups

In general, only a few of the non-pharmacological methods have been systematically evaluated. The most prominent are hand-washing and the use of face-masks. Jefferson et al (2011) carried out a review of studies on the effectiveness of physical measures to reduce the spread of respiratory infections, not necessarily influenza. 58 papers of 59 studies were included. The quality of the studies was poor or of mixed quality. Meta-analysis of six case-control studies suggested that hand washing, wearing face masks, wearing gloves, wearing gowns, and all measures combined, reduced the spread of severe acute respiratory syndrome. The combination was also effective in interrupting the spread of influenza within households. They found that the highest quality randomised trials suggested that spread of respiratory viruses can be prevented by hygienic measures in younger children and within households. The incremental effect of adding virucidals or antiseptics to normal hand washing to reduce respiratory disease remains uncertain. Global measures, such as screening at entry ports, were not properly evaluated. Evidence was limited for social distancing being effective, especially if related to risk of exposure.

Bin-Reza, F. et al., (2011) carried out a review of the literature. In six of eight randomized controlled trials they found no significant differences between control and intervention groups (masks with or without hand hygiene). In one household trial, face masks together with hand sanitizer use reduced secondary transmission of URI/ILI whereas hand sanitizer alone resulted in no reduction. In one hospital-based trial among HCW's, there was a lower rate of clinical respiratory illness associated with non-fit-tested N95 respirator use compared with medical masks. In eight of nine retrospective observational studies, they found that mask and ⁄ or respirator use was independently associated with a reduced risk of severe

acute respiratory syndrome (SARS), although they stressed that the findings may not be applicable to influenza.

2.2.2. Trials of the efficacy of physical interventions

Hand washing

A summary of trials on the efficacy of hand-washing to prevent the spread of influenza is presented in table 1. In general, there appeared to be a trend in lower rates of infection in the hand washing groups, although the evidence is not clear-cut. The following are highlights from some of the main studies on hand-washing to prevent the transmission of influenza-like illness (ILI). Larson et al (2010) found that the hand sanitizer group was significantly more likely to report that no household member had symptoms, but there were no significant differences in rates of infection by intervention group in multivariate analyses. Knowledge improved significantly more in the hand sanitizer group. Despite the fact that compliance with mask wearing was poor, mask wearing as well as increased crowding, lower education levels of caretakers, and index cases 0–5 years of age (compared with adults) were associated with significantly lower (?) secondary transmission rates.

Aiello et al (2010) carried out a trial of hand-washing and face masks and the transmission of influenza. They found significant reductions in ILI in the mask and hand hygiene group, compared with the control group, ranging from 35% (CI 9%–53%) to 51% (CI, 13%–73%), after adjusting for vaccination and other covariates. Face mask use alone showed a similar reduction in ILI compared with the control group, but adjusted estimates were not statistically significant. Neither face mask use and hand hygiene nor face mask use alone was associated with a significant reduction in the rate of ILI cumulatively.

Cowling (2009) et al carried out a randomized control trial on hand-washing among contacts in households that had confirmed influenza virus infection, in the 7 days after intervention. Hand hygiene with or without facemasks seemed to reduce influenza transmission, but the differences between the intervention and control group were not significant. In 154 households in which interventions were implemented within 36 hours of symptom onset in the index patient, transmission of confirmed influenza was reduced, an effect attributable to fewer infections among participants using facemasks plus hand hygiene (adjusted OR=0.33; 95% CI, 0.13 to 0.87).

Johnson et al (2009) has reported that there is no evidence that hand hygiene or other interventions prevent the transmission of influenza. However, this ignores much evidence that does support a role for hand hygiene in decreasing the likelihood of acquiring a respiratory tract infection (RTI) presented in a 2007 Cochrane Review.

Trials on the use of face masks

A summary of trials evaluating the efficacy of face masks in reducing the spread of influenza is presented table 2. For the general public there is no clear evidence in the reduction of influenza in the face masks groups. Nevertheless, some studies did find evidence of the efficacy of face masks. Aiello et al., (2012) found a significant reduction in the rate of ILI in the face mask group, with a maximum reduction of 75% during the final study week (rate ratio RR=0.25; 95% CI, 0.07 to 0.87). There was a cumulative reduction in rates of influenza over the study period, although results did not reach statistical significance. They stressed that generalizability was limited to similar settings and age groups.

In a study in Hong Kong et al (2009), hand washing and facemasks helped to prevent spread of influenza when people started using these measures within 36 hours of their family member becoming sick. The researchers could not prove that hand washing and use of facemasks prevented spread of influenza if these measures were begun after that time.

2.2.3. Compliance with non-pharmacological interventions

A summary of the studies on compliance with hand-washing and the use of face masks are presented in tables 3 and 4. Allison et al (2010) evaluated the compliance of hand-washing and use of face masks among elementary schoolchildren. Most of the teachers thought gel use was not disruptive, would use gel next winter, and would use gel in a pandemic. Less than half thought that mask use was not disruptive and would use masks next winter. However, most said they would use masks in a pandemic. About 70% estimated that their students used hand gel for both weeks. Students' mask use declined over time to less than 15% in week 2. Few barriers to gel use were identified whereas barriers to mask use were difficulty reading facial expressions and physical discomfort.

Suess et al (2011) carried out a cluster randomized trial on the use of facemasks in households with an index patient. Facemask use peaked on day 4 after symptom onset of the index patient. Mean daily frequency of hand disinfection in households assigned to intensified hand hygiene measures peaked at 7.7 (day 6) for children and at 10.1 (day 5) for

adults. The majority of participants reported no problems with mask wearing. They concluded that the use of NPI can be taught and are well tolerated by adults and sick children.

Deris et al (2010) carried out a cross-sectional study on Malayan pilgrims to Mecca. Seventy-two percent of hajj pilgrims received influenza vaccination before departure and 72.9% wore facemasks. Wearing masks was significantly associated with sore throat and longer duration of sore throat and fever, indicating that face masks were used primarily with people with ILI.

Compliance with community mitigation procedures

Aburto et al (2010) carried out a cross-sectional study of the response to community mitigation programs. More than 90% of respondents received community mitigation messages and adopted one or more community mitigation efforts. There were few differences among cities. Respondents reported high cost of masks, soaps, and gels as barriers to community mitigation-effort adoption. Nearly 20% of respondents, disproportionately from the lower socioeconomic tertile, found some messages confusing.

General compliance with preventive measures

Aguero et al (2011) conducted an anonymous telephone survey on the adoption of preventive measures in Spain. The most commonly adopted preventive measures were respiratory hygiene and hand washing. Factors independently associated with the adoption of the preventive measures recommended by the Ministry of Health were female gender, higher educational level, size of municipality of residence, high perceived susceptibility to infection, high perceived effectiveness of the measures and high perceived usefulness of the information provided by the government. The presence of school-aged children in household was associated with purchasing masks and hand sanitizer

Surveys on knowledge and compliance with preventive measures

Cowling et al () carried out 13 cross-sectional surveys on knowledge and compliance with preventive measures during the H1N1 pandemic in Hong Kong. Respondents reported low anxiety levels throughout the epidemic. Perceived susceptibility to infection and perceived severity of H1N1 were initially high but declined early in the epidemic and remained stable thereafter. As the epidemic grew, knowledge on modes of transmission did not improve, the adoption of hygiene measures and use of face masks did not change, and social distancing declined. Greater anxiety was associated with lower reported use of hygiene measures but

greater social distancing. Knowledge that H1N1 could be spread by indirect contact was associated with greater use of hygiene measures and social distancing.

Lau et al (2010) carried out a study of the compliance with hand washing and using face masks during the A/H1N1 influenza pandemic. About half washed hands more frequently, nearly 90% wore masks when ill with ILI and about 20% wore masks when in public areas. More frequent hand-washing was related to perceptions of the risk of illness, efficacy of frequent hand washing, non-availability of effective vaccines, a high chance of having a large scale local outbreak, and mental distress. Lack of vaccine availability was associated with face mask use when having ILI. The public's perception of the possibility of fatalities from the infection, efficacy of wearing face masks, and mental distress due to the epidemic, were associated with increased face mask use in public areas.

In a study of the perceptions of the public regarding influenza outbreaks Lau et al (2007) found that interviewees did not perceive a high likelihood of having a local H1N1 outbreak, nor did they regard H1N1 as a threatening disease. Nevertheless, the presence of flu symptoms triggered more frequent hand-washing (73.6%) and use of facemasks (47.9%). Interestingly, the public approved of governmental policies which included the quarantining of hotel guests. There was no evidence of panic reactions and the public had a perception of high efficacy of self-protection. Nevertheless, there were misconceptions, and a small percentage of the public avoided visiting crowded places, believing that this was a government recommendation.

In a study in Hong Kong following the SARS outbreak, Lau et al (2008) found that the general public are likely to adopt self-protective behaviours such as wearing face masks in public venues and increasing frequency of hand washing, and behaviours that protect others, such as wearing face masks when experiencing ILI, immediately seeking medical consultation, making declarations when crossing the border with ILI and complying to quarantine policies. These measures were independently associated with factors such as age, full-time employment, perceived susceptibility, perceived efficacy of preventive measures, perceived high fatality, perceived chance of a major local outbreak, and being worried about self/family members contracting the virus. Factors associated with protection of others included education level, variables related to perceived efficacy and the perceived risk of a major local outbreak.

2.2.4. Simulation models on control strategies to reduce the spread of influenza

Mao et al (2011) carried out simulation studies on control strategies to reduce the spread of influenza. They found that weaker control strategies could suffice to contain influenza epidemics, because individuals voluntarily adopt preventive behaviour, rendering these weaker strategies more effective than would otherwise have been expected. Wein et al (2009) carried out a simulation on the potential efficacy of prevention technologies. They found that the use of N95 respirators and the combination of respirators, humidifiers, and ventilation can reduce the risks of infection depending on compliance. However, only about 30% of the benefits in the household are achieved if these interventions are used only after the infected person develops symptoms.

2.2.5. Interventions to increase compliance

Gilles et al (2010) found that trust in medical organizations predicted perceived efficacy of officially recommended protection measures (getting vaccinated, washing hands, wearing a mask, sneezing into the elbow), as did beliefs about health issues (perceived vulnerability to disease, threat perceptions). It has been proposed that interventions that can increase the compliance among HCWs include educational campaigns, training sessions and staff meetings and campaigns and management board commitment.

2.2.6. Studies of knowledge and attitudes related to non-pharmacological interventions

Goodwin et al (2009) studied behavioural and attitudinal responses towards A/H1N1 influenza in the 6 days following the WHO pandemic alert level 5. 26% of the respondents were 'very concerned' about being a flu victim. 36% reported reduced public transport use, 39% flight cancellations and 8% purchased personal protection materials (e.g. face masks). Groups that were viewed as being at 'high risk' of infection included the immune compromised, pig farmers, elderly, prostitutes/highly sexually active, and the homeless. In data collected only in Europe, 64% greatly underestimated the mortality rates of seasonal flu, 26% believed seasonal flu vaccination gave protection against swine flu. 7% had reduced/stopped eating pork. 3% had purchased anti-viral drugs for use at home, while 32% intended to do so if the pandemic worsened.

Kamate (2009) et al carried out studies on knowledge and attitudes about an influenza pandemic. 83.1% had heard about Influenza A (H1N1), but 47.4% felt that they did not have

enough information about the pandemic. Only 34.5% felt that their health would be seriously affected if they contracted Influenza A (H1N1). Over half of the respondents (59.6%) had no idea about the duration of the pandemic. Knowledge differed significantly according to gender, age, and educational status as well as working status; however, females had better attitudes than males. Respondents rated face masks and vaccines as the most effective preventive measures.

2.3. Discussion

In this review, we examined the literature for evidence on the efficacy of non-pharmacological interventions to prevent the spread of influenza in different target groups, the compliance with non-pharmacological methods and the factors affecting the compliance. The evaluation is complex due to the numerous factors involved. Seven target groups need to be considered – the general population, healthcare workers, the elderly, the chronically ill, infants and small children, pregnant women and patients sick with influenza-like illness. Ten non-pharmacological interventions were considered – hand washing, respiratory etiquette, face masks, social distancing, staying away from work, travel restrictions, school and day-care closures, workplace closures, voluntary isolation of patients and personal hygiene at the home of a patient. Thus potentially, up to seventy types of studies need to be considered for each of the efficacy of the interventions, compliance with the interventions and factors associated with compliance. Furthermore, some of the interventions have a dual purpose – one for self-protection and the other for protection of others. Thus, for example, theoretically hand washing may be effective in the prevention of spread to others, but less so for self-protection.

The study of the efficacy of non-pharmacological interventions in the protection of others is somewhat more complex. In addition factors such as age, sex, socio-economic status and country need to be taken into account. As a result of the need to consider a large number of variables, it will be necessary to make cautious generalizations on the basis of the limited number studies available. Finally, compliance between countries and within countries varies widely.

2.3.1. Evidence of the efficacy of interventions in target groups

General population

There is no clear evidence of the efficacy of any of the non-pharmacological interventions to prevent the spread of influenza in the general population. The most widely studied is hand-washing with some studies on the use of face masks. Despite the lack of clear evidence, there are almost universal recommendations on the importance of hand washing. This may be due to the relative ease of implementation, low cost and apparent usefulness for the prevention of the spread of disease in general, including enteric diseases. There is much less consensus about the efficacy of the use of face masks in the general population.

Among healthcare workers, hand washing is considered to be essential in the control of infectious diseases in general. It is not clear whether it reduces the spread of influenza, although physical data provide some support. There is some evidence (not necessarily clinical trials) to support the use of face masks to protect healthcare workers when caring for patient s with influenza. However, it is a general recommendation. The type of face mask remains controversial.

There are few studies that have focused on the efficacy of any of the non-pharmacological interventions in the elderly. While hand washing is recommended, there is no clear evidence that face masks should be used when going to public places. Without clear evidence, there may be some support for limited social distancing, although it may be particularly problematical for elderly living alone.

As for the elderly, there is no clear evidence for the NPIs in the chronically ill. Face masks may be considered at the peak of epidemics. For infants and small children, hand washing appears to reduce the transmission of respiratory infections in small children. Face masks may not be practical. For pregnant women there is no clear evidence of the efficacy of NPI's. Staying away from work at the peak of the epidemic may be practical, when the workplace requires contact with numerous people.

While there is no specific evidence on the NPI's for patients with flu-like illness, hand washing and the use of masks at home are general recommendations. The recommendation for patients with ILI to remain at home, are almost universal.

2.3.2. Evidence of compliance with NPI's in target groups

There are few studies on the compliance with non-pharmacological interventions and factors associated with compliance. There are almost no studies focusing on specific target groups. It seems that compliance with increased frequency of hand washing is relatively low in the general population.

In general, the studies on HCWs show relatively low compliance with NPI's. Factors that have been associated with increased compliance include a sense of duty to protect patients and family and occupational health services encouragement as well as easy access to the vaccine. The health belief model is a traditional model used to explain attitudes and behaviour regarding vaccine compliance.

2.4. Conclusions

The evidence for the efficacy of non-pharmacological interventions to prevent influenza is very limited. This is partly due to a lack of studies and the difficulty in carrying out controlled studies. Individual interventions, such as hand washing and the use of masks are more amenable to controlled trials, although they are technically difficult to carry out. Interventions such as social distancing and remaining away from work are almost impossible to evaluate in controlled trials. Interventions such as school closures can only be evaluated in studies such as "before-after" and comparisons in infection rates between areas where such policies were instituted and those where they were not. In addition, the numerous biases such as confounding and selection bias are extremely difficult to control either at the design or analysis stage.

The studies on compliance with non-pharmacological interventions are sparse and variable in terms of the intervention and the group under study. Thus it is difficult to assess the compliance rates with the individual interventions.

Future studies

There is a need for more coordinated, focused trials to assess the efficacy of hand washing and mask use. There I also a need for more standard studies to assess the compliance with different non-pharmacological interventions.

3. INTRODUCTION – EFFECT OF OUTBREAK COMMUNICATION ON COMPLIANCE WITH PREVENTIVE MEASURES

Governments and organizations on the national and global level have come to agree in recent years that the media plays a critical role in national programs to prevent and confront the disease of influenza. Furthermore, during a disease outbreak the media plays a key role in moving the public to action. Analyzing the role of the media during a threat of an infectious disease outbreak can help us understand its effect on the public and the public's responses to the outbreak, since the media usually defines the situation for the public and influences their risk perception and attitudes towards this issue. However, in light of the large gaps discovered in various health crises between the intentions, plans and management of the WHO and its extensions and the way the public receives their messages n different countries, the role of the media does not appear to be given adequate attention, nor is it deeply and structurally built in to the overall effort of flu prevention and treatment in the various countries.

3.1. Methodological background

In order to locate published articles on communication and epidemic influenza, we used a combination of the following keywords: "communication and H1N1 influenza," "barriers to influenza vaccination", "risk communication on vaccination," "mass communication and influenza", "social media and influenza," "new media and influenza", "behaviour change and immunization," "social marketing and vaccination," "vaccine acceptance," "participation and immunization ," crises communication," epidemic crisis and emerging infectious disease".

A systematic review of English-language studies from 1974 to 2012 yielded 118 articles that fulfilled established criteria. In the first stage of the analysis we identified the different subjects of the article abstracts. In the second stage we characterized the central themes of the articles. In the third stage we sorted the abstracts into four main areas that cover the subject of the media and the epidemic: social marketing, risk communication, participation, planning and constructing a communications campaign, channels of communication and their influence.

In the fourth stage the articles were summarized in a table by one member of the writers' team and reviewed by another member to promise double control over the quality of the articles used in the review. In the fifth stage, once the sample was established, the first author, in consultation with the other authors, reviewed the content of the articles to

determine the nature of the theoretical perspective, methodology, and results of each one of the articles, in reference to the four subjects we mentioned.

The important role of the media in relation to a variety of issues regarding vaccination for seasonal and pandemic influenza has been studied quite frequently in the literature. The question is how the professional literature studies the various roles played by the media, such as: conveying information about influenza and the vaccine; the media's influence on perceptions, positions, opinions and behavioural intentions concerning the disease and the vaccine; its influence on the risk perception of the disease and the vaccine, and its supportive role in motivating the public to take action. How are the media circles including policymakers, health experts, public officials and media professionals studied in the literature? Beyond its exposure of the "use" of the various channels of communication, how does the literature analyze the theoretical concept and rhetorical strategies of the channels of communication? Does the professional literature raise ethical questions related to the issue of influenza vaccination? Beyond theoretical studies of risk communication and crisis communication during epidemics are there also empirical studies?

In order to try to answer these questions, this review will present the main subjects the media addresses and the ways it approaches the subject of the flu and the vaccine, which are as follows:

- Social marketing: What are the main barriers of the risk populations that prevent them from complying with seasonal and pandemic vaccines?
- Risk communication: Perceptions and attitudes of the public about illness and health regarding seasonal and pandemic vaccines

Later we will present the research that has been done on the issues of participation, planning and constructing a communications campaign by the three main circles in the communication process: policymakers and public health officials, media professionals, and the public. Following are the respective subheadings:

- Public participation in planning and communicating the pandemic and pandemic vaccines
- Health experts' (policymakers and public health workers) participation in planning and communicating the pandemic and pandemic vaccines
- Communication experts' participation in planning and communicating the pandemic and pandemic vaccines

In the third part of the review we will present the different channels of communication and their influence as follows:

- The effects of the mass media on risk perception and compliance with seasonal and pandemic vaccines
- The effects of new media on risk perception and compliance with seasonal and pandemic vaccines

The effects of personal communication on risk perception and compliance with seasonal and pandemic vaccines among healthcare workers and the public.

3.2. Effect of Outbreak Communication on Compliance with Preventive Measures

3.2.1. Social marketing: What are the main barriers of the risk populations that prevent them from complying with seasonal and pandemic vaccines?

The question of vaccines touches upon many areas: epidemiological, pharmaceutical, economic, social and psychological. The social-psychological aspects of the issue of the flu connect it to the field of social marketing, whose purpose is to change the habits, behaviours and lifestyles of various target audiences. Therefore a program geared at motivating the public to get vaccinated must adopt suitable communications and marketing strategies for the various target audiences and an infrastructure to support and encourage the appropriate changes.

There are numerous definitions of social marketing and each may represent different ideological and pragmatic approaches to how to influence people's attitudes and behaviours for the purpose of promoting the welfare of individuals and society(W. A. Smith, 2006). An underlying assumption in social marketing is that its goal is not only to change positions from the cost-benefit perspective like in commercial marketing but to promote issues that have an impact on administration, policy and politics, such as the issue of vaccines. Designing and implementing a vaccination program with a social marketing approach calls for systematic and culturally-attuned methodology.

The "product" of the influenza vaccine is complex. As opposed to other health products that can be improved, adjusted and controlled, the influenza vaccine is a product that cannot be absolutely improved or controlled because of the unpredictability of the mutation of the

influenza strains (John & Cheney, 2008). The poor global compliance with the seasonal and pandemic H1N1 flu vaccines attests to the complexity of the "product" (Burnett, Genao, & Wong, 2005; Galarce, Minsky, & Viswanath, 2011; D. R. Johnson, Nichol, & Lipczynski, 2008; Lasser et al., 2008; Matsui et al., 2011; Maurer & Harris, 2010; Vaux, Noel, Fonteneau, Guthmann, & Levy-Bruhl, 2010; Velan, Kaplan, Ziv, Boyko, & Lerner-Geva, 2011; Walter, Bohmer, Reiter, Krause, & Wichmann, 2012; Weingarten, Riedinger, Bolton, Miles, & Ault, 1989). Even risk populations, whom the WHO recommended vaccinating for years, are prone to low compliance with the vaccine (John & Cheney, 2008; Kroneman, van Essen, & John Paget, 2006; Naleway, Smith, & Mullooly, 2006; Panda, Stiller, & Panda, 2011). This is also true for public health professionals (physicians and nurses), who are supposed to mediate the issue of influenza vaccines to the public (D. R. Johnson, et al., 2008; Poland, 2010; Smedley et al., 2007; Vaux, et al., 2010; Weingarten, et al., 1989; Willis & Wortley, 2007).

Different populations have different barriers to compliance with the seasonal and epidemic vaccinations. But the empirical studies in the research point to recurring dominant barriers: barriers related to mistrust of governments and authorities (Allen Catellier & Yang, 2012; Burnett, et al., 2005; Poland, 2010; Walter, et al., 2012), cognitive barriers related to the risk perception that "a healthy person does not need to get vaccinated”; fear of side effects of the vaccine; concerns about the safety of the vaccine and its manufacture process and a perception of the vaccine as only partially protective (John & Cheney, 2008; D. R. Johnson, et al., 2008; Matsui, et al., 2011; Poland, 2010; Seale et al., 2010; Walter, et al., 2012).

There are additional barriers connected to the perception of seasonal flu as not a serious disease (John & Cheney, 2008; Matsui, et al., 2011) as well as a perception of epidemic flu as not being a serious disease(Poland, 2010; Rubin, Amlot, Page, & Wessely, 2009; Velan, et al., 2011; Walter, et al., 2012). However, the various empirical studies indicate that there is a wide variance between different subpopulations in terms of their risk perception of the vaccine. For example: a number of studies of ethnic groups indicated that they tend to be more obedient and to take the flu vaccine when it is free and accessible (Galarce, et al., 2011; Rubin, et al., 2009; van Noort, Antheunis, & van Reijmersdal, 2012). Several studies of pregnant women as a risk group focused on the unique barriers of that population and its primary health care providers who are gynaecologists (Naleway, et al., 2006; Panda, et al., 2011). Women as a group were found to seek more information about the vaccine and be more willing to be vaccinated than men(Allen Catellier & Yang, 2012). However, the studies

in the professional literature about ethnic and gender segments in the context of risk perception and barriers to the flu vaccine are few and require expansion and development.

There are also specific barriers unique to the H1N1 vaccine related to it being a new and unknown vaccine. Moreover, the severity of the epidemic changed in the course of the crisis, which influenced the way the public perceived the flu vaccine and how it perceived seasonal flu after the crisis (Poland, 2010; Rubin, et al., 2009). The dynamic nature of the epidemic and the uncertainty surrounding it were found to have the potential to change compliance with the vaccine before, during and after the crisis, as happened in 2009(van Noort, et al., 2012).

The literature indicates that media campaigns by governments on the subject of the flu were not informed by cultural sensitivity. The fact that a uniform call went out to the general population appears to be one of the main reasons for the low compliance with the seasonal flu vaccine and the epidemic flu vaccine in particular. Furthermore, every country has specific barriers that need to be lifted that do not exist in other countries. Several studies point to the economic barrier and the barrier of access to health services (Burnett, et al., 2005; Kroneman, et al., 2006; Maurer & Harris, 2010; Vaux, et al., 2010).The studies show that there is insufficient consideration of the specific barriers of each country and that the campaigns must address psycho-demographic barriers such as: social and economic class, ethnicity, race and beliefs (Galarce, et al., 2011).

Cultural competency is one of the main strategies that a social marketing campaign to promote a vaccine must use in order to reinforce the self-efficacy and confidence of various subpopulations (Burnett, et al., 2005; Lasser, et al., 2008). Identifying barriers and finding strategies and tactics to reduce them while tailoring the campaign to the abilities and needs of the different populations raises the effectiveness of the campaign (Keller & Lehmann, 2008). A review of the literature finds that with the exception of the study by John and Cheney, who examined the different readiness stages of risk groups (2008), there have been no formative research studies to accompany media campaigns.

The importance of formative research in the process of designing a media campaign to promote the flu vaccine was highlighted by the study by John and Cheney, who conducted formative research with different minority focus groups, some of which are defined as risk groups: Hispanics, Afro-Americans, Indian Americans and Caucasians.

A segmented model was based on that formative research, both crossing and based on subpopulations. According to it there are three groups of reference to the vaccines. One group was called "plans to get" – a group of people who planned to get vaccinated but due to barriers mainly of time and access had not done so. The second group was called "needs more information." This audience segment has a variety of concerns about the safety and efficacy of the vaccine. Evidence- based health education materials and detailed explanations by health care providers about the specific issues that concern individuals in this segment may convince them to accept vaccination. The third group was called "makes you get sick". This group is not simply unsure of the benefits of the product. It holds strongly negative views toward the product. John and Cheney (2008) point out that because the last group is an "ideological" group with strong resistance to the vaccine, the various strategies of consulting, education and marketing will not budge it and improve its compliance with the vaccine. Therefore, social marketing efforts should be addressed to the first two groups and messages should be tailored to fit their stages of readiness, needs and positions. Social marketing seeks to create concepts based on models and strategies of imitation, inclusion, dialogue, identification and empathy. According to the social marketing approach, health media campaigns based on strategies that rely on threatening messages should address the audience's support and sense of self-efficacy and offer the audience a solution (Andreasen, 1995; Witte & Allen, 2000).

John and Cheney (2008)argue that intimidation cannot be an effective strategy in the context of the flu vaccine. "Because the vaccine is a flawed product, any fear appeal cannot be backed by a warranty that getting a flu shot will protect someone from experiencing negative side effects or guarantee that he or she will not get the flu" (p. 77:2008).

This brings us back to our starting point, that the concept and strategies of a media campaign to market the vaccine against the H1N1 flu should be based on the uniqueness of the vaccine "product". The campaign should also be based on segmentation that takes into account both the audience's sensitivity and cultural capability and its stage of readiness in relation to the vaccine.

Many health promotion projects misuse the marketing/communicational potential that exists in the field, and even produce inappropriate materials and knowledge resources for the target audiences, because necessary tests weren't done and there was no use of the professional knowledge of social marketing adapted to health promotion. Thus, in many cases projects that were not adapted to the target audiences had only partial success and

wasted substantial resources. Sometimes there is even a so-called "boomerang" effect, because the reverse of the project's targets is achieved (Fishbein, Hall-Jamieson, Zimmer, von Haeften, & Nabi, 2002).

Risk communication: Perceptions and attitudes of the public about illness and health regarding seasonal and pandemic vaccines

How the public responds to a natural disaster is influenced not only by the information it has at its disposal about the risk ((JHSPH), 2011), but also by the way that risk is communicated to it. Risk communication focuses not only on the nature of the risk itself, but also on the public's reactions to the risk messages such as fears, concerns and objections to the risk messages and the institutions and organizations that manage them. Risk communication judgments are, to some degree, a by-product of social, cultural, and psychological influences (Sandman, 2003; Slovic, 1999). Governments and health agencies worldwide are planning for a potential influenza pandemic. Their plans acknowledge the importance of public communication during an outbreak and include related guidelines and strategies (Covello, Peters, Wojtecki, & Hyde, 2001; Freimuth, Linnan, & Potter, 2000; Holmes, Henrich, Hancock, & Lestou, 2009; Sandman, 2007).

Risk communication has many facets, one of which applies to crisis situations and is called "crisis communication." Crisis communication is unique and distinct from communication in routine circumstances because of the following: 1) The risk is not always familiar to the public and sometimes is not fully familiar to the scientific community either. Therefore, action often needs to be taken before full information is available to the decision-makers. 2) There is constant change in the situation and thus improvisation and flexibility are essential, and officials have to be well-trained and prepared for different scenarios (JHSPH; Reynolds, 2002). In addition, due to the fact that since many organizations and agencies are involved in this process, seamless coordination is essential in order to prevent redundancy, inefficiency, and inter-agency disagreements that can result in public confusion and anxiety (Reynolds, 2002).

The literature refers to one of the specific forms of risk communication during an epidemic crisis as Emerging Infectious Disease (EID) communication. This approach draws on health promotion communication, crisis communication and environmental/technological risk communication. There are very few studies in the literature about the role of the mass media during an EID outbreak (Holmes, 2008; Holmes, et al., 2009; Rudd, Comings, & Hyde, 2003). Furthermore, much of the emerging infectious disease communication literature

deals with one-way transmission of facts to the public by experts(Holmes, 2008). This one-way road of communicating the risk by the government in the course of an epidemic contradicts the understanding of the "nature" of the risk perception that concerns not only its scientific but also its psychological aspect (Sandman, 2003; Slovic, 1999). There is no single absolute definition of "what is a risk." The perception of a risk is culturally dependent and subject to the interpretations of different and varied subpopulations (Boholm, 1998; Frewer, 2004; Slovic, Finucane, Peters, & MacGregor, 2004).

The risk perception of a flu epidemic and vaccine reflects attitudes towards different issues such as trust, participation, power versus empowerment, rationality and uncertainty. We shall address the different expressions of these elements as related in the literature.

Trust

One of the most dominant elements of communicating and managing risk is the issue of trust between the communicator and his audience (Cvetkovich & Lofstedt 1999; Earle & Cvetkovich 1995; Lofstedt 2005). Studies have found that when the individuals who comprise the general public feel they have no control over the situation, trust in the Government becomes key and perhaps even the most important variable in the public's reception of the risk management approach (Cvetkovich & Winter, 2001). Studies in the literature indicate that organizations and governments need not only to establish a "trustworthy public image" but need to convey specific health messages that support their audience's positive emotions (Allen Catellier & Yang, 2012).

The issue of participation

The concept of the public as merely the receiving side as opposed to the Government and organizations on the recommending, communicating and directing side is no longer relevant to today's media environment. Nevertheless, organizations and governments still employ "top to bottom" communication. There are many reasons that explain that form of communication: some of them derive from the idea that the public's barriers that prevent it from getting vaccinated are "irrational," that the role of government is to lead and recommend clearly and unequivocally, and some, as Kotalik argues, come from the fear that exposing the public to the Government's uncertainty and fears would create panic (Kotalik, 2005).Yet these perceptions themselves create public distrust and hinder the organization's ability to communicate the risk optimally. Risk communication indicates the importance of

the inclusion of the public before, during and after the epidemic crisis (Holmes, et al., 2009; Kotalik, 2005).

The question of power versus empowerment

The literature refers to the differences between empowerment of the public to make decisions about risks for itself and the authorities' exercise of power (Covello, et al., 2001).Studies into the risk management of the flu and the vaccine by organizations and governments indicate an implicit assumption that the administration's prevailing perception is that the system's role is to direct, guide and manage the crisis and that the public must listen to its recommendations and act accordingly (Frewer et al., 2003; Leslie, 2006; Velan, et al., 2011). Holmes et al. (2009) found that policymakers fail to identify the inherent contradiction in emphasizing the administration's power on the one hand and expecting the public to comply passively on the other. Covello et al. (2001), who studied the function of the media during the West Nile virus outbreak in New York, point out that the communication of an epidemic risk has ethical as well as political and ideological aspects which governments ignore, such as who has the authority to declare a crisis, to decide on people's health and to declare health priorities.

Rationality

Governments and organizations have often explained the public's failure to follow certain recommendations as "irrational". Early theories of health communication focused on persuading the public by lifting "irrational" barriers by presenting accurate, credible and science information (Fischhoff, 1995; Powell & Leiss, 1997). Current studies show that the public makes decisions not because it is irrational but because it evaluates the risk according to its relevance to its life (Alaszewski, 2005; Velan, et al., 2011).

In his article about the public's risk perception of SARS, Leslie (2006) argues that people effectively disagree with the authorities' risk preparation and rely on their instincts, their past experience and their tolerance of a risk they perceive as neither threatening nor urgent. In a study by Velan et al. (2011) about the reasons for the low compliance with the H1N1 vaccine in Israel there is further evidence of the practical-rational consideration that characterizes the public's risk perception. The study found that as many as 30% of the non-vaccinated respondents provided reasoned arguments for rejecting the vaccine, based mainly on assessment of threat versus actual risk. Slovic et al. (2004) explored the association between an analytical risk analysis and experience-based risk perception. The

"analytical system" model was presented as a person's ability to analyze rules and norms and calculate risks and opportunities, whereas the "experiential system" model was presented as intuitive, quick, automatic and partly unconscious. Whereas in formal risk analysis the public's affective responses to risk were seen as irrational, recent studies have shown both of those models to exist simultaneously and interdependently. A rational decision relies on emotions and thoughts (Slovic, et al., 2004). This integrated perspective challenges the dichotomous presumption that "the experts" are rational whereas the public is motivated by "irrational" barriers (Morgan, Fischhoff, Bostrom, & Atman, 2002; Sandman, 1987).

Sandman's characterization of the process is that during risk assessment, members of the dispassionate scientific community typically provide technical know-how, whereas public stakeholders provide values, beliefs and feelings through feedback on the risk communication efforts or the risk management process (Sandman, 1987). He posits that the risk communicator must not only communicate the experts' risk assessment, but also address the emotional aspects of the risk (i.e. the public's perceptions, fears and concerns).

As opposed to the aforesaid model, Waddell's social constructionist approach (Waddell, 1995) views communication between experts and the public as a system where both sides share similar features. The success or failure of communication between experts and the public depends on how the risk management and communication address the expert's perceptions and preconceptions about the public along with the audience's concerns and reservations towards the expert. In common with the public, risk communication experts also have values and perceptions that inform their understanding of risk communication. Therefore, their risk perceptions and (emotional and analytical) positions about the flu vaccine must also be studied. Very little has been written in the risk communication literature about empirical studies examining the relation between emotion, trust and rationality as circles of influence that feed each other in experts. Furthermore, most of the articles on risk communication are theoretical and there have been very few empirical studies (D. Glik, 2007).

There is an empirical article that developed Holmes' theory of risk communication during an epidemic. Holmes and colleagues (2009) interviewed 22 health experts and policymakers and media professionals about their risk perceptions. The study examined the importance of two-way communication between the experts and the public (Holmes, et al., 2009).This study proposes a model that highlights the interactive relationship that influences the way in

which a message is communicated not only between the scientific community and the public, but also within networks of experts, the general population, and media intermediaries that link between experts and the public.

Uncertainty

The literature deals with the unique conditions of uncertainty in risk communication that raise the dilemma of public participation in conditions of uncertainty (Frewer, 2004; Frewer, et al., 2003; Mebane, Temin, & Parvanta, 2003; Rudd, et al., 2003).The 2009 H1N1 epidemic flu created a situation of uncertainty. Unpredictability, development and lack of control characterize uncertain situations of communicating risk to the public during crises. Frewer (2004) argued that few studies appear in the literature about communication in conditions of uncertainty. Frewer et al. (2003) studied health professionals' perceptions of conditions of uncertainty and their communication to the public. They found a common belief that the public cannot operate in a situation of uncertainty. They argue that such a situation can increase distrust and even create panic. Meanwhile, the public emphasized the need to inform it about situations of uncertainty. The public wants full transparency of information, including updates about uncertainty and differences of opinion between experts. Information and transparency are the basis of building the public's trust of the authorities (Frewer, et al., 2003).Speakers who communicate the risk to the public need to inform the public what they don't know (Rudd, et al., 2003). It is necessary to inform the public not only about conditions of uncertainty but also when, why and under what circumstances they occur (Mebane, et al., 2003).

Public participation in planning and communicating the pandemic and pandemic vaccines

While most of the research has been done on the mass media and policy makers little has been done on public participation (Farmer, Bouthillier, Dion-Labrie, Durand, & Doucet, 2010). Public participation in planning and communicating these kinds of programs is important due to the fact that it is the population that should adopt the suggested health instructions or new behaviour (Duffy & Thorson, 2009; Kotalik, 2005; Uscher-Pines, Chernak, Alles, & Links, 2007). Therefore, it is essential for all sectors of the public to participate in the development and communication of plans too in order to build mutual trust and solidarity (Crouse Quinn, 2008; Leonard & Green, 2008; Reynolds & M, 2005; Reynolds & Quinn Crouse, 2008).

There are two levels that should be taken into consideration while using the term "public." The first level is of public leaders - community, religious and others. These are the opinion leaders in the community that can mediate the campaign messages to the general public. Burnett, Genao and Wong (2005) suggested that the role of religious leaders can be very important in influencing health care, health access and compliance. The authors claim that among other strategies, public leaders' participation in planning and communicating can overcome common barriers, engage faith-based organizations, improve patient-provider communication and create public health initiatives that are culturally competent.

Studies on public participation deal mainly with the difference between the public's risk perception and that of the experts (Bouyer, Bagdassarian, Chaabanne, & Mullet, 2001; Covello, et al., 2001; Fischoff, Slovic, Lichtenstein, Read, & Combs, 1978; Krewski, Turner, Lemyre, & Lee, 2012). The psychometric paradigm, for example, suggests that risk perception of the public is influenced by dread, uncertainty, and lack of familiarity and controllability surrounding the hazard, unlike the risk perception of health experts(Fischoff, et al., 1978). Societal factors and personal factors were also found as important influencers(Bouyer, et al., 2001). Krewyski et al. (2012) suggest that understanding public risk perception and its possible change over time is a key factor in the design of successful risk management and risk communication strategies and empowerment of the public.

Health experts' (public health workers) participation in planning and communicating the pandemic and pandemic vaccines

Health experts have a major role in communicating pandemic and pandemic vaccines to the population. Even though the compliance of health professionals with vaccines is important because they are the people who serve as role models for the general population, health professionals have demonstrated low compliance with flu vaccines over the years (Poland, Tosh, & Jacobson, 2005).

Most studies point mainly to concerns about the side effects and safety of the vaccine (Smedley, et al., 2007; Weingarten, et al., 1989; Willis & Wortley, 2007). Additional barriers that appear in the literature in the context of the flu vaccine have to do with erroneous perceptions of the composition of the vaccine(Hollmeyer, Hayden, Poland, & Buchholz, 2009; Virseda et al., 2010).Additional reasons for low compliance of public health professional are inconvenience, including insufficient time for vaccination and dislike of injections or medications(Takayanagi, Cardoso, Costa, Araya, & Machado, 2007). In their study of the compliance of public health workers with the flu vaccine before and during the epidemic outbreak, Chor et al. (2009) found that the willingness to accept pre-pandemic influenza vaccination was low, and no significant effect was observed with the change in WHO alert level(Chor, et al., 2009). Some of the studies in the literature tried to find variables that would indicate which health workers would have higher compliance. For example, a study by Doebbeling et al. (1997) found that older individuals, those with higher socioeconomic status, and those employed longer are more likely to accept the influenza vaccine. Sex, marital status, and prior work absenteeism are also important predictors in specific groups of health care workers (Doebbeling, et al., 1997).

The literature tried to identify the positive incentives (Qureshi, Hughes, Murphy, & Primrose, 2004) versus the sanctions that could be used to recruit health workers to get vaccinated (Anikeeva, Braunack-Mayer, & Rogers, 2009). Some of the issues, particularly sanctions and regulation, raise sensitive ethical questions that need to be addressed. However, compared to studies of the barriers preventing healthcare workers from obtaining flu vaccines, there are few studies in the literature about the way health professionals (mainly physicians and nurses) communicate with their patients about vaccines. Sharing power and responsibility, the use of empathy and treating the patient like a person were found to be effective communication strategies to increase compliance with vaccinations (Lasser, et al., 2008; Russell & Ferguson, 2001).

Communication experts' participation in planning and communicating the pandemic and pandemic vaccines

Since mass media and new media are considered crucial players in planning and communicating pandemics and pandemic vaccines (D. C. Glik, 2007), one of the key populations whose perceptions about this issues should be considered is the communication experts, who can help understand what effective communication means. Communication experts, in this context, can be advertisers, social marketing managers, journalists and others(Alaszewski, 2005).

Holmes et al (2009) claim that communication experts perceive effective communication as being timely, empowering, clear and understandable, consistent, using a team approach, ethical and using the right number of spokespeople. These factors, according to Holmes, represent a gap between the perception of experts and other groups (B. B. Johnson, 1999; Kotalik, 2005; Morgan & Lave, 1990; Wray, Kreuter, Jacobsen, Clements, & Evans, 2004). This gap can support previous studies that suggested that ethical considerations are not clear-cut in what they include but in the need for ethics in the preparedness of communication (B. B. Johnson, 1999; Kotalik, 2005; Morgan & Lave, 1990; Wray, et al., 2004). When asked whether ethics could reduce the effectiveness of a campaign, communication experts were the only group who fully rejected this statement. Communication experts also strongly supported the importance of being guided by an ethical framework when making decisions about communications (Holmes, et al., 2009).

The effects of the mass media on risk perception and compliance with seasonal and pandemic vaccines

The mass media is still considered a popular force in many countries and the most important and used tool to spread information about seasonal and pandemic vaccines (Garrett, 2001; D. C. Glik, 2007; May, 2005). The importance of studying the mass media is justified by three important roles of the media: Providing information (Breban, 2011; Duncan, 2009; Dutta-Bergman, 2004; Dutta, 2007), fostering attitude formation towards vaccines and pandemics (Krishna, Balas, Boren, & Maglaveras, 2002; Maurer & Harris, 2010; Stockwell, Kharbanda, Martinez, Lara, et al., 2012; Yoo, Holland, Bhattacharya, Phelps, & Szilagyi, 2010) and influencing the decision to take the vaccine, including shaping risk perception (Abeysinghe & White, 2011; K. Holland, R. W. Blood, M. Imison, S. Chapman, & A. Fogarty, 2012; Holmes, et al., 2009; Walter, et al., 2012). Analyzing the role of the mass media during a threat of an

infectious disease outbreak can help us understand its effect on the public and the public's response to it, since media coverage usually defines the situation for the public and influences its risk perception and attitudes towards this issue (Smith, Burkle, Holman, Dunlop, & Archer, 2009; R. D. Smith, 2006).Nonetheless, healthcare providers still underestimate the power of the media to help in promoting health issues, while they fear its power to instil fear and irrational behaviour among the public(Garrett, 2001; D. C. Glik, 2007; May, 2005).

Holmes, Henrich, Hancock & Lestou (2009) claim that the mass media plays an important role in emerging infectious disease (EID) coverage. Dutta-Berman (2004) showed that active communication channels, such as print media and internet communication, can serve as primary tools for health information sources, but mainly for health conscious and informed individuals. Yoo et al. (2010) showed that the timing and annual receipt of the influenza vaccination is influenced by media coverage.

In the field of mass media and risk perception, Kristiansen (2007) concluded that the mass media plays an important role in risk perception of influenza pandemics. However, while Kristiansen (2007) showed a high perception of risk, in the case of the H1N1 influenza pandemic in 2009, Maurer and Haris (2010) showed that the vaccine uptake was lower than the seasonal vaccine, due to the fact that the population perceived it to be less safe, relying on different information sources, including mass media. Walter et al. (2012) added that in addition to the low level of safety that was attributed to the H1N1 influenza vaccine, the perceived low risk of the disease was also one of the main barriers that contributed to the low vaccination coverage.

It is also worth mentioning that while most of the studies analyze the content of the media coverage while checking its influence on the public, only few deal with the reporting process itself (Abeysinghe & White, 2011; Duncan, 2009; Kate Holland, et al., 2012). Holmes et al. (2009) mentioned that sometimes the media faces unique challenges associated with the need to communicate information in an environment of uncertainty. That can lead to a greater effect on the public, as Trivellin, Gandini and Nespoli (2011) showed. In an analysis in northern Italy a 100% increase in the number of visits in the E.R., with influenza-like illness, was found during weeks 42-46 of 2009. Yet there was only a low rate of hospitalization, which led to the conclusion that the pandemic risk had been overrated. The three researchers explained that the reports in the mass media regarding the H1N1 influenza virus created disproportionate fear in the population.

In a narrative analysis of the content of print media and policy papers of the Australian government, Abeysinghe and White (2011) studied the construction of avian influenza, with special focus on the discourses of contagion, preparedness and risk. The two researchers concluded that both the government and media discourse dealt in questions of risk, possible contagion and blame. They also found that reactions and preparation for a potential outbreak of avian influenza were framed in the media by the linking of the risk of the pandemic with globalized interconnectedness and contagion by the developing world. The question that arises from Abeysinghe and White's (2011) findings is who the key players in the media coverage are. In other words, the question is who are the people who provide the information to the audience? In a large content analysis of articles in the EU mass media, Duncan (2009) reviews European media coverage of the opening days of the H1N1 pandemic in 2009. It was found that national and international public health authorities were the main sources for information about the new virus, while only less than a quarter of the articles analyzed supported the authorities' handling of the situation. Holland, Blood, Imison, Chapman and Fogarty (2012)emphasized that in their encounters with the media, some experts were frustrated by news media constrains, while others managed to adapt to what was needed in order to "play the media game." By a qualitative study of interviews, the group of scholars shows that scientific experts balance their professional role and responsibilities with performance in the media.

The effect of the mass media is not measured only by its providing of information but also by threat levels and risk perception and communication (R. D. Smith, 2006). The SARS pandemic, which dealt with the fear of possible bio-terrorism, is a good comparative example that shows how the threat and fear affect the public. In this case, although the pandemic had been feared to cause disastrous health effects, only 1,000 people died. However, the fear level and threat that the public felt were much higher. According to the professional literature on strategies of intimidation (Person, Sy, Holton, Govert, & Liang, 2004), it is caused by many factors and media strategies, among them emphasis on death incidents, conflicting messages and metaphorical framing. This leads to the conclusion that sometimes while the pandemic potential is low, the fear potential remains high – because the media perceive the risk and threat as much higher than it is (Griffin, Dunwoody, & Zabala, 1998; Mansotte, 2004; Rezza, Marino, Farchi, & Taranto, 2004; R. D. Smith, 2006). May (2005) adds that the media portrayal of health crises can create public perception and cause irrational behaviour that threatens the effectiveness of vaccination programs.

The discussion in the literature regarding questions such as how the seasonal and pandemic vaccines are presented in the media is important, due to the fact that mass media, television and the web, in particular, are sometimes the most important sources for people for learning and developing their perceptions about these issues. Based on the Uses & Gratification and Media System Dependency theories, Tustin (2010) showed that there is a negative correlation between satisfaction from the treatment a patient receives from the physician and his tendency to look for health information on the web. While most people who used the web as the main source for information were unsatisfied in general, satisfied patients used the web for information less.

On this matter, Dutta (2007) claims that even though research in the last decade focused on the unhealthy effects of television, in recent years there has been an increase in the amount of scholarly research seeking to investigate the positive health effects of television. Taking the motivation-based approach to learning health information from television, the author argues that health orientation influences the amount of health information individuals learned from television, by demonstrating that individuals who gained health information from the television were more health-oriented than others.

However, mass media is not all about television. While most studies showed that traditional vaccine reminders have a limited effect on low-income populations (Abeysinghe & White, 2011; D. C. Glik, 2007; Holmes, et al., 2009; Smith, et al., 2009; Walter, et al., 2012), it has been learned that computerized messages and voice and text messages, sent directly to mobile phones, can help increase influenza vaccination (Krishna, et al., 2002; Stockwell, Kharbanda, Martinez, Lara, et al., 2012; Stockwell, Kharbanda, Martinez, Vargas, et al., 2012). R. D. Smith (2006)also raises an important question: Who are the key players in the process of spreading information regarding seasonal and pandemic vaccines and on risk perception and compliance with those vaccines (Janssen, Tardif, Landry, & Warner, 2006). The literature examines who creates the messages, how they are being created, what their effects are, but not how people are using the information with which they are presented (Duffy & Thorson, 2009; Gesser-Edelsburg, Forthcoming; D. C. Glik, 2007). Also, there are no studies about the involvement of journalists themselves in the process, nor their responses and thoughts about their role in pandemic and seasonal vaccine coverage (Garrett, 2001; D. C. Glik, 2007; May, 2005).

The effects of new media on risk perceptions and compliance with seasonal and pandemic vaccines

New media is a new development in the digital world. It opens new opportunities for its users that weren't available before. It is common to differentiate between two types of spreading information: Web 1.0 and Web 2.0 (Bernhardt, Mays, & Kreuter, 2011; Han, 2010; Harrison & Barthel, 2009; Hesse et al., 2011). Web 1.0 refers to the act of using the web platform to spread information only in one direction – from the senders to the receivers. Consumers of this information can look for it using the websites, search engines and etc. Although it has been a major field in our daily life and uses of technology, there has been very little research projects on the new media as a tool for communicating health issues, with an emphasis on risk perception and compliance with seasonal and pandemic vaccines. Most studies that have been cited here deal mainly with spreading the information using web 1.0 techniques. They also dealt with the questions of what kind of information is being published and where, but not with the question of who is looking for information. What do people look for? What are they expecting to find on the web, regarding seasonal and pandemic vaccines (Bass et al., 2006; Bernhardt, et al., 2011; Dutta-Bergman, 2004; Krewski, et al., 2012; van Noort, et al., 2012).

The best known definition of Web 2.0 is O'Reilly's (2005, 2006), as technologies intended to be interactive and consumer-centred, while enabling users to interact with others, create and share content and have control over their use. The term for using the new media for health communication , first coined in 2005, is Health 2.0 and is based on participation, data and collective intelligence (Hesse, et al., 2011)– all the technological features that provide healthcare professionals with new abilities to promote health among the general public (Bernhardt, et al., 2011; Gesser-Edelsburg, Forthcoming; Hesse, et al., 2011). Although it has been a major feature of our daily life, there have been very few research studies and projects of the new media as a tool for communicating health issues, with an emphasis on risk perception and compliance with seasonal and pandemic vaccines (Bass, et al., 2006; Bernhardt, et al., 2011; Dutta-Bergman, 2004; Krewski, et al., 2012; van Noort, et al., 2012).

It has been claimed that the new media revolution has changed the media arena, which is an important place for promoting health issues. Gesser-Edelsburg (Forthcoming) states that while planning health campaigns in the new media, it is important to explore the unique characteristics of the internet and social media, which are important tools for the public, especially in health crises with extreme conditions of stress and uncertainty. The assumption is that during a health crisis, the general population will turn to the digital world in order to gain information. This raises the question of how to manage an effective health campaign

that will affect risk perception and compliance among the public, especially in situations of seasonal and pandemic vaccines. Bernhardt, Mays and Kreuter (2011) explain that one of the reasons for lack of evidence-based health programs and services in the new media is a continuous failure of dissemination, when implementing practices. Failure of dissemination is caused by many factors, such as a significant gap in current processes to implement effective programs and the lack of systems and infrastructure to facilitate distribution of scientific research products to potential users, practitioners or the public.

There are four known strategies to promote dissemination and implementation of research evidence in practice, and each of them can be improved by leveraging Web 2.0 technologies to enhance dissemination (Kreuter & Bernhardt, 2009): to increase scientists' dissemination efforts, to assemble inventories of effective programs, to build partnerships for dissemination, and to increase demand among practitioners for evidence-based approaches. All of the strategies above require Web 2.0 training (Bernhardt, et al., 2011; Kreuter & Bernhardt, 2009). Another approach for new media is the health communication media choice model which is based on the migration of consumers to the web, health information strategies and effective evidence-based campaigns (Blumler & Katz, 1974; Duffy & Thorson, 2009; Eysenbach & Kohler, 2002; Palfrey & Gasser, 2009; Peterson, Aslani, & Williams, 2003).

Summing up the above findings, Gesser-Edelsburg (in preparation) concludes that it is important to enhance dialogue with the public on health websites, while creating a wide forum for public representation. Inclusive dialogic websites, according to the author, help to communicate with subpopulations during crises and tailor personal message for them, addressing their linguistic, cultural and normative frames of reference. Gesser-Edelsburg also adds that some multidisciplinary models and inclusive approaches should be implemented on the website: risk communication and social marketing, interactive technological tools, credibility and attractiveness.

In a study by Hesse et al. (2011), the group of researchers showed how the three main tenets of Health 2.0 –participation, data and collective intelligence – can be harnessed to improve the health of the nation. One of the main claims of the authors, based on the "Healthy people 2020” goals, is that changes in the communication environment shouldn't detract from national health goals. The authors suggest that national health goals should determine the communication strategy. They support their analysis with a survey of national trends, showing that patients were quick to look online for information to help them cope

with diseases. Other studies have also demonstrated that following the strategies for using the new media (Hesse, et al., 2011), and social media in particular, is helpful in risk perception, compliance and efficacy for parent-child communication regarding health campaigns (Evans, Davis, & Zhang, 2008). It also leads to strong connections between sender and receiver and positive responses, attitudes and behaviour (van Noort, et al., 2012).

The effects of personal communication on risk perceptions and compliance with seasonal and pandemic vaccines among healthcare workers and the public

While the mass media, and in a certain sense the new media as well, deals with communicating with the masses with "one size fits all" messages or "personal messages" tailored to subpopulations, in the case of the new media, personal communication allows primary care providers and policy makers to overcome common barriers and achieve better goals in risk perception and compliance , among healthcare workers and the public (Gene Badia, Pane Mena, Sais Curus, & Maicos, 1990; Lasser, et al., 2008). However, little study in the literature of personal communication campaigns, involving organizations and governmental actors, and instructions about pandemics.

Goldstein, Kincade, Gamble and Bearman (2004) claim that efforts should be personally tailored to the individual healthcare worker and adopted to the institution and healthcare system where he or she works. In a study of healthcare workers in institutions which serve the elderly population, the authors found health policies to be very uncommon, while most of the mechanism used to increase vaccinations was voluntary. On the other hand, that of the public, personal communication was found to be efficient to enhance compliance and risk perception of seasonal and pandemic vaccines (Lasser, et al., 2008; Maurer & Harris, 2010; Moran, Nelson, Wofford, & Velez, 1992).

In a self- reported national survey of US adults, employers were the most important source of vaccination reminders, ahead of health care providers and health insurance companies. It was also found that reminder receipt does not appear to be systematically higher among subpopulations, e.g. patients at risk for influenza-related complications (Maurer & Harris, 2010). These results supported early findings suggesting that the human factor is important in personal communication reminders, but cannot replace computer-generated mailed reminders for influenza immunization (Moran, et al., 1992). Lasser et al. (2008) add that encounters between personal care providers (PCP's) and elderly patients can help improve their compliance with the influenza vaccination. Sharing power and responsibility, the use of

empathy, and treating the patient like a person were found to be important factors of personal communication in improving compliance. Personal communication also helped to cope with cultural competence, introduction of the vaccine, revisiting the topic, rapport and trust between the patient and PCP and the vaccination process itself.

Table 2: Factors associated with type of communication

Negatively Influencing Factors	Positively Influencing Factors	Outcome Variables	Type of Communication or Population
Mass Communication	Construction of Influenza in Mass Media Patients behavior in result of coverage in mass media Vaccination Compliance Risk perception of viewers Uses and Gratifications of health media use Trust	Positive framing of influenza pandemic Using active communication channels High Media Skills Strong relations between journalists and societal roles Consuming variety of communication channels	Negative framing of Influenza Pandemic Low media skills Communication Uncertainty
New Media	Self and Collective efficacy Patients' behavior Risk Perception Attitudes Vaccination Compliance	High Internet Use Good adaption of Web 2.0 Technologies Active Communication channels Healthy Behavior Strong ties between sender and receiver - High Interactivity	Bad adaption of Web 2.0 Technologies Unhealthy behavior Low Interactivity
Personal Communication	Vaccination Compliance	Reminders Written Policies	Fear of side effects
Social Marketing	Trust Affect Barriers Fear Arousal & Appeal Vaccine Compliance Perceptions towards vaccines	Opinion Leaders in the community Healthcare workers recommendations Behavioral-inhibition system PSA's Personal Tailored Message Empathy	Lack of physician recommendations Mistaken assumptions Lack of adequate information Public Anxiety & Panic
Risk Communication	Behaviors Risk Perception Knowledge Fear Arousal Vaccine Compliance	Targeted communication messages Education	Attitude towards the government Mistrust Ethnic Minorities

	Attitudes towards influenza vaccination		
Public Participation	Healthcare workers compliance Risk Perception Vaccination Compliance	Opinion Leaders Community Engagement Healthy Behavior	Emergency Situations Unhealthy Behavior
Health Experts Participation	Vaccination Compliance Behavioral Responses Barriers Risk Perception Attitudes	Incentives & Sanctions High Self Efficacy Good Public Image High Peer-Review Feedback Organizational informative nature	Low Self Efficacy Bad Public Image Low Peer-Review Feedback
Communication Experts Participation	Risk Perception Information Management	Strong ties between sender and receiver – High Interactivity	Low Interactivity

3.3. Discussion

In conclusion, most of the studies that appear in the professional literature today focus on the evaluation of why compliance with vaccines is low. This literature review indicates two main things: that there are not enough studies about different subpopulations and that most of the media campaigns in different countries are not based on the components of social segmentation and support. It can also be stated that most of the studies in the literature are summative evaluation studies aimed at "explaining" and analyzing the barriers that emerge from the noncompliance. There have hardly been any formative research studies that accompanied and built social marketing campaigns to promote the issue of vaccines against seasonal and epidemic flu.

In addition, there are few empirical studies of the risk communication of flu at times of crisis and emergency, and most of them are theoretical. There are a number of empirical studies that examine the important and unique theoretical components of crisis communication such as uncertainty and the audience's decision-making rationality. However, the theoretical studies indicate gaps between what exists in the literature and the actual actions of the authorities and organizations that deal with the public's risk perceptions. The existing literature indicates the important connections between the element of trust (Cvetkovich & Lofstedt 1999; Earle & Cvetkovich 1995; Lofstedt 2005) and the strategies of uncertainty(Frewer, et al., 2003). exercise of emotion(Slovic, et al., 2004).and participation and involvement of the public (Holmes, et al., 2009), which need further study.

Another subject we looked at in the review was the participation of the public, the health experts and the media professionals. We found there were hardly any studies on forms of cooperation; most focused on barriers and non-compliance of the public and experts with the flu vaccine. Another area checked in the review was the various media channels. As a rule, the most studied communication medium is the “mass media,” mainly through the television and press.

However, mass media is not all about television. While most studies showed that traditional vaccine reminders have a limited effect on low-income populations (Abeysinghe & White, 2011; D. C. Glik, 2007; Holmes, et al., 2009; Smith, et al., 2009; Walter, et al., 2012), it has been learned that computerized messages and voice and text messages, sent directly to mobile phones, can help increase influenza vaccination (Krishna, et al., 2002; Stockwell, Kharbanda, Martinez, Lara, et al., 2012; Stockwell, Kharbanda, Martinez, Vargas, et al.,

2012). R. D. Smith (2006)also raises an important question: Who are the key players in the process of spreading information regarding seasonal and pandemic vaccines and on risk perception and compliance with those vaccines (Janssen, et al., 2006). The literature examines who creates the messages, how they are being created, what their effects are, but not how people are using the information with which they are presented (Duffy & Thorson, 2009; Gesser-Edelsburg, Forthcoming; D. C. Glik, 2007). Also, there are no studies about the involvement of journalists themselves in the process, nor their responses and thoughts about their role in pandemic and seasonal vaccine coverage (Garrett, 2001; D. C. Glik, 2007; May, 2005).

Another area of importance as a medium is the new media technologies, which enable the policy makers and the Government to communicate seasonal and pandemic vaccines more dialogically – in a two-way conversation. It also makes it possible to address subpopulations with personal, or personal-group, tailored messages. However, the literature on this topic reveals that it has been little studied. It seems that a lot of thinking and consideration should be invested in investigating and planning in the new media sphere. While the mass media, and in a certain sense the new media as well, deals with communicating with the masses with "one size fits all" messages or "personal messages" tailored to subpopulations, in the case of the new media, personal communication allows primary care providers and policy makers to overcome common barriers and achieve better goals in risk perception and compliance , among healthcare workers and the public (Gene Badia, et al., 1990; Lasser, et al., 2008). However, little study in the literature of personal communication campaigns, involving organizations and governmental actors, and instructions about pandemics.

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The efficacy and compliance with non-pharmacological interventions to prevent the spread of influenza

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