



uOttawa

L'Université canadienne  
Canada's university

**FACULTÉ DES ÉTUDES SUPÉRIEURES  
ET POSTDOCTORALES**



**uOttawa**

L'Université canadienne  
Canada's university

**FACULTY OF GRADUATE AND  
POSTDOCTORAL STUDIES**

**Po-Po Lam**

-----  
AUTEUR DE LA THÈSE / AUTHOR OF THESIS

**M.Sc. (Epidemiology)**

-----  
GRADE / DÉGRÉE

**Faculty of Medicine**

-----  
FACULTE, ÉCOLE, DÉPARTEMENT / FACULTY, SCHOOL, DEPARTMENT

**«Approaches to Implementing an Influenza Vaccine Decision Aid for Healthcare Personnel.»**

-----  
TITRE DE LA THÈSE / TITLE OF THESIS

**Larry Chambers**

-----  
DIRECTEUR (DIRECTRICE) DE LA THÈSE / THESIS SUPERVISOR

-----  
CO-DIRECTEUR (CO-DIRECTRICE) DE LA THÈSE / THESIS CO-SUPERVISOR

**Annette O'Connor**

**Virginia Roth**

**Gary W. Slater**

-----  
Le Doyen de la Faculté des études supérieures et postdoctorales / Dean of the Faculty of Graduate and Postdoctoral Studies

**APPROACHES TO IMPLEMENTING AN INFLUENZA VACCINE DECISION  
AID FOR HEALTHCARE PERSONNEL**

Po-Po Lam

Thesis submitted to the  
Faculty of Graduate and Postdoctoral Studies  
In partial fulfillment of the requirements for the MSc degree in Epidemiology

Epidemiology and Community Medicine  
Faculty of Medicine  
University of Ottawa



Library and Archives  
Canada

Published Heritage  
Branch

395 Wellington Street  
Ottawa ON K1A 0N4  
Canada

Bibliothèque et  
Archives Canada

Direction du  
Patrimoine de l'édition

395, rue Wellington  
Ottawa ON K1A 0N4  
Canada

*Your file* *Votre référence*  
ISBN: 978-0-494-69024-6  
*Our file* *Notre référence*  
ISBN: 978-0-494-69024-6

**NOTICE:**

The author has granted a non-exclusive license allowing Library and Archives Canada to reproduce, publish, archive, preserve, conserve, communicate to the public by telecommunication or on the Internet, loan, distribute and sell theses worldwide, for commercial or non-commercial purposes, in microform, paper, electronic and/or any other formats.

The author retains copyright ownership and moral rights in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

---

In compliance with the Canadian Privacy Act some supporting forms may have been removed from this thesis.

While these forms may be included in the document page count, their removal does not represent any loss of content from the thesis.

**AVIS:**

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque et Archives Canada de reproduire, publier, archiver, sauvegarder, conserver, transmettre au public par télécommunication ou par l'Internet, prêter, distribuer et vendre des thèses partout dans le monde, à des fins commerciales ou autres, sur support microforme, papier, électronique et/ou autres formats.

L'auteur conserve la propriété du droit d'auteur et des droits moraux qui protègent cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

---

Conformément à la loi canadienne sur la protection de la vie privée, quelques formulaires secondaires ont été enlevés de cette thèse.

Bien que ces formulaires aient inclus dans la pagination, il n'y aura aucun contenu manquant.

  
**Canada**

**Approaches to implementing an influenza vaccine decision aid for healthcare personnel**

Po-Po Lam, MSc Candidate

Dr. Larry W. Chambers, Supervisor

Dr. Anne E. McCarthy, Thesis Committee Member

Thesis submitted to the Faculty of Graduate and Postdoctoral Studies in partial fulfilment of the requirements for the MSc degree in Epidemiology

Epidemiology and Community Medicine

Faculty of Medicine

University of Ottawa

June 14, 2010

## **Abstract**

The Ottawa Influenza Decision Aid (OIDA) is a newly developed tool to assist healthcare personnel (HCP) make an informed decision regarding the seasonal influenza vaccine. The primary objective of this thesis is to determine approaches to implementing the OIDA into healthcare organizations by 1) conducting a systematic review of influenza immunization campaigns for HCP; 2) facilitating consultation meetings with healthcare organizers to collect their ideas on using the OIDA within their workplace; and 3) develop an OIDA implementation questionnaire based on the findings from the systematic review and consultation meetings. The systematic review results suggest that education-only campaigns only have a minimal impact on immunization rates. Future studies require improved reporting on the follow-up of HCP and calculation of HCP immunization rates. The consultation meetings identified ten approaches to implementing the OIDA within a healthcare setting. The OIDA Implementation Questionnaire was designed and a survey implementation approach recommended.

## **Acknowledgements**

This thesis would not have been possible without the guidance and support from Dr. Larry Chambers. His willingness to share his wisdom and practical experiences has made my thesis project an enriched learning experience. His ability and determination to improve healthcare practice and programs through research is truly inspiring. As well, I am sincerely thankful to Dr. Anne McCarthy, whose insight on the thesis topic provided depth to the project. I am grateful for her constant support and advice throughout the entire process. In addition, I would like to thank the members of the Canadian Healthcare Influenza Immunization Network (CHIIN) team for always being supportive of the thesis from the very beginning and providing the necessary resources to complete this project. Special thanks to Dr. Donna MacDougall for volunteering as the second reviewer for the systematic review and Sarah DeCouteres and Craig White for being secondary coders. Lastly, I would like to show my gratitude to my family and friends for their encouragement and understanding throughout the project.

## **Table of Contents**

### **1. Introduction**

- 1.1. Influenza-related burden and seasonal influenza immunization
- 1.2. Nosocomial influenza and influenza immunization among healthcare personnel
- 1.3. Facilitators and barriers to influenza immunization among healthcare personnel
- 1.4. Decisional conflict as a barrier to influenza immunization
- 1.5. Ottawa Influenza Decision Aid (OIDA)
- 1.6. Promoting Action on Research Implementation in Health Services (PARiHS) Framework
- 1.7. Canadian Healthcare Influenza Immunization Network (CHIIN)

### **2. Thesis Overview**

- 2.1. Aims and Objectives
- 2.2. Study Design
- 2.3. Ethics

### **3. Systematic Review of Seasonal Influenza Immunization Campaigns for Healthcare Personnel**

- 3.1. Introduction
- 3.2. Methods
  - 3.2.1. Literature search
  - 3.2.2. Study selection
  - 3.2.3. Data extraction and risk of bias assessment
  - 3.2.4. Data analysis
- 3.3. Results
  - 3.3.1. Search yield
  - 3.3.2. Excluded studies with reported interventions
  - 3.3.3. Studies included in analysis
  - 3.3.4. Risk of bias assessment
- 3.4. Discussion

### **4. Consultation Meetings**

- 4.1. Introduction
- 4.2. Methods
  - 4.2.1. Sampling

- 4.2.2. Site recruitment
- 4.2.3. Development of the Discussion Guide used in the Consultation Meetings
- 4.2.4. Discussion guide development: Review by expert team
- 4.2.5. Discussion guide development: Pilot test with lay participants
- 4.2.6. Discussion guide development: Pilot test with healthcare personnel
- 4.2.7. Consultation meeting format
- 4.2.8. Data processing
- 4.2.9. Data analysis

#### 4.3. Results

- 4.3.1. Group characteristics and group dynamics during consultation meetings
- 4.3.2. Participant perceptions about the OIDA
- 4.3.3. Approaches to using the OIDA in a healthcare setting
- 4.3.4. Evaluation of the OIDA
- 4.3.5. Target population for the OIDA
- 4.3.6. Barriers and facilitators to OIDA implementation strategies

#### 4.4. Discussion

- 4.4.1. Strengths and limitations
- 4.4.2. Implications for developing the OIDA implementation guide

### **5. OIDA Implementation Questionnaire Design**

#### 5.1. Rationale and Objectives of Questionnaire

#### 5.2. Methods

- 5.2.1. OIDA Implementation Questionnaire – Study Design
- 5.2.2. OIDA Implementation Questionnaire Items
- 5.2.3. Questionnaire review by CHIIN team
- 5.2.4. Questionnaire pilot-test
- 5.2.5. Survey implementation
- 5.2.6. Data process and analysis

#### 5.3. Strengths and Limitations

#### 5.4. Conclusions

### **6. Summary**

### **7. References**

**List of Tables:**

Table 1. Overview of thesis design

Table 2. Influenza Immunization Campaign Components

Table 3. Methods used to determine baseline measures and percentage point change in influenza immunization coverage

Table 4. Characteristics of studies included for analysis in non-hospital healthcare settings

Table 5. Characteristics of studies included for analysis in hospital settings

Table 6. Risk of bias assessment for RCTs and Cluster-RCTs

Table 7. Risk of bias assessment for controlled-before-and-after studies

Table 8. Risk of bias assessment for interrupted time series design

Table 9: Characteristics of groups participating in the consultation meetings

Table 10: Approaches to using the OIDA complementing influenza immunization campaign components

**List of Figures:**

Figure 1. Selection of studies for systematic review

Figure 2. Percentage point change in influenza immunization coverage among healthcare personnel in a non-hospital healthcare setting stratified by type of campaign components for the intervention group

Figure 3. Percentage point change in influenza immunization coverage among healthcare personnel in a hospital setting stratified by type of campaign components for the intervention group.

Figure 4. Survey implementation process

**List of Appendices:**

Appendix A: Copy of the Ottawa Influenza Decision Aid (OIDA)

Appendix B: Canadian Healthcare Influenza Immunization Network (CHIIN) Team

Appendix C: Ottawa Hospital Research Ethics Board Approval Letter

Appendix D: Search strategy for systematic review

Appendix E: Data extraction form for systematic review

Appendix F: Characteristics of excluded studies reporting an influenza immunization campaign in long-term care homes

Appendix G: Characteristics of excluded studies reporting an influenza immunization campaign in a hospital setting

Appendix H: Characteristics of excluded studies reporting an influenza immunization campaign in mixed-healthcare settings

Appendix I: References of excluded studies for systematic review

Appendix J: Risk of Bias Assessment for RCTs and Cluster-RCTs – Details

Appendix K: Risk of Bias Assessment for Controlled Before-and-After Studies – Details

Appendix L: Risk of Bias Assessment for Interrupted Time Series Designs – Details

Appendix M: Discussion guide for consultation meetings

Appendix N: PowerPoint slides for consultation meetings

Appendix O: OIDA implementation questionnaire

Appendix P: Coverletter for the OIDA implementation questionnaire

## 1. Introduction

---

### 1.1. Influenza-related burden and seasonal influenza immunization

Annually, approximately 4000 Canadians die from influenza (1). Children 6 to 23 months of age, individuals with chronic heart or lung disease and the elderly are at higher risk for influenza-attributed mortality and hospitalization (1-3). For Canadians 65 years and over, the influenza-attributable mortality rate is between 90 – 102 per 100,000 per year (1). Meanwhile, approximately 200 per 100,000 children 6 to 23 months of age are hospitalized due to influenza.

Influenza outbreaks in healthcare settings can result in poor staffing rates, postponed patient admissions, and increased risk of infecting patients with the disease (4-6). During an influenza outbreak in an internal medicine ward of a French hospital illness in staff resulted in 14 person-days of sick leave, eight postponed patient admissions, and a delay in emergency admissions for 11 days (6). Overall, the outbreak cost \$34,000 in patient-related issues (6). In the United States, the estimated total annual economic burden of seasonal influenza is \$87.1 billion (95% C.I. \$47.2, \$149.5) with hospitalization and lost productivity from missed work days as major costs contributors (7).

Influenza immunization is a recommended approach to decrease the disease burden of influenza (8). From a Cochrane review of trials, the influenza vaccine was 80% efficacious (95% C.I. 56%, 91%) in reducing the incidence of disease among healthy adults when vaccine matched circulating strains (9). Vaccine efficacy was further supported by the success of the Ontario Universal Influenza Immunization Program in decreasing mortality among the Ontario population as compared to other provinces without the program (ratio of relative rates = 0.61,  $p = 0.002$ ) (10). The Cochrane review found no significant differences between vaccinated and non-vaccinated groups for sick days and hospital admissions (9).

Among those 65 years and over, however, the vaccine is less effective because of poor immunological response to the vaccine. From a Cochrane review of 64 studies on influenza vaccine efficacy (11), influenza immunization was not significantly associated with preventing influenza among long-term care residents (relative risk = 1.04; 95% C.I. 0.43,

2.51). The vaccine, however, was efficacious in preventing influenza-related complications, including pneumonia, hospital admissions and mortality (11).

## **1.2. Nosocomial influenza and Influenza immunization among healthcare personnel**

Annual influenza immunization for healthcare personnel (HCP) is important for preventing transmission of the influenza virus to vulnerable patient populations, especially among older adults where the vaccine is less efficacious in preventing influenza. Healthcare personnel can act as vectors of the influenza virus and transmit the disease to their patients.

A Cochrane Review (12) of three studies found HCP immunization, in addition to patient immunization, was 86% efficacious (95% C.I. 40%, 97%) in preventing influenza-like-illnesses among elderly patients. HCP immunization was also found to be efficacious against pneumonia-related (efficacy 39%, 95% C.I. 2%, 62%) and all-cause patient mortality (efficacy 40%, 95% C.I. 27%, 50%). HCP vaccine coverage, however, was not significantly associated with influenza prevention (OR 0.86, 95% C.I. 0.44, 1.68) among patients (12).

HCP immunization is also associated with decreased economic burden associated with influenza. In a retrospective cohort study of a hospital emergency department, a smaller proportion of immunized HCP reported sick-days as compared to a non-immunized group (30.3% vs. 55.0%) (13). Reduction in worker absenteeism can decrease extra salary costs associated with hiring replacement workers. As part of an economic analysis study, a cost-benefit model was used to estimate the economic impact of an influenza immunization program for an academic medical centre in The Netherlands. It was estimated that an influenza immunization program for hospital employees resulted in cost-savings of \$125 EUR per vaccination (14).

In efforts to protect patients and decrease work-absenteeism, the Canadian National Advisory Committee on Immunization (NACI) has recommended a minimum 90% influenza vaccine coverage rate for HCP (8). Despite the above evidence supporting the benefits of the influenza vaccine, HCP immunization rates are often well below targeted levels and vary greatly across acute and long-term care organizations in Canada (8) and internationally. In 2003, the immunization coverage was 46% among Canadians employed in ambulatory

care, hospitals and long-term care homes (LTCHs) (15). A survey of Canadian LTCHs reported a 35% average immunization rate for LTCH personnel (16). Similarly, in the United States, HCP immunization coverage is approximately 40% (17). Meanwhile, from a cross-sectional survey of European countries, seven countries monitored HCP immunization and reported vaccine uptake ranging from 14% to 48% (18). Thus, continued effort is needed to encourage influenza immunization among HCP.

### **1.3. Facilitators and barriers to influenza immunization among healthcare personnel**

In a literature review of HCP attitudes and beliefs on influenza immunization (19), authors identified recurring barriers and facilitators from 25 studies. HCP were motivated to receive the influenza vaccine when there is a desire for self-protection and patient-protection, vaccine is easily accessible, past-recipient of vaccine and peer influence (19). Common reasons to refuse the influenza vaccine include fear of vaccine side effects, belief that vaccination causes influenza, perceived low likelihood of contracting influenza, insufficient time or inconvenience, influenza is perceived as a low-risk disease, vaccine is considered to be inefficient, and fear of needles (19).

### **1.4. Decisional conflict as a barrier to influenza immunization**

Decisional conflict occurs when a person has choices that involve uncertainty, tradeoffs between benefit and harms, and the possibility of regret (20). As a result, the individual has difficulty deciding which option to choose, and leads to an inability to perform effective decision-making. Such conflict often occurs with many health-related decisions since options affecting patient health often have desirable outcomes but also potential risks as well. In fact, of about 2500 reviewed treatments, 49% of the treatments did not have adequate evidence or no clear balance between harms and benefits for a straightforward treatment decision (21). Decisional conflict, however, can occur even with health decisions where there is clear evidence that benefits outweighs the risks. In a study of decisional needs among primary care patients, 71% of patients were uncertain about their treatment options after seeing their physician regarding vaccinations (unpublished data from Legare et

al., 2006). Although, vaccinations may seem to be the 'best choice', patients were unclear about their preferred treatment option.

Similar to the primary care patients, decisional conflict was identified as a potential factor contributing to the low influenza immunization coverage among healthcare personnel (22). A self-administered questionnaire on vaccination practices and the Decisional Conflict Scale was sent to direct care personnel of two long-term care homes. The Decisional Conflict Scale (23) measures uncertainty (inherent difficulty of facing a decision with positive and negative outcomes), modifiable factors causing uncertainty (including lack of knowledge, unclear values, and lack of support), and the quality of the decision-making process and the decision made (24). The Scale has 10 to 12 items, and each item is scored on a 3 to 5 point Likert scale. A final score, ranging from 0 to 100, was computed where scores greater or equal to 38 are associated with delayed decision making. Higher scores are associated with greater decisional conflict.

Personnel were asked about their decisions regarding whether or not to receive the influenza immunization (22). For one long-term care home, decisional conflict scores ranged from 12 to 87 with the mean total = 11 (SE = 2). The second long-term care home had a significantly higher mean total (M = 30, SE = 3,  $p < .0001$ ) with scores ranging from 0 to 69. Although decisional conflict scores were not high on the Decisional Conflict Scale among the two groups, the study showed that some direct care providers experience conflict when making a decision about the influenza vaccine. Thus, as suggested by the authors, decisional support is needed for these personnel.

### **1.5. Ottawa Influenza Decision Aid (OIDA)**

Decisional conflict among HCP may be improved through the use of the newly developed Ottawa Influenza Decision Aid (OIDA). The Decision Aid (see appendix A) is designed to assist staff members in making an informed, values-based decision regarding the influenza vaccine. It may be used as a component of an influenza immunization campaign. In a systematic review, decision aids designed for those facing treatment or screening decisions have been shown to improve knowledge and realistic expectations, enhance active participation in decision making, lower decisional conflict, decrease the number of

undecided individuals, and improve agreement between values and choice (24). Despite this, effective strategies for the dissemination of decision aids remain to be determined (24).

The OIDA was developed based on the Ottawa Decision Support Framework (<http://decisionaid.ohri.ca/odsf>) and the International Patient Decision Aid Standards (<http://ipdas.ohri.ca>). The decision aid presents evidence on the benefits and side effects of recommended influenza prevention options, and assists the HCP through the decision making process. The tool has been piloted tested in two long-term care organizations (25) and one acute-care hospital (working document, 2008). In the two long-term care homes, 57 HCP completed the OIDA and an acceptability questionnaire. 90% (n=51) reported that the information in the decision aid was completely or mostly clear, 83% (n=47) found the OIDA helped them know that the decision is dependent on personal values, and about 75% (n=43) reported that the OIDA was very or somewhat helpful when making a decision about influenza prevention choices. Only 36% (n=20) found the tool to be neutral and balanced.

Although the decision aid is intended to be an unbiased source of information, the current research evidence strongly supports immunization of healthcare personnel. As a result, the OIDA presents information that encourages influenza immunization. In fact, from pilot work with the OIDA, 59% of the hospital personnel did not find the tool as completely neutral or provided a balance of information (26). From the two pilot studies using the OIDA, 67% (n=35) of long-term care personnel (25) and 73% (n=24) of hospital personnel (26) preferred taking the influenza vaccine after completing the decision aid. Therefore, with the OIDA supporting the immunization of healthcare personnel, the tool can be incorporated into campaigns to increase immunization rates.

To date, the decision aid tool has never been integrated as part of an influenza immunization campaign for HCP. The introduction of the OIDA into healthcare organizations comprises a complex array of issues. For example, continuing education of employees has to take into account the culture of the individual health care organization, their policies and procedures, and their resources. The support of both union representatives and management is required so that HCP would be encouraged to use the OIDA. Also, personnel will need time to complete the decision-aid in the workplace. The optimal approaches to using the OIDA as part of an organization's influenza vaccine campaign remains to be determined. Before we can effectively evaluate the decision aid's

impact on vaccine uptake, the optimal approaches to implementation must first be determined.

As healthcare organizations do not have experience introducing decision-aids into their policies and procedures, implementation guidelines are required to assist the organizations using the tool. An OIDA implementation guide would assist healthcare planners on how to introduce the OIDA into their organization's influenza immunization campaign.

## **1.6. Promoting Action on Research Implementation in Health Services (PARiHS) Framework**

Context-focused models and frameworks conceptualize the relationship between contextual factors and implementation (27). Context-focused models are appropriate for the project because the aim is to understand the context in which to implement the OIDA. Four models were identified: The Ottawa Model of Research Use, The Knowledge-to-Action Process, the Coordinated Implementation Model and the Promoting Action to Research Implementation in Health Services Framework (PARiHS) (27).

The Ottawa Model of Research Use, Knowledge-to-Action process, and Coordinated Implementation Model were developed to conceptualize the different factors influencing the use of evidence into practice. The PARiHS framework differs from other context-based models because facilitation is incorporated as a core element for successful implementation. According to the framework, facilitation is an appointed role, whether internal or external, to help or empower others to implement change (28). For organizations with little experience using decision aids, facilitation will play a key role in helping planners implement the OIDA within a healthcare organization. Therefore, the PARiHS framework was selected as the ideal theoretical guide for this project.

According to the PARiHS framework, a successful implementation process requires: 1) shared understanding of evidence (research, clinical/patient experience, routine data), 2) the context must be conducive to innovations and 3) the need for facilitation to improve the preparedness for innovation within the organization (29). It is the interplay between these three elements that determines the level of success in implementing evidence into practice.

The PARIHS framework identifies the complex process of implementing evidence by identifying the key elements and their relationship, and, thus, providing a pragmatic tool for individuals to apply to their local context (29). Based on the framework, the implementation strategy for improving healthcare is developed and tailored directly from information regarding the specific context and the stakeholders involved in the implementation (29).

The framework was developed based on experience assisting healthcare providers improving quality of patient care and implementing clinical standards (30). It has been tested with four case studies of varying levels of the three elements. Four studies with varying levels of the three core elements (evidence, context, facilitation) were chosen for analysis using the PARIHS framework. With the analysis of the four studies, implementation was most successful when there was high evidence, high context (receptive to change), and facilitation was suitable for the context. The analysis also highlighted the facilitation as a key factor when implementing change. The four case-studies supported face validity for the framework (30).

The elements and sub-elements were refined and clarified with a concept analysis (28). Focus groups and semi-structured interviews were conducted with clinicians/practitioners to identify factors most important for implementation of evidence into practice and the role of evidence, context and facilitation. The findings support the three elements as key factors to implementation (31).

The framework has been previously used as a theoretical framework for a systematic review on the relationship between context and research use. Study findings were categorized under the three elements of the PARIHS framework (32). The framework was also applied in the validation of a research utilization variable, which also provided support for the context dimension. Sites that had high context elements were more likely to score higher on the research utilization scores. This supports construct validity for the PARIHS framework. The framework was also used to help explain the results of an implementation process among nurse managers (33).

As described above, the strengths of the framework lies in the research supporting face and construct validity and previous applications as a pragmatic tool to guiding implementation research. Limitations of the framework include the assumption that each core element can

be measured separately and the interactions between elements remain unknown. Further studies are needed to determine such interactions and continue to develop tools to evaluate the validity of the PARiHS framework.

### **1.7. Canadian Healthcare Influenza Immunization Network (CHIIN)**

A three-year project was initiated to find ways to improve HCP influenza vaccine uptake in Canada, which also includes the evaluation of the OIDA and development of the OIDA implementation guide. This project is led by a team of investigators of the Canadian Healthcare Influenza Immunization Network (CHIIN) (see Appendix B for list of team members), which includes the thesis supervisor and the thesis committee member. This project provided an opportunity and support for the masters' student (PL) to complete a thesis to aid the development of the OIDA Implementation Guide. This thesis was part of the first year of the three-year project, and formed the basis for its emerging design.

The student (PL) assisted with the CHIIN grant application primarily by drafting the discussion guide for the consultation meetings and development of questionnaires. The systematic review protocol was written by PL. PL conducted the search, screening of articles and analysis of results. Furthermore, PL was responsible for coordinating and implementing the consultation meetings for the first year of the project. The systematic review was performed separately and was outside the scope of the CHIIN project. PL consulted with supervisors and CHIIN team members while writing up the results. PL developed the strategy for the review and recruited people for questionnaire development.

## 2. Thesis Overview

---

### 2.1. Aims and Objectives

The overall aim of this thesis was to determine approaches to implementing the Ottawa Influenza Decision Aid (OIDA) into seasonal influenza immunization campaigns for HCP. To achieve this aim, the thesis has the following three components:

- a. **Systematic review of influenza immunization campaigns for HCP:** The OIDA was specifically designed to address influenza immunization among HCP. Each year organizations spend a tremendous amount of resources and effort to promote influenza immunization to their employees with limited success. The effectiveness of the current influenza immunization campaign strategies is unknown. Evidence-based approaches are needed to inform the operation of these programs. To better understand how the OIDA may fit with other possible interventions related to influenza immunization, a systematic review on strategies to increase HCP influenza vaccine uptake will be conducted. The results of the systematic review will provide the context in which the OIDA will be implemented.
- b. **Consultation meetings:** Structured meetings with planners and stakeholders of different healthcare organizations will be conducted to gain their perspectives on using the OIDA as part of their influenza immunization campaign. Such meetings will be referred to as consultation meetings. The main objective of the consultation meetings is to determine approaches to integrating the OIDA within a healthcare setting. Engagement of potential adopters in a group setting facilitates team effort, promotes shared understanding of evidence, and provides information on local context.
- c. **OIDA Implementation Questionnaire design:** The findings from the systematic review and consultation meetings were used to inform the design of the OIDA Implementation Questionnaire. The aim of this instrument is to determine how the OIDA was used in influenza immunization campaigns for HCP by healthcare organizations.

## 2.2. Study Design

The thesis design incorporated the PARIHS framework elements as guidance to determining OIDA implementation approaches. One of the three elements of the PARIHS framework (29) is the understanding of the context in which the innovation is being implemented. As such, a systematic review of influenza immunization campaigns for HCP was conducted to gain a better understanding of the operation of campaigns. According to the PARIHS framework, a shared understanding of evidence and facilitation are important elements in implementing research-based practice (29). As a result, consultation meetings were held with key campaign organizers to facilitate a group learning environment to discuss potential implementation approaches for the OIDA and prepared the organization to implement the tool.

The OIDA was designed to address seasonal influenza immunization. As such, the thesis focused on seasonal influenza immunization campaigns, and did not study pandemic influenza immunization campaigns. Table 1 provides an overview of the thesis design. The thesis began with the systematic review of the literature regarding the impact of influenza immunization campaigns and campaign strategies. This was used to inform the development of the consultation meetings and the design of the OIDA Implementation Questionnaire. Next, consultation meetings were held with healthcare organizations to identify approaches to using the OIDA. Data collected in the consultation meetings and the systematic review findings were synthesized to provide recommendations for the OIDA Implementation Guide. Additionally, the data helped inform the development of the OIDA Implementation Questionnaire.

<b>Table 1. Overview of thesis design</b>			
	<b>Systematic review of campaigns</b>	<b>Consultation meetings</b>	<b>OIDA Implementation Questionnaire design</b>
<b>Objective</b>	To determine which influenza immunization campaign or campaign components in healthcare settings are significantly associated with increased staff influenza immunization	To determine approaches to integrating the OIDA within healthcare settings	To develop a questionnaire on how different organizations used the OIDA in influenza immunization campaigns
<b>Study Design</b>	Systematic review	Consultation meetings and content analysis of discussion	Questionnaire design
<b>Methods</b>	Reviewed articles by searching electronic databases, consulting with field experts and bibliographies	Semi-structured meetings with personnel involved in influenza immunization campaign planning	Questionnaire developed based on results from consultation meetings and systematic review. Questionnaire to be reviewed by group of experts and pilot-tested for readability.
<b>Implications</b>	Understanding the context in which OIDA will be used and to inform development of consultation meeting and questionnaire questions	Identify approaches to implementing the OIDA for campaign organizers and inform development of Implementation Guide	Questionnaire developed to evaluate implementation process for future projects using the OIDA

### 2.3. Ethics

The thesis was part of a larger, three-year project of the Canadian Health Influenza Immunization Network (CHIIN). The project has been approved by the Ottawa Hospital Research Ethics Board (REB). Local research ethics board approval was not required by other participating healthcare organizations. The REB was informed about the thesis and approved the proposal (see Appendix C for a copy of the REB approval).

### 3. Systematic Review of Seasonal Influenza Immunization Campaigns for Healthcare Personnel

---

#### 3.1. Introduction

Various strategies have been recommended to overcome identified barriers and improve healthcare personnel (HCP) influenza immunization coverage. For example, National Advisory Committee on Immunization (NACI) encourages all HCP employers to actively promote the influenza vaccine and provide education aimed at HCP (8). Meanwhile, the American Healthcare Infection Control Practices Advisory Committee (HIPAC) and the Advisory Committee on Immunization Practices (ACIP) recommends all organizations employing HCP to use evidence-based approaches that may overcome the multiple barriers to vaccine uptake as part of their annual influenza immunization campaign (17). These two committees identified five broad categories of influenza immunization campaign components aimed at improving HCP immunization rates (Table 2).

**Table 2. Influenza immunization campaign components aimed at improving HCP uptake**

<b>Component</b>	<b>Operational Definition</b>	<b>Examples</b>
<b>Education/Promotion</b>	Organized effort to raise awareness and/or increase knowledge on influenza and influenza immunization	Educational sessions/materials; Vaccine promotional material/events; Incentives
<b>Improved Accessibility</b>	Strategies to allow for easier access to immunization for HCWs	Mobile vaccine carts; Peer-to-peer immunization; Additional or extended vaccine clinics
<b>Legislation/Regulation</b>	Interventions involving change in HCWs immunization policy	Staff immunization policy; Mandatory immunization programs; Declination forms
<b>Measurement/Feedback</b>	HCW immunization rates are tracked and results are disseminated	Regular monitoring of immunization coverage rates; Reporting coverage rates to administrators/HCWs
<b>Role Models</b>	Activities that involve leaders and/or senior staff to encourage immunization	Immunization advocates/champions; Public support from leaders; Visible vaccination of senior staff

---

Adapted from Pearson et al., 2006 (17)

---

There are no systematic reviews on interventions aimed at increasing staff influenza vaccination coverage in healthcare organizations. Previous reviews included a Cochrane Review for improving immunization rates among patient groups (34), a summary of 32 studies examining staff perception on the influenza vaccine and immunization coverage (19), and a systematic review of interventions to improve influenza coverage among high-risk adults (35). A narrative review on declination forms concluded that the intervention may result in modest increases depending on the content and language (36). The primary objective of this review is to determine which influenza immunization campaign or campaign components in healthcare settings are significantly associated with increased staff influenza immunization. The focus of our systematic review was on seasonal influenza immunization campaigns and did not include pandemic influenza immunization programs. The OIDA is designed specifically to address seasonal influenza immunization for HCP. As such, we focused the systematic review on other possible interventions related to influenza immunization so that we can better understand how the OIDA might fit within these interventions.

The review is an extension of the systematic review completed for the graduate course, EPI 6188 – Systematic Reviews and Meta-Analysis. The review in this course only included randomized-controlled trials and abstracted information from two articles. The review for the thesis had broader inclusion criteria and multiple references. The review results have been presented in part at the 8<sup>th</sup> Canadian Immunization Conference; Toronto, ON, Canada; November 30 – December 3, 2008 (Abstract P99). As well, a manuscript has been submitted to the Canadian Medical Association Journal for publication.

### **3.2. Methods**

This section includes the following: i) Literature search; ii) Study selection; iii) Data selection and risk of bias assessment; and iv) Data analysis.

### **3.2.1. Literature Search**

Reports were identified by searching the following databases using the OvidSP interface on April 29, 2008: 1) MEDLINE (January 1950 – Present); 2) EMBASE (1980 – 2008); and 3) CINAHL – Cumulative Index to Nursing & Allied Health Literature (1982 – 2008). Search terms included ‘health personnel’, ‘influenza vaccine’, ‘health facilities’ and methodological search filters by the Cochrane Effective Practice and Organisation of Care Group (EPOC) (37). Complete search strategies are presented in Appendix D. No language or date restrictions were applied. Infection control experts were consulted and bibliographies of relevant reports were hand-searched for additional studies. The MEDLINE and EMBASE databases were last searched on September 22, 2009. Additional databases were searched on September 27, 2009 including: 1) Science Citation Index Expanded (Web of Science 1899 – 2009); 2) Database of Abstracts of Reviews of Effects (DARE); 3) Cochrane Database of Systematic Reviews; 4) Cochrane Central Register of Controlled Trials (CENTRAL); and 5) Dissertations and Theses (ProQuest). Relevant articles were keyed into the PubMed Related Articles feature for similar reports.

### **3.2.2. Study Selection**

Studies evaluating influenza immunization campaigns for HCP were selected for analysis. Influenza immunization campaigns were defined as organized efforts to promote greater immunization coverage among staff members. An eligible study had to report percent/number of HCP who received the influenza vaccine as an outcome measure. Because the influenza vaccine is administered annually and HCP have specific attitudes towards this vaccine, studies associated with other vaccines were excluded.

Study design criteria were applied only to studies that were randomized controlled trials (RCTs), cluster randomized controlled trials (cluster-RCTs), controlled before-and-after (CBA) studies and interrupted time series (ITS) designs. In order to be included, CBA studies had to have at least one comparison group with one observation point before and after the implementation of the intervention. All included ITS studies had to have a clear time point in which the intervention was implemented. For long-time series designs, a minimum of five pre-intervention observations must have been recorded. For short-time

series designs, a minimum of three pre- and post-intervention points must have been recorded. It has been noted that studies with 10 or less pre- and post-data points are likely to be underpowered (38). However, because influenza vaccination programs are administered annually, it is not always feasible to have 10 or more observation points.

Cross-sectional and one-group before-and-after study designs are not adequate to account for secular trends, nor do they provide evidence to attribute outcome to intervention (39). Therefore, these study designs were not considered in this systematic review. Similarly, conclusions from post-intervention-only studies have poor internal validity because of potential systematic biases in group selection and inability to determine participant drop-outs.

### **3.2.3. Data Extraction and Risk of Bias Assessment**

Two reviewers (DM & PL) independently abstracted data using a data collection form (Appendix E). Any discrepancies in the review results were discussed by the reviewers to reach an agreement. The form covered information regarding study design, participant characteristics, setting, interventions assessed, influenza immunization campaign components and immunization uptake.

Risk of bias were independently assessed by two reviewers (DM & PL) using the EPOC quality assessment checklist (40). Each study design (RCTs/cluster-RCTs, CBAs, and ITS) had different assessment criteria (40). A study was marked as “Done” for explicitly reporting a study quality criterion. Items reported as not completed were checked off as “Not Done”. If a study characteristic was not reported, reviewers checked off “Not Clear”.

### **3.2.4. Data Analysis**

Abstracted data from the studies were synthesized and stratified by healthcare settings. The primary outcome was presented as percentage point change in influenza immunization coverage, which was calculated based on methods used by Shefer et al. (41) (see Table 3). As the assessed interventions and study populations were heterogeneous, a meta-analysis

was not conducted. Statistical measures of heterogeneity were not calculated because of the differences in reporting of immunization coverage. Because of the limited number of studies identified, it was not possible to generate funnel plots to explore the effects of publication bias. A funnel plot is only informative with numerous studies (42).

**Table 3. Methods used to determine baseline measures and percentage point change in influenza immunization coverage\***

Type of Study	Baseline Measurement	Percentage Point Change Calculation
<b>Randomized controlled trial with pre- and post-measurements</b>	$I_{pre}$	$( I_{post} - I_{pre} ) - ( C_{post} - C_{pre} )$
<b>Randomized controlled trial with post-only measurements</b>	$C_{post}$	$I_{post} - C_{post}$
<b>Before-and-after study with comparison group</b>	$I_{pre}$	$( I_{post} - I_{pre} ) - ( C_{post} - C_{pre} )$
<b>Interrupted time-series</b>	$I_{pre}$	$I_{post} - C_{post}$

\*Adapted from Shefer et al. 1999 (41)

$I_{pre}$  = Latest immunization rate in intervention group prior to intervention implementation

$I_{post}$  = Latest immunization rate in intervention group post intervention implementation

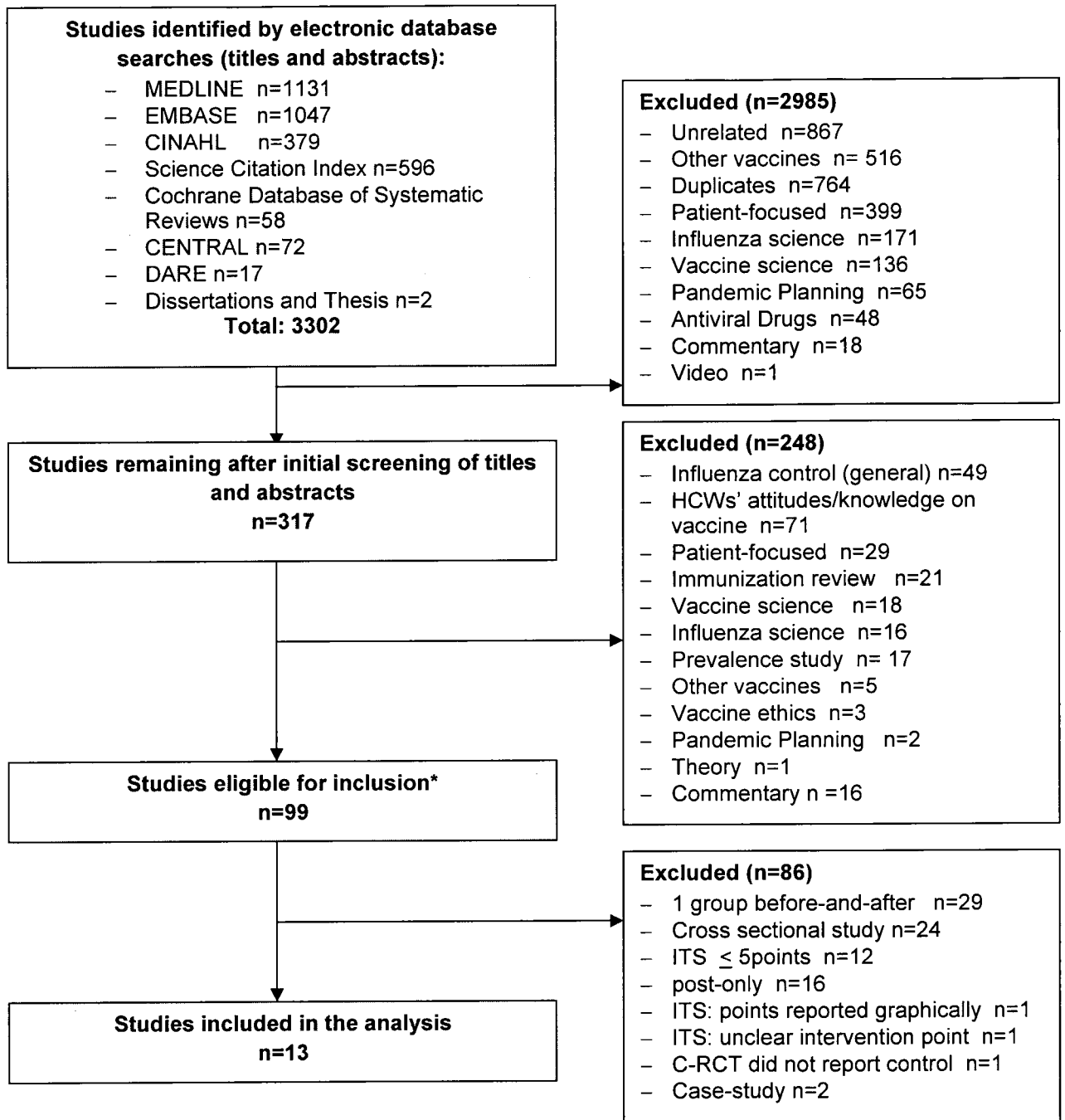
$C_{pre}$  = Latest immunization rate in comparison group prior to intervention implementation

$C_{post}$  = Latest immunization rate in comparison group post intervention implementation

### 3.3. Results

#### 3.3.1. Search Yield

The search strategy resulted in 3302 citations being retrieved from the search (see Figure 1). 99 studies were deemed eligible for inclusion, which reported an organized effort to increase staff influenza vaccination and evaluated implemented strategies. The majority of the eligible studies were excluded from analysis because study design did not match inclusion criteria. As a result, only 13 studies were included in the final analysis.



**Figure 1. Selection of studies for systematic review**

\* Included 21 studies through manual searching and 9 studies from updated searches in EMBASE and MEDLINE;

ITS (interrupted time series); C-RCT (cluster-randomized controlled trial); DARE (Database of Abstracts of Reviews of Effects); CINAHL (Cumulative Index to Nursing & Allied Health Literature); CENTRAL (Cochrane Central Register of Controlled Trials)

### **3.3.2. Excluded studies with reported interventions**

Characteristics of the studies deemed ineligible due to study design (n=87) are summarized in Appendix F-H and references are reported in Appendix I. Most studies were cross-sectional (n=24) or one-group before-and-after designs (n=29).

Among the excluded studies, approximately 68% (n=59) of the influenza immunization campaigns were held in a hospital setting and 20% (n=17) of the studies were conducted in a long-term care home (LTCH) setting. Although most studies were from the United States (n=43) and Canada (n=12), the search identified multiple campaigns based at international locations, including reports from Europe, South America, Asia, and Australia. The most common campaigns combined education/promotion and improved vaccine accessibility (n=27). Immunization uptake varied from 2% to 100%.

### **3.3.3. Studies Included in Analysis**

Table 4 provided data on non-hospital healthcare settings and Table 5 provided data on hospital settings. Both tables summarized the characteristics and results of the 13 studies included in the analysis. Changes in influenza immunization coverage are presented in Figure 2 for non-hospital healthcare settings and Figure 3 for hospital settings. Studies that reported more than one comparison group were shown as different study arms for each comparison. Included studies were published from 1992 – 2009 and conducted in LTCHs, hospitals and primary healthcare. Changes ranged from -1.1% to 38.1%. Studies were based in USA, Canada, UK, Germany and Switzerland.

#### **Non-hospital healthcare setting**

The search identified five studies in non-hospital healthcare settings (43-47). All studies were conducted in LTCHs. Dey et al. (43) conducted a separate study arm with primary healthcare teams. Four cluster-RCTs (43-46) and one CBA study (47) was identified. Within the five studies, there were eight reported comparisons. Populations targeted in the campaigns included physicians, nurses, nursing assistants, housekeeping staff, technicians, other professionals and administration. Ascertainment of immunization status primarily relied on self-report and reporting from the vaccine provider (Table 4).

Education/promotion only campaigns (43,45), had little change in immunization coverage compared to other campaigns (Figure 2) that did not meet statistical significance (Table 4). Meanwhile, HCPs with increased access to the vaccine (“Vaccine Days”) were 41% (prevalence ratio (PR) = 1.41; 95%CI: 1.17, 1.71) more likely to be vaccinated than control group HCP (45).

Campaigns in LTCHs with a combination of education/promotion and improved vaccine access averaged a 25% increase in immunization uptake. In a campaign where the study team interviewed each LTCH personnel and handed out leaflets, the intervention group achieved the highest immunization coverage (70%) among all non-hospital healthcare setting studies (46). Only one study reported a four component campaign: education/promotion, improved vaccine access, legislation/regulation, and role models (44). In the two years when the campaign was implemented, the average point percentage change was 29% (44).

**Table 4. Characteristics of studies included for analysis in non-hospital healthcare settings**

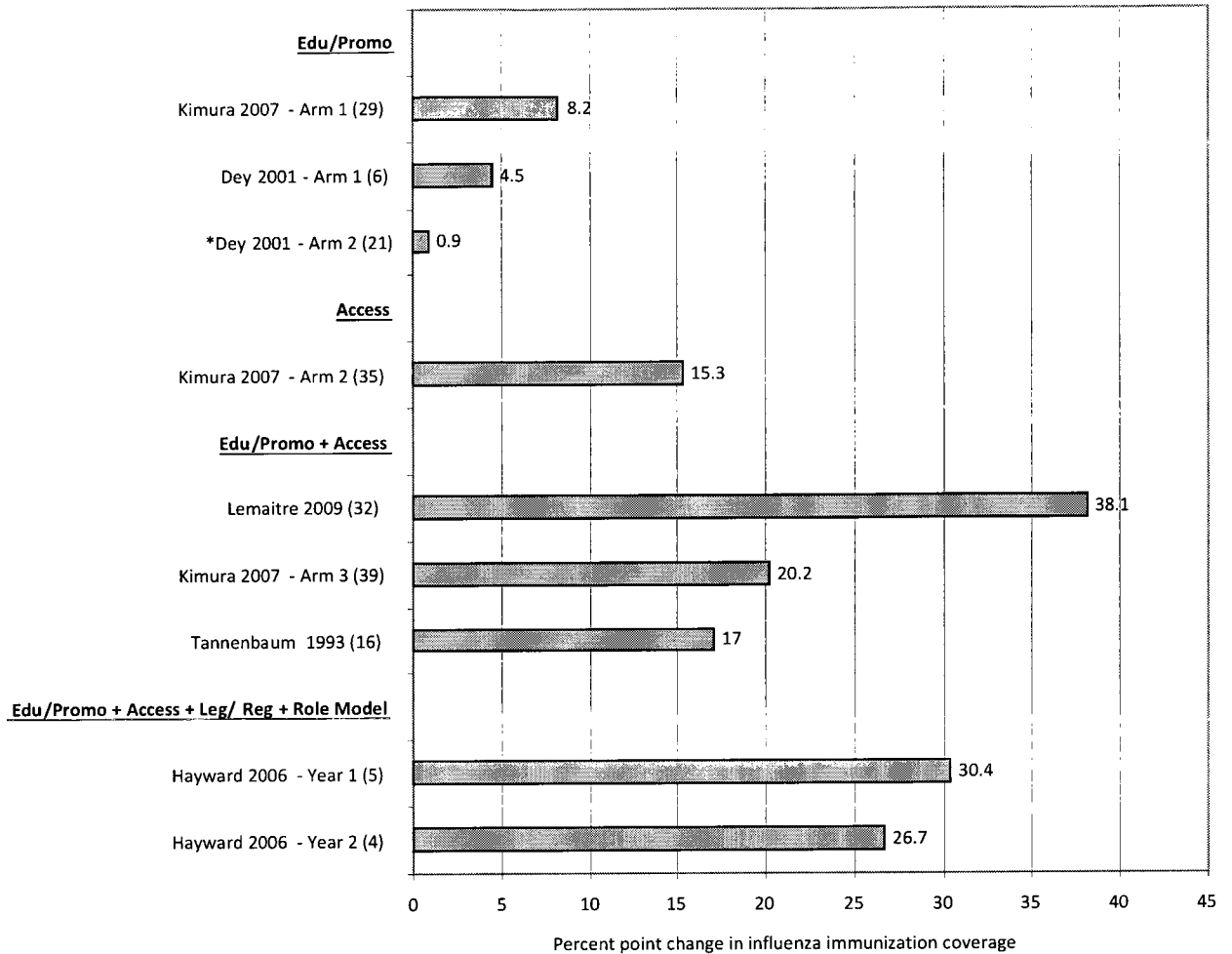
Study	Country	*Study Design	Population	Ascertainment	Intervention Group	Comparison Group	Results
Kimura 2007 (Arm 1) (45)	USA	CRCT	<ul style="list-style-type: none"> <li>- Nurses</li> <li>- Nursing assistants</li> <li>- Housekeeping</li> <li>- Rehab therapists</li> </ul>	Self-administered questionnaire to all HCWs	<ul style="list-style-type: none"> <li>n = 14 sites</li> <li>- 10 min educational video</li> <li>- Question and Answer brochure</li> <li>- Flyer attached to paystub</li> <li>- Info posters</li> </ul>	<ul style="list-style-type: none"> <li>n = 25 sites</li> <li>- No intervention</li> </ul>	Post-intervention immunization vs. comparison: 34% immunized (PR=1.18; 95%CI: 0.93, 1.50)
Dey 2001 (Arm 1) (43)	UK	CRCT	<ul style="list-style-type: none"> <li>- Nurses</li> <li>- Administration</li> <li>- Ancillary</li> </ul>	Vaccine provider submitted claim forms for vaccine reimbursement	<ul style="list-style-type: none"> <li>n = 17 sites</li> <li>- Comparison group campaign plus: Public health nurse raised awareness, provided education &amp; promo material</li> </ul>	<ul style="list-style-type: none"> <li>n=17 sites</li> <li>- Educational letter on free vaccine</li> <li>- Free vaccine from general practitioner</li> </ul>	Intervention: 10.2% vs. Comparison: 5.6% immunized (p=0.34; 95%CI: -4.8, 13.8)
<sup>†</sup> Dey 2001 (Arm 2) (43)	UK	CRCT	(same as Dey 2000 Arm 1)	(same as Dey 2000 Arm 1)	n = 30 sites (campaign same as Dey 2000 Arm 1)	n = 32 sites (campaign same as Dey 2000 Arm 1)	Intervention: 21.9% vs. Comparison: 21.0% immunized; (p=0.91; 95% CI: -13.7, 15.5)
Kimura 2007 (Arm 2) (45)	USA	CRCT	(same as Kimura 2007 Arm 1)	(same as Kimura 2007 Arm 1)	<ul style="list-style-type: none"> <li>n = 14 sites</li> <li>- Publicized days for free vaccine</li> <li>- Reminder posters</li> <li>- Reminders on paycheck</li> </ul>	(same as Kimura 2007 Arm 1)	Vaccine Day: 46% immunized (PR=1.41; 95% CI: 1.17, 1.71)
Lemaitre 2009 (46)	UK	CRCT	<ul style="list-style-type: none"> <li>- Caregivers</li> <li>- Technicians</li> <li>- Administration</li> </ul>	Intervention group: interview with study team; Comparison group: self-administered questionnaire	<ul style="list-style-type: none"> <li>n = 20 sites</li> <li>- Promo posters, leaflets</li> <li>- Info meeting with study team</li> <li>- Face-to-face interview with all staff</li> </ul>	<ul style="list-style-type: none"> <li>n = 20 sites</li> <li>- Routine info on vaccine</li> </ul>	Intervention: 69.9% vs. Comparison: 31.8% immunized.
Kimura 2007 (Arm 3) (45)	USA	CRCT	(same as Kimura 2007 Arm 1)	(same as Kimura 2007 Arm 1)	<ul style="list-style-type: none"> <li>n = 14 sites</li> <li>- Arm 1 &amp; 2 campaigns combined</li> </ul>	(same as Kimura 2007 Arm 1)	Education + Vaccine Day: 53% immunized (PR=1.45; 95% CI: 1.24, 1.71)
Tannenbaum 1993 (47)	Canada	CBA	<ul style="list-style-type: none"> <li>- Nurses</li> <li>- Nursing aid</li> <li>- Other professions</li> <li>- Orderly</li> <li>- Housekeeping</li> </ul>	<ul style="list-style-type: none"> <li>- Public health data</li> <li>- Tracked on-site vaccination</li> <li>- Self-administered questionnaire for off-site vaccination</li> </ul>	<ul style="list-style-type: none"> <li>n = 1 site</li> <li>- 5 information sessions by doctors</li> <li>- Info memos, posters</li> <li>- 3 vaccine clinics over 2 weeks</li> </ul>	<ul style="list-style-type: none"> <li>n = 1 site</li> <li>- No intervention</li> </ul>	<sup>†</sup> Intervention: Pre (15.8%) and Post (25.9%) immunized <sup>‡</sup> Control: Pre (16.7%) and Post (9.8%) immunized

Table 4. (continued)

Study	Country	*Study Design	Population	Ascertainment	Intervention Group	Comparison Group	Results
Hayward 2006 (Year 1 & 2) (44)	UK	CRCT	- Full- and part-time employees	Not reported	<p>n = 22 sites</p> <ul style="list-style-type: none"> <li>- New influenza vaccine policy</li> <li>- Lead nurses trained to promote, act as advocates, use promo material</li> <li>- Education letter for staff</li> <li>- 3 vaccine clinics with night shift</li> </ul>	<p>n = 22 sites</p> <ul style="list-style-type: none"> <li>- Letter explained that adults with chronic disease should be immunized</li> <li>- No active vaccine promo</li> </ul>	<p>‡2003-04: Intervention: 35.4% vs. Control: 5.0% immunized</p> <p>‡2004-05: Intervention: 30.5% vs. Control: 3.8% immunized</p>

\*Study designs: PO (Post-Only), ITS (Interrupted Time Series), BnA (1-group Before and After), C-RCT (Cluster-Randomized Controlled Trial), CSS (Cross-Sectional Study);

†Study reported two cluster-RCTs: Arm 1 long-term care and Arm 2 in primary health care



**Figure 2.** Percentage point change in influenza immunization coverage among healthcare personnel in a non-hospital healthcare setting stratified by type of campaign components for the intervention group. Baseline rates are presented in brackets beside study name. \*All studies are based in long-term care settings except for Dey 2001 – Arm 2 (36), where primary health care teams received the intervention. (Edu/Promo: Education/Promotion; Access: Improved Accessibility to Vaccine Leg/Reg: Legislation/Regulation)

### Hospitals Setting

Of the eight hospital studies reviewed, two were RCTs (48,49), three CBA (50-52) and three ITS study designs (53-55). Within the eight studies, there were 17 reported comparisons. The study populations included medical residents, nurses, physicians, other professionals, administration, housekeeping and hospital volunteers. Immunization rates were collected via tracking by vaccine provider and/or mandatory self-report (Table 5).

Intervention campaigns with only the education/promotion component showed mixed results (48,49,52). The majority of these studies reported minimal increases in immunization rates (1% - 8.7%) and one study that included business/administrative personnel decreased in coverage (-1.1%). Conversely, in a campaign where the intervention group received a personalized letter from the chief of infectious disease, significantly more post-graduate medical trainees were immunized (39%) as compared to the control group (14% immunized) ( $p=0.0005$ ) (49). Campaigns with only improved vaccine access (52) resulted in minimal increases in immunization coverage (average 4%) as compared to other campaigns. Only one study compared vaccination uptake across different personnel groups with varying levels of patient contact (52). Personnel with direct patient contact responded better to campaigns with improved vaccine access than those with indirect patient contact (52). Meanwhile, in a campaign with only the legislation/regulation component (that is, unvaccinated personnel were required to wear masks), immunization rates increased from 33% to 52% (statistical significance not reported by authors) (55).

Several two-component intervention campaigns were identified. Campaigns with a combination of education/promotion and improved vaccine access components (50,52) averaged 7% point change in immunization coverage. In one campaign where education/promotion and legislation/regulation (mandatory electronic declination form) components were implemented (53), immunization coverage increased to 55% which was statistically different from the previous nine-years where rates ranged from 21% to 38%. In groups where supervisors were provided with feedback on immunization rates and improved vaccine access, increase in vaccine uptake was significantly greater than the control group ( $p<0.001$ ) (51).

Only one intervention campaign implemented all five components (54). A multidisciplinary team was dedicated to increasing immunization rates by responding to the issues identified by surveying HCPs. The hospital was able to increase their immunization rate from 66% to 77% after one influenza immunization campaign with multiple components.

**Table 5. Characteristics of studies included for analysis in hospital settings**

Study	Country	*Study Type	Population	Ascertainment	Intervention Group	Comparison Group	Results
Zimmerman 2009 (Arm 1) (52)	USA	CBA	Direct patient contact staff employed Oct1-Dec31	Records from paper logs of each site	n = 3848 HCP (4 facilities) - Comparison campaign plus: - Incentive: lottery gift card/paid time off or food at clinic or party for unit with highest vaccine rate	n = 1237 HCP (2 facilities) - Free vaccine - Promo material - Peer vaccination - Letter to chief executives - Vaccine champion	Intervention: Pre (31.6%) and Post (38.4%); Control: Pre (31.6%) and Post (38.4%) immunized.
Zimmerman 2009 (Arm 2) (52)	USA	CBA	Indirect patient contact staff employed Oct1-Dec31	(same as Zimmerman 2009, Arm 1)	n = 1431 HCP (4 facilities) - Zimmerman 2009, Arm 1 intervention campaign	n = 423 HCP (2 facilities) - Zimmerman 2009, Arm 1 comparison campaign	Intervention: Pre (32.8%) and Post (43.3%); Control: Pre (30.5%) and Post (33.5%) immunized.
Zimmerman 2009 (Arm 3) (52)	USA	CBA	Business/Admin staff employed Oct1-Dec31	(same as Zimmerman 2009, Arm 1)	n = 6840 HCP (4 facilities) - Zimmerman 2009, Arm 1 intervention campaign	n = 997 HCP (2 facilities) Zimmerman 2009, Arm 1 comparison campaign	Intervention: Pre (34.6%) and Post (39.6%); Control: Pre (40.1%) and Post (46.2%) immunized.
<sup>†</sup> Doratotaj 2008 (Arm 1) (48)	USA	RCT	- Medical residents - Nurses - Physicians	Vaccine rates reported by on-site vaccine clinics	n = 200 HCP - Comparison campaign plus: - Educational letter from head of Infectious diseases dept	n = 200 HCP - Education poster/newsletter - T-shirts and buttons - Dept meetings - Extra vaccine clinics	Control: 38% vs. education: 39% immunized
<sup>†</sup> Doratotaj 2008 (Arm 2) (48)	USA	RCT	(same as Doratotaj 2008, Arm 1)	(same as Doratotaj 2008, Arm 1)	n = 200 HCP - Comparison campaign plus: Raffle ticket to win a \$3000 vacation	(same as Doratotaj 2008, Arm 1 comparison group)	Control: 38% vs. Raffle: 42% immunized
<sup>†</sup> Doratotaj 2008 (Arm 3) (48)	USA	RCT	(same as Doratotaj 2008, Arm 1)	(same as Doratotaj 2008, Arm 1)	n = 200 HCP - Comparison campaign & Doratotaj 2008, Arm 1&2	(same as Doratotaj 2008, Arm 1 comparison group)	Control: 38% vs. education + raffle: 44.5% immunized
Ohrh 1992 (Arm 1) (49)	USA	RCT	- Medical residents	Nurses recorded immunization rates	n = 180 medical residents - Comparison campaign plus: - Personalize letter from chief of Infectious Diseases to encourage vaccine uptake	n = 175 medical residents - Mailed educational memo - Vaccines at staff lounges, lectures, resident clinics and conferences	Letter: 39% vs. Control: 14% immunized (p=0.0005)
Ohrh 1992 (Arm 2) (49)	USA	RCT	(same as Ohrh 1992, Arm 1)	(same as Ohrh 1992, Arm 1)	n = 70 medical residents - Personalized phone call	n = 71 medical residents - Ohrh 1992, Arm 1	Follow-up call: 20% vs. Control: 11.3% immunized (p>0.05)

Table 5 (continued)

Study	Country	*Study Type	Population	Ascertainment	Intervention Group	Comparison Group	Results
Ohrt 1992 (Arm 2) (49)	USA	RCT	(same as Ohrt 1992, Arm 1)	(same as Ohrt 1992, Arm 1)	n = 70 medical residents - Personalized phone call	n = 71 medical residents - Ohrt 1992, Arm 1	Follow-up call: 20% vs. Control: 11.3% immunized (p>0.05)
Zimmerman 2009 (Arm 4) (45)	USA	CBA	(same as Zimmerman 2009, Arm 1)	(same as Zimmerman 2009, Arm 1)	n = 2437 HCP (2 facilities) - Comparison campaign plus: Mobile vaccine carts	(same as Zimmerman 2009, Arm 1 comparison group)	Intervention: Pre (30.6%) and Post (38.4%); Control: Pre (31.6%) and Post (38.4%) immunized.
Zimmerman 2009 (Arm 5) (52)	USA	CBA	(same as Zimmerman 2009, Arm 2)	(same as Zimmerman 2009, Arm 1)	n = 847 HCP (2 facilities) - Zimmerman 2009, Arm 4 campaign	(same as Zimmerman 2009, Arm 2 comparison group)	Intervention: Pre (28.3%) and Post (33.7%); Control: Pre (30.5%) and Post (33.5%) immunized.
Wicker 2009 (55)	Germany	ITS	- Nurses - Physicians - Other staff	(Not reported)	n = 3900 HCP (After Jan 7, 2009) - Comparison campaign plus: - Mandatory masks for unvaccinated workers	2003/2004 - Jan 7, 2009: - Education and publicity - Free vaccine - Mobile vaccine carts	Between 2003/2004 until Jan 7, 2009: proportion of immunized HCWs increased from 13.6% to 33.1%. After intervention, rate increased to 51.7%.
Zimmerman 2009 (Arm 6) (52)	USA	CBA	(same as Zimmerman 2009, Arm 1)	(same as Zimmerman 2009, Arm 1)	n = 6156 HCP (3 facilities) - Comparison campaign and Zimmerman 2009, Arm 1 - Zimmerman 2009, Arm 1&4 intervention	(same as Zimmerman 2009, Arm 1 comparison group)	Intervention: Pre (31.1%) and Post (41.4%); Control: Pre (31.6%) and Post (38.4%) immunized.
Zimmerman 2009 (Arm 7) (52)	USA	CBA	(same as Zimmerman 2009, Arm 2)	(same as Zimmerman 2009, Arm 1)	n = 2219 HCP (3 facilities) - Zimmerman 2009, Arm 6 campaign	(same as Zimmerman 2009, Arm 2 comparison group)	Intervention: Pre (32.0%) and Post (37.9%); Control: Pre (30.5%) and Post (33.5%) immunized.
Harbarth 1998 (50)	Switzerland	CBA	- Physicians - Nurses' aides - Nurses - Housekeeping - Other professional	(Not reported)	n=1092 HCP (Areas with high-risk patients) - Comparison campaign plus: - Educational conferences on issues identified by staff questionnaire - Mobile vaccine cart	n=4422 HCP (Other hospital areas) - Newsletters / posters - E-mail reminders - Personal letter on paycheck - Free vaccine	Intervention: Pre (13%) and Post (37%) immunized Control: Pre (9%) and Post (23%) immunized Significant difference in change in rates (p<0.001)
<sup>†</sup> Bertin 2007 (53)	USA	ITS	- Paid workers - Volunteers	- Before intervention: Rates provided by vaccine clinics - Post intervention: Declination form to capture rates	n = 20,170 HCP (After Oct 17, 2005) - Mandatory intranet declination with pop-up education for HCPs declining vaccine - Feedback on rates - Letter from upper-management on goals	Before intervention 1997-2005: - Paper declination - Champion - Senior staff support - Doctors promoted staff immunization - Vaccine distribution	Between 1997 to 2005, the proportion of immunized HCWs increased from 21% to 55% (p <0.000001)

Table 5 (continued)

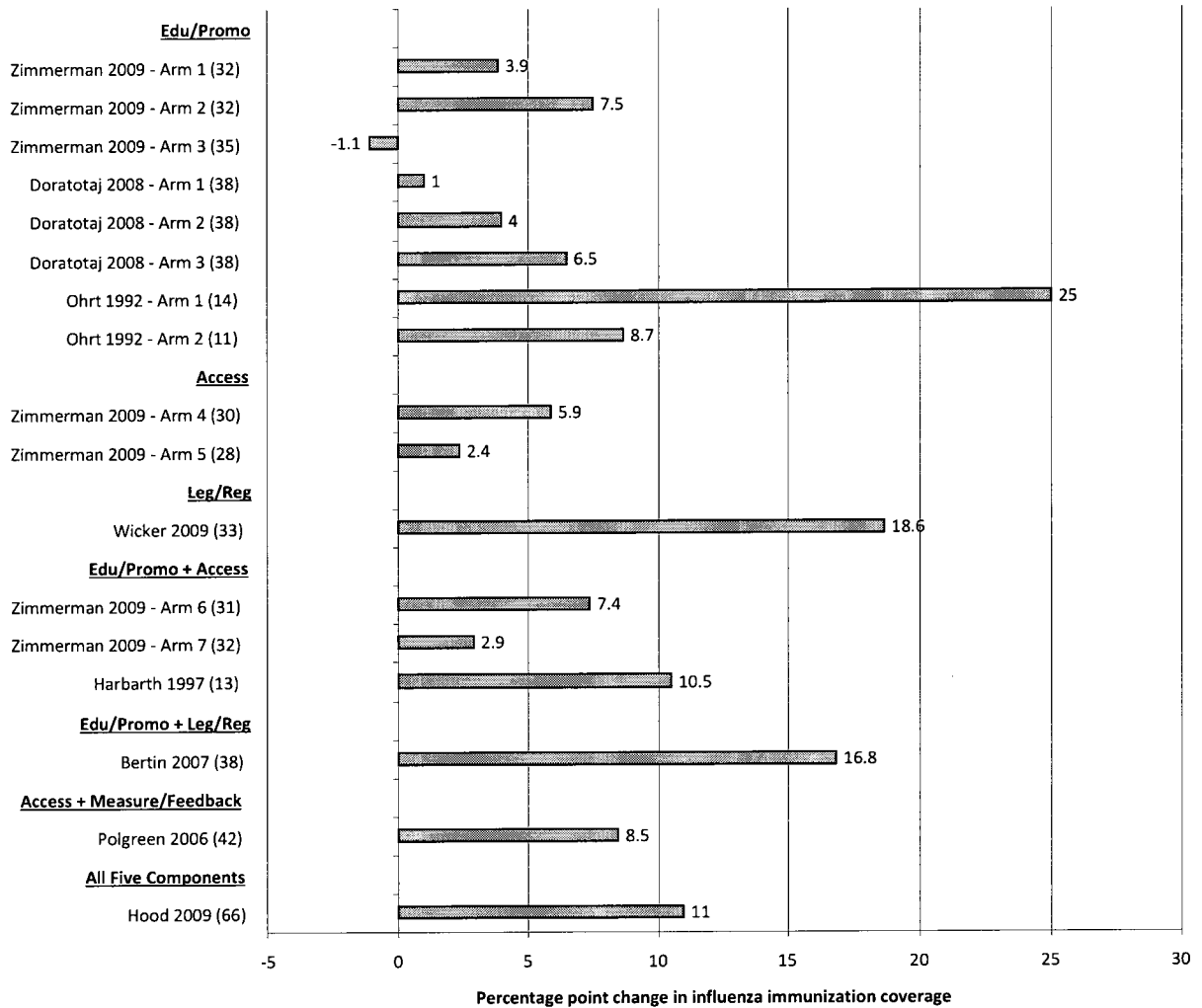
Study	Country	*Study Type	Population	Ascertainment	Intervention Group	Comparison Group	Results
Polgreen 2006 (51)	USA	CBA	- Medical residents	(Not reported)	n = 195 medical residents - Comparison campaign plus: - Directors given feedback on rates - Vaccines offered at meetings	n = 176 medical residents - Free vaccine for 4 weeks + extra 4 weeks - E-mail/poster advertising	Feedback Intervention: Pre (42%) and Post (58%); Control: Pre (54%) and Post (61%) immunized; Significant difference (p = 0.04)
§Hood 2009 (54)	USA	ITS	Not specified	(Not reported)	2007/2008 campaign: - Multidisciplinary team - Gaps identified by questionnaire - Patient-centered, evidence-based - Extra vaccine hours/sites - Declination form for HCPs refusing vaccine after education - Active support from upper management - Pandemic influenza module required - Focus on high-risk units - Weekly education emails - Email vaccine rates	Before 2007/2008 campaign: - Peer vaccinations - Multiple clinics and hours - FluMist (nasal spray) given - Education flyers/sessions - Mandatory training module on influenza	Between 2001/2002 to 2007/2008: proportion of immunized HCWs increased from 49% to 66%. After 2007/2008 intervention, rate increased to 77%.

\*Study design: PO (Post-Only), ITS (Interrupted Time Series), BnA (1-group Before and After), C-RCT (Cluster-Randomized Controlled Trial), CSS (Cross-Sectional Study)

<sup>†</sup>Dorotaj 2008: Insignificant differences across comparison groups (p=0.66);

<sup>‡</sup>Bertin 2007: Authors reported two campaigns (2004 & 2005). Only 2005 campaign was considered because authors only compared the difference between the 2005 coverage rate and the past 9-year period;

§Hood 2009: Authors reported two campaigns: one in 2007 and another in 2008, which was slightly modified. The review only captured the change for the 2007 campaign because that was the year when the hospital first started to make significant changes to improve their campaign.



**Figure 3.** Percentage point change in influenza immunization coverage among healthcare personnel in a hospital setting stratified by type of campaign components for the intervention group. Baseline rates are presented in brackets beside study name.

(**Edu/Promo:** Education/Promotion; **Access:** Improved Accessibility to Vaccine  
**Leg/Reg:** Legislation/Regulation)

### 3.3.4. Risk of Bias Assessment

Risk of bias assessments are reported for each study in RCT/C-RCTs (Table 6), CBAs (Table 7) and ITS (Table 8). Details on the risk of bias assessments are provided in Appendix J-L. The majority of the randomized studies had concealment of allocation and protection against contamination by using sites as the unit of allocation. However, the follow-up of workers, baseline vaccine uptake between intervention and comparison group, and a reliable method of ascertaining immunization status were not reported in the studies.

**Table 6. Risk of bias assessment for RCTs and Cluster-RCTs**

<b>Assessment criteria for RCTs/C-RCTs*</b>	<b>Doratotaj 2008 (48)</b>	<b>Dey 2001 (43)</b>	<b>Hayward 2006 (44)</b>	<b>Kimura 2007 (45)</b>	<b>Lemaitre 2009 (46)</b>	<b>Ohrt 1992 (49)</b>
<b>Concealment of allocation</b>	Not clear	Done	Done	Done	Done	Done
<b>Follow-up of professionals</b>	Not clear	Done	Not clear	Not clear	Not clear	Not clear
<b>Baseline measurement</b>	Not clear	Not clear	Not clear	Done	Done	Not clear
<b>Reliable primary outcome measure</b>	Done	Not clear	Not clear	Not clear	Not clear	Not clear
<b>Protection against contamination</b>	Not clear	Done	Done	Done	Done	Not done

\*Criteria adapted from EPOC checklist (40); Follow-up of patients and blinded assessment of primary outcome were not applicable to the studies included in this review

Before-and-after studies with comparison group and ITS designs (Table 7 & 8) reporting was not clear for many of the risk of bias assessment criteria as well. Comparable baseline measures between groups were reported for three out of the four CBS studies. However, similar to RCTs, the follow-up of workers and a reliable method of ascertaining immunization status were not explicitly reported. The three ITS explained the intervention effect but authors did not report many of the other assessment criteria.

<b>Assessment criteria for CBAs*</b>	<b>Zimmerman 2009 (52)</b>	<b>Tannenbaum 1993 (47)</b>	<b>Polgreen 2006 (51)</b>	<b>Harbarth 1998 (50)</b>
<b>Baseline measurement</b>	Done	Done	Not done	Done
<b>Characteristics for studies using second site as control</b>	Not clear	Not clear	Not applicable	Not applicable
<b>Protection against contamination</b>	Done	Done	Not clear	Not clear
<b>Reliable primary outcome measure(s)</b>	Not clear	Not clear	Not clear	Not clear
<b>Follow-up of professionals</b>	Not clear	Not clear	Not clear	Not clear

\*Criteria adapted from EPOC checklist (40); Follow-up of patients and blinded assessment of primary outcome were not applicable to the studies included in this review

<b>Assessment criteria for ITS designs*</b>	<b>Bertin 2007 (53)</b>	<b>Wicker 2009 (55)</b>	<b>Hood 2009 (54)</b>
<b>Intervention is independent of other changes</b>	Not done	Not clear	Not clear
<b>Data were analyzed appropriately</b>	Not clear	Not done	Not done
<b>Reason for number of points pre- and post-intervention given</b>	Not clear	Not clear	Not done
<b>Shape of the intervention effect was specified</b>	Done	Done	Done
<b>Intervention unlikely to affect data collection</b>	Not done	Not clear	Not clear
<b>Completeness of data set</b>	Not applicable	Not clear	Not clear
<b>Reliable primary outcome measure(s)</b>	Done	Not clear	Not clear

\*Criteria adapted from EPOC checklist (40); Blinded assessment of primary outcome were not applicable to the studies included in this review

### 3.4. Discussion

The review identified 13 studies that evaluated interventions to increase influenza immunization coverage among HCP in LTCHs, hospital and primary healthcare settings. Of the five recommended campaign components to increase HCP immunization (Table 2), the most commonly implemented strategies were education/promotion and improving vaccine accessibility. No campaign reached the recommended level of 90% uptake among HCP among the included studies.

In non-hospital healthcare settings, campaigns with only the education/promotion components resulted in minimal increases in immunization rates as compared to other interventions. Meanwhile, a combination of education/promotion and improved vaccine access yielded significant coverage increases among LTCH workers. Coverage was highest when a personal interview session was conducted with each healthcare worker (46). Because there was only one campaign with four components, no conclusions can be made for campaigns that used other combinations of components

In hospital settings, education/promotion resulted in small improvements in coverage. Only Ohrt et al. (49) found a significant improvement, which may have been, in part, due to a low baseline level of vaccine uptake. Similarly, campaigns with only improved vaccine access had minimal impact. On the other hand, campaigns with legislation/regulation components (that is, mandatory declination form; mandatory masks for unimmunized personnel) achieved higher rates than other interventions. The highest immunization coverage was reported by a hospital campaign that implemented all five components.

Failure to report the number of HCP exposed to the campaign and the number of HCP that were not followed-up were the major shortcomings of the studies reviewed. Ascertainment of immunization status often excluded off-site immunizations resulting in underestimation of coverage. In order to assess the association between the campaign and immunization rate, HCP should be tracked for their exposure to the intervention and their resulting immunization status. Rates stratified by varying levels of direct contact with patients may inform future efforts to target specific high-risk groups.

Limitations of this review include the inability to pool data across studies due to the heterogeneity in study methods and campaign components. Additionally, the included studies' methodologies had several risks of bias that may generate misleading results, such as lack of comparable baseline characteristics across study groups. The review did not address the impact of pandemic influenza programs. Three excluded studies (56-58) incorporated "pandemic vaccination drills" as part of their seasonal campaign. The effect of pandemic influenza on seasonal HCP immunization coverage is unknown.

The review revealed gaps in the literature about the appropriate components to use to increase influenza immunization among HCP. Although the search identified 100 studies, only 13 had eligible study designs. One-group before-and-after studies and cross-sectional studies were the most common. Such studies cost less to conduct, and are more logistically feasible for organizations. However, these designs do not control for factors outside the “intervention” that may inflate or diminish the observed outcome. Campaign evaluations should consider having a comparable control group for before-and-after studies. Organizations are encouraged to monitor and report annual HCP immunization rates over time, so there are sufficient observation points for an interrupted time series design and improved accuracy for observed outcomes.

Studies must minimize the risk of biases by reporting follow-up of workers and calculation of immunization rates. Campaigns with only education/promotion component were not effective. To determine appropriate influenza immunization campaigns for HCP, studies assessing the effect of different campaign components using rigorous study design are needed.

## **4. Consultation Meetings**

---

### **4.1. Introduction**

The OIDA is a newly developed tool and has only been tested outside or in parallel with an influenza immunization campaign but it has never been integrated within a campaign. To help campaign organizers and other potential adopters with the implementation of the OIDA, the Canadian Healthcare Influenza Immunization Network (CHIIN) team is developing an OIDA implementation guide. Consultation meetings were held with different healthcare organizations to identify different approaches to using the OIDA within a healthcare setting. The results of the consultation meetings were analyzed to inform the development of the OIDA implementation guide.

### **4.2. Methods**

Consultation meetings with different healthcare organizations were selected as the method to explore different approaches to implementing the OIDA. This method optimizes generation of diverse ideas with open-ended questions and incorporates group dynamics to enhance richness of the data (59). The consultation meetings used the same methods as focus groups. This type of consultation is unique because key people are selected for their expertise/involvement about the discussion topic and a full-explanation of the topic is given prior to the meeting. As a result, participants are able to prepare for the consultation meeting. The OIDA can be a complex tool for individuals unfamiliar with decision aids. Consultation meetings offer the advantage of being able to provide participants with an overview of the tool and time to review the tool before the meeting.

A structured questionnaire with specific response items would limit the creativity in individual responses and not ideal for the exploratory nature of this study. Additionally, consultation meetings tap into the diverse ways of organizing an influenza immunization campaign using input from multidisciplinary staff members. This method allows for individuals to reflect on others' comments to formulate their own ideas and opinions. Individual interviews with key participants do not allow for such interaction and, as a result, responses may have not been as in-depth. Within and between healthcare organization comparisons can be made with the

qualitative data generated from consultation meetings to improve our understanding on the ideas and issues related to using the OIDA.

#### 4.2.1. Sampling

Hospital sites and long-term care homes were selected using purposeful sampling techniques, with emphasis on maximizing variation across groups representing these organizations. In qualitative research, purposeful sampling involves identifying participants that could provide information regarding the topic of interest (60). In this case, sites interested in learning about the OIDA and improving their influenza immunization campaign were sampled. In addition, the following eligibility criteria for included sites are based on the UK National Health Service 'Clean Your Hands' campaign (61), which were designed to maximize the changes of successful integration of a new initiative:

- Organization must have an annual influenza immunization campaign for HCP
- Staff should have access to free influenza vaccination on site.
- There must be identified champion(s) expressing interest in facilitating the use of the OIDA.

Due to the heterogeneity of the influenza vaccine campaigns in hospitals and long-term care homes, sampling that reflected a high level of variation across sites was used to capture common themes across groups. Thus, sampling included a *minimum* of four consultation meetings with at least one long-term care home and one hospital site with below average immunization coverage (<46% uptake) (15) and one long-term care home and one hospital site with above average immunization coverage (>46% uptake). Immunization coverage was based on the previous year and was self-reported by sites. The team was unable to identify an Ontario long-term care home willing to participate in the study that had below average immunization coverage. Instead, we were able to include a mix of for-profit and municipal long-term care homes.

Decisions to add consultation meetings with more organizations were driven by the level of theme saturation. The initial set of transcripts was reviewed for reoccurrence of similar ideas to using the OIDA across consultation meetings. There are no systematic guidelines to

determine when saturation is achieved (62). Instead, researchers are encouraged to thoroughly report on the process of saturation in the context of their project (62). For the consultation meetings, saturation was considered complete when all coders agreed that the collection of new data will not contribute significantly to the understanding of the issue. This was used as a basis to decide whether additional organizations should be recruited for the study.

#### **4.2.2. Site recruitment**

Eleven organizational champions within participating healthcare organizations interested in using the OIDA were identified through communication with researchers, infection control practitioners, occupational health workers, and public health workers. Interested organizations were identified through networking by the CHIIN team throughout the development of the OIDA. Sites were limited to those located in Ontario to limit travel costs. Each champion was contacted to arrange a pre-consultation teleconference between PL, member(s) of the project team, and staff involved in the organization's annual immunization campaign (as indicated by the champion). During the teleconferences, participants were introduced to the purpose of the present study, participated in a short discussion about the previous year's immunization coverage and invited to participate in a two-hour consultation meeting.

Champions of each organization were asked to invite staff members involved in the organization and operation of the influenza immunization campaign to attend the consultation meeting. They included administrators, occupational health representatives, nursing representatives, and/or infection control committee members. Staff positions and responsibilities varied across organizations, and, as a result, not all meetings had the same type of participants. Consultation meetings were limited to English-speaking participants.

Voluntary participation by the site throughout the project was interpreted as informed consent. During the pre-consultation teleconference and consultation meeting, participants were informed of the purpose of the project, participant involvement, how collected data was to be used and clarification on the right to withdraw at any point during the project.

### **4.2.3. Development of the Discussion Guide used in the Consultation Meetings**

Each consultation meeting was structured by a discussion guide (Appendix M), which was developed to be used by study team members to ensure a systematic process of generating qualitative data from the discussions (63). Due to the organizational differences between acute-care hospitals and long-term care homes, the discussion guide was modified to match the context of the participating healthcare organization. For example, influenza facts related to long-term care facilities only would be reported to long-term care home groups. Nonetheless, the key questions and OIDA content remained consistent across participating sites.

The discussion guide was developed to provide structure and consistency to the meetings. It was used in conjunction with a set of PowerPoint slides to provide visuals for participants (see Appendix N). Because the OIDA is a novel tool, a section of the guide was dedicated to introducing the concept of decision aids and guiding the participants through the OIDA. In addition, the discussion guide included a planned sequence of questions, where the participants were allowed sufficient time to contemplate the question, to gather their thoughts, and develop familiarity with the discussion topic. The questioning route began with broader and more general questions to help people feel more comfortable and engaged people to think about their influenza immunization campaigns. Examples of questions included: “What activities and materials does your organization use to encourage staff members to have the flu shot?” and “What are your general thoughts and feelings on the OIDA?” The discussion transitioned into more specific questions on the implementation of the OIDA. This flow of discussion was designed to engage participants so they become familiar with the tool and to direct focus on the key questions.

### **4.2.4. Discussion Guide Development: Review by Expert Team**

A draft discussion guide was reviewed by the members of the CHIIN team which included researchers, decision-aid experts and infection control staff. The team provided feedback on questioning sequence and wording of the facilitation script. The discussion guide was revised accordingly and was pilot tested with a group of lay participants for clarity and understanding.

#### **4.2.5. Discussion Guide Development: Pilot-Test with Lay Participants**

The purpose of the pilot-test with the lay group was to ensure that the discussion guide and questioning route flowed logically and that participants understood what was being asked of them. Also, the pilot-test of the discussion guide helped PL (moderator) gain familiarity with using the discussion guide with participants. In the lay group (n=4), individuals had no background knowledge on the OIDA and were not involved with the organization of an influenza immunization campaign. At the end of the session, participants were asked to provide feedback. Comments were made to improve the clarity of the PowerPoint slides and flow of the discussion. Also, suggestions were given to improve PL's presentation skills, such as avoiding the repeated use of "um's".

#### **4.2.6. Discussion Guide Development: Pilot-Test with Healthcare Personnel**

The discussion guide was pilot-tested with a group of healthcare personnel similar to the target population. The group was recruited following the same procedures as the main groups (as outlined under the Site Recruitment section 4.2.2). The participants were staff members of a long-term care home (n=6), who were involved in the planning and operation of their organization's influenza immunization campaign. Similar to the first pilot-test, the participants were prompted for feedback on the structure of the consultation meeting and the skills of the moderator. Overall, participants felt that the meeting was well-paced with opportunities for interaction. However, participants suggested that more time should be given for people to voice their opinions on the OIDA. The moderator was clear and engaged the group.

The results of this pilot-test were included in the final data analysis. The pilot-test closely followed the same methods and procedures as the other consultation meetings. The discussion guide was revised to allocate more time for OIDA feedback, but the question sequence and key questions remained intact. Therefore, the pilot-test generated information-rich data using a systematic process consistent with the other consultation meetings, and, as a result, the pilot-test data was included in the analysis.

#### **4.2.7. Consultation Meeting Format**

As structured by the discussion guide, each consultation meeting was approximately two hours in length. The first hour of the meeting was devoted towards creating a comfortable and open environment for participants, explaining the OIDA, and having participants become more familiar with the tool. The second hour was focused on having participants brainstorm approaches to using the OIDA in their influenza immunization campaigns.

Consultation meetings were conducted between July and October 2008, when organizations were planning their campaigns and influenza immunization was a salient topic. The meetings were held at the site of each of the healthcare organizations with the key staff members involved in the planning and operation of the influenza immunization campaign. For each meeting, there was a moderator and an assistant moderator. The moderator (PL) was responsible for guiding the meeting and group discussions. The assistant moderator (project coordinator) recorded notes about the discussion and helped with equipment set-up. Prior to the meeting, the moderator reviewed the discussion guide with the assistant. After the meeting, the moderator and assistant met to debrief on the meeting and shared key notes.

Discussions at the consultation meetings were captured by a voice recorder and key notes were taken by the moderator and assistant. Permission to tape-record the meeting was verbally requested from the participants. At the end of each consultation meeting, participants were asked for verification of key ideas expressed in the discussion to ensure authenticity of collected data.

#### **4.2.8. Data Processing**

Tape recordings were transcribed verbatim by an independent transcriptionist. The moderator reviewed the transcripts for accuracy to ensure that the transcripts matched the tape-recordings. The final transcripts were purged of all participant-identifying features prior to analysis. Field notes taken by the moderator and assistant moderator supplemented the transcripts. Original tape-recordings were stored by the project coordinator in a locked cabinet for the duration of the project. Transcripts were entered and organized into N.VIVO software (Version 8.0.332.0 SP4).

#### 4.2.9. Data Analysis

Content analysis was used to analyze the transcripts. It is a systematic method to draw conclusions from qualitative data (64). This approach ensures that the conclusions made about the implementation of the OIDA relate to the context in which the data was collected. Content analysis involves comparing groups to identify key categories and the relationships between the categories (64).

While PL conducted most of the analysis, two CHIIN team members each independently reviewed the transcripts. They were consulted for alternative perspectives, to clarify patterns, and to protect the interpretation of the data from possible biases of PL. The two other reviewers included a physician trainee and a clinical research nurse. Both were familiar with the OIDA and knowledgeable about influenza prevention.

Content analysis involves the clustering of similar data into key categories (65). This technique helped organize the massive amount of data from the consultation meetings into meaningful categories. Participants' responses were segmented into meaningful sections and given an identifying label (or code). This process of coding the transcripts was performed independently by each reviewer for all the transcripts. Data was coded based on the questions asked at the consultation meetings to determine the range of responses.

Each reviewer independently created their own coding scheme with a series of categories and their associated properties. Afterwards, all three reviewers met to compare their coding schemes and to reach a consensus for one final coding scheme. Operational definitions were given to all the categories and their properties, so that codes were applied consistently throughout the analytic process. In order to determine the frequency (number of times the category was mentioned) and extensiveness (the number of different people that talked about the category), PL recoded the set of transcripts using the final coding scheme. As a comparison, a second reviewer (clinical research nurse) recoded one of the transcripts to verify that PL's process of recoding reflected participants' perspectives. Discrepancies in coding were discussed until consensus was achieved.

Comparative analysis was applied to formulate generalized relationships between the categories which emerged from the data. Content analysis describes the data in segments,

while comparative analysis theorizes how the different categories fit together (65). After re-coding, between and within healthcare organization comparisons were made to reveal connections between the identified categories and to interpret how the categories relate to OIDA implementation approaches. Throughout this process, ideas on the relationships between categories were discussed with a second reviewer (clinical research nurse) and PL's thesis supervisors.

### **4.3. Results**

Of the eleven organizations contacted, seven organizations agreed to participate in the pre-consultation teleconference. Four long-term care homes could not dedicate sufficient time to participate in the study but were interested in future research endeavors using the OIDA. Of the seven organizations that participated in the pre-consultation teleconference, six organizations agreed to participate in a consultation meeting. A complex continuing care hospital did not want to participate at the current exploratory phase of the project, but was interested in using the OIDA once implementation strategies have been developed. For one of the six organizations, two consultation meetings were conducted with two divisions of an acute-care hospital. As a result, seven consultation meetings were conducted.

After reviewing the transcripts, approaches to using the OIDA were repeated across consultation meetings and, as a result, the CHIIN team decided that additional data collection was not needed. All three coders felt that the final coding scheme captured the participants' perspectives and many themes were being repeated across and within groups. Additional support for saturation was shown when re-coding of the transcripts using the final coding scheme did not require changing the themes or addition of codes. As well, the moderator (PL) was hearing no new ideas from participants on OIDA implementation by the fifth consultation meeting. This was confirmed when PL coded the transcripts sequentially and no new codes for OIDA implementation were added after the fourth consultation meeting. Thus, the final sample size included six recruited organizations and seven consultation meetings conducted. The following sections describes: i) group characteristics and group dynamics during consultation meetings; ii) participant perceptions of the OIDA; iii) approaches to using the OIDA in a healthcare setting; iv) evaluation of the OIDA; v) target population for the OIDA; and vi) barriers and facilitators to OIDA implementation strategies.

#### **4.3.1. Group Characteristics and Group Dynamics during Consultation Meetings**

Six organizations were successfully recruited for a consultation meeting, with four long-term care homes and two acute-care hospitals (Table 9). Consultation meetings were conducted for two separate divisions of a hospital (cardiovascular health centre and housekeeping department). In total, seven consultation meetings were held. Two organizations were located in northern Ontario, while the other sites were situated in Southern Ontario. Only the southern Ontario hospital had below average immunization coverage (<46%) in 2007.

From the seven consultation meetings, group size ranged from four to 11 participants. In total, 46 individuals participated. Occupations of the participants were diverse and mainly consisted of upper and middle management employees. In addition to infection prevention and control staff, organization of the campaign involved participants from various departments including: clinical managers, clinical staff, administrators, housekeeping, occupational health and safety, pharmacy, and spiritual care,

**Table 9. Characteristics of groups participating in the consultation meetings**

<b>Group</b>	<b>Type of Facility</b>	<b>Location</b>	<b>Vaccine coverage</b>	<b>Number of participants</b>	<b>Participant occupation/title</b>
Group A	Long-term care	Southern Ontario	Above average*	6	- Manager of nursing practice - Program manager - Dietitian - Registered nurse - Executive secretary - Unit clerk
Group B	Acute care hospital	Northern Ontario	Above average	8	- Public health nurse - Occupational health & safety (2) - Manager - Environmental services supervisor - Pharmacy director - Infection prevention and control coordinator
Group C	Long-term care	Northern Ontario	Above average	6	- Staff educator - Executive director - Program manager - Resident services coordinator - Registered nurse - Environmental manager
Group D	Long-term care	Southern Ontario	Above average	11	- Staff health & development coordinator - Manager - Resident services director - Administrator - Support services - Dietitian - Spiritual care coordinator - Registered nurse - Food service supervisor - Housekeeping supervisor - Life enrichment & volunteer services - Manager (6)
Group E	Acute care hospital – cardiovascular health centre	Southern Ontario	Below average	6	
Group F	Acute care hospital – housekeeping	Southern Ontario	Below average	5	- Director - Security - Operations coordinator (2) - General manager - Assistant director of care - Clinical coordinator - Director of care - Administrator
Group G	Long-term care	Southern Ontario	Above average	4	

\*Average immunization rate for Canadian healthcare workers: 46% (15)

Consultation meetings were held with established groups within an organization. All groups had previously worked on planning an immunization campaign together and were able to relate back to previous campaign efforts. Groups were familiar with discussion settings and comfortable with sharing their ideas. While most participants stayed for the entire duration of the consultation meeting, a few individuals had to leave early for other duties.

Aside from the cardiovascular health centre, all groups had a supervisor present. There was a concern that supervisors could influence the ideas and opinions of other group members or that the presence of the supervisors would inhibit discussion by the subordinates. As a safe-guard, careful attention was given to incorporate the opinions of all participants by asking around the table for at least one implementation idea. In addition, the moderator (PL) stressed that the meeting was an open discussion with no right or wrong answers. At times, subordinates would refer to the supervisor for clarification on organizational policy. However, with the wide range of responses, there was little evidence that subordinates refrained from expression of ideas.

Using the discussion guide, the moderator was able to maintain group discussions on the OIDA and ways to use the tool. However, there was one group (hospital – housekeeping department) where the conversation was dominated by a single participant, who focused on measuring the impact of the OIDA on immunization rates. Consequently, the bulk of the discussion was about evaluation of the OIDA. During the analysis, reviewers were careful not to over-interpret or over-emphasize the information collected from that consultation meeting, since much of the data in this group was influenced by the dominating participant.

#### **4.3.2. Participant Perceptions about the OIDA**

Participants were asked for their feedback and opinions on the decision aid immediately after completing the OIDA. A summary of group attitudes towards the tool is outline here, as this framed the discussion on strategies to implementing the OIDA. In general, most groups provided mainly positive feedback and believed the OIDA could be used in different ways with their staff members. On the other hand, a long-term care home and housekeeping department of a hospital, gave negative feedback with concerns that the OIDA would not be compatible for their group of workers.

Among the groups with positive attitudes towards the OIDA, the majority of participants felt the information presented in the OIDA was valuable and appreciated that the information was based on evidence. Some participants believed the OIDA was simple and easy for their staff to comprehend. Other participants perceived the OIDA as being an unbiased tool by presenting both benefits and risks of the influenza vaccine to workers. Many participants, however, found Step 2 of the OIDA confusing and had to read multiple times before understanding the questions. Step 2 of the OIDA deals with personal values and how it may affect an individual's decision to be immunized. Managers in one organization (cardiovascular health centre) were unsure whether their workers would benefit from using the OIDA. Nevertheless, participants openly shared and discussed their ideas on implementing the OIDA.

Two groups were particularly negative about the OIDA. In the long-term care home and hospital housekeeping department, the majority of their staff members do not speak English or French as their first language. Consequently, participants criticized the OIDA as being too difficult for their workers to complete. Some participants believed that the OIDA did not address adequately the needs of workers from cultures where vaccines are uncommon. The negative perceptions limited the discussion on potential approaches to using the OIDA, and as a result, only a few strategies were identified by the participants of these two groups.

#### **4.3.3. Approaches to using the OIDA in a Healthcare Setting**

From the set of consultation meetings, a wide range of implementation strategies were identified by the participants. Instead of selecting one key strategy, most participants suggested using multiple strategies to respond to the needs of different types of workers. Subsequent to the consultation meetings, each reviewer coded the different strategies. Reviewers compared and discussed the strategies identified and agreed upon ten general categories: 1) Group sessions; 2) One-on-one discussions; 3) Distribute to staff for independent completion; 4) Electronic OIDA; 5) Reinforce education using OIDA; 6) Use OIDA for campaign launch; 7) Use with consent form; 8) Use at immunization clinics; 9) Use OIDA during Workplace Wellness Week; and 10) OIDA poster. In the process of

brainstorming, participants also discussed potential benefits and barriers to using the OIDA for particular strategies.

### **1) Group sessions:**

The use of the OIDA in a group format was commonly discussed across all consultation meetings. Participants often suggested the integration of the OIDA into routine group meetings, such as staff meetings, health and safety lectures, employee training sessions, and influenza prevention presentations. Staff meetings were the most prevalent group format discussed by participants. For some participants, group sessions provided an opportunity to clarify potential questions about the OIDA, to address other influenza-related issues, and/or to allow for group discussion.

Two methods were suggested on how the OIDA can be used in a group format: 1) Employees could complete the OIDA together; and 2) The OIDA can be introduced in a presentation format. A hospital pharmacy director described how a group can go through the OIDA together by referring to how her department completed educational quizzes:

“We used to do [name] quizzes. I think that way we sat with the department and then we went through this step-by-step....We give the question then everybody would answer it. Then we go through it together and say, “Is that the right answer?””

The second method, as suggested by a long-term care home manager, uses the OIDA in a presentation format, where the information and research in the OIDA are explained to staff. Following the presentation, staff members are given time to complete the questions and given an opportunity for group discussion.

Although using the OIDA in group sessions was a popular strategy for many participants, barriers to this strategy were identified. Firstly, participants acknowledged that doing groups sessions with all workers will require repeated efforts to capture staff on different shifts and units. One hospital manager noted that group sessions will only be successful with a facilitator knowledgeable on influenza-related issues, and not all departments have such strong facilitators. Another nursing manager cautioned the limited time available to introduce the OIDA at staff meetings because there are often multiple agenda items to cover. Lastly, participants acknowledged that the not all departments have regular meetings, and as result, may not be adapt to facilitating group sessions. For example, at

one long-term care home, group meetings were infrequent and participants believed that it would be difficult to convince staff members to attend. As well, they felt that workers with English as a second language would feel uncomfortable in a group discussing the OIDA.

## **2) One-on-One discussion tool:**

The OIDA was perceived by some participants as an aid for managers and/or vaccine providers to discuss influenza prevention with their workers. In this one-on-one approach, managers or vaccine providers will go through the OIDA with a worker and discuss their options regarding influenza prevention.

Participants only intended to use the one-on-one approach with specific groups of workers. For example, one long-term care home registered nurse anticipated that some of her staff who struggle with English will need additional assistance completing the OIDA. For participants who can track staff immunization status easily, they suggested that the OIDA can be used one-on-one with unimmunized workers or workers having difficulty making a decision. The manager or vaccine provider may identify a staff member who is undecided and go through parts of the OIDA and discuss their options with them using the OIDA.

## **3) Mass distribution to staff to complete OIDA on their own:**

Many groups suggested distributing the OIDA to staff, so they would complete it individually on their own time. The most common method of distribution was attaching the OIDA to a document that is routinely sent out to all employees, such as pay stubs, information notices, and influenza-related educational materials. For example, one particular long-term care home regularly sent out questionnaires attached to workers' paystubs and found that it was an effective method to distribute information to all workers. Another hospital considered including the OIDA in their annual mail-out to staff on immunization policies and influenza prevention facts. One long-term care home clinical coordinator pointed out that staff would have more time at home to go through the OIDA and potentially have others help them through the decision aid, especially for workers that do not speak English as their first language.

Although many participants agreed that mass distribution of the OIDA for workers can be easily done, some participants cautioned that many of their workers do not read the information attached to pay stubs or placed in their mail boxes at work. In fact, materials

provided in workers' mailboxes end up in the trash. Some participants acknowledged that other approaches, in addition to mass distribution of the OIDA to workers, would be needed to encourage workers to use the OIDA. In particular, for long-term care groups, participants were concerned about the additional costs for printing and mailing the OIDA to all staff.

#### **4) Electronic version of the OIDA:**

Two hospital groups contemplated about having an electronic version of the OIDA where workers could complete the OIDA from a computer. For example, one cardiovascular health centre manager suggested having the OIDA be integrated into the workers' log-in system. At the user log-in screen, workers are asked if they have made a decision on the influenza vaccine. For workers that answer "no", they will have to go through the electronic OIDA before proceeding to the hospital computer system. Another participant suggested that the OIDA can be made accessible to workers through their hospital website. One staff educator at a long-term care home suggested that having an electronic OIDA would be helpful when conducting group sessions with workers.

Using an electronic version of the OIDA, however, raised many concerns regarding accessibility. Some participants noted not all workers have designated access to a work computer, nor have a work email address. Additionally, one hospital group learned from their previous experiences with internet-based knowledge tests for workers did not have a high completion rate.

#### **5) Use OIDA to Reinforce Influenza Immunization Campaign Education:**

Participants at two long-term care homes recommended that the OIDA be used after the influenza immunization campaign to reinforce earlier educational efforts. This strategy was described by a resident services coordinator:

"So providing [workers] with an overview of education and then giving them this [OIDA] a week or two later to refresh their memory about all of the things that were talked about in the education session. If they had further questions after this, then they can be directed to go see [staff health and development coordinator]."

A long-term care nursing manager suggested a more targeted approach, whereby the OIDA is only given to those that have not been immunized:

“Have the education at the front end of the flu season but then just kind of reinforce that after we have done all the education. We have done the [immunization] clinics and there is still that 40% of the people that don’t want the [flu] shot. We can send [the OIDA] to them and say, ‘Hey, here is a tool for you. Maybe it will help you make a better decision. If you have any questions, contact employee health.’ ”

In this strategy, the OIDA is used to supplement other on-going educational efforts to encourage influenza immunization.

#### **6) Using the OIDA as a launching point for the influenza immunization campaign:**

One hospital and one long-term care group speculated that the OIDA will spark conversations and questions from workers regarding influenza immunization. As a result, some participants saw the OIDA as a launching point for the influenza immunization campaign. A registered nurse felt the OIDA would encourage workers to inquire about their influenza prevention options and it would be the organization’s responsibility to provide additional information and references.

A cardiovascular health centre unit manager described the strategy as “a campaign for the campaign”. She believed the OIDA can be used before the annual influenza immunization campaign to raise awareness among workers. Other unit managers were supportive of providing the OIDA before campaign, so workers are given time to read and inquire about their influenza prevention options.

#### **7) Use OIDA with the influenza immunization consent form:**

A long-term care home discussed the integration of the OIDA into their influenza immunization consent form, in which all workers must sign and complete prior to receiving the influenza vaccine. Participants were receptive of the concept. For example, a registered nurse felt their current consent form did not provide enough information for the worker to make an informed decision. Instead, she liked how the OIDA can provide the worker with quality information to help them make an informed decision. Although receptive to this

strategy, some participants stressed that the evidence presented in the OIDA must match the organizational policy and information contained in the consent form.

**8) OIDA made available at influenza immunization clinics:**

It was suggested by participants to have the OIDA available to workers at the sites where influenza immunization is given to staff. Hospital managers believed workers would not have time to complete the OIDA until the immunizations are provided. Based on past experiences, long-term care participants provided influenza prevention information to personnel at in-house immunization clinics. As a result, a few participants felt it was important to have the OIDs available for additional education at the immunization clinics.

**9) Workplace Wellness Week:**

A long-term care home was mandated by their corporation to organize an annual Workplace Wellness Week for workers. The Workplace Wellness Week occurs in the Fall and promotes occupational health and safety among staff members. A long-term care home administrator suggested the OIDA be incorporated into the Workplace Wellness Week and take the opportunity to introduce the tool to workers.

**10) OIDA poster:**

At the first two consultation meetings with long-term care homes, both groups suggested presenting Step 1 (“What does the research show?”) section in the OIDA as a poster posted on walls throughout their organization for their staff to view. Participants agreed that the information presented in Step 1 would make an attention-catching, visual aid. An environmental services manager recommended the posters be placed on staff health and safety boards, and other participants suggested placing the posters on doors and staff rooms around the facility.

In response to groups’ feedback, the CHIIN team created colour posters using Step 1 of the OIDA. At subsequent meetings, the posters were presented to the participants. Posters were provided to organizations free of charge. Participants appreciated that Step 1 was presented in a poster format and were very keen on placing the posters on their units or departments. In addition to workers, a hospital manager believed the information on the posters will be beneficial to patients and visitors as well.

#### 4.3.4. Evaluation of the OIDA

Most groups required the moderator to probe for ideas on evaluating the impact of the OIDA in an organization. Some participants framed evaluation of the OIDA as part of our study rather than a task they would normally perform to determine the value of using the tool with their workers. In particular, methods to collect the completed OIDs from workers were only discussed for the purposes of our study. Participants suggested that workers can be requested to return OIDs back to the manager/department in a sealed envelope or internal drop-off box. Subsequently, collected responses to the OIDA can be analyzed by the CHIIN team. Collection and evaluation of the OIDA responses would not commonly occur with the absence of a study.

While discussing evaluation methods that could be performed by the organization, most participants suggested change in immunization rates would determine the usefulness of the OIDA for their organization. Increased influenza immunization rate was perceived as the ultimate goal by many participants, as described by one long-term care home staff educator:

“If we increase the 25 [workers] in the past that refused the flu shot and if we [after using the OIDA] have five of them that decided to get the flu shot, then we will know.”

Although increased rates would be ideal, participants recognized the importance of having their workers make an informed decision regarding the influenza vaccine. For example, a hospital housekeeping director noted his department’s strategic priorities:

“These are two strategic priorities. One strategic prior is to raise the level of awareness, give [workers] the [OIDA] to make a better decision and two, to increase our participation rates and hopefully the two [priorities] will connect.”

For smaller long-term care homes, feedback on the OIDA may be done informally, as a staff educator assumed that workers would simply tell her if they did not like the particular tool. Another long-term care home director anticipated only a small number of undecided workers

and suggested tracking the number of workers that found the tool helpful in making a decision:

“You know if there are 10 [workers] that we end up meeting with and using the [OIDA] and 5 of them actually use the [OIDA] and answer the questions and make their decision, then 50% of [the workers] have found it useful.

#### **4.3.5. Target Population for the OIDA**

Within the discussions on OIDA implementation and evaluation, participants expressed concerns about which type of workers should be given the OIDA. Participants agreed that the information provided in the OIDA is valuable for all workers. A public health nurse favoured mass distribution of the OIDA because targeted efforts would alienate that targeted group of workers:

“Just targeting the fence-sitters can be a risk too because we have done that a couple of times at [organization]. It causes [the workers] to dig their heels even further because now someone is making them and no one else, do something that they don't want to do and, by golly, they are never going to do it.”

Participants were concerned, however, over the use of extra resources related to mass distribution. As noted by a hospital pharmacy director, the OIDA will not be useful for workers who are decided:

“It is often people that are on the fence that you give the decision aid. If they are set against [the influenza vaccine], they are not going to change their mind”

Additionally, a cardiovascular health centre unit manager noted the difficulty with evaluating the usefulness of the OIDA when the target population included workers who have already made a decision about the influenza vaccine.

Alternatively, participants suggested only targeting undecided workers, which included those who have not reported their immunization status or have not yet received the influenza

vaccine. A cardiovascular health centre unit manager recommended using the OIDA with the departments that have had low immunization rates in the past. Long-term care homes did not anticipate high numbers of undecided workers and saw it as a manageable task to target only the workers who are uncertain of the influenza vaccine. Other organizations were unsure about the percentage of workers undecided.

#### **4.3.6. Barriers and facilitators to OIDA implementation strategies**

Three prevalent factors emerged from the consultation meetings that directly influenced the approaches to using the OIDA in a healthcare setting: 1) Routine organizational activities, including annual influenza immunization campaign activities; 2) Healthcare personnel characteristics and needs; and 3) Resources available. Participants perceived each factor (or theme) as a barrier and/or facilitator depending on their local context. At least one of these three factors was considered by participants when discussing any of the ten approaches to using the OIDA.

##### **A) Routine organizational activities**

The most common factor discussed was routine organizational activities. Participants discussed how the OIDA could be used in conjunction with their annual influenza immunization campaign and other regularly scheduled staff activities. For example, one long-term care home routinely had in-house influenza information sessions provided by their staff educator, and, as a result, participants suggested using the OIDA with their information sessions. On the other hand, another long-term care home invited outside organizations, such as Public Health units, to educate workers on influenza prevention and did not have regular staff meetings. For these participants, it was not feasible to conduct separate group sessions since group meetings were not common in their organization.

##### **B) Healthcare personnel characteristics and needs**

Discussion of how healthcare workers would perceive the OIDA was prevalent across all consultation meetings, especially when participants were asked for feedback on the OIDA. Based on prior experiences with using similar educational materials, participants gauged how well their staff members would respond to the OIDA and how to best tailor their

implementation approaches to staff characteristics and needs. For example, some cardiovascular health centre unit managers anticipated their nurses will not have the time to read through the OIDA delivered to their mailboxes. As such, participants suggested more direct approaches including one-on-ones and presentations at staff meetings. Similarly, groups where healthcare personnel have difficulty with English preferred using approaches where the worker has additional support completing the OIDA.

### **C) Available resources**

The resources available within the organization also influenced the strategies suggested by participants. The issue of mailing and printing costs was raised during discussions on using the mass distribution approach. Meanwhile, using an electronic version of the OIDA was a more salient topic in hospitals, where more employees had designated computer access at work. As well, organizations capable of tracking immunization rates in a timely manner for all departments were able to target approaches to workers who have not been immunized.

## **4.4. Discussion**

With the rapid growth in the development of decision aids, approaches to facilitate the use of such tools in a healthcare setting are needed. The results of the consultation meetings generated ten approaches to implementing the OIDA as identified by potential adopters (i.e. influenza immunization campaign organizers). As well, participant discussions highlighted key barriers/facilitators that influenced the approaches identified, including healthcare personnel needs and characteristics, routine organizational practices and available resources. The identified approaches and key factors may help potential adopters facilitate the uptake of the OIDA in the context of influenza immunization campaigns within healthcare organizations.

The wide range of approaches to using the OIDA highlighted the adaptability of the tool within a healthcare organization. Almost all ten strategies were applicable to acute care and long-term care settings with the exception of using an electronic OIDA. The implementation of electronic OIDA was limited to hospital groups due to the lack of regular computer access

for most long-term care home personnel. As electronic records increase across health organizations, the feasibility for using an electronic OIDA will be more feasible. Moreover, the OIDA can be integrated at any point of the influenza immunization campaign. Participants identified opportunities to introduce the OIDA before, during and/or after the campaign.

The facilitators and barriers to knowledge use have been reported frequently in literature (66). The three factors influencing OIDA implementation strategies identified in this study were the most salient with influenza immunization campaign organizers and are specific to the use of the OIDA within a campaign. The three factors (healthcare personnel characteristics and needs, routine organizational activities, and available resources) fit within with the taxonomy of barriers and facilitators on implementing the Ottawa Decision Support Framework (66). Firstly, healthcare personnel characteristics and needs can be classified under the category, “applicability based on characteristics of the patient”, where the potential adopter agrees/disagrees that the tool is suitable for the end user. Meanwhile, routine organizational activities relates to “compatibility” of the OIDA with the organization’s current approach. Finally, available resources fits as an environmental factor related to implementation.

#### **4.4.1. Strengths and Limitations**

There are seven key steps to ensure qualitative analysis is a systematic process for data generated from focus groups (67):

- Conclusions are derived from the data gathered
- Appropriate sequence of questions formulated to facilitate insightful responses
- Reliable process of capturing data from the focus groups
- Coding of data to provide a structured process of identifying patterns
- Participant verification of responses
- Debriefing sessions with assistant moderator after focus group sessions
- Sharing of preliminary and final reports with participants

With the exception of sharing the report with participants, all steps were achieved in the study to ensure a systematic process for qualitative analysis. The sequencing of questions in the consultation meetings was reviewed by an expert team and pilot-tested to maximize participation. A tape recorder was used to capture all discussions and key points were verified with participants to ensure accurate depiction of ideas and opinions. Also, immediately after each consultation meeting, PL held debriefing sessions with the assistant moderator to reflect on participants' responses.

Although qualitative data was systematically analyzed, there were limitations to the study. Firstly, data analysis did not occur concurrently with consultation meetings. Instead, analysis only occurred after the consultation meetings because not enough time was allotted for data analysis in between meetings. Also, the nature of planning immunization campaigns only happens during a few months and did not allow for sufficient data analysis between consultation meetings. As a result, it was not possible to probe for areas that may have benefited with more details or examples from participants. Secondly, a novice moderator (PL) is less experienced in interpreting group dynamics, noticing non-verbal cues and focusing group discussions. A more experienced moderator may have elicited more insightful responses from participants. Also, because the moderator is part of the project team, neutrality in the participants' responses may be affected. For example, if the participant highly regards our project team, this may elicit responses in favour of the moderator as perceived by the participant. Lastly, sampling did not include long-term care homes with low immunization rates and only included Ontario organizations. In Ontario, under the Universal Immunization Plan, the influenza vaccine is offered free of charge. Resource implications and accessibility to the vaccine maybe more salient in organizations where personnel are required to pay for the vaccine or with low immunization rates, and, in turn, may affect the implementation of the OIDA.

There are weaknesses to the sampling strategy used for the consultation meetings. Firstly, risk of selecting an outlier is high when only one site is selected for each category of a healthcare setting. The goal was to maximize variation to help inform the implementation guide by consulting with different types of organizations. However, it was also recognized that there was only a short time frame when organizations plan for their annual influenza campaigns. As a result, a minimum of one site per category was the most reasonable sampling strategy while still attempting maximum variation. Secondly, the group was not

able to identify a long-term care home with below average immunization rates. We did attempt to locate organizations with low immunization rates by working with Ottawa Public Health. Ottawa Public Health collects data on immunization rates and provided us with a three long-term care organizations with below average immunization rates. All three organizations declined to participate because of lack of time to participate in the study. The resulting sample is biased towards organizations that have more time and resources dedicated to influenza immunization campaigns. It is acknowledged that implementation methods generated from the consultation meetings may not apply to organizations with limited resources and time allocated to healthcare personnel influenza immunization.

#### **4.4.2. Implications for developing the OIDA implementation guide**

At the beginning stages of the CHIIN project, the original intent was to develop an implementation guide specifically for the Ottawa Influenza Decision Aid. During the course of the first year of the CHIIN project, it became clear that healthcare managers devote an impressive amount of time and effort to encourage staff immunization through their annual influenza immunization campaign, but with limited success. Healthcare organizations have a wide variety of approaches to the immunization of their workers. As highlighted by the systematic review, organizations continue to struggle with the need to immunize their healthcare personnel against influenza and to use evidence-based resources in planning their campaign.

As a result, the implementation guide was expanded to facilitate the use of evidence-based research on strategies to increase immunization rates by healthcare planners and, as well as, introduce ways to incorporate the OIDA into their campaign. It is intended to provide campaign managers, teams and organizations with a comprehensive, straightforward guide based on current evidence about how to build a successful influenza immunization campaign. The CHIIN team developed the implementation guide based on the following sources of information: 1) Systematic review of literature on interventions to increase healthcare personnel immunization rates; 2) Ideas from consultation meetings with different campaign organizers, 3) Experiences of organizations implementing the OIDA in 2008-2009, 4) Results from the OIDA pilot studies, 5) Input from Occupational Health and Infection Control practitioners working closely with the project team and; 6) Additional

research by team members on specific topics within the guide. Currently, the implementation guide is being further revised and evaluated for feasibility. The current implementation guide can be found at [www.chiin.ca](http://www.chiin.ca).

The systematic review results highlighted the importance of a multifaceted approach to influenza immunization campaigns and the inclusion of components beyond just educational/promotional efforts. Generally, influenza immunization campaigns with more than one component are more effective in increasing immunization coverage. Consequently, the implementation guide placed emphasis on considering all five possible components of an influenza immunization campaign (measurement/feedback, role models, legislation/regulation, improved vaccine access, education/promotion – see Table 2 for definitions). For each component, the systematic review provided examples of previously evaluated strategies for healthcare managers to consider in their campaign.

In addition to campaign strategies, the systematic review highlighted the importance of rigorous evaluations to determine the effectiveness of different strategies. As a result, evaluation techniques and the calculation of healthcare personnel immunization rates were emphasized within the implementation guide. The guide outlines the steps to systematically evaluating a campaign to encourage proper follow-up of healthcare personnel and stronger study designs for quality assurance. The results of the systematic review provided information on the context in which the OIDA will be implemented. The implementation guide was produced to cover the issues raised in the systematic review.

In order to add to our knowledge from the systematic review, the seven consultation meetings involving six organizations offered insight on the potential approaches to using the OIDA in a campaign. The current version of the implementation guide was developed at the preliminary stages of the consultation meeting data analysis. Thus, only broad examples of approaches to using the OIDA were provided in the implementation guide. Future editions of the OIDA should include the ten approaches to implementing the OIDA as identified by healthcare organizations and highlight the three key barriers/facilitators influencing the use of the OIDA (healthcare personnel characteristics and needs, routine organizational activities, available resources).

The implementation guide encourages healthcare organizers to consider all five possible components of an influenza immunization campaign (Table 2). In order to encourage the

use of the OIDA and showcase its adaptability to a campaign, the ten approaches can be used to complement four of the five campaign components (Table 10). When stratified into the five components, majority of the approaches are categorized under education/promotion (Table 10) including: group sessions, one-on-one discussion tool, mass distribution to staff, electronic OIDA, using the OIDA for the campaign launch, Workplace Wellness Week, and OIDA poster. Although not categorized as one of the ten approaches, the targeting of unimmunized workers can be integrated with the measurement and feedback component. The use of role models with the use of the OIDA was not identified. Although most approaches are education/promotion orientated, the OIDA can be used to complement different components of a campaign. Table 10 can be included in the implementation guide to help planners determine where the OIDA may fit within their campaign.

---

**Table 10. Approaches to using the OIDA complementing influenza immunization campaign components**

---

<b>Influenza Immunization Campaign Component</b>	<b>Complementary approaches to using the OIDA</b>
Education/Promotion	<ul style="list-style-type: none"> <li>– Group sessions</li> <li>– One-on-one discussion tool</li> <li>– Mass distribution to staff to complete OIDA on their own</li> <li>– Electronic version of the OIDA</li> <li>– Use OIDA to reinforce influenza immunization campaign education</li> <li>– Using the OIDA as a launching point for the influenza immunization campaign</li> <li>– Workplace Wellness Week</li> <li>– OIDA poster</li> </ul>
Improved Accessibility	– OIDA made available at influenza immunization clinics
Legislation/Regulation	– Use OIDA with the influenza immunization consent form
Measurement/Feedback	– *Target unimmunized workers
Role Models	– (No approaches identified)

---

\*Targeting unimmunized workers was not categorized as one of the ten approaches to using the OIDA but was mentioned in consultation meeting discussions

---

There was no one key approach to using the OIDA. Participants identified strategies depending on the three most salient factors: healthcare personnel characteristics and needs, routine organizational activities and available resources: Such factors can act as barriers and/or facilitators to the uptake of the OIDA depending on the organizational characteristics. For example, organizations with routine presentations/meetings could easily present the OIDA in a group setting. On the other hand, an organization with little experience with setting up a staff presentation may find it difficult to introduce the OIDA in a group format. When selecting which approach to implement the OIDA, the revised implementation guide must emphasize the need for organizers to consider whether the factors facilitate or impede a particular approach.

Additionally, the revised implementation guide must provide more guidance on evaluating the OIDA for campaign organizers. Campaign organizers need to have an evaluation plan to determine the effectiveness of the OIDA within their organizations. At the consultation meetings, unless probed by the moderator, evaluation of the tool was not a salient issue among participants. Participants were interested in different outcomes including change in behaviour (i.e. increased immunization rates), improved decision making (i.e. personnel made more informed decisions) and acceptability of the OIDA among workers. Thus, the revised implementation guide must emphasize the importance of evaluating the OIDA and potential methods to determine the effectiveness of the OIDA depending on the goals of the organization. For example, a nursing manager may informally survey his/her department staff for their opinions of the OIDA after a group presentation on the tool.

In summary, the implementation guide was produced using the information provided by the systematic review on influenza immunization campaign strategies and data collected from the consultation meetings with campaign organizers. The systematic review results provided an overview of current influenza immunization campaign strategies used and the ways in which the five components of a campaign can be addressed. From the consultation meetings, recommendations for the revised implementation guide include: 1) inclusion of the ten approaches to using the OIDA identified by campaign organizers; 2) consideration of the three barriers/facilitators to implementing the OIDA; and 3) providing advice on evaluating the OIDA for their organization.

## **5. OIDA Implementation Questionnaire Design**

---

### **5.1. Rationale and Objectives of OIDA Implementation Questionnaire**

The third objective of the thesis was to develop the OIDA Implementation Questionnaire. For Year Two (2009-2010) of the Canadian Healthcare Influenza Immunization (CHIIN) project, the OIDA and the Implementation Guide was to be implemented in six to ten healthcare organizations across Canada and evaluated for feasibility. One of the objectives for the evaluation was to describe the process of how organizations used the OIDA. Thus, development of the OIDA Implementation Questionnaire was required to capture the different implementation strategies used by participating organizations.

The ten approaches identified in the consultation meetings only provided a description of planned strategies. There are often unplanned factors that may change the implementation process, and, as a result, organizations may use the OIDA differently from the original intent. Thus, it is important to describe the process of how the OIDA was actually implemented. Information collected from the questionnaire will provide information on experiences involved in using the OIDA. Understanding the process of implementation can help explain the effectiveness of the OIDA in future evaluations.

The OIDA Implementation Questionnaire was based on the results of the consultation meetings, and the systematic review. The information gathered from the consultation meetings highlighted the topics deemed important for the questionnaire and helped identify the appropriate terms familiar to respondents. The results from the systematic review of influenza immunization campaign strategies helped our team better understand the contextual issues related to the intended respondents.

Additionally, the Questionnaire was based, in part, on the lessons learned from follow-up telephone interviews conducted as part of Year 1 (2008-2009) of the CHIIN project. The follow-up telephone interviews were conducted to evaluate OIDA implementation within healthcare organizations. Only one out of seven organizations was willing to participate in a follow-up interview. The high nonresponse was, in part, due to the failure to contact the key liaison person in each organization. Healthcare personnel involved in organizing the influenza immunization campaign often have multiple roles, and have little time to focus on

influenza immunization after the influenza season. As a result, key liaisons were difficult to contact at work. Due to the poor response to the follow-up telephone interviews, an OIDA Implementation Questionnaire was developed to be used for future evaluations.

## **5.2. Methods**

The following sections describe the OIDA Implementation Questionnaire development process and proposal for a survey implementation process.

### **5.2.1. OIDA Implementation Questionnaire - Study Design**

The findings from the consultation meetings (section 4.3.3) resulted in the production of a new questionnaire (OIDA Implementation Questionnaire). The OIDA Implementation Questionnaire was designed with close-ended questions specifically addressing OIDA implementation strategies. Information on organizational characteristics, influenza immunization campaign and staff feedback on the OIDA will be collected from other questionnaires previously developed by the CHIIN team and will be administered pre or post the influenza immunization campaign as part of the CHIIN study in Year Two (2009-2010).

The OIDA Implementation Questionnaire will be a self-administered questionnaire and mailed to the key liaisons of each organization that used the OIDA after the 2009 seasonal influenza immunization campaigns. Interview-based studies would require interviewing multiple staff members within each organization. On the other hand, a self-administered questionnaire allows input from more than one person, and can be filled out at the convenience of the respondent.

For Year Two (2009-2010), six to ten organizations will be recruited to use the OIDA. Because of the small number of organizations, sampling is not required for this study design. All recruited organizations will be surveyed. Details about the questionnaire development and the proposed survey implementation strategy are presented below.

### **5.2.2. OIDA Implementation Questionnaire Items**

The OIDA implementation Questionnaire is presented in Appendix O. Ten approaches to using the OIDA were identified from the consultation meetings (section 4.3.3). Thus, it was possible to develop close-ended questions regarding the implementation of the OIDA using the ten approaches. A questionnaire item was developed for each approach, since the OIDA may be used in more than one way (For example: Was the OIDA distributed to healthcare personnel to complete individually? Or in group sessions?). Examples identified by consultation meeting participants were used as questionnaire items. For example, participants identified a method to use the OIDA in a group format by reviewing the OIDA together as a group. In the addition to the ten approaches, an open-ended question was added to inquire about other possible approaches to implementing the OIDA.

Questionnaire items were also drafted to capture data on targeted efforts. During the consultation meetings, participants discussed the possibility of targeting specific types of healthcare personnel to use the OIDA (section 4.3.5). Thus, two questionnaire items were included to cover targeted efforts, for example, “Were specific types or groups of healthcare personnel targeted (or given extra attention) to use the OIDA?” Items regarding barriers and facilitators to using the OIDA and evaluation issues were not included. Barriers and facilitators would be covered by another questionnaire administered to campaign organizers on staff advocate acceptability of the OIDA, which was previously developed by the CHIIN team. Items on evaluating the OIDA were excluded because evaluation of the tool will be completed by the CHIIN research team. The CHIIN team will be holding pre- and post-campaign workshops with organizations using the OIDA during the 2009-2010 season.

### **5.2.3. Questionnaire review by CHIIN team**

The OIDA Implementation Questionnaire was reviewed by the CHIIN team for face and content validity, ensuring that all relevant aspects of the topic are captured. Members of the CHIIN team include infection control personnel, occupational health personnel, individuals who are knowledgeable about the OIDA, individuals who have used the OIDA before within a healthcare organization, and individuals who understand the objectives of the project (see Appendix B for full list of team members). CHIIN team members were asked to determine if

the questionnaire meets study objectives and, as well, determine if organizations are able to answer such questions based on the experience from members who have used the OIDA in the past.

PL sent each CHIIN team member the cover letter and questionnaire via email, requesting for feedback and comments. For each question, team members were asked to consider ten common problems with survey questions: 1) Complex wording; 2) Too much information to recall (memory overload); 3) Vague or imprecise word terms; 4) Unfamiliar technical terms; 5) Leading questions; 6) Unclear question purpose; 7) Question contains more than one subject/topic; 8) Mismatch between question and answer options; 9) Difficult to access or recall information; and 10) Respondent unlikely to know answer. These common problems were adapted from Graesser et al (1999) list of twelve common problems with survey questions (68). Additionally, CHIIN team members were asked to review the ordering and relevancy of the questionnaire items to the analytic objectives. A reminder email was sent to members that did not respond within seven days of the initial email.

Half of the CHIIN team members (10 out of 20 individuals) provided feedback and comments on the cover letter (Appendix P) and questionnaire (Appendix O). Suggestions for the cover letter included grammatical corrections, shortening the length of letter, rewording of sentences for improved clarity, re-ordering of information sequence and alternative incentives. Feedback for the OIDA Implementation Questionnaire included the following: 1) confusing item responses for particular questions; 2) confusing skip-step instructions; 3) rewording of questions for improved clarity; 4) unclear terms used (for example "on-site"); 5) suggestions for additional items and item responses; 6) some questions were repetitive; 7) some double-barreled questions; 8) re-order questions to improve flow of questionnaire; 9) grammatical errors; and 10) use of terms should be consistent throughout questionnaire.

Appropriate revisions were made according to the feedback from the experts. The length of the cover letter was shortened. Grammatical errors and unclear wording were fixed. An individual suggested offering a flashlight with the CHIIN logo to questionnaire respondents instead of a gift-card. The information sequence in the letter was rearranged to highlight the provided incentive and instructions on returning the completed questionnaire. For the OIDA Implementation Questionnaire, grammatical errors, confusing wording and vague terms

were corrected. To improve the flow of the questionnaire, items were re-ordered to group questions with similar topics. Double-barreled questions were broken down into two questions (for example, Q7 and Q10).

#### **5.2.4. Questionnaire pilot-test**

The original intent was to pilot-test the revised OIDA Implementation Questionnaire with the seven organizations that used the OIDA during the 2008-2009 influenza season. However, the poor response rates to the follow-up telephone interviews indicated lack of interest from the organizations to continue participating in the study. As a result, it was not possible to pilot-test the OIDA Implementation Questionnaire with the seven organizations that have previously used the OIDA.

Alternatively, the OIDA Implementation Questionnaire was pilot-tested for readability with a convenience sample of five research associates of an infectious disease research department. They were asked to review the questionnaire and cover letter for clarity, flow of questions and overall appeal.

In general, the research associates found the cover letter and questionnaire easy to follow and read. The arrows for the skip-response questions helped visually guide the respondents. Grammatical corrections were noted in the cover letter and questionnaire. As well, comments were given to improve the introduction of the cover letter. One individual noted that the questions seemed repetitive because the first word of most questions was the same.

The questionnaire was revised based on the comments from the convenience sample. Grammatical errors were corrected and the introduction of the cover letter was modified. Some questions were modified slightly to minimize repetitiveness of words used.

### **5.2.5. Survey Implementation**

The proposed survey implementation would follow Dillman's Tailored Design Method (69) as seen in Figure 4. This approach is described below.

For a regular influenza season, seasonal influenza immunization campaigns occur between mid September – mid November. Due to the 2009 H1N1 pandemic, the delivery of seasonal influenza vaccines to HCP was delayed to mid November - December. As a result, survey implementation will begin end of January 2010. In addition to the OIDA Implementation Questionnaire, the CHIIN study will involve administering other questionnaires at an orientation workshop before the influenza immunization campaign and at a debriefing workshop after the campaign. The OIDA Implementation Questionnaire will be administered before the debriefing workshop. The information collected from the questionnaire will inform the development of questions/probes at the debriefing workshop.

Key liaisons for each participating organization would have already been identified and recruited as part of the CHIIN study. For the initial contact, key liaisons for each organization will receive a pre-notification letter via electronic-mail (email) to inform them of the upcoming study questionnaire that they will be receiving in the mail. Based on experience from the 2008-2009 influenza season, key liaisons had easy access to email at work.

Also in the first week, the initial package with the questionnaire will be couriered to key liaisons. The initial package will include a cover letter (see Appendix P), the OIDA Implementation Questionnaire (see Appendix O), and a stamped, return-address envelope. Additionally, organizations will be given a pocket-sized flashlight with the CHIIN logo as a small incentive for completing the questionnaire.

A week later, a reminder email will be sent to all key liaisons to remind them of the study and express thanks to those who have already responded. A replacement package will be sent to non-responders one week following the reminder email. The replacement package contents will be identical to the initial package except that the cover letter is slightly modified with a focus on influenza prevention to entice non-responders and a flashlight will not be included. The final contact will be made one week after the replacement package. Key

liaisons who have not responded will be contacted by phone or left a voice message by the project coordinator/research assistant. If there are non-respondents remaining after the final contact, questionnaires will be given to them at the debriefing workshop.

#### **5.2.6. Data Process and Analysis**

All closed-ended questions will be coded into numeric format using SPSS data entry software. To ensure data is correctly entered, a second research assistant will review the database for entry mistakes and missed fields. Double entry of the questionnaire responses is not necessary, since the number of respondents is small. Frequency for each of the response items will be tabulated. Data will be used in conjunction with data collected from other questionnaires administered as part of the CHIIN study to perform cross-tabulations. Frequency of each implementation strategy will be stratified by characteristics of organizations (such as overall healthcare personnel influenza immunization rates and type of organization). Responses to the open-ended questions will be analyzed and coded into categories and themes. Analysis will be conducted by the research assistant after the final contact (debriefing workshop).

#### **5.3. Strengths and Limitations**

The questionnaire items were based on examples and strategies identified by influenza immunization campaign organizers. This ensured that questions were relevant and feasible among campaign organizers. Although the questionnaire was not pilot-tested with previous organizations, it was reviewed by a team of experts (CHIIN) and five research associates in a infectious disease research unit to ensure questions were easy to understand for respondents and relevant to the analytical objectives.

On-site observations of the actual OIDA implementation process would provide the most accurate data on how campaign organizers used the tool. However, influenza immunization campaigns can range from one-week to one-month in length. On-site observations will require multiple observers at different departments and different times of the day. As a result, it will not be logistically feasible and would be cost-intensive. Mailed self-

administered questionnaires often yield a lower response rate, as compared to interview-based studies (70). However, interviews were not feasible with campaign organizers as shown in the lessons learned from the 2008-2009 follow-up telephone interviews. A mailed questionnaire allows the respondent to complete the questionnaire at their own convenience and is able to refer to other team members for information. Illiteracy or difficulty understanding the questionnaire is unlikely to occur with the target population, since campaign organizers are often trained healthcare professionals. However, there may be a potential for item non-response due to multiple skip patterns used throughout the questionnaire. Arrows are used to direct respondents to the appropriate question.

By following Dillman's Tailored Design Method (69), the study hopes to minimize the overall non-response rate. The OIDA Implementation Questionnaire is short and would not be overburdening for respondents. Additionally, the study will provide a pre-paid incentive, which is associated with higher response rates than conditional incentives (71).

There is potential for systematic non-response bias, where organizations that favoured the OIDA may be more willing to respond to the questionnaire than organizations that disliked the OIDA and did not use the tool. This bias will cause results to favour multiple uses of the OIDA, since organizations favouring the OIDA are more likely to use the tool different ways (as shown from the consultation meetings- section 4.3.2). In efforts to minimize this bias, the cover letter emphasizes the importance of understanding of the OIDA implementation process to inform the future development of the Implementation Guide. As well, the small pre-paid incentive will be offered to all participants to decrease overall non-response and encourage participation from organizations that disliked or did not use the OIDA as planned.

#### **5.4. Conclusions**

The OIDA Implementation Questionnaire was designed based on information from the systematic review and consultation meetings. The systematic review provided a better understanding of the context of influenza immunization campaigns for HCP. Meanwhile, questionnaire items stemmed from the results of the consultation meetings. The data collected will help inform the feasibility of using the OIDA in healthcare organizations.

## 6. Summary

---

The thesis summarized the literature on seasonal influenza immunization campaigns and identified approaches to implementing the OIDA in a healthcare organization. The results guided the development and revisions of the Implementation Guide and provided information for the design of the OIDA Implementation Questionnaire. The thesis had three components:

- A systematic review of influenza immunization campaigns for HCP was conducted to provide information on the context in which the OIDA would be implemented. The review identified 13 studies on campaign effectiveness. Campaigns with only education/promotion resulted in small changes in immunization rates. There was sparse evidence on other campaign components.
- Seven consultation meetings with six healthcare organizations were held to determine approaches to using the OIDA. From the meetings, ten approaches were identified and key barriers/facilitators to implementation were highlighted. With the information from the systematic review, recommendations were made for the Implementation Guide.
- Data collected from the review and the consultation meetings was used to design the OIDA Implementation Questionnaire. The questionnaire objective was to determine the ways in which an organization uses the OIDA. It was reviewed by a team of researchers and pre-tested for readability. As well, a survey implementation process was proposed.

The PARIHS framework was a useful theoretical guide for the project. It highlighted the importance of facilitation when implementing an innovation, such as the OIDA. The framework also helped us understand why some influenza immunization campaigns were more successful than other campaigns. The pragmatic framework highlighted the key elements important to consider when determining implementation strategies for the OIDA.

## **6.1. Implications for Research**

As shown from the systematic review, there is a need for more rigorous evaluations of influenza immunization campaigns. In order to assess the association between the campaign and immunization rate, healthcare personnel should be tracked for their exposure to the intervention and their resulting immunization status. Rates stratified by varying levels of direct contact with patients may inform future efforts to target specific high-risk groups.

The next steps for the CHIIN team will be to evaluate the use of the OIDA in combination with the Implementation Guide. The consultation meeting results helped to further refine the Implementation Guide, which will be used next influenza season. Usefulness of the Guide for healthcare organizations should be evaluated. The OIDA Implementation Questionnaire will be used by the CHIIN team as part of their evaluation study for the 2009-2010 season.

## **6.2. Implications for Practice**

Healthcare organizations need to consider using all five possible components of an influenza campaign to improve immunization rates among healthcare personnel. In addition, organizations are encouraged to monitor and report annual healthcare personnel immunization rates over time for improving the accuracy of observed outcomes and for providing multiple observation points to improve evaluation efforts.

The consultation meeting identified ten pragmatic approaches to implementing the OIDA as determined by potential users including: 1) Group sessions; 2) One-on-one discussions; 3) Distribute to staff for independent completion; 4) Electronic OIDA; 5) Reinforce education using OIDA; 6) Use OIDA for campaign launch; 7) Use with consent form; 8) Use at immunization clinics; 9) Use OIDA during Workplace Wellness Week; and 10) OIDA poster. The ten approaches will make it easier for healthcare organizations to decide on an implementation approach when using the OIDA.

## 7. References

---

- (1) Schanzer DL, Langley JM, Tam TW. Co-morbidities associated with influenza-attributed mortality, 1994-2000, Canada. *Vaccine* 2008 Aug 26;26(36):4697-4703.
- (2) Glezen WP. Prevention and Treatment of Seasonal Influenza. *N.Engl.J.Med.* 2008 December 11;359(24):2579-2585.
- (3) Schanzer DL, Langley JM, Tam TW. Hospitalization attributable to influenza and other viral respiratory illnesses in Canadian children. *Pediatr.Infect.Dis.J.* 2006 Sep;25(9):795-800.
- (4) Cunney RJ, Bialachowski A, Thornley D, Smail FM, Pennie RA. An outbreak of influenza A in a neonatal intensive care unit. *Infection Control and Hospital Epidemiology* 2001;21(7):449-451.
- (5) Malavaud S, Malavaud B, Sanders K, Durand D, Marty N, Icart J, et al. Nosocomial outbreak of influenza virus A (H3N2) infection in a solid organ transplant department. *Transplantation* 2001;72(3):535-537.
- (6) Sartor C, Zandotti C, Romain F, Giacomo V, Simon S, Atlan-Gepner C, et al. Disruption of services in an internal medicine unit due to a nosocomial influenza outbreak. *Infection Control Hospital Epidemiology* 2002;23(10):615-619.
- (7) Monlinari NM, Ortega-Sanchez IR, Messonnier ML, Thompson WW, Wortley PM, Weintraub E, et al. The annual impact of seasonal influenza in the US: Measuring disease burden and costs. *Vaccine* 2007;25(27):5086-5096.
- (8) National Advisory Committee on Immunization. Statement on Influenza Vaccination For The 2008-2009 Season. *Canada Communicable Disease Report* 2008;34(ACS-3):1 - 46.
- (9) Jefferson TO, Rivetti D, Di Pietrantonj C, Rivetti A, Demicheli V. Vaccines for preventing influenza in healthy adults. *Cochrane Database Syst.Rev.* 2007 Apr 18;(2)(2):CD001269.
- (10) Kwong JC, Stukel TA, Lim J, McGeer AJ, Upshur RE, Johansen H, et al. The effect of universal influenza immunization on mortality and health care use. *PLoS Med.* 2008 Oct 28;5(10):e211.
- (11) Rivetti D, Jefferson T, Thomas RE, Rudin M, Rivetti A, Di Pietrantonj C, et al. Vaccines for preventing influenza in the elderly. *Cochrane Database of Systematic Reviews* 2006(3).
- (12) Thomas RE, Jefferson T, Demicheli V, Rivetti D. Influenza vaccination for healthcare workers who work with the elderly. *Cochrane Database of Systematic Reviews* 2006;3:005187.
- (13) Chan S. Does vaccinating ED health care workers against influenza reduce sickness absenteeism? *American Journal of Emergency Medicine* 25(808-811).
- (14) Parlevliet W, de Borgie C, Frijstein G, Guchelarr H. Cost-benefit analysis of vaccination against influenza of employees from an Academic Medical Centre. *Disease management and health outcomes* 2002;10(9):579-587.
- (15) Johansen H, Sambell C, Zhao W. Flu shots--national and provincial/territorial trends. *Health Rep.* 2006 May;17(2):43-48.
- (16) Stevenson CG, McArthur MA, Naus M, Abraham E, McGeer AJ. Prevention of influenza and pneumococcal pneumonia in Canadian long-term care facilities: how are we doing?[see comment]. *CMAJ Canadian Medical Association Journal* 2001 May 15;164(10):1413-1419.
- (17) Pearson ML, Bridges CB, Harper SA. Healthcare Infection Control Practices Advisory Committee (HICPAC). Advisory Committee on Immunization Practices (ACIP). Influenza vaccination of health-care personnel: recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP). *Morbidity & Mortality Weekly Report.Recommendations & Reports* 2006;55(RR-2):1-16.

- (18) Mereckiene J, Cotter S, Nicoll A, Levy-Bruhl D, Ferro A, Tridente G, et al. National seasonal influenza vaccination survey in Europe, 2008. *Euro Surveill.* 2008 Oct 23;13(43):19017.
- (19) Hofmann F, Ferracin C, Marsh G, Dumas R. Influenza vaccination of healthcare workers: a literature review of attitudes and beliefs. *Infection* 2006 Jun;34(3):142-147.
- (20) McFarland GK, McFarlane EA. *Decisional Conflict. Nursing Diagnosis and intervention: Planning for patient care.* 3rd ed. USA: Mosby; 1997. p. 486-496.
- (21) BMJ Clinical Evidence. How much do we know? 2009; Available at: <http://clinicalevidence.bmj.com/ceweb/about/knowledge.jsp>. Accessed September 30, 2009.
- (22) Sullivan SM, Pierrynowski-Gallant D, Chambers L, O'Connor A, Bowman S, McNeil S, et al. Influenza vaccination and decisional conflict among regulated and unregulated direct nursing care providers in long-term-care homes. *AAOHN J.* 2008 Feb;56(2):77-84.
- (23) O'Connor AM. Validation of a decisional conflict scale. *Medical Decision Making* 1995;15(1):25-30.
- (24) O'Connor AM, Bennett CL, Stacey D, Barry M, Col NF, Eden KB, et al. Decision aids for people facing health treatment or screening decisions (review). *The Cochrane Library* 2009(3):Art. No.: CD001431.
- (25) Chambers LW, Sullivan S, McCarthy A, Chambers LW, O'Connor A, Knoefel FD, et al. Development and evaluation of a decision aid about influenza prevention for healthcare workers. *Can.J.Infect.Control* 2007 Winter;22(4):203-5, 207-10.
- (26) McCarthy AE, Lafleur C, Sutherland J, Lam PP, Roth V, O'Connor AM, et al. Helping healthcare workers decide: evaluation of an influenza immunization decision tool. *Can.J.Infect.Control* 2010 Spring;25(1):21-24.
- (27) Sudsawad P. Knowledge translation: Introduction to models, strategies, and measures. 2007.
- (28) Rycroft-Malone J, Kitson A, Harvey G, McCormack B, Seers K, Titchen A, et al. Ingredients for change: revisiting a conceptual framework. *Qual.Saf.Health.Care.* 2002 Jun;11(2):174-180.
- (29) Kitson AL, Rycroft-Malone J, Harvey G, McCormack B, Seers K, Titchen A. Evaluating the successful implementation of evidence into practice using the PARIHS framework: theoretical and practical challenges. *Implementation Science* 2008;3(1):1-12.
- (30) Kitson A, Harvey G, McCormack B. Enabling the implementation of evidence based practice: a conceptual framework. *Qual.Health Care* 1998 Sep;7(3):149-158.
- (31) Rycroft-Malone J, Harvey G, Seers K, Kitson A, McCormack B, Titchen A. An exploration of the factors that influence the implementation of evidence into practice. *J.Clin.Nurs.* 2004 11;13(8):913-924.
- (32) Meijers JM, Janssen MA, Cummings GG, Wallin L, Estabrooks CA, Y G Halfens R. Assessing the relationships between contextual factors and research utilization in nursing: systematic literature review. *J.Adv.Nurs.* 2006 Sep;55(5):622-635.
- (33) Ellis I, Howard P, Larson A, Robertson J. From workshop to work practice: An exploration of context and facilitation in the development of evidence-based practice. *Worldviews on Evidence-Based Nursing* 2005;2(2):84-93.
- (34) Jacobson VJ, Szilagyi P. Patient reminder and patient recall systems to improve immunization rates. *Cochrane Database Syst.Rev.* 2005 Jul 20;(3)(3):CD003941.
- (35) Ndiaye SM, Hopkins DP, Shefer AM, Hinman AR, Briss PA, Rodewald L, et al. Interventions to improve influenza, pneumococcal polysaccharide, and hepatitis B vaccination coverage among high-risk adults: a systematic review. *Am.J.Prev.Med.* 2005 Jun;28(5 Suppl):248-279.
- (36) Talbot TR. Do Declination Statements Increase Health Care Worker Influenza Vaccination Rates? *Clinical Infectious Diseases* 2009 SEP 1;49(5):773-779.

- (37) Effective Practice and Organization of Care Group. EPOC methodological search filters. Available at: <http://www.epoc.cochrane.org/en/newPage1.html>. Accessed May/07, 2008.
- (38) Ramsay CR, Matowe L, Grilli R, Grimshaw JM, Thomas RE. Interrupted time series designs in health technology assessment: lessons from two systematic reviews of behavior change strategies. *Int.J.Technol.Assess.Health Care* 2003 Fall;19(4):613-623.
- (39) Cook TD, Campbell DT. *Quasi-experimentation: Design and analysis issues for field settings*. USA: Rand McNally College Publishing Company; 1979.
- (40) Effective Practice and Organization of Care Group. EPOC-specific resources for review authors. Available at: <http://www.epoc.cochrane.org/en/handsearchers.html>. Accessed May/07, 2008.
- (41) Shefer A, Briss P, Rodewald L, Bernier R, Strikas R, Yusuf H, et al. Improving immunization coverage rates: An evidence-based review of the literature. *Epidemiological Reviews* 1999;21(1):96-142.
- (42) Khan KS, Kunz R, Kleijnen J, Antes G. *Systematic reviews to support evidence-based medicine*. London, UK: Royal Society of Medicine Press Ltd; 2003.
- (43) Dey P, Halder S, Collins S, Benons L, Woodman C. Promoting uptake of influenza vaccination among health care workers: a randomized controlled trial. *J.Public Health Med.* 2001 Dec;23(4):346-348.
- (44) Hayward AC, Harling R, Wetten S, Johnson AM, Munro S, Smedley J, et al. Effectiveness of an influenza vaccine programme for care home staff to prevent death, morbidity, and health service use among residents: cluster randomised controlled trial. *BMJ* 2006 Dec 16;333(7581):1241.
- (45) Kimura AC, Nguyen CN, Higa JI, Hurwitz EL, Vugia DJ. The effectiveness of vaccine day and educational interventions on influenza vaccine coverage among health care workers at long-term care facilities. *Am.J.Public Health* 2007 Apr;97(4):684-690.
- (46) Lemaitre M, Meret T, Rothan-Tondeur M, Belmin J, Lejonc J, Luquel L, et al. Effect of Influenza Vaccination of Nursing Home Staff on Mortality of Residents: A Cluster-Randomized Trial. *J.Am.Geriatr.Soc.* 2009 SEP;57(9):1580-1586.
- (47) Tannenbaum TN, Thomas D, Baumgarten M, Saintonge F, Rohan I. Evaluation of an influenza vaccination program for nursing home staff. *Canadian Journal of Public Health.Revue Canadienne de Sante Publique* 1993;84(1):60-62.
- (48) Doratotaj S, Macknin ML, Worley S. A novel approach to improve influenza vaccination rates among health care professionals: a prospective randomized controlled trial. *Am.J.Infect.Control* 2008 May;36(4):301-303.
- (49) Ohrt CK, McKinney WP. Achieving compliance with influenza immunization of medical house staff and students. A randomized controlled trial. *JAMA* 1992 Mar 11;267(10):1377-1380.
- (50) Harbarth S, Siegrist CA, Schira JC, Wunderli W, Pittet D. Influenza immunization: improving compliance of healthcare workers. *Infection Control & Hospital Epidemiology* 1998 May;19(5):337-342.
- (51) Polgreen PM, Pottinger J, Polgreen LA, Diekema DJ, Herwaldt LA. Influenza vaccination rates, feedback and the Hawthorne effect. *Infect.Control Hosp.Epidemiol.* 2006 Jan;27(1):98-99.
- (52) Zimmerman RK, Nowalk MP, Lin CJ, Raymund M, Fox DE, Harper JD, et al. Factorial design for improving influenza vaccination among employees of a large health system. *Infection Control & Hospital Epidemiology* 2009 Jul;30(7):691-697.
- (53) Bertin M, Scarpelli M, Proctor AW, Sharp J, Robitson E, Donnelly T, et al. Novel use of the intranet to document health care personnel participation in a mandatory influenza vaccination reporting program. *Am.J.Infect.Control* 2007 Feb;35(1):33-37.

- (54) Hood J, Smith A. Developing a "best practice" influenza vaccination program for health care workers--an evidence-based, leadership-modeled program. *AAOHN J.* 2009 Aug;57(8):308-312.
- (55) Wicker S. Unvaccinated health care workers must wear masks during flu season-a possibility to improve influenza vaccination rates? *Vaccine* 2009 May 5;27(20):2631-2632.
- (56) Kuntz JL, Holley S, Helms CM, Cavanaugh JE, Vande Berg J, Herwaldt LA, et al. Use of a pandemic preparedness drill to increase rates of influenza vaccination among healthcare workers. *Infection Control & Hospital Epidemiology* 2008 Feb;29(2):111-115.
- (57) Stubbe KK, Luebbert PP, Madison L. Drill down: Increasing influenza vaccination rates while testing for pandemic preparedness. *American Journal of Infection Control* 2007;35(5):E43.
- (58) Yang KS, Fong YT, Koh D, Lim MK. High coverage of influenza vaccination among healthcare workers can be achieved during heightened awareness of impending threat. *Ann.Acad.Med.Singap.* 2007 Jun;36(6):384-387.
- (59) Krueger RA, Casey MA. *Focus groups: A practical guide for applied research.* 3rd ed. London, UK: Sage Publications; 2000.
- (60) Patton MQ. *Qualitative research and evaluation methods.* 2nd ed. USA: Sage Publications; 2001.
- (61) National Health Service. *Ready, Steady, Go!* N.P.S. Agency 2005.
- (62) Bowen GA. Naturalistic inquiry and the saturation concept: a research note. *Qualitative Research* 2008;8(1):137-152.
- (63) Krueger RA. *Developing questions for focus groups.* London, UK: Sage Publications; 1998.
- (64) Downe-Wamboldt B. Content analysis: method, applications, and issues. *Health Care Women Int.* 1992 Jul-Sep;13(3):313-321.
- (65) Penrod J, Gueldner SH, Poon LW. Managing multiple chronic health conditions in everyday life. In: Poon LW, Gueldner SH, Sprouse BM, editors. *Successful aging and adaptation with chronic diseases USA:* Springer Publishing Company; 2003. p. 181-208.
- (66) Legare F, O'Connor AM, Graham I, Saucier D, Cote L, Blais J, et al. Primary health care professionals' views on barriers and facilitators to the implementation of the Ottawa Decision Support Framework in practice. *Patient Education and Counseling* 2006;63:380-390.
- (67) Krueger RA. *Analyzing and reporting focus groups results.* London, UK: Sage Publications; 1998.
- (68) Graesser A, Bommareddy S, Swamer S, Golding J. Integrating questionnaire design with a cognitive computational model of human question answering. In: Schwarz N, Sudman S, editors. *Answering questions* San Francisco: Jossey-Bass; 1996. p. 143-174.
- (69) Dillman DA. *Mail and Internet Surveys: The Tailored Design Method.* Canada: John Wiley & Sons, Inc; 2007.
- (70) Groves RM, Fowler FJ, Coupter MP, Lepkowski JM, Singer E, Tourangeau R. *Survey Methodology.* Canada: John Wiley & Sons, Inc; 2004.
- (71) Gendall P, Healey B. Alternatives to Prepaid Monetary Incentives in Mail Surveys. *Int J Public Opin Res* 2008 December 1;20(4):517-527.

**Appendix A: Copy of the Ottawa Influenza Decision Aid (OIDA)**

---

## Step 3: What else do you need to make your decision?

Find out how well this decision aid helped you learn the key facts.  
Check  the best answer.

Flu shot & pills	Decline flu shot & pills	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Which option has the highest chance of you getting the flu?
- Which option has the lowest chance of patients dying from flu that was spread by their care providers?
- Which option has the highest chance of a sore arm as a side effect?
- Which option has the highest chance of nausea and vomiting as side effects?

Correct answers at the bottom of the page.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

- Knowledge:** Do you know enough about the benefits and side effects of each option?
- Values:** Are you clear about which benefits and side effects matter most to you?
- Support:** Do you have enough support and advice from others to make a choice?
- Uncertainty:** Do you feel sure about the best choice for you?

## Step 4: What are the next steps?

Check  your next steps:

- I have decided to take the flu shot before the flu season.
- I have decided to wait for an outbreak and take the flu shot and antiviral pills.
- I have decided to decline both the flu shot and antiviral pills.
- I need to discuss the options with my doctor and family.
- I need to read more about my options.
- Other, please specify: \_\_\_\_\_

Answers for the key facts: 1. Decline flu shot & pills 2. Flu shot 3. Flu shot 4. Antiviral pills

This information is not intended to replace the advice of a health care provider.

This decision aid was developed by Canadian researchers who conducted an extensive review of the available scientific literature. Content Editors: A. McCarthy MD, S. Sullivan MSc, J. Sutherland MEd and the Ottawa Influenza Decision Aid Planning Group. Funded in part by: CHRR, MOHLTC via SHRTN. All Authors have declared no conflict of interest. Format is based on the Ottawa Decision Guide © 2000, A.O'Connor, D. Stacey, University of Ottawa, Canada August 2008

For additional information please contact the Occupational Health and Safety Department for the "Facts and Numbers Behind the Ottawa Influenza Decision Aid".

# What can you do to prevent influenza?

Ottawa Influenza Decision Aid

## A decision aid for those working in a healthcare setting

### What is influenza?

- Influenza (the flu) is a common respiratory illness caused by a virus.
- The flu is spread easily from person to person.
- It starts rapidly. People don't feel well and get a fever and cough. They may also have a headache, runny nose, muscle aches and fatigue.
- Most people recover in 7 to 10 days, but some have complications such as pneumonia and death.
- If the elderly are in contact with people who have not had the flu shot, they are more likely to get the flu and die from complications.

### What are your options to decrease your risk of getting or spreading the flu?

✍ Take the influenza vaccine (flu shot) before flu season. Your employer arranges for you to have a flu shot in your arm in the fall. The government pays for the flu shot.

✍ Wait until there is an outbreak of the flu. You wait to see if your employer declares a flu outbreak. Then you have a flu shot. It takes 14 days to protect you from the flu. During those 14 days, you need to take antiviral pills (Tamiflu) everyday.

✍ Decline both the flu shot and antiviral pills. In a flu outbreak, workers declining the flu shot and antiviral pills because of medical reasons would be reassigned if possible. Workers who decline without a valid medical reason will be placed on unpaid leave of absence until the flu outbreak is over.

### What other health factors may affect your choice?

You should take a flu shot if you OR someone you live with has a chronic condition that needs regular visits to a doctor. Check  any that apply:

- Chronic heart or respiratory disease
- Diabetes
- Kidney disease
- Anemia
- Cancer
- Other \_\_\_\_\_
- None of these apply to me

You should talk to your doctor BEFORE taking the flu shot in some situations. Check  any that apply:

- Strong allergic reaction to a previous flu shot
- Strong allergic reaction to eggs
- Allergy to other parts of the vaccine
- Other medical conditions that concern you, \_\_\_\_\_
- I have no medical concerns about flu shots

### Working through the 4 steps of this decision aid may help you decide

- Step 1: What are the benefits and side effects of each option?  
 Step 2: Which reasons to choose each option matter most to you?  
 Step 3: What else do you need to make your decision?  
 Step 4: What are the next steps?



## **Appendix B: Canadian Healthcare Influenza Immunization Network (CHIIN) Team**

---

Paula Arnold, Ottawa Public Health

Donna Baker, Infection Control, Bruyère Continuing Care

Sherry Bowman, St. Francis Xavier University

Larry W. Chambers, ÉBRI (Elisabeth Bruyere Research Institute), University of Ottawa

Lois Crowe, ÉBRI, OHRI (Ottawa Health Research Institute)

Sarah DeCoutere, Capital Health – Halifax

Caroline George, Bruyère Continuing Care

Kieran Jordan, Infection Control, Bruyère Continuing Care

Jeremy Levine, Bruyère Continuing Care

Chantal Lafleur, ÉBRI, OHRI

Po-po Lam, ÉBRI, University of Ottawa

Anne McCarthy, OHRI, The Ottawa Hospital

Shelly McNeil, CCfV (Canadian Centre for Vaccinology), Dalhousie University

Annette O'Connor, OHRI, University of Ottawa

Donna Pierrynowski MacDougall, CCfV, St. Francis Xavier University

Virginia Roth, The Ottawa Hospital

Kathryn Suh, The Ottawa Hospital

Jane Sutherland, OHRI

Joanne Villeneuve, Occupational Health, Bruyère Continuing Care

Craig White, CCfV, Dalhousie University

## **Appendix C: Ottawa Hospital Research Ethics Board Approval Letters**

---

In Appendix C, there are two letters from the Ottawa Hospital Research Ethics Board (OHREB). In my original thesis proposal, I planned to develop and pilot-test a questionnaire on the implementation of the Ottawa Influenza Decision Aid (OIDA) with a group of organizations. However, it was not logistically feasible to pilot the Questionnaire with the intended organizations. As a result, my thesis proposal was approved by the OHREB (the first letter) but excluded the section on questionnaire development and pilot-testing. I was still able to produce a questionnaire on the implementation of the OIDA as part of my thesis and pilot-test with a convenience sample of five co-workers. The second letter from the REB approved the questionnaire development section of the thesis.



**Ottawa Hospital Research Ethics Boards / Conseils d'éthique en recherches**

751 Parkdale Avenue Suite 106, Ottawa, Ontario K1Y 1J7 613-798-5555 ext. 14902 Fax: 613-761-4311  
<http://www.ohri.ca/ohreb>

Thursday, July 30, 2009

Dr. Anne McCarthy  
Division of Infectious Diseases  
Module G, Box 223  
Ottawa Hospital - General Campus  
501 Smyth Road  
Ottawa, ON K1H 8L6

Dear Dr. McCarthy:

**Re: Protocol # 2008435-01H Optimizing Health Care Workers Interpandemic Vaccine Uptake  
in Acute and Long Term Care**

Thank you for the email correspondence of July 15, 2009 and July 30, 2009 from Lois Crowe with regard to our concerns. Based on her response, the proposed Thesis Proposal dated March 17, 2009 is approved, excluded the development and pilot-testing of a questionnaire on implementing the Ottawa Influenza Decision Aid (OIDA).

Ethical approval remains in effect until October 07, 2009.

Yours sincerely,

  
Francine F-A. Sarazin, Ph.D., C.Psych  
Vice-Chairman  
Ottawa Hospital Research Ethics Board

RS/hm



**Ottawa Hospital Research Ethics Boards / Conseils d'éthique en recherches**

751 Parkdale Avenue Suite 108, Ottawa, Ontario K1Y 1J7 613-798-5565 ext. 14902 Fax: 613-761-4311  
<http://www.ohri.ca/ohreb>

Thursday, December 17, 2009

Dr. Anne McCarthy  
Division of Infectious Diseases  
Module G, Box 223  
Ottawa Hospital - General Campus  
501 Smyth Road  
Ottawa, ON K1H 8L6

Dear Dr. McCarthy:

**RE: Protocol# - 2008435-01H - Optimizing Health Care Workers Interpandemic Vaccine Uptake in Acute and Long Term Care**

**Renewal Expiry Date - Thursday, December 16, 2010**

Thank you for the letter of December 01, 2009, from Lois Crowe enclosing the 'Ottawa Implementation Decision Aid (OIDA) Implementation Questionnaire'. It is approved.

I am pleased to inform you that your Annual Renewal Request (listed above) was reviewed by the Ottawa Hospital Research Ethics Board (OHREB) and is approved. No changes, amendments or addenda may be made in the protocol or the consent form without the OHREB's review and approval.

We acknowledge the name change of Dr. Donna Gallant, and the file has been updated accordingly.

Renewal is valid for a period of one year. Approximately one month prior to that time, a single renewal form should be sent to the OHREB office.

The Tri-Council Policy Statement requires a greater involvement of the OHREB in studies over the course of their execution. As well, you must inform the Board of adverse events encountered during the study, here or elsewhere, or of significant new information which becomes available after the Board review, either of which may impinge on the ethics of continuing the study. The OHREB will review the new information to determine if the protocol should be modified, discontinued, or should continue as originally approved.

  
Raphael Saginur, M.D.  
Chairman  
Ottawa Hospital Research Ethics Board

/km

## Appendix D: Search Strategies for Systematic Review

---

### MEDLINE (OVID)

1. exp Health Personnel
2. (health\$ adj3 personnel).tw.
3. (health\$ adj3 worker\$).tw.
4. (health\$ adj3 practitioner\$).tw.
5. (health\$ adj3 employee\$).tw.
6. (medical adj3 staff).tw.
7. doctor\$.tw.
8. physician\$.tw.
9. (allied health adj3 staff).tw.
10. (allied health adj3 personnel).tw.
11. (allied health adj3 worker\$).tw.
12. paramedic\$.tw.
13. (nursing adj3 staff).tw.
14. nurse\$.tw.
15. (nurs\$ adj3 auxiliar\$).tw.
16. (hospital adj3 personnel).tw.
17. (hospital adj3 staff).tw.
18. (hospital adj3 worker\$).tw.
19. (health adj3 provider\$).tw.
20. personal support worker\$.tw.
21. (nurse\$ adj aide\$).tw.
22. exp hospital volunteers/  
23. (hospital adj volunteer\$).tw.
24. or/1-23
25. Health Facilities/  
26. Academic Medical Centers/  
27. Community Health Centers/  
28. exp Hospitals/  
29. Dental Clinics/  
30. Homes for the Aged/  
31. exp Nursing Homes/  
32. Long-Term Care/  
33. (health\$ adj3 facilit\$).tw.
34. (health adj3 institut\$).tw.
35. (health\$ adj3 organization\$).tw.
36. (nursing adj3 home\$).tw.
37. (long term adj3 care).tw.
38. hospital\$.tw.
39. hospice\$.tw.
40. (acute adj3 care).tw.
41. (community adj health adj center\$).tw.
42. (community adj health adj centre\$).tw.
43. or/25-42
44. exp influenza vaccines/  
45. exp influenza/  
46. exp Immunization Programs/  
47. exp immunization/  
48. exp vaccination/  
49. exp vaccines/  
50. (immun\$ adj3 program\$).tw.
51. (vaccin\$ adj3 program\$).tw.
52. influenza.tw.
53. flu shot\$.tw.
54. vaccin\$.tw.
55. (influenza adj3 vaccin\$).tw.
56. (influenza adj3 immun\$).tw.
57. (flu adj3 immun\$).tw.
58. (flu adj3 vaccin\$).tw.
59. or/44-58
60. randomized controlled trial.pt.
61. random\$.tw.
62. control\$.tw.
63. intervention\$.tw.
64. evaluat\$.tw.
65. or /60-64
66. Animal/  
67. Human/  
68. 66 not (66 and 67)
69. 65 not 68
70. 24 and 43 and 59 and 69

## EMBASE (OVID)

1. exp health care personnel/
2. (health\$ adj3 personnel).tw.
3. (health\$ adj3 worker\$).tw.
4. (health\$ adj3 practitioner\$).tw.
5. (health\$ adj3 employee\$).tw.
6. (medical adj3 staff).tw.
7. doctor\$.tw.
8. physician\$.tw.
9. (allied health adj3 personnel).tw.
10. (allied health adj3 staff).tw.
11. (allied health adj3 worker\$).tw.
12. paramedic\$.tw.
13. (nursing adj3 staff).tw.
14. nurse\$.tw.
15. (nurs\$ adj3 auxiliar\$).tw.
16. (hospital adj3 personnel).tw.
17. (hospital adj3 staff).tw.
18. (hospital adj3 worker\$).tw.
19. (health adj3 provider\$).tw.
20. personal support worker\$.tw.
21. (hospital adj volunteer\$).tw.
22. (nurse\$ adj aide\$).tw.
23. or/1-22
24. exp health care facility/
25. home for the aged/
26. exp long term care/
27. exp hospital care/
28. nursing care/
29. (health\$ adj3 facilit\$).tw.
30. (health\$ adj3 organization\$).tw.
31. (long term adj3 care).tw.
32. (nursing adj3 home\$).tw.
33. hospital\$.tw.
34. (health adj3 institut\$).tw.
35. (community adj health adj centre\$).tw.
36. (community adj health adj center\$).tw.
37. hospice\$.tw.
38. (acute adj3 care).tw.
39. or/24-38
40. Influenza Vaccine/
41. exp Influenza/
42. influenza vaccination/
43. immunization/
44. Vaccine/
45. (immun\$ adj3 program\$).tw.
46. (vaccin\$ adj3 program\$).tw.
47. influenza.tw.
48. flu shot\$.tw.
49. (flu adj3 vaccin\$).tw.
50. (flu adj3 immun\$).tw.
51. (influenza adj3 vaccin\$).tw.
52. (influenza adj3 immun\$).tw.
53. or/40-52
54. Randomized controlled trial/
55. random\$.tw.
56. experiment\$.tw.
57. (time adj series).tw.
58. (pre test or pretest or post test or posttest).tw.
59. impact.tw.
60. intervention\$.tw.
61. chang\$.tw.
62. evaluat\$.tw.
63. effect?.tw.
64. compar\$.tw.
65. control\$.tw.
66. or/54-65
67. Nonhuman/
68. 66 not 67
69. 23 and 39 and 53 and 68

## CINAHL (OVID)

1. exp Health Personnel/
2. (health\$ adj3 personnel).tw.
3. (health\$ adj3 worker\$).tw.
4. (health\$ adj3 practitioner\$).tw.
5. (health\$ adj3 employee\$).tw.
6. (medical adj3 staff).tw.
7. doctor\$.tw.
8. physician\$.tw.
9. (allied health adj3 staff).tw.
10. (allied health adj3 personnel).tw.
11. (allied health adj3 worker\$).tw.
12. paramedic\$.tw.
13. (nursing adj3 staff).tw.
14. nurse\$.tw.
15. (nurs\$ adj3 auxiliar\$).tw.
16. (hospital adj3 personnel).tw.
17. (hospital adj3 staff).tw.
18. (hospital adj3 worker\$).tw.
19. (health adj3 provider\$).tw.
20. personal support worker\$.tw.
21. (nurse\$ adj aide\$).tw.
22. (hospital adj volunteer\$).tw.
23. or/1-22
24. Health Facilities/
25. Academic Medical Centers/
26. Community Health Centers/
27. exp Hospitals/
28. Dental Clinics/
29. exp Nursing Homes/
30. Long-Term Care/
31. (health\$ adj3 facilit\$).tw.
32. (health adj3 institut\$).tw.
33. (health\$ adj3 organization\$).tw.
34. (nursing adj3 home\$).tw.
35. (long term adj3 care).tw.
36. hospital\$.tw.
37. hospice\$.tw.
38. (acute adj3 care).tw.
39. (community adj health adj center\$).tw.
40. (community adj health adj centre\$).tw.
41. or/24-40
42. exp influenza vaccine/
43. exp influenza/
44. exp Immunization Programs/
45. exp immunization/
46. exp vaccination/
47. exp vaccines/
48. (immun\$ adj3 program\$).tw.
49. (vaccin\$ adj3 program\$).tw.
50. influenza.tw.
51. flu shot\$.tw.
52. vaccin\$.tw.
53. (influenza adj3 vaccin\$).tw.
54. (influenza adj3 immun\$).tw.
55. (flu adj3 immun\$).tw.
56. (flu adj3 vaccin\$).tw.
57. or/42-56
58. clinical trials/
59. control\$.tw.
60. random\$.tw.
61. comparative studies/
62. experiment\$.tw.
63. (time adj series).tw.
64. impact.tw.
65. intervention\$.tw.
66. evaluat\$.tw.
67. effect?.tw.
68. exp pretest-posttest design/
69. exp quasi-experimental studies/
70. or/58-69
71. "cochrane database of systematic reviews".jn.
72. 70 not 71
73. 23 and 41 and 57 and 72

### **Science Citations Index Expanded (Web of Science)**

TS=((worker\* OR personnel\* OR nurse\* OR physician\* OR allied health\*)) AND TS=((influenza immun\* or influenza vaccin\*)) AND TS=((health\* facilit\* OR health organization\* OR nursing home\* OR long-term care OR hospital\* OR hospice\* OR acute care OR community health cent\*))

### **Database of Abstracts of Reviews of Effects (DARE)**

(influenza immun\* or influenza vaccin\*) AND (personnel or worker\* or nurse\* or physician\* or allied health or personal support worker\*)

### **Cochrane Database of Systematic Reviews and Cochrane Central Register of Controlled Trials**

(worker\* OR personnel\* OR nurse\* OR physician\* OR allied health\*) and (influenza immun\* or influenza vaccin\*) and (health\* facilit\* OR health organization\* OR nursing home\* OR long-term care OR hospital\* OR hospice\* OR acute care OR community health cent\*)

### **Dissertations & Theses (ProQuest)**

IF((worker\* OR personnel\* OR nurse\* OR physician\* OR allied health\*)) AND IF((influenza immun\* or influenza\*))

## **Appendix E – Data Extraction Form for Systematic Review**

---

For questions where the author did not explicitly state in the original paper, please write 'Not Clear'. For questions where it does not apply to the study, please write 'N/A'.

### **1. Document Identification**

---

Reviewer's Initials \_\_\_\_\_ Source \_\_\_\_\_

Lead Author \_\_\_\_\_ Journal/Title of Medium \_\_\_\_\_

Year of publication \_\_\_\_\_ Language of publication: 1. English 2. Other: \_\_\_\_\_

Country(ies) of Study Origin: \_\_\_\_\_

### **2. Type of Document**

---

#### **Purpose:**

1. Evaluation of intervention      2. Economic Impact      3. Guideline  
4. Other: \_\_\_\_\_

#### **Medium:**

1. Full journal Publication      2. Published abstract      3. Editorial      4. Letter/comment  
5. Book proceedings      6. Conference      7. Grey literature

**Study Design:** \_\_\_\_\_

### **3. Study Participants**

---

#### **Staff Group(s) (check all that apply):**

1. Physicians
2. Nurses
3. Other direct patient-care staff (please specify): \_\_\_\_\_
4. Housekeeping
5. Administration
6. Volunteers
7. Other (please specify): \_\_\_\_\_

**Employment Status (check all that apply) :** 1. Full-time      2. Part-time      3. Casual Workers

#### **4. Study Setting**

---

**Type of health organization (circle all that apply)**

1. Acute Care Hospital   2. Long-term care home   3. Rehabilitation   4. Complex-Continuing Care  
5. Mental Health Organization   6. Other: \_\_\_\_\_

Specify department/ward (if applicable): \_\_\_\_\_

**Academic Status of Organization**

1. Academic /research   2. University Affiliated   3. Non-teaching setting   4. Mixed

#### **5. Methods**

---

**Unit of allocation to study groups:** \_\_\_\_\_

**Unit of analysis used in the results:** \_\_\_\_\_

**Power calculation reported?:**

Yes                      No (authors reported study was underpowered)                      Not Clear

## 6. Intervention/Control Group characteristics

GROUP 1: \_\_\_\_\_

**Method of delivery (check all that apply):**

1. One-on-One                      2. Group Sessions                      3. Unknown

**Format of intervention (check all that apply):** 1. Paper-based    2. Web-based

3. Audio/visual                      4. Interpersonal    5. Computer (not web-based)                      6. Learning resources

7. Other: \_\_\_\_\_

**Who (or what) delivered the intervention?** \_\_\_\_\_

**Frequency and duration of the intervention:**

**When was intervention administered? (check all that apply)**

1. Before the flu season    2. During the flu season    3. Year-round

4. Other: \_\_\_\_\_

**Was intervention based on any conceptual/theoretical model(s):** Yes    No

If YES, specify model: \_\_\_\_\_

**Was intervention based on good evidence (i.e. performed systematic review):** Yes    No

**Describe details of the intervention:** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

GROUP 2:

**Method of delivery (check all that apply):**

1. One-on-One                      2. Group Sessions                      3. Unknown

**Format of intervention (check all that apply):** 1. Paper-based    2. Web-based

3. Audio/visual                      4. Interpersonal    5. Computer (not web-based)                      6. Learning resources

7. Other: \_\_\_\_\_

**Who (or what) delivered the intervention?** \_\_\_\_\_

**Frequency and duration of the intervention:**

**When was intervention administered? (check all that apply)**

1. Before the flu season    2. During the flu season    3. Year-round

4. Other: \_\_\_\_\_

**Was intervention based on any conceptual/theoretical model(s):** Yes    No

If YES, specify model: \_\_\_\_\_

**Was intervention based on good evidence (i.e. performed systematic review):** Yes    No

**Describe details of the intervention:** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**GROUP 3:** \_\_\_\_\_

**Method of delivery (check all that apply):**

1. One-on-One                      2. Group Sessions                      3. Unknown

**Format of intervention (check all that apply):** 1. Paper-based    2. Web-based

3. Audio/visual                      4. Interpersonal    5. Computer (not web-based)                      6. Learning resources  
7. Other: \_\_\_\_\_

**Who (or what) delivered the intervention?** \_\_\_\_\_

**Frequency and duration of the intervention:**

**When was intervention administered? (check all that apply)**

1. Before the flu season    2. During the flu season    3. Year-round  
4. Other: \_\_\_\_\_

**Was intervention based on any conceptual/theoretical model(s):** Yes    No

If YES, specify model: \_\_\_\_\_

**Was intervention based on good evidence (i.e. performed systematic review):** Yes    No

**Describe details of the intervention:** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**GROUP 4:** \_\_\_\_\_

**Method of delivery (check all that apply):**

1. One-on-One                      2. Group Sessions                      3. Unknown

**Format of intervention (check all that apply):** 1. Paper-based    2. Web-based

3. Audio/visual                      4. Interpersonal    5. Computer (not web-based)                      6. Learning resources  
7. Other: \_\_\_\_\_

**Who (or what) delivered the intervention?** \_\_\_\_\_

**Frequency and duration of the intervention:**

**When was intervention administered? (check all that apply)**

1. Before the flu season    2. During the flu season    3. Year-round  
4. Other: \_\_\_\_\_

**Was intervention based on any conceptual/theoretical model(s):** Yes    No

If YES, specify model: \_\_\_\_\_

**Was intervention based on good evidence (i.e. performed systematic review):** Yes    No

**Describe details of the intervention:** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## SECTION 7: Outcomes

For **Randomized Control Trials (RCTs)/Cluster-RCTs**: Report the main outcomes for each group in chart below

For **Controlled-Before and After Studies**: Report baseline and post-intervention results in chart below

For **Interrupted Time Series**: Report pre- and post- intervention means and absolute change in chart below and complete the ITS section

Label the column headings appropriate for the study design  
(i.e. intervention group, time points)

<b>Variable</b>			
# of Total Subjects enrolled			
# of Subjects analyzed			
# Withdrawals			
Length of post-intervention follow-up period			
Average Age (SE/SD)			
# Males/ # females			
Mean change in level of influenza rates			
Number of those received the flu shot			
# Reported influenza cases among HCWs			
# Reported sick-leave among HCWs			
# Patients/residents with influenza			
# Influenza outbreaks at organization (note the time periods of outbreaks)			
<b>Report all other main outcomes:</b>			
Other outcomes: _____			
Other outcomes: _____			
Other outcomes: _____			

**Further notes on ITS outcomes:**

Number of pre –intervention observation points \_\_\_\_\_

Number of post –intervention observation points \_\_\_\_\_

Time interval between points \_\_\_\_\_

Was information on the value of individual observations over time only reported graphically in the original paper?

YES NO

**Further General Notes**

**Examples: Difficulties that arose during implementation of the intervention, author conclusions, applicability of intervention, cost-implications.**

---

---

---

**Appendix F. Characteristics of excluded studies reporting an influenza immunization campaign in long-term care homes**

Study	Country	*Study Design	Intervention Campaign Components				Results	Other Campaign Details
			Education / Promotion	Improve Access	Legislation/ Regulation	Measure/ Feedback		
McLeod 2001 (1)	Canada	CSS	x				Rates not reported Staff meetings to talk about strategies	
Neudorf 2003 (2)	Canada	ITS	x				Designated sub-committee; Survey for reasons for low uptake	
Sullivan 2008 (3)	Canada	PO	x				67% preferred vaccine Ottawa Influenza Decision Aid	
†McArthur 1999 (4)	Canada	CSS		x			Promotion/encouragement of influenza vaccine associated with increased uptake >75% immunized	
Looijmans-van den Akker 2007 (5)	Netherlands	BnA			x		Before 2004: 5-8% After 2004: 11% Introduction of national guidelines on influenza immunization in 2004	
†Hauri 2006 (6)	Germany	CSS	x	x			All sites with 50-69% uptake had an active campaign for HCPs Surveyed directors of LTCHs for campaign practices	
†Maltezou 2008 (7)	Greece	CSS	x	x			Mean 16.4% immunized Training of infection control nurse;	
†Song 2006 (8)	Korea	ITS	x	x			2000: 23% immunized 2003-04:78% immunized	
Tapiainen 2005 (9)	Switzerland	BnA	x	x			Pre: 19% immunized Post: 24% immunized	
Manuel 2002 (10)	Canada	CSS	x	x			Rates not reported 'The Big Shot Challenge'	
†Russell 2001 (11)	Canada	CSS	x	x		x	Median 29.9% immunized Monitoring compliance; Reminder systems; Written staff immunize policy	
Festini 2007 (12)	Italy	PO	x	x			30.3% immunized Peer vaccination	
Bannerman 1992 (13)	Canada	BnA	x	x		x	Pre: 6-10% immunized Post: 34-41% immunized Competition between wards; Dignitaries vaccinated	
†Nace 2007 (14)	USA	ITS	x		x		Formal needs assessment; Used successful adult immunization programs	
†Sand 2007 (15)	USA	BnA	x	x		x	10 teams improved by at least 10%; 3 teams had ≥80% immunized Rapid cycle quality improvement (RCQI); Interventions tailored to self-identified barriers and previous research	
†Halliday 2003 (16)	Australia	CSS	x	x			28% immunized Policy of staff vaccination	
†Stevenson 2001 (17)	Canada	CSS					35% immunized Higher uptake associated with having an infection control practitioner, and offering vaccine in winter and to casual staff	

\*Study designs: PO (Post-Only), ITS (Interrupted Time Series), BnA (1-group Before and After), C-RCT (Cluster-Randomized Controlled Trial), CSS (Cross-Sectional Study)

†Interventions were not implemented by all participating organizations

‡Interventions were not implemented concurrently

Full references provided in Appendix I

**Appendix G. Characteristics of excluded studies reporting an influenza immunization campaign in a hospital setting**

Study	Country	*Study Design	Intervention Campaign Components				Results	Other Campaign Details
			Education / Promotion	Improve Access	Legislation / Regulation	Measure/ Feedback		
Qureshi 2004 (18)	UK	CSS	x				28% immunized Local media releases	
<sup>†</sup> Leitmeyer 2006 (19)	Germany	ITS	x				2001-02: 21% uptake 2003-04: 26% uptake Surveyed for reasons for low uptake	
<sup>†</sup> O'Reilly 2005 (20)	Ireland	CSS	x				3.4 – 17.6% immunized General and targeted publicity methods	
Chittaro 2009 (21)	Italy	ITS		x			Public health doctors visited wards to provide vaccine; "Avian flu crisis" in 2005 may have affected rates	
Piccirillo 2006 (22)	USA	CSS		x			Before: 10.4% uptake After (2005): 36.6% After (2006): 23.3% 50% immunized	
Pur 2005 (23)	USA	PO			x		Clinic: 1 vaccine per 2.5 mins/vaccinator Cart: 1 vaccine per 3.0 mins/ vaccinator	
Adal 1996 (24)	USA	ITS		x			Graph showed increased uptake	
Jones 1999 (25)	Australia	PO		x			24% immunized	
O'Rorke 2003 (26)	Ireland	CSS		x			17.5% immunized	
Lee 2007 (27)	Singapore	BnA		x			Pre: 56.8% immunized Post: 66.4% immunized	
Yang 2007 (28)	Singapore	PO		x			56.8% immunized Exercise for pandemic influenza	
Yassi 1991 (29)	Canada	PO		x			6-11% immunized	
Polgreen 2008 (30)	USA	BnA			x		Mean rate change: 12% Declination statements	
Smithers 2003 (31)	Australia	PO				x	Immunization coordinator designated	
<sup>†</sup> Fedson 1996 (32)	USA	ITS				x	Designated nurse to vaccinate others; Clinic director monitoring uptake	
Primus 2009 (33)	USA	BnA	x				Roving clinics and education	
de Juanes 2004 (34)	Spain	ITS	x				Information posters and mobile carts	
Norton 2008 (35)	Canada	PO	x				Multiple clinics and mobile vaccine carts	
Traeger 2006 (36)	USA	PO	x				Radio broadcast; Immunization workshop; CDC recommendations	
Shah 2008 (37)	USA	BnA	x				Originally set up as a program to increase uptake among parents	

Study	Country	*Study Design	Intervention Campaign Components				Results	Other Campaign Details
			Education / Promotion	Improve Access	Legislation/ Regulation	Measure/ Feedback		
			Role Models					
Begue 1998 (38)	USA	BnA	x	x		Pre: 21% immunized Post: 38% immunized Median 43% uptake	Addressed concerns highlighted by baseline survey Network provided educational materials as requested	
†Bryant 2004 (39)	USA	CSS	x	x				
Wells 2008 (40)	USA	BnA	x	x		Pre: 39% immunized Post: 48% immunized	Peer vaccination; Reviewed literature for campaign ideas	
Girasek 1990 (41)	USA	BnA	x	x		Pre: 9- 11% immunized Post: 30-36% immunized	Buttons for immunized HCWs; Literature review on staff compliance	
Smedley 2002 (42)	UK	ITS	x	x		1995: 2.0% immunized 1999: 4.5% immunized 49.8% immunized	Vaccine offered at managers' briefing; Surveyed for barriers	
Carman 2000 (43)	UK	CRCT	x	x				
Lopes 2008 (44)	Brazil	ITS	x	x		2004: 6% immunized 2007: 48.5% immunized		
Takayanagi 2007 (45)	Brazil	ITS	x	x		2003 (intervention): 34% 2005: 12.8%		
Wicker 2007 (46)	Germany	PO	x	x		35.8% immunized		
Watanakunakorn 1993 (47)	USA	BnA	x	x		1990: 18.1% immunized 1991: 30.2% immunized		
Hall 1998 (48)	USA	BnA	x	x		Pre: 34-55% immunized Post: 100% immunized	Emailed reminders; Infection Control Fair	
Sartor 2004 (49)	France	ITS	x	x		1998: 6% immunized 2002: 32% immunized		
Chamoux 2006 (50)	France	BnA	x	x		Pre: 4.8% immunized Post: 12.6% immunized		
Elorza 2002 (51)	Spain	PO	x	x		12.7-14.7% immunized		
Norton 2008 (35)	Canada	PO	x	x		78% immunized nurses		
Jacomo 2001 (52)	France	PO	x	x		36% immunized		
Stewart 2002 (53)	Australia	BnA	x		x	Pre: 19% completed status report; Post: 42% of new HCWs completed report	Employees required to complete a vaccination status report ; New employees introduced to immunization guidelines	
Stubbe 2007 (54)	USA	PO	x	x		75% immunized	2-3 day emergency drill; Special task force	
Nichol 1997 (55)	USA	CSS	x	x		67.4% intended uptake		
Cyrnow 2008 (56)	USA	BnA		x	x	20% immunized in 2 hrs	2-hour emergency drill	
Gornick 2007 (57)	USA	BnA	x	x		Pre: 50% immunized Post: 60% immunized	Free luncheon for flu shot Q&A	

Study	Country	*Study Design	Intervention Campaign Components					Results	Other Campaign Details
			Education / Promotion	Improve Access	Legislation/ Regulation	Measure/ Feedback	Role Models		
Keedick 2007 (58)	USA	BnA	x	x	x	x	Pre: 33% immunized Post: 77% immunized	Free lunch if uptake reaches 80% Reviewed evidence-based interventions	
Salgado 2004 (59)	USA	ITS	x	x		x	Pre: 4% immunized Post: 67% immunized		
Nafziger 1994 (60)	USA	PO	x	x			51% of internal medicine residents immunized	Free vaccine provided at Health Fair Memo from chairman of department	
Ballestas 2009 (61)	Australia	BnA	x	x			All 5 sites improved uptake: 48.8 – 76.5%	Dedicated working committed Consistent campaign message across sites Flu champions	
Nicholson 2009 (62)	USA	BnA	x	x		x	Before: 45% immunized After: 65% immunized	Trained flu coordinators for each unit to be responsible for contacting their workers	
Chance 2005 (63)	USA	BnA	x	x		x	Pre: 15-33% immunized Post: 55% immunized	"I have had my flu vaccine" sticker	
Shannon 1993 (64)	USA	BnA	x	x		x	Pre: 5% immunized Post: 44% immunized		
†Mehta 2008 (65)	USA	CSS	x	x		x	Higher rates for areas with mobile carts		
Dunais 2006 (66)	France	BnA	x	x		x	Pre: 7% immunized Post: 35% immunized		
†Garcia de Codes Ilario 2004 (67)	Spain	BnA	x	x		x	Pre: 20.2% immunized Post: 38.0% immunized		
Ofstead 2008 (68)	USA	CSS	x	x		x	64.5% intended uptake		
Samms 2004 (69)	USA	BnA	x	x		x	Pre: ~30% immunized Post: 47% immunized	Nurse champions trained to educate; Peer vaccination; Corporate goal of 50% uptake	
†Gazmararian 2007 (70)	USA	CSS	x	x	x	x	Mean 41% immunized	Managers compared rates to other groups	
McCullers 2006 (71)	USA	ITS	x	x		x	44.7% immunized		
Kuntz 2008 (72)	USA	BnA	x	x		x	Pre: 41% immunized Post: 51% immunized	6-day pandemic influenza drill; 'I got it' stickers; Peer vaccination	
Ribner 2008 (73)	USA	BnA	x	x	x	x	Pre: 43% immunized Post: 67% immunized	Initiated task force; Announced 65% goal	
†Polgreen 2008 (74)	USA	CSS	x	x	x	x	41-60% immunized	Survey of immunization practices	
††Polgreen 2009 (75)	USA	CSS	x	x	x	x	Use of declination forms associated with 12.6% increase	Cross sectional survey of influenza campaign activities	

\*Study designs: PO (Post-Only), ITS (Interrupted Time Series), BnA (1-group Before and After), C-RCT (Cluster-Randomized Controlled Trial), CSS (Cross-Sectional Study)

†Interventions were not implemented by all participating organizations

††Interventions were not implemented concurrently

Full references provided in Appendix I

**Appendix H. Characteristics of excluded studies reporting an influenza immunization campaign in mixed-healthcare settings**

Study	Country	*Study Design	Intervention Campaign Components					Results	Other Campaign Details
			Education / Promotion	Improve Access	Legislation / Regulation	Measure / Feedback	Role Models		
<sup>†</sup> Desbiens 2005 (76)	USA	CSS	x				1999-00:79% immunized 2003-04:90% immunized	Policy to have all employees immunized	
Heimberger 1995 (77)	USA	BnA	x				Before: 16% immunized After: 33% immunized	Surveyed for factors related to uptake	
Harrison 2002 (78)	UK	PO		x			9% immunized	Physicians trained by occupational health nurses to provide immunization	
<sup>†</sup> Rothan-Tondeur 2006 (79)	France	CSS			x		Avg. 31.2% immunized	Local organizational policy on immunization	
Bruce 2007 (80)	Canada	BnA	x	x			Before: 62.4% uptake After: 87.5% immunized	Paramedics attended educational program as part of mandatory training and vaccines were offered immediately after.	
<sup>†</sup> D'Heilly 2004 (81)	USA	CSS	x				Rates not reported	Healthcare related companies more likely to encourage vaccination, gave time off for vaccine, and offered vaccine to volunteers	
Thomas 1993 (82)	USA	ITS		x			1989-90: 8% immunized 1991-92:54% immunized	1-day Staff Vaccination Fair Senior staff reviewed CDC guidelines	
<sup>†</sup> Goldstein 2004 (83)	USA	CSS	x	x	x		38% of organizations had a formal policy	Formal written policy for staff immunization	
<sup>†</sup> Borlaug 2007 (84)	USA	CSS					Hospitals with declination forms had higher rates (65%) LTCHs with free vaccine, education, or declination form had significantly higher rates		
<sup>†</sup> CDC, 2005 (85)	USA	Mixed	x	x			3 case studies	Peer vaccination	
<sup>†</sup> NFID, 2007 (86)	USA	Mixed	x	x	x		5 case studies	State law	

\*Study designs: PO (Post-Only), ITS (Interrupted Time Series), BnA (1-group Before and After), C-RCT (Cluster-Randomized Controlled Trial), CSS (Cross-Sectional Study)

<sup>†</sup>Interventions were not implemented by all participating organizations

<sup>‡</sup>Interventions were not implemented concurrently

Full references provided in Appendix I;

## Appendix I – References of Excluded Studies for Systematic Review

---

1. McLeod L, Lau WW. Decreasing influenza impact in lodges: 1997-2000 calgary regional health authority. *Canadian Journal of Public Health*. 2001;92(4):291-4.
2. Neudorf C, Obayan A, Anderson C, Chomyn J. A collaborative system-wide response to influenza outbreak management in saskatoon health region. *Canadian Journal of Public Health. Revue Canadienne de Sante Publique*. 2003;94(5):338-40.
3. Sullivan SM, Pierrynowski-Gallant D, Chambers L, O'Connor A, Bowman S, McNeil S, et al. Influenza vaccination and decisional conflict among regulated and unregulated direct nursing care providers in long-term-care homes. *AAOHN J*. 2008 Feb;56(2):77-84.
4. McAurthur MA, Simor AE, Campbell B, McGeer A. Influenza vaccination in long-term-care facilities programs for success. *Infection Control and Hospital Epidemiology*. 1999;20:499-503.
5. Looijmans-van den Akker I, van Delden JJM, Verheij TJM, van Essen GA, van der Sande MAB, Huscher ME, et al. Which determinants should be targeted to increase influenza vaccination uptake among health care workers in nursing homes? *Vaccine*. 2009 JUL 23;27(34):4724-30.
6. Hauri AM, Uphoff H, Gussmann V, Gawrich S. Factors that affect influenza vaccine uptake among staff of long-term care facilities. *Infection Control and Hospital Epidemiology*. 2006 JUN;27(6):638-41.
7. Maltezou H, Maragos A, Raftopoulos V, Karageorgou K, Halharapi T, Remoudaki H, et al. Strategies to increase influenza vaccine uptake among health care workers in greece. *Scand J Infect Dis*. 2008;40(3):266-8.
8. Song JY, Park CW, Jeong HW, Cheong HJ, Kim WJ, Kim SR. Effect of a hospital campaign for influenza vaccination of healthcare workers. *Infection Control & Hospital Epidemiology*. 2006 Jun;27(6):612-7.
9. Tapiainen T, Bar G, Schaad UB, Heininger U. Influenza vaccination among healthcare workers in a university children's hospital. *Infection Control & Hospital Epidemiology*. 2005 Nov;26(11):855-8.
10. Manuel DG, Henry B, Hockin J, Naus M. Health behaviour associated with influenza vaccination among healthcare workers in long-term-care facilities. *Infection Control and Hospital Epidemiology*. 2002;23:609-614.
11. Russell ML. Influenza vaccination in alberta long-term care facilities. *Can Med Assoc J*. 2001;164(10):1423-7.
12. Festini F, Biermann KP, Neri S, Reali MF, de Martino M. [Influenza vaccination of nurses in an italian pediatric hospital: Effects on absenteeism and on costs, factors associated with vaccine uptake and analysis of personal motivations. A prospective cohort study]. *Assistenza Infermieristica e Ricerca:Air*. 2007 Jan-Mar;26(1):5-13.
13. Wright SW, Decker, Edwards KM. Incidence of pertussis infection in healthcare workers. *Infect Control Hosp Epidemiol*. 1999 Feb;20(2):120-3.
14. Nace DA, Hoffman EL, Resnick NM, Handler SM. Achieving and sustaining high rates of influenza immunization among long-term care staff. *Journal of the American Medical Directors Association*. 2007 Feb;8(2):128-33.
15. Sand KL, Lynn J, Bardenheier B, Seow H, Nace DA. Increasing influenza immunization for long-term care facility staff using quality improvement. *J Am Geriatr Soc*. 2007 Nov;55(11):1741-7.
16. Halliday L, Thomson JA, Roberts L, Bowen S, Mead C. Influenza vaccination of staff in aged care facilities in the ACT: How can we improve the uptake of influenza vaccine?. *Aust N Z J Public Health*. 2003;27(1):70-5.
17. Stevenson CG, McArthur MA, Naus M, Abraham E, McGeer AJ. Prevention of influenza and pneumococcal pneumonia in canadian long-term care facilities: How are we doing?[see comment]. *CMAJ Canadian Medical Association Journal*. 2001 May 15;164(10):1413-9.
18. Qureshi AM, Hughes NJ, Murphy E, Primrose WR. Factors influencing uptake of influenza vaccination among hospital-based health care workers. *Occupational Medicine (Oxford)*. 2004 May;54(3):197-201.
19. Leitmeyer K, Buchholz U, Kramer M, Schenkel K, Stahlhut H, Kollstadt M, et al. Influenza vaccination in german health care workers: Effects and findings after two rounds of a nationwide awareness campaign. *Vaccine*. 2006 Nov 17;24(47-48):7003-8.
20. O'Reilly FW, Cran GW, Stevens AB. Factors affecting influenza vaccine uptake among health care workers. *Occupational Medicine*. 2005;55:474-479.
21. Chittaro M, Turello D, Calligaris L, Farneti F, Faruzzo A, Fiappo E, et al. Impact of vaccinating HCWs on the ward and possible influence of avian flu threat. *Infection*. 2009 Feb;37(1):29-33.

22. Piccirillo B, Gaeta T. Survey on use of and attitudes toward influenza vaccination among emergency department staff in a new york metropolitan hospital. *Infection Control and Hospital Epidemiology*. 2006 Jun;27(6):618-22.
23. Pur S, Vestal A, Connolly P, Segreti J, Trenholme G. Mass vaccination in a hospital setting: The push and pull approaches. *SHEA*.
24. Adal KA, Flowers RH, Anglim AM, Hayden FG, Titus MG, Coyner BJ, et al. Prevention of nosocomial influenza. *Infection Control & Hospital Epidemiology*. 1996 Oct;17(10):641-8.
25. Jones C. Influenza vaccination: Impact on absenteeism among nursing and medical staff in a metropolitan teaching hospital. *Aust Infect Control*. 1999 Spring;4(3):14-7.
26. O'Rorke C, Bourke W, Bedford D, Howell F. Uptake of influenza vaccine by healthcare workers in an acute hospital in ireland. *Irish Medical Journal*. 2003;96(7):207-209.
27. Lee HY, Fong YT. On-site influenza vaccination arrangements improved influenza vaccination rate of employees of a tertiary hospital in singapore. *Am J Infect Control*. 2007 Sep;35(7):481-3.
28. Yang KS, Fong YT, Koh D, Lim MK. High coverage of influenza vaccination among healthcare workers can be achieved during heightened awareness of impending threat. *Ann Acad Med Singap*. 2007 Jun;36(6):384-7.
29. Yassi A, Kettner J, Hammond G. Effectiveness and cost-benefit of an influenza vaccination program for health care workers. *Canadian Journal of Infectious Disease*. 1991;2(3):101-108.
30. Polgreen PM, Septimus EJ, Parry MF, Beekmann SE, Cavanaugh JE, Srinivasan A, et al. Relationship of influenza vaccination declination statements and influenza vaccination rates for healthcare workers in 22 US hospitals. *Infection control and hospital epidemiology*. 2008;29(7):675-677.
31. Smithers P, Murray SB, Stewart S, Skull S. Hospital health care worker (HCW) vaccination coverage after implementation of an HCW vaccination policy. *Australian Health Review*. 2003;26(1):76-83.
32. Fedson DS. Influenza vaccination of medical residents at the university of virginia. *Infection control and hospital epidemiology*. 1996;17:431-433.
33. Primus L. Improving influenza vaccination to health care workers. *Am J Infect Control*. 2009 Jun;37(5):430-1.
34. Garcia De Codes Ilario A, Arrazola Martinez MDP, De Juanes Pardo JR, Gallardo MIS, Herreros FJ, Lopez EL. Influenza vaccination in healthcare workers. strategies to achieve compliance in a general hospital. *Med Clin*. 2004 23 Oct;123(14):532-4.
35. Norton SP, Scheifele DW, Bettinger JA, West RM. Influenza vaccination in paediatric nurses: Cross-sectional study of coverage, refusal, and factors in acceptance. *Vaccine*. 2008 02 Jun;26(23):2942-8.
36. Traeger M, Thompson A, Dickson E, Provencio A. Bridging disparity: A multidisciplinary approach for influenza vaccination in an american indian community. *Am J Public Health*. 2006 May;96(5):921-5.
37. Shah SI, Caprio M. Availability of trivalent inactivated influenza vaccine to parents of neonatal intensive care unit patients and its effect on the healthcare worker vaccination rate. *Infection Control and Hospital Epidemiology*. 2008 Apr;29(4):309-13.
38. Begue RE, Gee SQ. Improving influenza immunization among healthcare workers. *Infect Control Hosp Epidemiol*. 1998 Jul;19(7):518-20.
39. Bryant KA, Stover B, Cain L, Levine GL, Siegel J, Jarvis WR. Improving influenza immunization rates among healthcare workers caring for high-risk pediatric patients. *Infection Control & Hospital Epidemiology*. 2004 Nov;25(11):912-7.
40. Wells P, Faris L, Abell V, Sweigert M, Stephens C. Improving healthcare workers influenza vaccination compliance in acute care settings. *American Journal of Infection Control*. 2008;36(5):E79-E80.
41. Girasek D. Increasing hospital staff compliance with influenza immunization recommendations. *American Journal of Public Health*. 1990;80(10):1272-1273.
42. Smedley J, Palmer C, Baird J, Barker M. A survey of the delivery and uptake of influenza vaccine among health care workers. *Occupational Medicine*. 2002;52(5):271-276.
43. Carman WF, Elder AG, Wallace LA, McAulay K, Walker A, Murray GD, et al. Effects of influenza vaccination of health-care workers on mortality of elderly people in long-term care: A randomised controlled trial. *Lancet*. 2000 Jan 8;355(9198):93-7.
44. Lopes MH, Sartori AM, Mascheretti M, Chaves TS, Andreoli RM, Basso M, et al. Intervention to increase influenza vaccination rates among healthcare workers in a tertiary teaching hospital in brazil \*. *Infection Control & Hospital Epidemiology*. 2008 Mar;29(3):285-6.

45. Takayanagi IJ, Cardoso MRA, Costa SF, Araya ME, Machado CM. Attitudes of health care workers to influenza vaccination: Why are they not vaccinated? *Am J Infect Control*. 2007 Feb;35(1):56-61.
46. Wicker S, Doerr HW, Gottschalk R, Rabenau HF, Allwinn R. [Influenza: Acceptance of vaccination by healthcare personnel. evaluation of the influenza season 2006/2007]. *Dtsch Med Wochenschr*. 2007 Aug;132(33):1683-7.
47. Watanakunakorn C, Ellis G, Gemmel D. Attitude of healthcare personnel regarding influenza immunization. *Infection Control & Hospital Epidemiology*. 1993 Jan;14(1):17-20.
48. Hall KL, Holmes SS, Evans ME. Increasing hospital employee participation in an influenza vaccine program. *American Journal of Infection Control*. 1998;26(3):367-368.
49. Sartor C, TissotDupont H, Zandotti C, Martin F, Roques P, Drancourt M. Use of a mobile cart influenza program for vaccination of hospital employees. *Infect Control Hosp Epidemiol*. 2004 Nov;25(11):918-22.
50. Chamoux A, Denis-Porret M, Rouffiac K, Baud O, Millot-Theis B, Souweine B. Impact study of an active antinfluv vaccination programme on the clermont-ferrand teaching hospital staff. *Med Mal Infect*. 2006 Mar;36(3):144-50.
51. Elorza Ricart JM, Campins Marti M, Martinez Gomez X, Allepuz Palau A, Ferrer Gramunt E, Mendez-Aguirre Guitian M. [Influenza vaccine and health-care workers: Strategies to achieve compliance in a tertiary hospital]. *Med Clin*. 2002 Oct 12;119(12):451-2.
52. Jacomo V, Sartor C, Zandotti C, Atlan-Gepner C, Drancourt M. Nosocomial influenza outbreak in an intensive-care unit. *Med Mal Infect*. 2001;31(9):563-8.
53. Stewart S, Murray SB, Skull SA. Evaluation of health-care worker vaccination in a tertiary Australian hospital. *Intern Med J*. 2002 Dec;32(12):585-92.
54. Stubbe KK, Luebbert PP, Madison L. Drill down: Increasing influenza vaccination rates while testing for pandemic preparedness. *American Journal of Infection Control*. 2007;35(5):E43.
55. Nichol KL, Hauge M. Influenza vaccination of healthcare workers. *Infect Control Hosp Epidemiol*. 1997 Mar;18(3):189-94.
56. Cynnow E, Wyatt M. Using a mass vaccination exercise to increase compliance with annual flu vaccination while preparing for an influx of potentially infectious patients. *American Journal of Infection Control*. 2008;36(5):E25-e@6.
57. Gornick W, Nelson C, Scalan G, Lang DJ. "Mandatory" influenza immunization (flulmm) of healthcare workers (HCW) at children's hospital of orange county (CHOC). *American Journal of Infection Control*. 2007;35(5):E99.
58. Keedick CS. Increasing healthcare worker influenza vaccination rates via implementing evidence-based interventions. *American Journal of Infection Control*. 2007;35(5):E99-E100.
59. Salgado CD, Giannetta ET, Hayden FG, Farr BM. Preventing nosocomial influenza by improving the vaccine acceptance rate of clinicians. *Infection Control & Hospital Epidemiology*. 2004 Nov;25(11):923-8.
60. Nafziger DA, Herwaldt LA. Attitudes of internal-medicine residents regarding influenza vaccination. *Infection Control and Hospital Epidemiology*. 1994 JAN;15(1):32-5.
61. Ballestas T, McEvoy SP, Doyle J, on behalf of the SMAHS Healthcare Worker Influenza Vaccination Working Party. Co-ordinated approach to healthcare worker influenza vaccination in an area health service. *J Hosp Infect*. 2009 Sep 25.
62. Nicholson MR, Hayes DM, Bennett AM. Partnering with nursing service improves health care worker influenza vaccination rates. *Am J Infect Control*. 2009 August;37(6):484-9.
63. Chance J, Williamson S. A user-friendly approach to improving healthcare worker influenza vaccination compliance. *American Journal of Infection Control*. 2005;33(5):E62.
64. Shannon SC. Community hospitals can increase staff influenza vaccination rates. *American Journal of Public Health*. 1993;83(8):1174-1175.
65. Mehta M, Pastor CA, Shah B. Achieving optimal influenza vaccination rates: A survey-based study of healthcare workers in an urban hospital. *J Hosp Infect*. 2008 Sep;70(1):76-9.
66. Dunais B, Saccomano C, Mousnier A, Roure MC, Dellamonica P, Roger P. Influenza vaccination: Impact of an intervention campaign targeting hospital staff. *Infect Control Hosp Epidemiol*. 2006 May;27(5):529-31.
67. Ilario AGD, Martinez MDA, Pardo JRD, Gallardo MIS, Herreros FJ, Lopez EL. Influenza vaccination in healthcare workers. strategies to achieve compliance in a general hospital. *Med Clin*. 2004 OCT 23;123(14):532-4.

68. Ofstead CL, Tucker SJ, Beebe TJ, Poland GA. Influenza vaccination among registered nurses: Information receipt, knowledge, and decision-making at an institution with a multifaceted educational program. *Infect Control Hosp Epidemiol*. 2008 Feb;29(2):99-106.
69. Samms D, Reed K, Lee T, Barill S, Branham D. Achieving a corporate goal for influenza vaccination using nurse champions. *American Journal of Infection Control*. 2004;32(3):E7-E8.
70. Gazmararian JA, Coleman M, Prill M, Hinman AR, Ribner BS, Washington ML, et al. Influenza vaccination of health care workers: Policies and practices of hospitals in a community setting. *Am J Infect Control*. 2007 Sep;35(7):441-7.
71. McCullers JA, Speck KM, Williams BF, Liang H, Mirro J, Jr. Concise communications. increased influenza vaccination of healthcare workers at a pediatric cancer hospital: Results of a comprehensive influenza vaccination campaign. *Infect Control Hosp Epidemiol*. 2006 Jan;27(1):77-9.
72. Kuntz JL, Holley S, Helms CM, Cavanaugh JE, Vande Berg J, Herwaldt LA, et al. Use of a pandemic preparedness drill to increase rates of influenza vaccination among healthcare workers. *Infection Control & Hospital Epidemiology*. 2008 Feb;29(2):111-5.
73. Ribner BS, Hall C, Steinberg JP, Bornstein WA, Chakkalal R, Emamifar A, et al. Use of a mandatory declination form in a program for influenza vaccination of healthcare workers. *Infection Control and Hospital Epidemiology*. 2008 Apr;29(4):302-8.
74. Polgreen PM, Chen Y, Beekmann S, Srinivasan A, Neill MA, Gay T, et al. Elements of influenza vaccination programs that predict higher vaccination rates: Results of an emerging infections network survey. *Clinical Infectious Diseases*. 2008 Jan 1;46(1):14-9.
75. Polgreen PM, Polgreen LA, Evans T, Helms C. A statewide system for improving influenza vaccination rates in hospital employees. *Infection Control and Hospital Epidemiology*. 2009 MAY;30(5):474-8.
76. Desbiens NA. A 5-year experience with influenza prevention and containment in a program of all-inclusive care for elderly adults. *Am J Infect Control*. 2005 May;33(4):238-42.
77. Heimberger T, Chang HG, Shaikh M, Crotty L, Morse D, Birkhead G. Knowledge and attitudes of health-care workers about influenza - why are they not getting vaccinated. *Infection Control and Hospital Epidemiology*. 1995 JUL;16(7):412-5.
78. Harrison J, Abbott P. Vaccination against influenza: UK health care workers not on-message. *Occupational Medicine*. 2002;52(5):277-279.
79. RothanTondeur M, de Wazieres B, Lejeune B, Gavazzi G. Influenza vaccine coverage for healthcare workers in geriatric settings in france. *Aging Clin Exp Res*. 2006 Dec;18(6):512-6.
80. Bruce G. Paramedic services workplace program improves influenza immunization rates among paramedics. *Can J Infect Control*. 2007 Fall;22(3):156,8, 160-1.
81. D'Heilly SJ, Nichol KL. Work-site-based influenza vaccination in healthcare and non-healthcare settings. *Infect Control Hosp Epidemiol*. 2004 Nov;25(11):941-5.
82. Thomas DR, Winsted B, Koontz C. Improving neglected influenza vaccination among healthcare workers in long-term care. *J Am Geriatr Soc*. 1993 Sep;41(9):928-30.
83. Goldstein AO, Kincade JE, Gamble G, Bearman RS. Policies and practices for improving influenza immunization rates among healthcare workers. *Infection Control & Hospital Epidemiology*. 2004 Nov;25(11):908-11.
84. Borlaug G, Newman A, Pfister J, Davis JP. Factors that influenced rates of influenza vaccination among employees of wisconsin acute care hospitals and nursing homes during the 2005-2006 influenza season. *Infect Control Hosp Epidemiol*. 2007 Dec;28(12):1398-400.
85. Centers for Disease Control and Prevention (CDC). Interventions to increase influenza vaccination of health-care workers--california and minnesota. *MMWR - Morbidity & Mortality Weekly Report*. 2005 Mar 4;54(8):196-9.
86. Immunizing healthcare personnel against influenza: A report on best practices [homepage on the Internet]. . 2007. Available from: <http://www.nfid.org/HCW/toolkit/BestPracticesToolkitDocument.pdf>.

## Appendix J: Risk of Bias Assessment for RCTs and Cluster-RCTs – Details

Criteria adapted from EPOC checklist (40); Follow-up of patients and blinded assessment of primary outcome were not applicable to the studies included in this review

### Dey 2001 (43) – C-RCT

Assessment criteria	Assessment	Notes
Concealment of allocation	Done	<ul style="list-style-type: none"> <li>Unit of allocation: worksites</li> <li>Randomization process not explicit</li> </ul>
Follow-up of professionals	Done	<ul style="list-style-type: none"> <li>Table showed almost all employees' vaccination status were obtained</li> </ul>
Baseline measurement	Not clear	<ul style="list-style-type: none"> <li>Baseline immunization rate not reported</li> </ul>
Reliable primary outcome measure	Not clear	<ul style="list-style-type: none"> <li>GPs are reimbursed for vaccinating HCPs and must report vaccination status for reimbursement</li> </ul>
Protection against contamination	Done	<ul style="list-style-type: none"> <li>Allocation by worksites</li> </ul>

### Doratotaj 2008 (48) - RCT

Assessment criteria	Assessment	Notes
Concealment of allocation	Not clear	<ul style="list-style-type: none"> <li>Unit of allocation: workers</li> <li>Randomization process not explicit</li> </ul>
Follow-up of professionals	Not clear	<ul style="list-style-type: none"> <li>Number of unknown vaccination status not reported</li> <li>Cross-checked list of subjects with hospital immunization recipients</li> </ul>
Baseline measurement	Not clear	<ul style="list-style-type: none"> <li>Baseline immunization rate not reported</li> </ul>
Reliable primary outcome measure	Done	<ul style="list-style-type: none"> <li>Cross-checked with hospital clinic list</li> </ul>
Protection against contamination	Not clear	<ul style="list-style-type: none"> <li>Possibility of contamination where workers can share their letter with co-workers</li> </ul>

### Hayward 2006 (44) - CRCT

Assessment criteria	Assessment	Notes
Concealment of allocation	Done	<ul style="list-style-type: none"> <li>Unit allocation: Long-term care homes</li> <li>Randomization with random number table</li> </ul>
Follow-up of professionals	Not clear	<ul style="list-style-type: none"> <li>Unclear if all workers were followed up for vaccination status</li> </ul>
Baseline measurement	Not clear	<ul style="list-style-type: none"> <li>Baseline immunization rate not reported</li> </ul>
Reliable primary outcome measure	Not clear	<ul style="list-style-type: none"> <li>Unclear how vaccination status was obtained</li> <li>Captured workers vaccinated off-site</li> </ul>
Protection against contamination	Done	<ul style="list-style-type: none"> <li>Randomized by site</li> </ul>

---

**Kimura 2007 (45) - CRCT**

---

<b>Assessment criteria</b>	<b>Assessment</b>	<b>Notes</b>
Concealment of allocation	Done	<ul style="list-style-type: none"><li>• Unit allocation: worksites</li><li>• Sites randomized into different recruitment lists</li></ul>
Follow-up of professionals	Not clear	<ul style="list-style-type: none"><li>• Unclear if all workers were followed up for vaccination status</li></ul>
Baseline measurement	Done	<ul style="list-style-type: none"><li>• Tables showed baseline immunization rates</li></ul>
Reliable primary outcome measure	Not clear	<ul style="list-style-type: none"><li>• Self-report by written questionnaire administered to workers</li></ul>
Protection against contamination	Done	<ul style="list-style-type: none"><li>• Randomized by site</li></ul>

---

---

**Lematire 2009 (46) - CRCT**

---

<b>Assessment criteria</b>	<b>Assessment</b>	<b>Notes</b>
Concealment of allocation	Done	<ul style="list-style-type: none"><li>• Unit allocation: long-term care homes</li><li>• Central computer randomization</li></ul>
Follow-up of professionals	Not clear	<ul style="list-style-type: none"><li>• Unclear if all workers were followed up for vaccination status</li></ul>
Baseline measurement	Done	<ul style="list-style-type: none"><li>• Sites were matched based on staff vaccine coverage rate from the previous season</li></ul>
Reliable primary outcome measure	Not clear	<ul style="list-style-type: none"><li>• Intervention sites: Study team administered vaccine after interview with worker</li><li>• Control sites: Self-report by written questionnaire administered to workers</li></ul>
Protection against contamination	Done	<ul style="list-style-type: none"><li>• Randomized by site</li></ul>

---

---

**Ohr 1992 (49) - RCT**

---

<b>Assessment criteria</b>	<b>Assessment</b>	<b>Notes</b>
Concealment of allocation	Done	<ul style="list-style-type: none"><li>• Unit allocation: workers</li><li>• Computer randomization</li></ul>
Follow-up of professionals	Not clear	<ul style="list-style-type: none"><li>• &lt;80% of participants were followed-up for vaccination status</li></ul>
Baseline measurement	Not clear	<ul style="list-style-type: none"><li>• Baseline vaccine coverage not reported</li></ul>
Reliable primary outcome measure	Not clear	<ul style="list-style-type: none"><li>• Employees and student health nurses recorded vaccination on-site, but unclear how off-site vaccinations were captured</li></ul>
Protection against contamination	Not done	<ul style="list-style-type: none"><li>• Authors noted possibility of contamination</li></ul>

---

## Appendix K: Risk of Bias Assessment for Controlled Before-and-After Studies – Details

Criteria adapted from EPOC checklist (40); Follow-up of patients and blinded assessment of primary outcome were not applicable to the studies included in this review

### Harbarth 1998 (50)

Assessment criteria	Assessment	Notes
Baseline measurement	Done	<ul style="list-style-type: none"> <li>• Similar baseline immunization rates between comparison and control group</li> </ul>
Characteristics for studies using second site as control	Not applicable	<ul style="list-style-type: none"> <li>• Used same site for control</li> <li>• Departments with patients at high risk for influenza complications received the intervention</li> </ul>
Protection against contamination	Not clear	<ul style="list-style-type: none"> <li>• Possibility for contamination</li> </ul>
Reliable primary outcome measure(s)	Not clear	<ul style="list-style-type: none"> <li>• Process to capture vaccination rates was not explicit</li> </ul>
Follow-up of professionals	Not clear	<ul style="list-style-type: none"> <li>• Follow-up process was not explicit</li> </ul>

### Polgreen 2006 (51)

Assessment criteria	Assessment	Notes
Baseline measurement	Not done	<ul style="list-style-type: none"> <li>• Researchers intentionally placed departments with lower immunization rates into intervention group</li> </ul>
Characteristics for studies using second site as control	Not applicable	<ul style="list-style-type: none"> <li>• Used same site for control</li> </ul>
Protection against contamination	Not clear	<ul style="list-style-type: none"> <li>• Possibility for contamination</li> </ul>
Reliable primary outcome measure(s)	Not clear	<ul style="list-style-type: none"> <li>• Process to capture vaccination rates was not explicit</li> </ul>
Follow-up of professionals	Not clear	<ul style="list-style-type: none"> <li>• Follow-up process was not explicit</li> </ul>

### Tannenbaum 1993 (47)

Assessment criteria	Assessment	Notes
Baseline measurement	Done	<ul style="list-style-type: none"> <li>• Similar baseline vaccination rates</li> </ul>
Characteristics for studies using second site as control	Not clear	<ul style="list-style-type: none"> <li>• Baseline characteristics reported</li> <li>• Control group was younger and had more part-time employees.</li> </ul>
Protection against contamination	Done	<ul style="list-style-type: none"> <li>• Unit allocation by site</li> </ul>
Reliable primary outcome measure(s)	Not clear	<ul style="list-style-type: none"> <li>• Process to capture vaccination rates was not explicit</li> <li>• Questionnaire administered after the intervention to determine off-site vaccinations</li> </ul>
Follow-up of professionals	Not clear	<ul style="list-style-type: none"> <li>• Follow-up process was not explicit</li> </ul>

---

**Zimmerman 2009 (52)**

---

<b>Assessment criteria</b>	<b>Assessment</b>	<b>Notes</b>
Baseline measurement	Done	<ul style="list-style-type: none"><li>• Baseline immunization rates were similar</li></ul>
Characteristics for studies using second site as control	Not clear	<ul style="list-style-type: none"><li>• Similar characteristics reported for pre- and post-period</li><li>• Characteristics for control and comparison sites not reported</li></ul>
Protection against contamination	Done	<ul style="list-style-type: none"><li>• Unit allocation by site</li></ul>
Reliable primary outcome measure(s)	Not clear	<ul style="list-style-type: none"><li>• Vaccination status obtained from papers logs of each site</li><li>• Unclear if paper logs captured off-site vaccinations</li></ul>
Follow-up of professionals	Not clear	<ul style="list-style-type: none"><li>• Follow-up process was not explicit</li></ul>

---

## Appendix L: Risk of Bias Assessment for Interrupted Time Series Design – Details

Criteria adapted from EPOC checklist (40); Blinded assessment of primary outcome were not applicable to the studies included in this review

### Hood 2009 (54)

Assessment criteria	Assessment	Notes
Intervention is independent of other changes	Not clear	<ul style="list-style-type: none"> <li>• Protection against secular changes not specified</li> </ul>
Data were analyzed appropriately	Not done	<ul style="list-style-type: none"> <li>• Vaccination rates plotted on graph but not statistically analyzed</li> </ul>
Reason for number of points pre- and post-intervention given	Not done	<ul style="list-style-type: none"> <li>• Explanation for number of pre- and post-intervention points not provided</li> </ul>
Shape of the intervention effect was specified	Done	<ul style="list-style-type: none"> <li>• Rationale for increase in vaccination rates provided</li> </ul>
Intervention unlikely to affect data collection	Not clear	<ul style="list-style-type: none"> <li>• Data collection process not explicit</li> </ul>
Completeness of data set	Not clear	<ul style="list-style-type: none"> <li>• Data collection process not explicit</li> </ul>
Reliable primary outcome measure(s)	Not clear	<ul style="list-style-type: none"> <li>• Data collection process not explicit</li> </ul>

### Bertin 2007 (53)

Assessment criteria	Assessment	Notes
Intervention is independent of other changes	Not done	<ul style="list-style-type: none"> <li>• Authors noted other factors the may have affected vaccination rates (i.e. news of H5N1, pandemic influenza plan)</li> </ul>
Data were analyzed appropriately	Not clear	<ul style="list-style-type: none"> <li>• Analysis technique for difference across time not explicit</li> </ul>
Reason for number of points pre- and post-intervention given	Not clear	<ul style="list-style-type: none"> <li>• Rationale for number of pre- and post-intervention points not explicit</li> </ul>
Shape of the intervention effect was specified	Done	<ul style="list-style-type: none"> <li>• Authors showed increase in immunization rates and provided possible explanation in discussion section</li> </ul>
Intervention unlikely to affect data collection	Not done	<ul style="list-style-type: none"> <li>• Intervention involved electronic consent form which collected self-reported vaccination status. Intervention changed data collection method from previous years.</li> </ul>
Completeness of data set	Done	<ul style="list-style-type: none"> <li>• Table 1 showed high participation rates</li> </ul>
Reliable primary outcome measure(s)	Not clear	<ul style="list-style-type: none"> <li>• Self-reported immunization status</li> </ul>

---

**Wicker 2009 (55)**

---

<b>Assessment criteria</b>	<b>Assessment</b>	<b>Notes</b>
Intervention is independent of other changes	Not clear	<ul style="list-style-type: none"><li>• Protection against secular changes not specified</li></ul>
Data were analyzed appropriately	Not done	<ul style="list-style-type: none"><li>• Vaccination rates plotted on graph but not statistically analyzed</li></ul>
Reason for number of points pre- and post-intervention given	Not clear	<ul style="list-style-type: none"><li>• Campaigns initially started in 2003/2004</li><li>• Rationale was not explicitly provided</li></ul>
Shape of the intervention effect was specified	Done	<ul style="list-style-type: none"><li>• Rationale for increase in vaccination rates provided</li></ul>
Intervention unlikely to affect data collection	Not clear	<ul style="list-style-type: none"><li>• Data collection process not explicit</li></ul>
Completeness of data set	Done	<ul style="list-style-type: none"><li>• Data collection process not explicit</li></ul>
Reliable primary outcome measure(s)	Not clear	<ul style="list-style-type: none"><li>• Data collection process not explicit</li></ul>

---

## Appendix M: Discussion Guide for Consultation Meetings

---

Date:

<b>Introductions</b>	<b>3 minutes</b>
<b>Purpose of Meeting</b>	<b>1minute</b>
<b>Meeting Guidelines</b>	<b>2 minutes</b>
<b>Influenza Vaccine Campaign Components</b>	<b>5 minutes</b>
<b>Decisional Needs and Support</b>	<b>5 minutes</b>
<b>OIDA Project</b>	<b>5 minutes</b>
<b>Going through the OIDA</b>	<b>15 minutes</b>
<b>Feedback on OIDA</b>	<b>15 minutes</b>
<b>Break</b>	<b>10 minutes</b>
<b>Brainstorming Session</b>	<b>40 minutes</b>
<b>Summary and Closing Comments</b>	<b>15 minutes</b>

## Introductions (3 minutes)

---

### (Slide 1)

Good afternoon and thank you for taking the time to join us. This meeting is part of the Ottawa Influenza Decision Aid Project.

### (Slide 2)

My name is Po-Po Lam and I am a master's student at the University of Ottawa and research assistant at the Elisabeth Bruyere Research Institute. [Moderator Assistant] are also part of our project team, and are here to help me take note of today's discussion.

This current project is supported by multiple organizations listed here, including different research institutes (such as the Ottawa Health Research Institute), universities (such as Dalhousie University in Nova Scotia), and health organizations (such as the Ottawa Hospital).

### (Slide 3)

In addition to us 3 today, we have a diverse team working on this project with us, including policy makers, epidemiologist, decision-aid experts and infection control experts.

Now that I have introduced myself, I would like to get to know each person a little more. Lets go around the table and have each person introduce themselves by stating their name and their affiliation with the ORGANIZATION.

*Allow people to introduce themselves, make note of names*

To better capture your thoughts and ideas, I will be tape recording today's meeting and my colleagues will be taking notes as well. This recording and notes will only be used by the project team members, and will be kept confidential. We will summarize our findings from the health care organizations we visit without identifying individuals or a particular organization. Just let me know at any point during the meeting, if you do not wish to be recorded.

*Turn on tape recorder in centre of table*

### **Additional notes on confidentiality and anonymity (if needed):**

*Although we will be making notes on the discussion, the notes will be kept confidential. We will summarize our findings from the healthcare organizations we visit. All reports summarize these findings without identifying individuals or a particular organization.*

## Purpose of Meeting: (1 minute)

---

### (Slide 4)

So, today's meeting was set up to:

- 1) Introduce you to our current project and the new tool we have developed, the Ottawa Influenza Decision Aid. We call it OIDA for short.

2) To get your thoughts on the newly developed tool and the ways to use the OIDA as part your organization's influenza vaccine campaign for staff

## **Meeting Guidelines (2 minutes)**

---

This is an opportunity to share and collaborate with each other.

1. For this topic, there are no right or wrong answers, so please feel free to express your thoughts and opinions
2. Due to the limited time available, I will try my best to keep the group on topic and make sure the discussion does not go over the two hours.

## **Staff Influenza Immunization**

---

One of our overall goals of the current project is to encourage those working in a healthcare setting to receive the influenza vaccine. This issue has become increasingly important.

The healthcare worker plays a very important role in the prevention of influenza outbreak in long-term care. A worker who does not receive the flu shot may import the influenza virus into the hospital and act as a vector for virus circulation among their colleagues and their patients

A lot of times a worker can be infected with the virus with out showing any symptoms. She or he can easily spread the virus to their co-workers and patients unknowingly.

So one way to limit the spread virus, is to have the workers immunized  
In fact, Staff Influenza immunization can have large impact on flu outbreaks  
Organizations with higher staff vaccine uptake report fewer influenza outbreaks  
Organizations with higher staff vaccine rates actually has lower patient mortality

Currently, in Canada, staff immunization rates range from 26 to 61%  
As you can see, organizations across Canada are well below the 90% target rate, and more needs to be done to achieve this.

## **Influenza Vaccine Campaign Components (5 minutes)**

---

**(Slide 5)**

Every year, most health organizations will run an influenza vaccine campaign to encourage their staff to take the flu shot. Just by reviewing research literature alone, we have identified multiple strategies used by organizations. Some common components include:

- Mobile vaccination carts
- Declination forms
- Vaccine advocates
- Incentives
- Feedback on staff vaccine rates
- Education

As you look at this list, you may see some similarities to your organization's influenza vaccine campaign.

What activities and materials does your organization use to encourage staff members to have the flu shot?

*Group discussion on what the organization is currently doing;  
Try to have everyone in the group share a thought*

Those are some very good approaches, and it would be interesting to see how the OIDA can fit or complement some of the approaches your organization is already doing. So the OIDA can be an additional tool in your toolbox of strategies used in your influenza vaccine campaign. The OIDA actually targets a very specific group of healthcare workers.

In your experiences, you may know a worker or colleague who is just unsure about whether or not to take the vaccine. He or she may wonder about the risks and benefits of the flu, but is undecided. Your colleague is not alone in this situation. To better understand the needs of that particular group of undecided workers, our project team survey one group of healthcare workers about making a decision to take the flu shot.

## **Decisional Needs and Support (5 minutes)**

The results of our questionnaire uncovered needs in the four areas:

- 12% felt UNSURE about the best choice
- 16% felt UNINFORMED about benefits and risks of each option; for this group knowledge seems to be a problem
- 19% UNCLEAR about which benefits and risks matter most to them; this particular group understands their options but are unclear as to what they value the most.
- 21% NOT ENOUGH ADVICE to make a choice

So with our survey we identified four areas of decision making needs among a group of healthcare workers.

Not all organizations or groups of health care workers have needs as great as this but it is food for thought as you consider what the needs are in your organization.

Seeing that healthcare workers experience decisional needs when deciding whether or not to take the flu shot.....our team went on to develop a decision aid to address those needs. A decision aid is a tool to help users make an informed and values-based decision by 1) presenting evidence on the benefits and risks of available options; 2) help them weigh the benefits and risks, and determine what they value the most, and 3) provide support in decision-making process.

So taking the decision aid format, our team developed the Ottawa Influenza Decision Aid (OIDA).

This decision is unique in that it is specifically designed to be used by healthcare workers. It is designed to help them make an informed decision on whether or not to take the flu shot.

This OIDA presents evidence on different flu prevention options, and assist the healthcare workers through the decision making process.

The OIDA has been tested in two long-term care homes and an acute care hospital. Healthcare staff in these organizations found the tool to be:

- to be clear
- listed the options
- provided decisional support
- helped staff be knowledgeable about influenza prevention options

So far we have tested the feasibility of the OIDA but what we haven't done is use the tool as part of an organization's influenza vaccine campaign. So our team's next steps are outlined in the next slide.

## **Ottawa Influenza Decision Aid project (5 minutes)**

---

### **(Slide 6)**

Now, I want to tell the group about our exciting new project.

On this slide, is how we envision the project flow in the next three years:

- Year 1, being this current year:
  - Collect information on what is being done now by organizations, how they run their influenza vaccine campaign for staff and their staff vaccine uptake, and capture the different approaches that we just discussed as a group. And this will be done by having each organization complete a questionnaire, which one of your colleagues has already completed one for us.
  - Consult with organizations on approaches to using the OIDA (what we are currently doing).
  - Have health organizations use the OIDA as part of their annual influenza vaccine program. We hope to evaluate the tool's acceptability and its impact on vaccine uptake among healthcare workers.
  - Using all the information we collect from these participating organizations, we hope to produce a step-by-step guide to assist healthcare planners introduce the OIDA into their organization....as many healthcare planners do not have experience with decision aids.
- In Year 2:
  - We will be continuing the same activities in Year 1 but with different organizations, and, as well....
  - We will also be evaluating the step-by-step guide developed in Year 1.
- In Year 3:
  - In the final year, the same activities in Year 2 would be carried on.

- Using all the information and lessons learned from the three years, we will develop an online sharing platform. This platform will allow different healthcare organizations can share their approaches to running an influenza vaccine campaign with other organizations across Canada.
- For example, Organization X may be struggling with low staff compliance to the influenza vaccine. So Organization X can go on-line to access the sharing platform and see what approaches have been successful for similar organizations.
- This will avoid organizations having to consistently re-invent the wheel in regards to vaccine campaign development

As you can see, our project has a three year timeline. Your organization may choose to participate in all three years or just one of the three years. It is entirely dependent on your organization's needs.

## **Going through the Decision Aid (15 minutes)**

---

### **(Slide 13)**

Now that you know a little more about decisional needs and the OIDA project, you have the opportunity to actually go through the decision aid.

I have given each person a copy of the Decision Aid. It is titled "What can you do to prevent influenza?"

Please fill out the questions on the decision aid as we go through the OIDA. We will be collecting the decision aids after the meeting. You do not have to write your name on the OIDA, and your responses will remain confidential. After going through the OIDA, You have an opportunity to comment on OIDA tool itself. So I will ask you to hold on to your comments about the content of the OIDA until we have finished going through the tool.

### **(Slide 14)**

Let's begin with the introduction page. It begins with describing who this decision aid is for and what the flu is.

The OIDA is for people who are direct care providers or an employer has offered you influenza prevention options.

The OIDA begins with describing the influenza, and the flu is a common respiratory illness caused by a virus and can spread easily from person to person.

### **(Slide 15)**

There are 3 options to decrease your risk of getting or spreading the flu:

1. You can take the flu shot before the "flu season"
2. Wait until there is an outbreak of the flu. You can take the flu shot and take the anti-viral pills, such as Tamiflu, for the first 14 days of the "flu outbreak" until the flu shot gives you protection.
3. Or you can decline both options

**(Slide 16)**

There are also specific health factors that may affect your choice. On the decision aid, please check off the conditions or concerns that apply to you.

You should take a flu shot if you OR someone you live with has a chronic condition such as heart disease, diabetes, and cancer.

For some situations, you should talk to your doctor before taking the flu shot. Such as if you have a strong allergic reaction to eggs.

**(Slide 17)**

There are 4 steps in the decision aid:

Step 1: What are the benefits and side effects of each option?

Step 2: Reasons to choose which options matter most to you?

Step 3: What else do you need to prepare for decision making?

Step 4: What are the next steps?

**(Slide 18)**

After you have completed the intro page, please turn to the second page, titled "Step 1: What are the benefits and side effects of each option?"

Research evidence on the benefits and side effects are represented by showing what happens to 100 people who choose different options during a flu season. Each face represents one person.

Step 1 begins by describing the benefits of each option.

From the diagram on the decision aid, you can see that fewer people get the flu during an outbreak among those who took the flu shot or the anti-viral pills. As well, fewer people die from the flu if the flu shot was taken by the care provider.

**(Slide 19)**

The second half of this page looks at the side effects of each option.

A sore arm maybe experienced as a result of taking the flu shot, and people may experience nausea and vomiting while taking anti-viral pills.

There is also an additional note on Guillan-Barre Syndrome and other side effects such as fever, fatigue, headache, and muscle pain.

**(Slide 20)**

Now turn to page 3 of the decision aid. Step 2 outlines the reasons to choose each option based on what matters to you the most.

In this part, each question asks you to rate the importance of each reason on a scale from 0 to 5, with 0 being not important and 5 being very important. Please mark your response on the decision aid.

The first section of page 3 focuses on the reasons to choose the flu shot.

There are 3 questions – How important is it to you to:

- avoid getting the flu and spreading it to others?

- avoid taking antiviral pills for 14 days?
- avoid work limitations?

For each question, please rate the level of importance on a scale of 0 to 5, with 0 being not important and 5 being very important.

*Can you think of other reasons why you or someone else might choose to take the flu shot?*  
Please write down your reasons on the decision aid and rate the importance of the reasons.

**(Slide 21)**

The second section looks at the reasons to choose anti-viral pills.

There are 2 questions – How important is it to you to:

- Wait and see if there is a flu outbreak?
- Avoid work limitations?

Please rate the level of importance for these questions, and list other reasons why you or someone else might choose to take the pills?

The last section on page 3 looks at the reasons to decline both the flu shot and pills.  
How important is it for you to avoid the side effects of taking the flu shot and antiviral pills?  
Please list other reasons you or someone else might choose to decline flu shots and pills.

**(Slide 22)**

Now that we have gone through the reasons to choose each option, think about which option has the reasons that are most important to you. Please select the option you prefer the most

**(Slide 23)**

Now turn to the last page of the decision aid.

Step 3 presents what else you might need to prepare for decision making. The first part is for you to find out how well the decision aid helped you learn the key facts about influenza prevention options.

For each question, check off the answer you think is correct. You do not have to share your answers with the group.

**(Slide 24)**

The second part of Step 3 looks at what else you need to prepare for decision making. You are not required to share your answers; just check off the appropriate box on your own copy of the decision aid.

**(Slide 25)**

Step 4 describes what the next steps are after completing the decision aid. It provides a checklist of things you might need to do before you make a choice. You only need to check off the appropriate boxes on the decision aid; you do not need to share your answers with the group.

So you have now completed the OIDA. Your completed decision aid will be collected by us at the end of the meeting.

---

## **Feedback on the OIDA (20 Minutes)**

**(Slide 26)**

Now that you have gone through the OIDA, we would like to get your thoughts and feelings about the tool. This is an opportunity to express your comments regarding the tool.

*[Pause to see if anyone is really eager to speak; You can use potential questions to facilitate discussion; The main point is to let them express their concerns regarding the OIDA, and address those concerns accordingly.]*

Potential Probes (if needed):

- Will it help your staff reach a decision about the flu prevention choices?
- Does it guide you through the decision making process in a logical fashion?
- Would this be acceptable to your staff?
- Did the tool help you understand the benefits/risk of the prevention options?
- Were all the risks and benefits of each option for prevention presented?
- Are there any other things not mentioned in the OIDA, which are important for staff to consider before making a decision?
- Was the amount of information appropriate in the decision tool?
- Was the information presented clearly?
- Is it simple to use?

Are there any additional thoughts and comments on the OIDA before we break?

**Break (5-8 minutes)**

---

*[Provide snacks and beverages for participants]*

## Brain Storming Session (40 minutes)

---

Now that we have gone through the OIDA, we would like to get some feedback from the group on how to use this tool in your long-term care home.

As I mentioned before, we plan to develop a step-by-step guide to assist organizations with the planning, implementation and evaluation of the OIDA.

To help us develop this guide, I will be taking the group through a brainstorming exercise to gain some of your thoughts and input on using the OIDA.

I have provided each of you with some paper and a pen to write your thoughts down if needed.

With your organization's existing resource, how do you see the OIDA being used in your health organization?

*[Write question on flipchart]*

For the first 2-3 minutes I will ask that you think about this question and write your thoughts on the paper. Afterwards, I will go around the table and have each person share their top idea. For each shared idea, I would invite the group to share their thoughts and feeling on it.

### **Moderating the discussion:**

Go around table asking for one idea from each person, and write each idea down on the flip chart; Next, have the group give their comments about each idea.

For each idea, ensure the six areas have been covered:

- **Who:** Ex. Who in your organization needs to be involved in order to make this approach work?
- **What:** Ex. What tools, resources, and other procedures or structures would you need to have in place to support the use of this approach?
- **Where:** Ex. Where would this idea take place?
- **When:** Ex. When should planning begin for this idea to work?
- **How:** Ex. How does that work?
- **Evaluation:** Ex. How would you evaluate this approach?

Additional Probes:

- Tell me more about that
- What are some ways to ensure that your staff will use the OIDA?
- What are the advantages to this approach?
- What are the disadvantages to this approach?

After idea has been discussed – move on to next idea (about 10-15 minutes per idea)

## Moderating Tips:

### Potential Probes:

- Would you explain further?
- Can you give me an example?
- Would you say more?
- Is there anything else?
- Please describe what you mean?
- What experiences have you had that make you feel that way?

### Silence breakers:

- Moderator should pause 5 seconds after each comment;
- There is no need to rush, think on this for a moment, and when you are you ready tell us your thoughts?
- Why there is no answer to the question?

### Special considerations:

- **Experts that dominate conversation:**
  - o Remind group that 'we are interested in all points of view';
  - o 'Who else has something to share?'
  - o 'Does anyone feel differently?'
- **Disruptive Participants:**
  - o Remind group of guidelines;
  - o We are not looking for agreement on the best approach, but to listen to all the potential approaches to using the OIDA';
- **Ramblers/Wanderers:** Limit eye contact with these participants
- **Shy/Quiet:**
  - o Make eye contact;
  - o Call on person – 'you haven't had a chance to express your views, what do you think?'
- **Avoiding side-bar conversations:** Stand by the those who are having side conversations

## Summary of Discussion and Closing Comments (15 minutes)

---

### (Slide 28)

That was a great discussion, and it generated many useful ideas. To recap the discussion, I am going take a couple of minutes to summarize the key ideas that came out of our discussion.

*[Summarize key ideas and for each idea briefly cover the who, what, where, when and how]*

Did I missing any key points? Would anyone like to add to the summary?

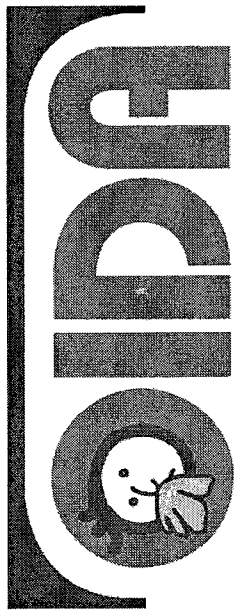
Is there anything you wanted to discuss at this consultation meeting, but was never mentioned?

If you have any questions about today's consultation meeting or the project, feel free to contact me. I have listed my contact information on this slide.

Please drop off your completed decision aid in the envelope that Lois is holding.

*[Note: Moderator and assistant(s) should thank participants at door as they leave;  
[After participants have left, quickly debrief with assistant moderator on how the meeting went,  
the key ideas that came out of the meeting, and what can be done to improve for next time.]*

Thank you for taking the time to participate in this discussion. Your opinions and suggestions are highly valued and appreciated



## Ottawa Influenza Decision Aid

### Consultation Meeting

Po-Po Lam

## Support for the Project

- Elisabeth Bruyère Research Institute
- Ottawa Health Research Institute
- The Ottawa Hospital
- Bruyère Continuing Care
- St. Francis Xavier University
- University of Ottawa
- Dalhousie University
- Canadian Center for Vaccinology
- Ottawa Public Health
- Canadian Institutes of Health Research, Institute of Population and Public Health
- Ontario Seniors Health Research Transfer Network

## Ottawa Influenza Decision Aid Team

- Shery Bowman, RN, Researcher
- Larry Chambers, President and Chief Scientist, EBRI
- Lois Crowe, Project Manager
- Donna Gallant, Assistant Professor School of Nursing
- Chantal Lafleur, Research Associate
- Anne McCarthy, MD, Infectious Disease
- Shelly McNeil, MD, Infectious Disease
- Po-po Lam, MSc Epidemiology Candidate
- Annette O'Connor, Professor, OHRI
- Virginia Roth, MD, Infectious Disease
- Kathryn Suh, MD, Infectious Disease
- Donna Baker, RN, Infection Control
- Joanne Villeneuve, RN, Occupational Health Nurse
- Paula Arnold, Manager, Ottawa Public Health
- Jane Sutherland, Researcher
- Craig White, MD, Infectious Disease

## Meeting Purpose

- Introduction to the Project and Ottawa Influenza Decision Aid (OIDA)
- How to effectively use the OIDA as part of your organization's annual influenza vaccine campaign for staff?

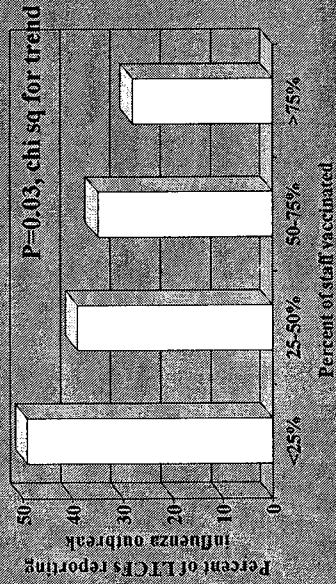
### Why is Immunizing Staff Important?

- Accreditation Canada: New Required Organizational Practice - Organizational policy and protocol for administering the influenza vaccine (Jan. 2009)
- Canadian National Advisory Committee on Immunization: Recommends immunization of at least 90% of healthcare workers

### Role of the healthcare workers in influenza outbreaks in long-term care

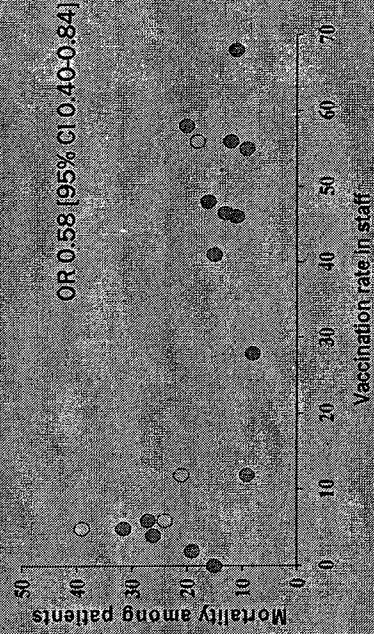
- Up to 25% of unvaccinated workers can be infected during the winter months
- Unvaccinated worker may import influenza into the organization and act as a vector for its circulation
- Asymptomatic worker may be infected and actively shedding virus

### Impact of staff vaccination on flu outbreaks



Stevenson Gg, et al. CMAJ 2001;164:1413-9

### Impact of Staff Vaccination



Carman et al. Lancet 2000;355:93-97

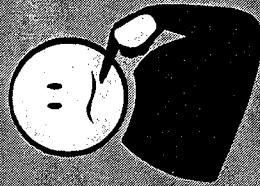
## How are we doing?

- In Canada, average coverage rates among healthcare workers range from 26–61%
- [Organization]: (%) of healthcare workers were immunized for influenza?

## Influenza Vaccine Campaign Components

- Multiple strategies to increase vaccine uptake including:
  - Mobile vaccination carts
  - Declination forms
  - Vaccine advocates
  - Incentives
  - Feedback on staff vaccine rates
  - Education
- What activities and materials does your organization use to encourage staff members to have the flu shot?

## Decisional Needs



- Provides direct care to elderly
- Wonders about the risks of the flu shot
- “I’m not sure if I should have one..”

## Decisional Needs and the Flu Shot

- 12% felt **UNSURE** about the best choice
- 16% felt **UNINFORMED** about benefits and risks of each influenza prevention option
- 19% **UNCLEAR** about which benefits and risks matter most to them
- 21% **NOT ENOUGH ADVICE** to make a choice

# Decision Aids

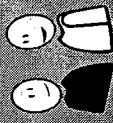
○ Inform



○ Help people weigh pros & cons



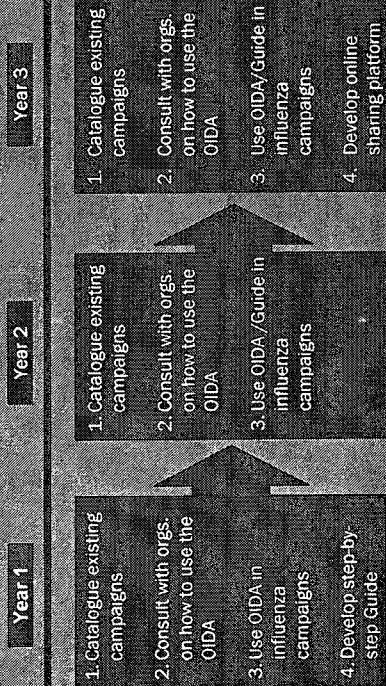
○ Provide support



# OIDA

- Ottawa Influenza Decision Aid (OIDA)
- Help healthcare workers make a decision to take the influenza vaccine
- Pilot-tested in 2 long-term care homes and an acute-care hospital
- Staff found tool:
  - to be clear
  - listed the influenza prevention options
  - provided support for decision-making
  - helped staff be knowledgeable on prevention options

# OIDA Project



# Decision Aid Group Exercise

- Go through the decision aid as a group
- Fill out the questions on your copy of the decision aid
- We will not ask you to share your response with the group
- Decision aids will be collected at the end of the meeting

# OIDA – Page 1: Introduction

## What can you do to prevent influenza?



### A decision aid for those working in a healthcare setting

#### What is influenza?

- Influenza (the flu) is a common respiratory illness caused by a virus.
- The flu is spread easily from person to person.
- It starts rapidly. People don't feel well and get a fever and cough. They may also have a headache, runny nose, muscle aches and fatigue.
- Most people recover in 7 to 10 days, but some have complications such as pneumonia and death.
- If the elderly are in contact with people who have not had the flu shot, they are more likely to get the flu and die from complications.

# OIDA – Page 1: Options

## What are your options to decrease your risk of getting or spreading the flu?

Take the influenza vaccine (flu shot) before flu season. Your employer arranges for you to have a flu shot in your arm in the fall. The government pays for the flu shot.

Wait until there is an outbreak of the flu. You wait to see if your employer declares a flu outbreak. Then you have a flu shot. It takes 14 days to protect you from the flu. During those 14 days, you need to take antiviral pills (Tamiflu) everyday.

Decline both the flu shot and antiviral pills. In a flu outbreak, workers declining the flu shot and antiviral pills because of medical reasons would be reassigned if possible. Workers who decline without a valid medical reason will be placed on unpaid leave of absence until the flu outbreak is over.

# OIDA – Page 1: Other factors

## What other health factors may affect your choice?

You should take a flu shot if you OR someone you live with has a chronic condition that needs regular visits to a doctor. Check  any that apply:

- Chronic heart or respiratory disease
- Diabetes
- Kidney disease
- Anemia
- Cancer
- Other \_\_\_\_\_
- None of these apply to me

You should talk to your doctor BEFORE taking the flu shot in some situations. Check  any that apply:

- Strong allergic reaction to a previous flu shot
- Strong allergic reaction to eggs
- Allergy to other parts of the vaccine
- Other medical conditions that concern you, \_\_\_\_\_
- I have no medical concerns about flu shots

# OIDA – Page 1: Four Steps

## Working through the 4 steps of this decision aid may help you decide

- Step 1: What are the benefits and side effects of each option?
- Step 2: Which reasons to choose each option matter most to you?
- Step 3: What else do you need to make your decision?
- Step 4: What are the next steps?

# OIDA - Page 2: Step 1

## Step 1: What are the benefits and side effects of each option?

### What does the research show?

Blocks of 100 faces show a best estimate of what happens to 100 people who choose different options during a flu season. Each face is shaded for one person. The shaded areas show the number of people affected. There is no way of knowing in advance if you or your patients will be the ones affected.

Benefits	To flu shot or antiviral pills	Flu shot	Antiviral pills
A. Fewer people in the community get the flu during an outbreak if they take the flu shot or antiviral pills.	15 get the flu	4 get the flu	3 get the flu
B. Fewer patients die from the flu shot.	19 die from flu	2 die from flu	3 die from flu
C. Fewer patients die from the flu shot.	31 don't die	58 don't die	Unknown

# OIDA - Page 2: Step 1

Side Effects	Flu shot	Antiviral pills
1. Most people who have a flu shot report having a sore arm for 1 or 2 days.	52 sore arms	N/A
2. More people who take antiviral pills report nausea and vomiting while taking pills.	8 get nausea & vomiting	75 need this
3. Platinum or Gold symbols mean stronger study results.	37 need this	55 avoid this

Other notes on the flu shot: Guillain-Barre syndrome is a rare nervous system disorder where the body's immune system attacks the nerves in the body. This can cause weakening and numbing of the muscles, and, in severe cases, paralysis may occur. The exact cause of the disorder is unknown, but it is commonly triggered by an infection. Influenza vaccine may slightly increase the risk of developing the disorder. It is a million people have a flu shot, one person may get Guillain-Barre syndrome. This is the same as dying in an airplane or train accident. Some people wonder if the flu shot is worth the risk of Guillain-Barre, or muscle pain. The chance of getting these symptoms is the same as having a placebo shot with no active medicine.

# OIDA - Page 3: Step 2

## Step 2: Which reasons to choose each option matter most to you?

Custom reasons to choose each option are listed below. An answer in every column is a number from 0 to 5. When answering the questions below, if you decide a reason is important to you, just check options are shown on the right.

Reasons to choose	Not important	Very important	Options to consider
To avoid ALL side effects of taking flu shots and antiviral pills?	0	5	Flu shot
To avoid a month with side effects unless there is an outbreak?	0	5	Antiviral pills
To avoid the inconvenience and side effects of taking pills?	0	5	Flu shot
To avoid getting the flu for the whole flu season?	0	5	Flu shot
To avoid spreading the flu to family and patients?	0	5	Flu shot
To avoid work, childcare during a flu outbreak if you decide the flu shot?	0	5	Flu shot

List other things that are important: \_\_\_\_\_

# OIDA - Page 3: Step 2

Now, think about which option has the reasons that are most important to you.

- Which option do you prefer? Check  one:
- Take the flu shot before the flu season
  - Wait for an outbreak and take the flu shot and antiviral pills for 14 days
  - Decline both the flu shot and antiviral pills
  - I don't know

# OIDA – Page 4: Step 3

## Step 3: What else do you need to make your decision?

Find out how well this decision aid helped you learn the key facts.  
 Check  the best answer.

	Flu shot	Antiviral pills	Declines flu shot & pills	Don't know
1. Which option has the <b>highest</b> chance of you getting the flu?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Which option has the <b>lowest</b> chance of patients dying from flu that was spread by their care providers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Which option has the <b>highest</b> chance of a sore arm as a side effect?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Which option has the <b>highest</b> chance of nausea and vomiting as side effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Correct answers at the bottom of the page.

# OIDA – Page 4: Step 3

1. Knowledge: Do you know enough about the benefits and side effects of each option?
2. Values: Are you clear about which benefits and side effects matter most to you?
3. Support: Do you have enough support and advice from others to make a choice?
4. Uncertainty: Do you feel sure about the best choice for you?

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

# OIDA – Page 4: Step 4

## Step 4: What are the next steps?

Check  your next steps:

- I have decided to take the flu shot before the flu season.
- I have decided to wait for an outbreak and take the flu shot and antiviral pills.
- I have decided to decline both the flu shot and antiviral pills.
- I need to discuss the options with my doctor and family.
- I need to read more about my options.
- Other, please specify: \_\_\_\_\_

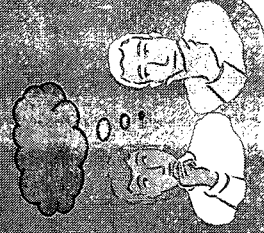
Answers for the key facts: 1. Decline flu shot & pills 2. Flu shot 3. Flu shot 4. Antiviral pills

This information is not intended to replace the advice of a health care provider.  
 This decision aid was developed by Canadian researchers who conducted an extensive review of the available scientific literature. It was funded by the Canadian Institutes of Health Research (CIHR) and the Ottawa Health Research Group. Partially in part by: CHU, MRC, JG, SHRM, & A. Ambrose have declared no conflict of interest. Form 19 based on the Ottawa Decision Guide © 2010, A.O. Charon, D. Stacey, University of Ottawa, Canada August 2008

**4** For additional information please contact the Occupational Health and Safety Department for the "Facts and Numbers Behind the Ottawa Influenza Decision Aid".

# Feedback on the OIDA

- Thoughts about the OIDA
- Will it help your staff reach a decision about the flu prevention choices?



## Discussion on using the OIDA

◎ With your organization's existing resources, how do you see the OIDA being used in your health organization?

- Each person will be asked to share one idea
- For each idea, group discussion on six focus areas:
  - *Who* – i.e. Who needs to be involved to make this work?
  - *What* – i.e. What tools/resources need to be in place?
  - *Where* – i.e. Where would this approach take place?
  - *When* – i.e. When should planning begin for this to work?
  - *How* – i.e. How does that work?
  - *Evaluation* – i.e. How would you evaluate this approach?

## Summary of Discussion

- ◎ Summary of the main ideas from discussion
- ◎ Any missing points or ideas?
- ◎ Anything you wanted to discuss at the meeting, but was not mentioned?

## Appendix O: OIDA Implementation Questionnaire

Please complete the following questions on the different methods you used when implementing the Ottawa Influenza Decision Aid (OIDA) within your organization for the **2009-2010 influenza season**.

Please note: Your organization may have used the OIDA in more than one way, and as a result, you may need to consult with other staff members to answer some or all of the questions below.

**1. Was the OIDA introduced in a group setting with healthcare personnel? For example, the OIDA was presented at a staff meeting or in a presentation.**

- Yes (proceed to Question 2)
- No → (skip to Question 3)
- Do not know → (skip to Question 3)

**2. (If Yes to Question 1) Did healthcare personnel review the OIDA together as a group?**

- Yes
- No
- Do not know

**3. Was the OIDA used in a one-on-one setting? For example, a member of your team and/or other healthcare personnel explained or introduced the OIDA to a co-worker.**

- Yes
- No
- Do not know

**4. Was the OIDA distributed to healthcare personnel for them to complete individually?**

- Yes
- No
- Do not know

**5. Before the start of your organization's 2009-2010 *seasonal* influenza immunization campaign, was the OIDA used with healthcare personnel? For example, the OIDA may have been used to raise awareness about influenza before the start of your *seasonal* influenza immunization campaign.**

- Yes
- No
- Do not know

**6. After providing influenza education for healthcare personnel, was the OIDA used to reinforce/supplement the information provided by your organization?**

- Yes
- No
- Do not know

**7. Were seasonal influenza immunization clinics held within your organization (including central location(s) and/or satellite site(s))?**

- Yes (proceed to Question 8)
- No → (skip to Question 10)
- Do not know → (skip to Question 10)

**8. (If Yes to Question 7) At the seasonal influenza immunization clinics, was the OIDA made available to healthcare personnel?**

- Yes
- No
- Do not know

**9. Was the OIDA provided to healthcare personnel with your organization's influenza immunization consent form?**

- Yes
- No
- Do not know

**10. Were specific types or groups of healthcare personnel targeted (or given extra attention) to use the OIDA?**

- Yes (proceed to Question 11)
- No → (skip to Question 14)
- Do not know → (skip to Question 14)

**11. (If Yes to Question 10) Was the OIDA targeted towards personnel that had not received the influenza vaccine after a certain point in your campaign?**

- Yes
- No
- Do not know

**12. Was the OIDA targeted towards personnel undecided (or having difficulty making a decision) about the influenza vaccine?**

- Yes
- No
- Do not know

**13. Was the OIDA targeted towards departments or groups that had low immunization rates in previous year(s)?**

- Yes
- No
- Do not know

**14. Workplace Wellness Week is dedicated towards occupational health. Some organizations may hold an event to raise awareness on workplace wellness. Did your organization have Workplace Wellness Week event(s) for healthcare personnel?**

- Yes (proceed to Question 15)
- No → (skip to Question 16)
- Do not know → (skip to Question 16)

**15. (If Yes to Question 14) Was the OIDA used as part of your organization's Workplace Wellness Week event(s)?**

- Yes
- No
- Do not know

**16. Did your organization use the web-based version of the OIDA available on <http://www.chiin.ca>?**

- Yes (proceed to Question 17)
- No → (skip to Question 18)
- Do not know → (skip to Question 18)

**17. (If Yes to Question 16) Were healthcare personnel given a password to access the web-based version of the OIDA?**

- Yes
- No
- Do not know

**18. OIDA posters were made available to organizations. Were the OIDA posters displayed within your organization?**

- Yes
- No
- Did not receive OIDA posters
- Do not know

**19. Were there additional ways the OIDA was used within your organization that were not mentioned above?**

- Yes (proceed to Question 20)
- No → (End of questionnaire)
- Do not know → (End of questionnaire)

**20. (If Yes to Question 19) Please describe below the additional ways the OIDA was used within your organization that were not mentioned above.**

---

---

---

---

---

## Appendix P: Cover Letter for the OIDA Implementation Questionnaire

---

Date

Name

Organization

Dear Mr./Ms. Name,

On behalf of the Canadian Influenza Immunization Network, I hope your organization had excellent success with this year's seasonal influenza immunization campaign. In order to help us improve the OIDA and Implementation Guide, please complete the enclosed "Ottawa Influenza Decision Aid (OIDA) Implementation Questionnaire".

With this questionnaire, you will be asked about the different methods your organization used when implementing the OIDA during your seasonal influenza immunization campaign for 2009-2010.

In order to get an accurate view on how your organization used the OIDA, we ask that the person who was most involved with this process complete the questionnaire. It may be of benefit for other staff members to contribute their views as well.

Your responses to the questionnaire will be kept confidential. Neither your name, nor that of your organization will appear in any report or publication. All responses will be summarized and aggregated results will be presented at the upcoming Debriefing Workshop for participating organizations.

Your participation in the study is highly valued and contributes to the effort in improving the OIDA and Implementation Guide. A gift card is enclosed in appreciation for your continued participation in our study.

If you have questions or concerns regarding the project, please contact: Project Coordinator, (Name), (Number). This study has been approved by The Ottawa Hospital Research Ethics Board. If you have any questions you may contact the Chairperson of The Ottawa Hospital Research Ethics Board at (613) 798-5555, extension 14902.

Please return the completed questionnaire in the enclosed stamped-address envelope. Thank you for your time and consideration.

Sincerely,

[Signature]

(Name)

Project Coordinator

Canadian Healthcare Influenza Immunization Network