The Influence of Knowledge and Attitudes on Influenza & Pertussis Vaccination among Healthcare Workers in Wisconsin
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Mandatory vaccination is increasingly becoming policy for healthcare workers (HCWs) in many US hospitals, but as opinion leaders with the opportunity to influence health behaviors among lay adults, HCWs are also a priority group for influenza and pertussis vaccination beyond their potential to contract and transmit disease. Unfortunately, despite the proven safety, clinical efficacy, and population effectiveness of vaccines, current seasonal flu and Tdap vaccination rates (among both lay adults and HCWs) are too low to prevent disease outbreaks (as evidenced by widespread cases of influenza each winter and increasing numbers of pertussis cases in recent years). During the 2010-2011 flu season, less than half (41%) of all US adults and only two-thirds (64%) of HCWs received the seasonal flu vaccine (CDC, 2011a; CDC, 2011b). Even smaller percentages of lay adults and HCWs (12% and 27%, respectively) received the Tdap vaccine over a recent six-year period from 2005-2011 (CDC, 2013).

This analysis applies both the Health Belief Model (HBM) (Becker 1974; Janz & Becker 1984) and the Theory of Reasoned Action (TRA) (Fishbein & Ajzen 1975; Ajzen & Fishbein 1980) to an evaluation of the association between HCW's personal knowledge and attitudes (about influenza, pertussis, and their respective vaccines) and vaccination decisions. The HBM and TRA, conceptual frameworks developed to help explain factors that individuals might consider when deciding whether or not to engage in various health-related behaviors, suggest vaccination decisions are associated with the perceived threat (both susceptibility and severity) of disease (and perceived risks associated with certain vaccines), benefits and barriers to vaccination, and local cultural norms associated with vaccines and disease.

Part of a Type 2 Translational Research Pilot Grant Program (funded by the University of Wisconsin-Madison Institute for Clinical and Translational Research (ICTR)), this study analyzes 1,458 influenza and 1,133 pertussis questionnaires collected in 2010-2012 from two random samples (2,500 HCWs each) selected from a population of 114,764 clinicians, pharmacists and nurses currently licensed to practice medicine and residing in Wisconsin. Survey data included measures of knowledge about and attitudes toward disease and vaccination, perceived social norms of vaccination, self-efficacy to vaccinate and discuss vaccination with patients/clients and family/friends, vaccination history and present intention to get vaccinated, and demographic characteristics.

Specifically, this paper asks: Among Wisconsin HCWs, is there a significant influence of disease- and vaccine-specific knowledge and attitudes on their own decision to receive the seasonal flu or Tdap vaccine? Knowledge and attitudes also will be evaluated to assess the relative importance of egoism and altruism (the relative importance of protecting oneself and others) on their decision to receive the seasonal flu and Tdap vaccines. Sensitivity analyses will be conducted to determine whether vaccination behaviors vary significantly across the three occupation groups.

First, Exploratory Factor Analysis extraction and rotation techniques are used to collapse Likert-scale, dichotomous, and continuous observed survey measures (factor indicators) of knowledge about and attitudes toward disease (influenza and pertussis) and vaccines (seasonal flu and Tdap) into several latent constructs (factors). Then, Structural Equation Modeling (SEM) tests the influence of these latent constructs on the outcome measure (HCWs' vaccination). Parallel analyses of both the influenza and pertussis data will be conducted.

Factor Analysis of the influenza data (see Table and Figure, below) suggests these factor indicators represent several latent constructs, including: NORMS (other people's beliefs about whether I should get the seasonal flu vaccine); BENEFITS (my likelihood of contracting and transmitting influenza); SEVERITY (perception of influenza as a serious illness); and SUSCEPTIBILITY (other people's likelihood of contracting influenza). Bivariate analyses show very strong associations between knowledge/attitudes and HCW vaccination (with Pearson chi-square and F statistics all highly significant, $p<0.001$). In particular, influenza vaccination was more common among HCWs who believed: patients, family, and coworkers think they should get the seasonal flu vaccine; seasonal flu vaccine reduces influenza contraction and transmission; influenza is a serious illness; and seasonal flu vaccine reduces other's susceptibility to influenza. SEM measurement and structural models will be used to further test these associations.

Program and policy efforts need to understand the factors that influence HCW immunization. In the true nature of Type 2 Translational Research, the knowledge gained from this study can be used to increase compliance with vaccination policies and, ultimately, to improve the health of both healthcare workers and lay people across the country.

References

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Latent Constructs Extracted via Exploratory Factor Analysis, showing Observed Survey Measures with Highest Factor Loadings: Percent of HCWs who Received the Seasonal Flu Vaccine, by How Much They Disagree/Agree with Each Statement (n=1,458).

q#	Latent Construct: Observed Survey Measures	Strongly Disagree	Disagree	Undecided or DK	Agree	Strongly Agree	Pearson ChiSq
NORMS:							
q19	Patients or clients think I should get the seasonal flu vaccine.	40%	23%	62%	73%	79%	69.77
q10	My family thinks I should get the seasonal flu vaccine.	28%	29%	63%	75%	80%	152.21
q3	People with whom I work think I should get the seasonal flu vaccine.	43%	32%	54%	62%	80%	93.61
BENEFITS:							
q5	If I get the seasonal flu vaccine, I'll be less likely to spread influenza to patients or clients.	59%	49%	40%	66%	78%	70.70
q11	If I get the seasonal flu vaccine, I'll be less likely to spread influenza to my family or friends.	62%	28%	39%	67%	79%	117.57
q2	If I get the seasonal flu vaccine, I'll be protected from getting influenza.	43%	54%	54%	75%	80%	85.53
q39	In a typical year, by how much would the seasonal flu vaccine reduce your chance of getting influenza? (Mean % protection expected)	Vacc'd 76%	NotVacc'd 63%	F statistic 139.83			
SEVERITY:							
q13	Influenza is a serious illness for children.	70%	48%	57%	65%	76%	39.71
q18	Influenza is a serious illness for adults 65 and older.	79%	30%	58%	57%	75%	54.03
q1	Influenza is a serious illness for someone my age.	53%	59%	65%	70%	78%	29.37
SUSCEPTIBILITY:							
q12	Healthy adults don't need to get the seasonal flu vaccine.	81%	70%	40%	27%	55%	152.46
q15	People my age should get the seasonal flu vaccine	53%	23%	37%	70%	80%	168.66
q17	Other people my age are unlikely to get influenza this season.	81%	69%	62%	61%	89%	35.55

Path Diagram for SEM Analysis of Survey Measures, Latent Constructs, and Healthcare Worker Seasonal Flu Vaccination, including Factor Loadings from Exploratory Factor Analysis.