



The Utility of the Theory of Planned  
Behaviour in Health Services Research  
When Examining the Intentions of  
Immunization Provider Behaviour

**THESES  
M.P.H.  
2009  
F37**

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Research Paper in Health Studies

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## **Introduction**

This paper will demonstrate the need for public health involvement with health services research in order to effectively meet its' mandate for achieving population health.

The success of our public health programs requires working effectively with other health service providers to achieve desired outcomes. The goal of the vaccine preventable disease program in Ontario will be used to illustrate the importance of health services research in accomplishing the desired outcomes. In Ontario, immunizations are primarily administered outside of the public health domain with approximately 85 % of immunizations being administered in primary healthcare settings such as family physician offices or community health care centers. How do public health professionals affect immunization provider behaviour that is performed by independent practitioners in other healthcare sectors? The answer lies with health services researchers who wish to predict and understand specific behaviour in health care professionals.

Knowledge transfer or implementation research which focuses on investigating the uptake of evidence-based practice in health care professionals has been conducted through questionnaires based on the Theory of Planned Behaviour (Francis et al., 2004). The importance of immunization and the goal of the vaccine preventable disease program in Ontario will be presented. The theoretical framework of the Theory of Planned Behaviour will be examined to highlight the constructs of the theory and how they interact with one another. Next, the application of the Theory of Planned Behaviour as a theoretical model on which to base the design of a questionnaire to assess health care provider's immunization behaviour will be reviewed. A survey instrument (jointly developed by the Communicable Diseases Epidemiology Services of the British Columbia Centre for Disease Control and the Clinical Trials Research

Centre from Dalhousie University) to measure the psychological determinants of immunization intentions of Canadian Immunization Providers will be examined to determine its usefulness for public health. Finally recommendations for future research will be presented in order to identify priorities for health service research to effectively advance the goals and objectives of staff working in the vaccine preventable diseases program area in Ontario.

### **Status of Childhood Immunization in Canada**

Immunization is not only one of the most effective illness prevention strategies (Romanow, 2002) it is cited as the most cost-effective health intervention and is vital in the promotion of health (Canadian Immunization Guide, 2006; Naus & Scheifele, 2003; Canadian Coalition for Public Health in the 21<sup>st</sup> Century, 2004). “Immunization programs for children are among the most cost-effective ways to improve population health, prevent illness and reduce health care costs” (Ministry of Health Services, p. 16, Government of British Columbia, 2005).

The importance of immunization has further been demonstrated by the investments that have been taking place on a national level in recent years. In 1999, the Federal/Provincial/Territorial Deputy Ministers of Health endorsed the idea of the development of a National Immunization Strategy (Public Health Agency of Canada, 2005). Unfortunately it was not until 2001 that the development of the National Immunization Strategy received approval.

The immunization coverage rates for children have declined over the last ten years (Canadian Coalition for Public Health in the 21<sup>st</sup> Century, 2004). In the Romanow report, it was noted that in some regions of the country, immunization rates have deteriorated as a result of the

lack of attention by health care professionals (Romanow, 2002). The Naylor Advisory Committee reviewed a number of documents as far back as 1990, and found significant differences among the provinces and territories in publicly-funded programs and legislation pertaining to immunization and vaccination (Naylor, 2003). These programs target childhood immunizations, so this decline is alarming as the greatest risk for a child with respect to vaccine preventable disease is during the first three years of life (Neudorf, 2005).

A recent study published in the journal of Pediatrics in 2006, reviewed immunization rates of 101,570 infants born in urban areas in the province of Ontario between July 1, 1997 and June 31, 1998 (Guttmann et al., 2006). This birth cohort of children was monitored over the first six years of life when they are most vulnerable and are recommended to receive frequent immunizations. The assessment at two years of age determined that only 66 % of two years olds had achieved the required doses. Further analysis revealed that at 13 and 19 months, less than 50 % of these children were up to date with their immunizations. This same Ontario study also revealed that these children had a medium average of 19 visits to a physician provider, demonstrating many missed opportunities for immunization. The conclusion of the researchers was that despite universal access to primary care services, rates of complete immunization coverage among two-year-old children in Ontario are low (Guttmann et al., 2006). This research was completed prior to the introduction of additional publicly-funded vaccines into the Ontario childhood immunization schedule in 2003. This new schedule is more complex and requires two needles to be administered at all recommended visits for immunization during the first 18 months of age. The concern of the researchers from the findings published in 2006 is that Ontario's coverage rates with the new schedule will become even lower due to the added complexity of new vaccines and the need for multiple injections per visit. Thus although the literature supports

that immunization is a cornerstone of public health, healthcare professionals are failing to achieve the recommended childhood coverage rates in Ontario for vaccine preventable diseases control. This performance indicates that interventions to increase childhood immunization coverage rates are clearly indicated.

### **Goal of the Vaccine Preventable Diseases Program in Ontario**

The goal of the vaccine preventable diseases program in Ontario is ‘To reduce or eliminate the burden of vaccine preventable diseases’ (Ontario Public Health Standards, 2008). The Ministry of Health and Long Term Care provides the mandate for programs in the Ontario Public Health Standards including the outcomes for which Boards of Health are accountable. Table 1 outlines the outcomes for Boards of Health with respect to the Vaccine Preventable Diseases program.

Table 1

#### **Vaccine Preventable Diseases**

1. The board of health achieves timely and effective detection and identification of children susceptible to vaccine preventable diseases, their associated risk factors, and emerging trends.
2. The board of health achieves timely and effective detection and identification of priority populations facing barriers to immunization, their associated risk factors, and emerging trends.
3. The board of health is aware of and uses epidemiology to influence the development of healthy public policy and its programs and services to reduce or eliminate the burden of vaccine preventable diseases.
4. The public is aware of the importance of immunization across the lifespan.
5. Health care providers report adverse events following immunization to the board of health.
6. Health care providers are knowledgeable of improved practices related to proper vaccine management, including storage and handling.
7. Target coverage rates for provincially funded immunizations are achieved.

8. The board of health effectively responds to vaccine preventable disease outbreaks.
9. The public is aware of the availability of travel health services, including immunizations for travelers.
10. Health care providers adhere to proper vaccine management, including storage and handling practices and inventory management.
11. Vaccines are distributed in an equitable and timely manner that adheres to proper vaccine management, including storage and handling practices.
12. The board of health achieves timely and effective detection and identification of adverse events following immunization.
13. Children have up-to-date immunizations according to the current Publicly Funded Immunization Schedules for Ontario and in accordance with the Immunization of School Pupils Act and the Day Nurseries Act.

As cited in Ontario Public Health Standards, Ministry of Health and Long Term Care, 2008

In order to achieve the above 13 board of health outcomes, a multitude of strategies and interventions are indicated. Many of these strategies and interventions require the cooperation of health care professionals who provide the majority of immunizations to children and adults in Ontario.

As demonstrated in the previous section, the evidence indicates that in Ontario, these goals are not being achieved with respect to immunization target coverage rates and having children up-to-date with the recommended immunization schedule. While the research indicates that we are falling short on these goals, it does not offer the solution of how public health should intervene to address these gaps. It does recognize that children are being seen by their primary healthcare provider an average of 19 visits by two years of age. Healthcare providers are not using the opportunity during the office visit to provide the recommended immunizations, which demonstrates that the appropriate immunizing behaviour is not occurring. What is not provided is the solution of how to change and increase immunization enhancing behaviour.

In addition, the goal of increasing the health care providers' knowledge of immunization



with the subsequent translation into best practice immunization behaviour assumes that providers are starting with a core knowledge base in this area. To determine the strategies to assist in achieving these outcomes, one must know the providers' immunization behaviours and the factors that influence these behaviours. For this reason, the Theory of Planned Behaviour is the theoretical framework chosen in order to achieve this end.

### **The Theory of Planned Behaviour**

The Theory of Planned Behaviour (Ajzen, 1988) is an extension of The Theory of Reasoned Action (Ajzen & Fishbein, Fishbein & Ajzen, 1975), which is an integrated model of behaviour and behavioural determinants.

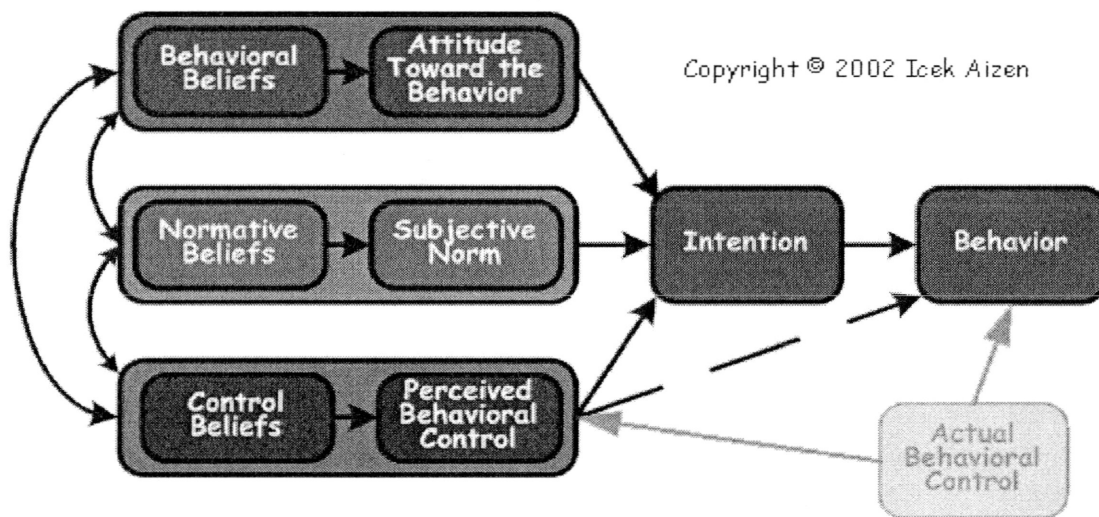
Volitional behaviour, which is defined as within the conscious control of the person, follows the person's intention to perform that behaviour. Expressions of behavioural intention should permit a very accurate prediction of corresponding volitional action. A central factor in the theory of planned behaviour is a person's intention to perform the behaviour of interest or target action. The principle of compatibility was developed by Ajzen (1988) who stated that the correspondence between attitudes and behaviours will be the greatest when both are measured at the same level with respect to four elements. These elements are action, target, context and time, which are represented by the acronym TACT. The behaviour of interest must be specific around the action, who it is performed on, defined by the context where the action occurs and when (Conner and Sparks, 1995). Otherwise stated, all of the measures used must have the same level of generality including the measure of intention.

Intentions are thought to capture the motivational factors that influence behaviour and to

indicate how much effort a person would exert to perform the behaviour. The theory suggests that there are three independent determinants of intentions. They are the attitude toward the behaviour, the subjective norm and perceived behavioural control as outlined in Figure 1.

Figure 1

**Conceptual Model**



Source: Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, p. 179-211.

Attitude towards the behaviour reflects the person’s global evaluations of performing a particular behaviour. According to Ajzen, an attitude is a disposition to an object, person, institution or event in either a favorable or unfavorable response (Ajzen, 1988).

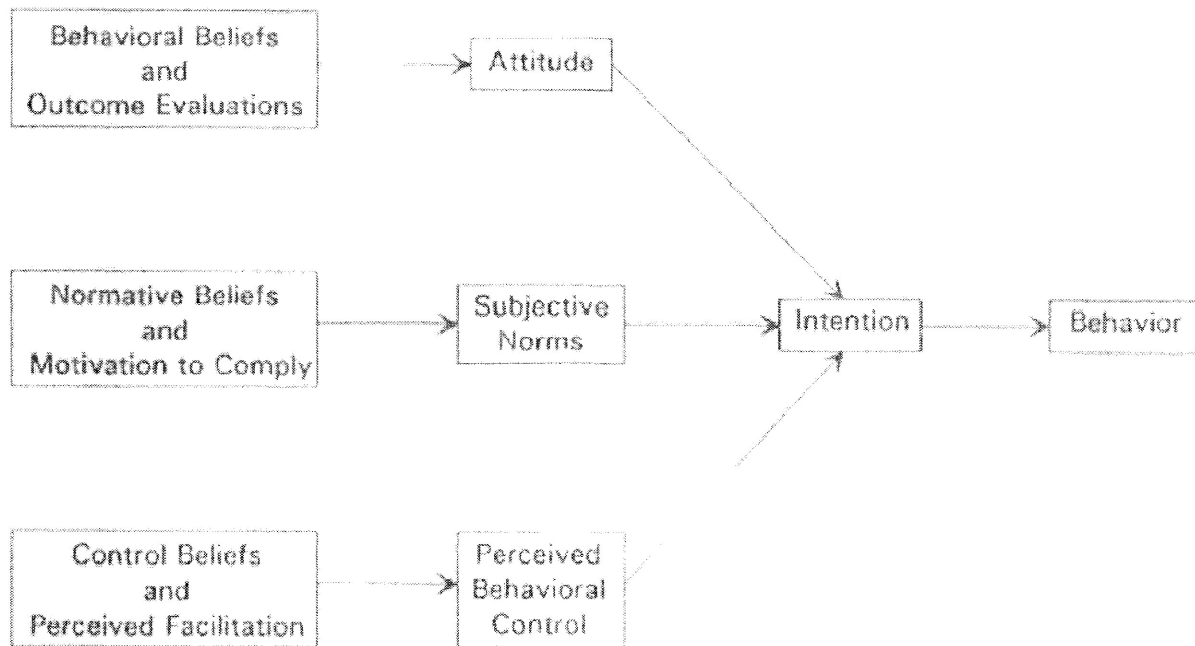
Subjective norm is the person’s perceptions of general social pressure to perform (or not perform) the behaviour. If a person perceives that significant others endorse (or disapprove of) the behaviour, they will be more (or less) likely to intend to perform it. These two behavioural

determinants comprised the Theory of Reasoned Action.

The Theory of Planned Behaviour expanded on the Theory of Reasoned Action to include non-volitional behaviours by including the perception of control over the performance of the behaviour as an additional predictor of behaviour (Ajzen, 1988). The causal model of the Theory of Planned Behaviour describes behaviour being determined by the intention to engage in the behaviour and perceptions of control over the behaviour. The Theory of Planned Behaviour offers an account of how perceptions of control may influence people's intentions and behaviour (Ajzen, 1988).

In addition to these three behavioural determinants, there are the antecedents or precursors of attitude, subjective norm and perceived behavioural control, which are corresponding beliefs that reflect the underlying cognitive structure. Each behavioural belief links a given behaviour to a certain outcome or to some other attribute. Thus the model can be broken down even further to uncover these components influencing these constructs as seen in Figure 2.

Figure 2



Source: Mathieson, K. (1991). Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behaviour, *Information Systems Research*, Vol. 2 Issue 3, p. 175.

The first independent determinant of intention for discussion is the attitude towards the specific behaviour. It is comprised of two components which work together: behavioural beliefs and the corresponding outcome of each specific behavioural belief. The behavioural belief is what the person believes is a consequence of the behaviour and whether the consequence is positive or negative (Ajzen, 1988).

The next independent determinant of intention for discussion is the subjective norms about the behaviour, which is the person's estimate of the social pressure to either perform or not perform the target behaviour. It is comprised of two components which work together: normative beliefs and the corresponding outcome of each specific normative belief (Ajzen, 1988). This describes how the person's beliefs about how other people important to them view the behaviour

and how they believe these significant others would like them to behave.

The last independent determinant of intention for discussion is perceived behavioural control which is the extent a person feels able to perform the behaviour. It also is comprised of two components which work together: control beliefs about the behaviour and the power of both internal and situational factors which inhibit or facilitate performing this behaviour. Another way of stating this is how much control the person perceives they have over the behaviour and how confident they are about their ability to perform or not perform the behaviour (Ajzen, 1988). As Ajzen stated 'it is not very illuminating to discover that people do what they intend to do but in understanding human behaviour. Understanding the behaviour, not just predicting it, requires the determinants of behavioural intentions' (Ajzen, 1988, p. 116).

### **Validity of the Model in Health Research**

This theoretical framework for behaviour has been used extensively in health research and a number of reviews to critically appraise the models' performance in this large body of research have occurred. In 1996, Godin and Kok reviewed studies using the Theory of Planned Behaviour as it was applied to health, over the timeframe from 1985 to 1994. The need for this review was driven by the increased use of the application of social psychology theories, which Godin and Kok viewed as evidence of their increased popularity in research which seeks to predict and understand social behaviours in various domains. They also noted that there are limitations to the Theory of Reasoned Action when predicting behaviours where people have incomplete volitional control. This led to Ajzen's Theory of Planned Behaviour and the construct of perceived behavioural control as it contributes to both intention and the behaviour. Godin and

Kok's review of the Theory of Planned Behaviour was on studies dealing specifically with health-related behaviours which had not been done in previous reviews. Although this qualitative analysis revealed values similar to previous meta-analytic studies of the Theory of Reasoned Action, the previous Theory of Reasoned Action meta-analysis did not cover the domain of health-related behaviours. Overall, the review attributed intention as the most important variable with health-related behaviours, with the conclusion that these remain largely within one's personal motivation. (Godin & Kok, 1996). However, clinical and screening behaviours are categories where perceived behavioural control was more significant than intention as other factors also impact these specific behaviours which are consistent with the Theory of Planned Behaviour. It is these clinical and screening behaviours that are of interest to health services researchers.

The results of Armitage & Conner's meta-analysis on the efficacy of the Theory of Planned Behaviour were also consistent with the previous findings in Godin and Kok's results. This analysis determined that perceived behavioural control on average adds around 2% over and above intention with respect to the prediction of behaviour. This finding supports the diagram of the model that links perceived behavioural control not only to intention but also to behaviour (Armitage & Conner, 2001).

Thus the usefulness of the perceived behavioural control construct in predicting behaviour when the behaviour is not completely under volitional control was supported by this finding. Correlations between belief-based and direct measures of attitude, subjective norm and perceived behavioural control were determined. Behavioural and normative-belief measures inform attitude and subjective norms respectively and are strongly correlated with each other congruent with Fishbein and Ajzen (1975). The expectancy-value basis to control beliefs is

correlated to the perceived behavioural control, which supports Ajzen's (1991) previous work (Armitage & Conner, 2001).

All of the correlations in this meta-analysis represented 'medium' to 'large' effect sizes. Although the analysis determined that the subjective norms were the weakest construct, the authors argued that this finding relates to the fact that norms are usually measured by a single item. When multi-item measures of subjective norm and normative beliefs were used, these demonstrated significantly stronger correlations with intention than the other measures (Armitage & Conner, 2001). This meta-analysis provided supportive evidence that intention and behaviour can be predicted by using the Theory of Planned Behaviour. Prediction of self-reported behaviour was superior to observed behaviour in the studies reviewed. This meta-analysis compared favourably with the findings of previous meta-analyses of the Theory of Planned Behaviour. Perceived behavioural control was found to contribute uniquely to the prediction of behaviour, demonstrating the efficacy of this construct.

Additional support for the efficacy of the Theory of Planned Behaviour over the Theory of Reasoned Action is provided by the multiple correlations of attitude, subjective norm and perceived behavioural control with intention. In this present meta-analysis, perceived behavioural control adds on around 6 % to the prediction of intention, over and above attitude and subjective norm. Thus perceived behavioural control appears to influence behaviour directly and indirectly, independent of the Theory of Reasoned Action variables representing a useful addition to the Theory of Reasoned Action (Armitage & Conner, 2001).

### **Implementing the model into health research**

It has been demonstrated that the Theory of Planned Behaviour has assisted those involved in health services research to produce an effective questionnaire to measure the relevant constructs. Thus the attitudes and beliefs underlying health behaviour can be investigated using questionnaires based on the Theory of Planned Behaviour. A practical application of the model is demonstrated through the investigation of the uptake of evidence-based practice using these questionnaires in implementation or knowledge transfer research with health care professionals.

According to the model, intention is the precursor of behaviour which is influenced by the three predictors of the intention. Thus by influencing these predictors, one can change the intention to perform a desired action and increase the chance that a person will perform the behaviour of interest. Clinical treatment decisions are examples of intentional behaviour that could be influenced to comply with evidence-based clinical guidelines which can maximize quality of care. By working through the attitudes, subjective norms and perceived behavioural control of clinicians and enhancing them in a positive way, greater compliance with guidelines may be achieved (Francis et al., 2004).

Designing strategies to assist health care providers with increasing their uptake of clinical guidelines can be ascertained through the utilization of the Theory of Planned Behaviour. A questionnaire which measures the variables in this model can identify which predictors of behaviour should be targeted. The behaviour of clinicians is of interest in implementation research as interventions designed to change their practice are important to increase the occurrence of a positive clinical behaviour.

The usefulness of the theory lies in the view that behavioural intention is the precursor to



actual behaviour and therefore it can be used as a proximal measure of behaviour. This relationship allows the examination of the variables in the model to determine their effectiveness as implementation interventions without the actual measurement of the behaviour. These variables also influence each other as well as the behavioural intention (Ajzen, 1988).

Specific application of the Theory of Planned Behaviour as it relates to examination of immunization behaviour was undertaken by Gallagher. This research focused on immunization behaviour that examined the determinants of the intentions of older adults with respect to receiving influenza vaccination. Vaccine uptake in persons 60 years and older was not achieving the optimal target rates for this population. The perspective of Gallagher was that it was the older adult who makes the decision to choose to receive that vaccine and it was their perspective that needed to be examined. Thus the study's aim was to identify determinant factors that promote or inhibit decision making for influenza immunization in older Irish Adults, using the Theory of Planned behaviour as the theoretical framework. The central question was: Could the motivating determinants of influenza vaccination intentions be identified using this model? The Theory of Planned behaviour components accounted for 48 % of vaccination intentions indicating its usefulness as a framework to base future interventions on. The determinants and motivations as well as the processes involved in the decision making to vaccinate against influenza can be better understood through the contribution of this research. Attitudes and subjective norms were associated with intentions to vaccinate. Thus the motivation to comply with and seek the approval of significant others such as family physicians led to stronger intentions to vaccinate, demonstrating the facilitating effect of health care providers (Gallagher & Povey, 2006).

Identifying factors that positively influence health care providers' immunization behaviours is a key health promotion strategy as they have the responsibility to prevent vaccine-

preventable diseases in those under their care (Canadian Immunization Guide, 2006). Thus, health care providers need to recognize the significant impact they can have on patient vaccination behaviours.

### **Application and Critique**

Evidence of the strength of this model in health research is the development of a manual by Francis et al. which was the response to requests from health service researchers involved in research-based education and quality improvement in the European Union. This manual is designed to assist these researchers in designing effective questionnaires to measure the Theory of Planned Behaviour constructs (Francis et al., 2004).

The recommendations for developing the measurement of these constructs is taken from this manual and will be used as a reference for critiquing the Survey Instrument developed to measure the Psychosocial determinants of Immunization Intentions of Canadian Immunization Providers. A summary of the recommendations from this manual for the development of the questionnaire will be outlined followed by a detailed examination of the survey instrument to determine if its development was congruent with the recommendations by Francis et al. Again this manual was an integration of all of the previous reviews and meta-analysis of the Theory of Planned Behaviour as well as a best practice review of the design and use of questionnaires applicable to surveys of health service staff and patients.

Francis et al. reiterate that all of these variables are internal constructs except for the behaviour which is observable. Therefore to measure these constructs, questions may be asked directly of the variable or indirectly by asking about the components of the variable. For example

questions would be asked directly about attitude towards the behaviour, as well as the behavioural beliefs and associated outcome evaluation of each behavioural belief with respect to the behaviour of interest. Both direct and indirect measurement of the predictor variable (attitude) is recommended and scores tapping the same construct should be positively correlated (Francis et al., 2004). An index of internal consistency to determine whether the items in the scale are measuring the same construct is the recommended method. In addition, test-retest reliability is suggested to determine temporal stability (Francis et al., 2004).

A series of step by step processes are recommended in the construction of a questionnaire to measure the variables in the Theory of Planned Behaviour model and are outlined as follows (Francis et al., 2004).

1. First, the population of interest must be defined and then a methodology for selecting a representative sample is required. According to Francis et al. for implementation research, the relevant issue under study has specific features. These features will facilitate the completion of the research and when completed the results will be more informative to the target audience. These features are:
  - the relevant issue(s) has clear clinical evidence
  - there is moderate or low compliance with the clinical evidence
  - it is a common clinical issue
  - there is variation in performing the behaviour in the population of interest
  - treatment decisions are of a 'yes/no' nature and
  - the population of interest has readily available contact information.

In the context of examining immunization provider behaviour the above criteria are supported by the current research on immunization. There is clear clinical evidence about

immunization provider practice and compliance with immunization best-practice behaviour is low to moderate. As well there is variation in the behaviour of interest and contact information is available to reach immunization providers in Canada.

2. A careful definition of the behaviour under study must follow using the TACT principle. Therefore the behaviour needs to be described in terms of its target, the actual action, the context where it is performed and when it is performed. This definition should be included in the general introduction explaining the questionnaire. An example of the immunization behaviour using this principle would be described as administering multiple injections, i.e. giving all recommended vaccines (action) to an infant (target) during one clinic visit (when) in my office (where) (Appendix A, question 1, p 43).
3. The best way to measure intentions must be decided. There are three methods of measuring intentions; intention performance, generalized intention and intention simulation. Intention performance is a method where observation of the actual performance of the behaviour could be measured against the person's self-reporting of the same behaviour. The generalized intention method involves asking the person to self-report on their intention to perform a behaviour with respect to their expectation around the behaviour, as well as their desire and their intention to perform the behaviour. This method has been most commonly used on research about one's own health-related behaviour. Intention simulation involves writing scenarios which ask the clinician for a treatment decision. This method is viewed as a more close approximation of 'real' situations that occur in clinical decision making and thus a more valid proxy measure of actual behaviour when investigating health care professionals' behaviour. As this research is interested in the health care professionals' behaviour, intention simulation

would be the recommended method for the measurement of intention (Francis et al., 2004).

4. Next, a determination of the most frequently perceived advantages and disadvantages of performing the behaviour of interest should take place by determining the measurement of attitude and using direct or indirect measures. The indirect measure of attitude requires a way of measuring the behavioural beliefs and outcome evaluations and requires an elicitation study. The elicited commonly held behavioural beliefs are then assessed to determine their respective strengths as well as assessment of each belief with respect to outcome evaluations. Direct measures are achieved through asking respondents about their overall attitude.
5. Now, the most important people who would approve or disapprove of the behaviour must be determined. This entails measuring subjective norms either through direct or indirect methods of measurement. Indirect measurement approach requires measuring normative beliefs and the motivation to comply and also requires an elicitation study. Again, these elicited commonly held normative beliefs are assessed to determine their respective strengths and the assessment of the motivation to comply with the normative belief is also required.
6. Next, facilitating factors or perceived barriers which could ease or reduce the adoption of the behaviour are determined. Perceived behavioural control can be measured directly or indirectly. The indirect method requires measuring control beliefs and their perceived power to influence behaviour which is determined via the same method as the indirect methods for attitude and subjective norms. The strength of these control beliefs is assessed as well as the power of each of these control factors to influence the behaviour.

The indirect measures for attitude, subjective norm and perceived behavioural control can be developed from the same elicitation study. The ideal number of 25 participants is suggested for this sample representation as is the use of free-format responses to set questions whether in a focus group, individual interviews or mailed questionnaire.

7. The first draft of the Theory of Planned Behaviour -based study should include questions that are direct measures of all three predictor variables as well as demographic questions to provide information about the sample population. Questions on belief-based measures of all the predictor variables from the elicitation study are important to include ensuring measurement of all the constructs of the model. Also questions assessing behavioural intention should be included. Three items is the minimum recommendation for measurement of each construct, therefore 12 items for intentions and direct measures of the predictor variables is the minimum. A further 18 items is needed for the belief-based measures. As the questionnaire of interest was developed to investigate the behaviour of health care professionals, behavioural simulation methods would be indicated, requiring 10 more items (one for each scenario) for a minimum of eight demographic items and 40 carefully worded items addressing the variables. Refer to Table 1 for a summary of these recommendations. Including more than three behavioural, normative and control beliefs may require the inclusion of more items of indirect measures, which will improve the validity of the study but may cause participant fatigue and decreased response rates due to the length of the questionnaire. The final point is that questions assessing the three predictor variables should be mixed up throughout the questionnaire according to Ajzen.

Table 1

Recommended Formatting of Questions

Nature of Question	Recommended number
Demographic	8
Direct Measure for each predictor variables*	9
Elicitation study questions for all constructs*	18
Behavioural Intention*	3
	Sub-total 38
Behavioural intention simulation method	10
	Total 48

\*A total of 30 questions are recommended for every behaviour being studied as it should include these three types of questions.

8. The validity of the instrument is achieved through careful pilot testing of the items to determine if there is a high correlation with intention. Eliciting feedback from a minimum of five expert respondents is recommended by having them answer the questions. Feedback should include determining if items are ambiguous, difficult to answer, too repetitive, annoying features of wording or formatting and if it is too long or superficial. Items may be omitted to improve internal consistency. Indications that response endpoints are problematic can be seen with inconsistent responses from respondents completing the questionnaire too quickly. Major changes to address these issues suggest the need for a second elicitation study with a different sample population (Francis et al., 2004).
9. Lastly, the test-retest reliability is assessed by administering the edited questionnaire at a two week interval to the same group of people (Francis et al., 2004). Knapp (1985) recommends this method to assess the stability of the instrument by correlating scores obtained on different administrations of the survey. The purpose is to provide evidence regarding the short-term consistency of the measurements yielded by the survey. 'It is not

concerned with the long-term consistency of the construct that is being measured'

(Knapp, 1985, p. 190).

## **Application and Critique of the Theory of Planned Behaviour and Immunization**

### **Behaviour**

A poster by researchers from British Columbia and Nova Scotia, titled "Development of a Survey Instrument to Measure Psychosocial Determinants of Immunization Intentions of Canadian Immunization Providers Using the Theory of Planned Behaviour" was presented at the 2006 Canadian Immunization Conference and this information was available as a handout to participants. Included in the poster presentation was an outline of the steps involved in the development of the instrument referencing the above manual for construction of questionnaires based on the Theory of Planned Behaviour. While the details of each step of the development process were not available, the following description was presented. An inductive approach was used in the development and refinement of the instrument. This inductive method moves from specific observations to broader generalizations and theories and is a more open-ended and exploratory method of research. Inductive reasoning starts with specific observations and measures with the beginning detection of patterns and regularities. This leads to the formulation of some tentative hypotheses that can be explored. The final step results in developing some general conclusions or theories (Trochim, 2006).

An elicitation survey was completed with 125 immunization providers across Canada through interviews to determine the most critical key behaviours for an optimal immunization delivery program. The methodology of selecting these 125 participants as a representative



sample for Canadian immunization providers was not described in the document.

From these interviews, a thematic analysis was conducted and from this, nine themes were determined. These themes were categorized as different dimensions of an optimal immunization delivery program and each dimension then had an associated behaviour of interest that if performed, would contribute to achieving a best practice standard. A detailed examination for each of the dimensions and the desired behaviour of interest from the final draft of the questionnaire will be done to determine if the instrument met the criteria of the TACT principle and whether both direct and indirect measurements of the predictor variable for that behavioural intention was included. Before proceeding with this, the broad overview of the development process described will be presented to provide further context.

From each dimension of the optimal immunization delivery program and its associated behaviour of interest, the assessment of intention, attitudes, subjective norms and perceived behavioural control for all nine, were drafted. Again, unfortunately the methodology describing the determination of establishing the measurement of each of these variables was not available.

This provided the first draft of the survey which was distributed to a focus group of ten public health nurses to evaluate content validity. A two stage process to determine and quantify content validity as described by Lynn (1986) was utilized. This method included the initial identification of all the domains of desired immunization provider behaviours which were then categorized into items and themes. Using a structured evaluation process, a content validity index was calculated on each item and theme. This entailed using a 4- point ordinal rating scale, with 1 indicating an irrelevant item and 4 indicating an extremely relevant item. The proportion of items that receive a rating of 3 or 4 by the experts is the actual content validity index or CVI. For this survey, eight of the experts had to give either a 3 or 4 rating for the item or theme to

achieve statistical significance. Items or themes that did not achieve statistical significance ( $p < 0.05$ ) were deleted (Lynn, 1986). The questionnaire was revised for the creation of the second draft of the survey.

Field testing was done with ten immunization providers on the second draft version with more refinement taking place to complete the questionnaire contained in appendix A. The questionnaire in appendix A is designed to capture the demographic information of the immunization provider and contains the questions developed based on the Theory of Planned Behaviour. It is this questionnaire that will be used in the critique of its effectiveness to measure the Theory of Planned Behaviour constructs of the behaviour of interest.

The current instrument was refined down to seven dimensions which are listed as follows: multiple vaccine administration, healthcare worker influenza vaccination, missed opportunities, MMR vaccine, adverse event reporting, benefit-risk communication and immunizing with a minor illness. Support for these dimensions can be found in the 2006 Canadian Immunization Guide which is a publication of the recommendations from the National Immunization Committee on Immunization. Since 1975, the National Immunization Committee on Immunization, which is a national committee of recognized experts from public health, pediatrics, infectious diseases, immunology, medical microbiology and internal medicine, and works through the Public Health Agency of Canada, provides the Federal Ministry of Health with medical, scientific, and public-health advice relating to immunization.

According to the Canadian Immunization Guide, several challenges within immunization programs are present. Highlighted are the documentation of ongoing missed opportunities for immunization, specific populations in Canada with lower vaccine coverage rates, large variations in the reporting of adverse events following immunization and evidence that the benefits and

risks of vaccines are inadequately communicated.

Guidelines for immunization practices for all health professionals who administer vaccines or are responsible for managing immunization services for Canadians, both in the public and private sector, have been developed by National Immunization Committee on Immunization. There are 17 guidelines for immunization practices and all of the seven dimensions in the questionnaire are found in these guidelines. The behaviour of interest is the “best practice” recommendations in order to achieve the desired goal for immunization programs in Canada. Every four years the Canadian Immunization Guide is published and contains all of National Immunization Committee on Immunization’s recommendations on vaccine use in Canada, with additional statements and updates published in the Canada Communicable Disease Report for the interim period between new guides.

In the 2009 Canada Communicable Disease Report, the National Immunization Committee on Immunization’s summary on developing evidence-based recommendations for immunization explicitly state the methodology used to retrieve, assemble and evaluate the available scientific evidence to increase the transparency of the recommendation process to better serve the information needs of vaccine community stakeholders.

The demographic section of the questionnaire contains 17 items to determine specific information on type of profession, educational background, practice setting, patient population and specific training on immunization provision. Table 2 provides a summary of the questionnaire in Appendix B and provides a comparison between the recommended elements from the manual for health services researchers (Francis et al., 2004).

Table 2

Comparison of Recommended Format of the Theory of Planned Behaviour  
Questionnaire and the Immunization Provider (IP) Survey

<b>Nature of Question</b>	<b>Recommended number</b>	<b>IP Survey</b>
Demographic	8	17
<b>Different Dimensions of IP Behaviour</b>		
1. Multiple Vaccines	30*	14
2. Health Care Provider & Influenza Vaccination	30*	17
3. Avoiding missed opportunities	30*	14
4. MMR vaccine	30*	11
5. Reporting adverse events	30*	11
6. Benefit-risk communication	30*	11
7. Immunizing with a minor illness	30*	13
<b>Total</b>	<b>218</b>	<b>108</b>

\* This total includes the direct measure for each predictor variable (8) the elicitation study questions for all constructs (18) and behavioural intention (3) as described in Table 1

## Discussion

As can be seen in Table 2, the immunization provider behaviours survey does not follow the recommended number of questions for the measurement of both the direct and indirect predictor variables and constructs. The survey also does not follow the recommended number of questions for behavioural intention. This survey is comprised of all of the dimensions of immunization provider behaviours that are of interest utilizing the same 17 demographic questions. By failing to construct the questionnaire using the Theory of Planned Behaviour approach it is not possible to predict the intention of immunization provider's behaviours. By not ensuring that there are at least three direct questions for each construct (i.e. three for attitudes, three for subjective norms and three for perceived behavioural control) and three questions measuring intention, it is impossible to validate the constructs and intentions (Francis et al., 2004). One specific dimension of immunization provider behaviour from the questionnaire will

be examined in greater details to demonstrate the weakness in the present tool. In addition to the poster presentation of the immunization provider behaviours survey instrument, the researchers from British Columbia and Nova Scotia also presented a poster, titled “Self-Reported Intent to Receive, and Uptake Of, Influenza Vaccine by Immunization Providers” at the 2006 Canadian Immunization Conference.

Before providing question examples, the measurement scale selected for all of the questions will be discussed. The variation between the strength of association between attitude and behaviour is felt to be influenced by the pairs of bipolar adjectives used in the measurement scale (Valois & Godin, 1991). Thus certain scale pairs are proposed to be more appropriate dependent on the health-related behaviour under study. The research by Valois and Godin used four seven-point scale pairs which had the following endpoints: unpleasant-pleasant, healthy-unhealthy, bad-good and useful-useless. These same scales were used to evaluate four attitudes of different health-related behaviours. The analyses were performed in two steps to identify the influence of same set of scale pairs on the attitude-behaviour relation. First the internal consistency of the attitude construct and the item-total correlations were verified. Then for each attitude-behaviour relation, the Pearson correlation coefficient was computed. The results indicated that a given set of scale pairs cannot be used to measure attitude toward different health-related behaviours. The different interpretations that could be applied to a single scale pair is described by the term semantic stability. The relevance to the behaviour or action being assessed and their semantic stability for the behaviour under study should determine what items are selected (Valois & Godin, 1991).

Throughout the survey, questions that are direct measures of attitude use the same five-point pair scales for all seven of the health-related behaviours which has the following endpoints:

extremely unimportant - extremely important, extremely harmful - extremely beneficial, extremely bad - extremely good. The scale pair of extremely bad - extremely good for the measurement of attitude towards giving an infant multiple injections could be viewed by some as good in terms of protecting the infant and others as bad due to the pain from more than one needle poke.

Francis et al. (2004), recommend using bipolar adjectives or pairs of opposites that are evaluative (i.e. good – bad) when direct measurement of attitude is done. It should also include items that are instrumental (worth of behaviour) and experiential (feeling when performing) from the perspective of the immunization provider. A five-option response format was used throughout this questionnaire although a seven- option response format is most recommended in the literature using the Theory of Planned Behaviour. It is also interesting to note that Intention Simulation was not used in any of the questions. As this survey was interested in the behaviour of health care professionals, this method is felt to more closely approximate clinical decision making such as deciding to immunize a patient. As Jones et al. concluded, written simulations are most likely an effective research instrument for eliciting attitudes and beliefs (Jones et al.1990).

Under this dimension, the behaviour of interest is whether the immunization provider will receive the influenza vaccine in advance of each influenza season. There are 17 questions to measure the Theory of Planned Behaviour constructs which can be found in Table 3.

Table 3

Question	Response format				
1) Receipt of influenza vaccine in advance of each influenza season will give me the flu.	a. <input type="checkbox"/>	b. <input type="checkbox"/>	c. <input type="checkbox"/>	d. <input type="checkbox"/>	e. <input type="checkbox"/>
2) My getting the flu from influenza vaccine would be...	Strongly disagree	Disagree	Neither	Agree	Strongly agree
3) Receipt of influenza vaccine in advance of each influenza season will increase my risk for Guillain Barre Syndrome.	a. <input type="checkbox"/>	b. <input type="checkbox"/>	c. <input type="checkbox"/>	d. <input type="checkbox"/>	e. <input type="checkbox"/>
4) My having an increased risk for Guillain Barre Syndrome would be...	Extremely unacceptable	Unacceptable	Neither	Acceptable	Extremely acceptable
5) Receipt of influenza vaccine in advance of each influenza season will increase my risk for oculorespiratory syndrome.	a. <input type="checkbox"/>	b. <input type="checkbox"/>	c. <input type="checkbox"/>	d. <input type="checkbox"/>	e. <input type="checkbox"/>
6) My having an increased risk for oculo-respiratory syndrome would be...	Strongly disagree	Disagree	Neither	Agree	Strongly agree
7) Health care provider receipt of influenza vaccine in advance of each influenza season should be mandatory.	a. <input type="checkbox"/>	b. <input type="checkbox"/>	c. <input type="checkbox"/>	d. <input type="checkbox"/>	e. <input type="checkbox"/>
8) Mandatory receipt of influenza vaccine for health care providers (in advance of each influenza season) would be...	Extremely unacceptable	Unacceptable	Neither	Acceptable	Extremely acceptable
9) As a health care provider, my receipt of influenza vaccine in advance of each influenza season is...	a. <input type="checkbox"/>	b. <input type="checkbox"/>	c. <input type="checkbox"/>	d. <input type="checkbox"/>	e. <input type="checkbox"/>
9.1)	Extremely unimportant	Unimportant	Neither	Important	Extremely important
9.2)	a. <input type="checkbox"/>	b. <input type="checkbox"/>	c. <input type="checkbox"/>	d. <input type="checkbox"/>	e. <input type="checkbox"/>
9.3)	Extremely harmful	Harmful	Neither	Beneficial	Extremely beneficial
10) My colleagues think that, as a health care provider, I should receive influenza vaccine in advance of each influenza season.	a. <input type="checkbox"/>	b. <input type="checkbox"/>	c. <input type="checkbox"/>	d. <input type="checkbox"/>	e. <input type="checkbox"/>
11) My colleagues' opinion influences my decision about receipt of the influenza vaccine.	Extremely bad	Bad	Neither	Good	Extremely good
10) My colleagues think that, as a health care provider, I should receive influenza vaccine in advance of each influenza season.	a. <input type="checkbox"/>	b. <input type="checkbox"/>	c. <input type="checkbox"/>	d. <input type="checkbox"/>	e. <input type="checkbox"/>
11) My colleagues' opinion influences my decision about receipt of the influenza vaccine.	Strongly disagree	Disagree	Neither	Agree	Strongly agree
11) My colleagues' opinion influences my decision about receipt of the influenza vaccine.	a. <input type="checkbox"/>	b. <input type="checkbox"/>	c. <input type="checkbox"/>	d. <input type="checkbox"/>	e. <input type="checkbox"/>
	Strongly disagree	Disagree	Neither	Agree	Strongly agree

<p>12) My employer thinks that, as a health care provider, I should receive influenza vaccine in advance of each influenza season.</p>	<p>a. <input type="checkbox"/> Strongly disagree</p> <p>b. <input type="checkbox"/> Disagree</p> <p>c. <input type="checkbox"/> Neither</p> <p>d. <input type="checkbox"/> Agree</p> <p>e. <input type="checkbox"/> Strongly agree</p>
<p>13) My employer's opinion influences my decision about receipt of the influenza vaccine.</p>	<p>a. <input type="checkbox"/> Strongly disagree</p> <p>b. <input type="checkbox"/> Disagree</p> <p>c. <input type="checkbox"/> Neither</p> <p>d. <input type="checkbox"/> Agree</p> <p>e. <input type="checkbox"/> Strongly agree</p>
<p>14) I am afraid of the pain of receiving an influenza vaccine in advance of each influenza season.</p>	<p>a. <input type="checkbox"/> Strongly disagree</p> <p>b. <input type="checkbox"/> Disagree</p> <p>c. <input type="checkbox"/> Neither</p> <p>d. <input type="checkbox"/> Agree</p> <p>e. <input type="checkbox"/> Strongly agree</p>
<p>15) As a health care provider, I feel that I should receive influenza vaccine in advance of each influenza season.</p>	<p>a. <input type="checkbox"/> Strongly disagree</p> <p>b. <input type="checkbox"/> Disagree</p> <p>c. <input type="checkbox"/> Neither</p> <p>d. <input type="checkbox"/> Agree</p> <p>e. <input type="checkbox"/> Strongly agree</p>
<p>16) As a health care provider, I intend to receive influenza vaccine in advance of each influenza season.</p>	<p>a. <input type="checkbox"/> Extremely unlikely</p> <p>b. <input type="checkbox"/> Unacceptable</p> <p>c. <input type="checkbox"/> Neither</p> <p>d. <input type="checkbox"/> Acceptable</p> <p>e. <input type="checkbox"/> Extremely likely</p>
<p>17) As a health care provider, I have received influenza vaccine in advance of each influenza season</p>	<p>a. <input type="checkbox"/> 0-24 %</p> <p>b. <input type="checkbox"/> 25-49 %</p> <p>c. <input type="checkbox"/> 50-74 %</p> <p>d. <input type="checkbox"/> 75-100 %</p> <p>e. <input type="checkbox"/> of the time</p>



Questions one through eight are questions pertaining to the indirect measurement of attitude; they are measuring behavioural beliefs and the outcome evaluations of each behavioural belief. Four behavioural beliefs and their associated outcome evaluations are being measured. Question 14 also appears to be measuring the behavioural belief about receiving the influenza vaccine as it refers to the fear of the pain associated with the vaccination. The outcome associated with this behavioural belief does not occur in any of the 17 questions.

Question nine is a direct measure of attitude, which does use bipolar adjectives. It does not ask the immunization provider how it feels to perform this behaviour; it only focuses on whether the behaviour achieves something (extremely unimportant – extremely important). It is also recommended by Francis et al., that the ends of the scales do not consistently have the same endpoints, which has not been done. That is the questions should alternate the negative and positive endpoints so that the person does not tend to answer the questions in the same way regardless of their content.

Questions ten through 13 are questions pertaining to the indirect measurement of subjective norms; normative beliefs and the corresponding outcome of each specific normative belief. Other people important to the health care provider referenced are a colleague and their employer and their motivation to comply with those important people's wishes.

Questions 15 and 16 appear to be measuring behavioural intention using the generalized intention method. Question 17 asks the health care provider to self-report on their actual behaviour around receiving the influenza vaccine prior to the season. The measure for perceived behavioural control or measures of control beliefs and their perceived power to influence behaviour do not occur in this set of questions. Given the importance of this predictor variable, which is the essence of the Theory of Planned Behaviour, as it not only influences behavioural

intent but the actual behaviour, the absence of the measurement of this construct is concerning. Thus it has been demonstrated that the questions designed to assess whether the immunization provider will receive the influenza vaccine in advance of each influenza season and the format of the responses does not follow the theoretical model of the Theory of Planned Behaviour.

The researchers did utilize this questionnaire using a cross-sectional postal survey that was mailed to all immunization providers in British Columbia. Their analysis of the responses suggested that almost 90 % of immunization providers intend to receive annual influenza vaccine but on self-report that uptake was closer to 80 %. They concluded that positive attitudes of immunization providers to receiving the vaccine may be important in their recommending it to others. Their recommendation included health promotion initiatives that should target individual perceptions. This is often a strategy that public health will undertake to influence key individuals, however if the analysis is flawed through design methodology, these measures may not result in the desired outcome.

In summary, it has been demonstrated that there are a multitude of issues with the current instrument. This includes the overall assessment of the entire questionnaire that identifies the inadequate number of questions to measure the predictor variables as well as the measurement scale utilized throughout. In addition, the specific examples provided from the section focused on immunization provider's receipt of influenza vaccine in advance of each influenza season further details the flaws where the format of the responses does not follow the theoretical model of the Theory of Planned Behaviour. Therefore this survey is unable to predict intention as the constructs and behavioural intention cannot be validated due to the poor design methodology.

## **Recommendations for Future Research**

The survey instrument designed to measure Psychosocial Determinants of Immunization Intentions of Canadian Immunization Providers was not constructed to follow the requirements of the Theory of Planned Behaviour. The immunization behaviours of interest are supported as evidenced in the Canadian Immunization Guide which ‘define the most desirable immunization practices that health care providers can use to assess their own current practices and identify areas of excellence as well as deficiency’ (Canadian Immunization Guide, 2006, p 26). In reviewing the different behaviours, it was revealed that the design of the questions within each behavioural domain did not meet the criteria recommended for construction questionnaires using the Theory of Planned Behaviour. Instead the omission of these questions resulted in inadequate measures of the constructs which are essential for the prediction and the understanding of the behaviour. The ambitiousness of the questionnaire to address all seven immunization provider behaviours, if correctly constructed, would produce an extremely long questionnaire that would require a significant amount of time to complete. A questionnaire that focused on one or a few of these behaviours, with the recommended minimum questions per sections would produce an instrument that could be validated but not be so lengthy as to result in participant fatigue when completing the tool.

The questions developed from the elicitation study could be examined with a careful review of the methodology used to ascertain these questions. The minimum recommended items of direct measures for each construct as well as for behavioural intention would need to be included in the survey so that a reliability test for each construct and intention can be carried out. The scoring procedures for each question may require changing from a five-point scale to a

seven-point scale so the analysis can be done per the recommendations by Francis et al (2004).

## **Conclusion**

The Theory of Planned Behaviour has demonstrated its efficacy in the prediction of health-related behaviour. The ability to design an effective questionnaire to measure the constructs of the Theory of Planned behaviour is critical for the prediction of the behaviour of interest (i.e. the investigation of the three determinants of intentions underlying the health-related behaviour). For the vaccine preventable diseases program within the Ontario Public Health Standards, the achievement of the outcomes identified for the program relies on specific health-related behaviours occurring. For the purposes of this paper, it is the health-related behaviours of healthcare professionals, with respect to their immunization provider behaviour. Specific immunization provider behaviours consistently performed are key factors to addressing certain shortfalls in the desired outcomes for this program. The dilemma for public health professionals, who constitute the minority of immunization providers in Ontario, is in determining how to change the majority of immunization provider behaviours outside the public health domain. The Theory of Planned Behaviour, through measurements of its constructs, allows one to understand the behaviour which is essential to determine strategies to change it.

A questionnaire designed to follow the Theory of Planned Behaviour in order to predict the intention of immunization providers would add a significant contribution to the current health services research literature and provide public health practitioners with the understanding of how to influence immunization providers' behaviour to achieve the desired outcomes for the vaccine preventable diseases program in Ontario.

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Appendix A



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**Healthcare Provider Survey of Knowledge, Attitudes, Beliefs and Behaviours  
Regarding Immunization**

**DRAFT**

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**Healthcare Provider Survey of Knowledge, Attitudes, Beliefs and Behaviours  
Regarding Immunization**

Dear Colleague:

You are invited to participate in this survey because you are a healthcare provider who provides immunization in BC.

This national survey was developed collaboratively by nurse and physician epidemiologists to evaluate knowledge, attitudes, and beliefs related to immunization, and to understand how these influence and predict behaviour. The initial phase of this project involved an extensive review of the immunization literature. Findings revealed that survey tools used to assess immunization providers' knowledge, attitudes, and beliefs have generally not been based on theoretical frameworks, and few have incorporated measures of immunization behaviours. Without a theoretical framework such results are descriptive only, and have little public health application in terms of guiding behaviour change. In an effort to change this, our research group developed a survey tool based on the Theory of Planned Behaviour, a theoretical model of behaviour change that was chosen for its ability to predict and understand behaviour.

The survey is being distributed to immunization providers in several Canadian provinces and territories. This survey is voluntary and you may decline participation with no consequences. It will take approximately 15-20 minutes to complete. All answers are anonymous and will be kept strictly confidential. You will not be asked to identify yourself on the survey. Return of the survey, in the addressed, stamped envelope will be taken as consent to participate. The survey is split into two different sections and you will only receive one of the sections to complete. A random selection will determine which section you receive. The section themes are outlined below.

Section 1 of the survey consists of questions designed to measure general immunization knowledge.

Section 2 of the survey is designed to measure beliefs, attitudes, intentions, and behaviours regarding specific immunization themes. Questions regarding the importance of others' opinions, and the strength of the motivation to comply with these opinions are also included. Although some of the questions may appear similar and repetitive, each theme is constructed within the "Theory of Planned Behaviour" theoretical framework and each question is actually measuring something slightly different. When analyzed within this framework, responses to these questions can be used to predict, explain, and influence immunization behaviour.

If you have any questions about this survey, please contact Ms. Karen Pielak at 604-660-3382. If you have any questions regarding your treatment as a research subject, please contact the Office of Research Services at the University of British Columbia at 604-822-8598.

By answering the questions in this survey, you will help to increase our understanding of immunization providers' beliefs and attitudes towards immunization, perceptions of others' wishes, and motivation to comply with these wishes. This will aid in the development of interventions directed at increasing knowledge, promoting immunization, and influencing immunization behaviours.

Thank you for your time!

### Demographics

For each of the following questions, please indicate your answer by checking the appropriate box(es).

1. What is your age?
  - a.  21-30
  - b.  31-40
  - c.  41-50
  - d.  51-60
  - e.  61 or over
  
2. What is your gender?
  - a.  Male
  - b.  Female
  
3. What is your ethnic/racial background (check all that apply)?
  - a.  White/Caucasian
  - b.  Chinese
  - c.  South Asian (e.g., East Indian, Pakistani, Punjabi, Sri Lankan, etc.)
  - d.  Black
  - e.  First Nation/Aboriginal Peoples of North America (e.g., North American Indian, Metis, Inuit/Eskimo)
  - f.  Arab/West Asian (e.g., Armenian, Egyptian, Iranian, Lebanese, Moroccan, Saudi Arabian, etc.)
  - g.  Filipino(a)
  - h.  South East Asian (e.g., Cambodian, Indonesian, Laotian, Vietnamese, Thai, etc.)
  - i.  Latin American
  - j.  Japanese
  - k.  Korean
  - l.  Other (specify) \_\_\_\_\_
  
4. What is your profession?
  - a.  Nurse
  - b.  Family physician
  - c.  Pediatrician
  - d.  Other (specify): \_\_\_\_\_
  
5. What is your educational background (check all that apply; also check "in progress" if you are currently a student)?
  - a.  Diploma
  - b.  Bachelors --  in progress
  - c.  Masters --  in progress
  - d.  PhD --  in progress
  - e.  Certificate (specify): \_\_\_\_\_ --  in progress
  - f.  MD
  - g.  FRCPC
  - h.  Other (specify): \_\_\_\_\_ --  in progress

6. Please indicate the primary setting in which you provide immunization (if applicable; check one):

- a.  Hospital
- b.  Private practice –  solo or  group
- c.  Public health unit
- d.  Walk-in clinic
- e.  Outreach
- f.  Other (describe): \_\_\_\_\_

7. What is the population size of the community in which you practice/are employed?

- a.  less than 5,000
- b.  5,000-10,000
- c.  10,001-30,000
- d.  30,001-50,000
- e.  50,001-100,000
- f.  more than 100,000

8. Approximately what percentage of your patient population is less than five years of age?

- a.  0-10%
- b.  11-25%
- c.  26-50%
- d.  51-75%
- e.  76-100%

DRAFT

9. Your practice or place of employment is located in what type of community?

- a.  Urban
- b.  Rural

10. Are you affiliated with a university or college?

- a.  Yes
- b.  No

11. How many years have you been a healthcare provider? Please specify: \_\_\_\_\_ years

12. How many years have you spent providing immunizations? Please specify: \_\_\_\_\_ years

13. Approximately how many vaccinations on average do you provide per month?

Adult

Pediatric (0-18 years)

- |                                     |                                  |
|-------------------------------------|----------------------------------|
| a. <input type="checkbox"/> None    | <input type="checkbox"/> None    |
| b. <input type="checkbox"/> 1-5     | <input type="checkbox"/> 1-5     |
| c. <input type="checkbox"/> 6-10    | <input type="checkbox"/> 6-10    |
| d. <input type="checkbox"/> 11-20   | <input type="checkbox"/> 11-20   |
| e. <input type="checkbox"/> 21-50   | <input type="checkbox"/> 21-50   |
| f. <input type="checkbox"/> Over 50 | <input type="checkbox"/> Over 50 |

14. To which age group(s) do you administer vaccines, and for what indication(s)? Please check each applicable box.

a.  Pediatric (0-18 years)

- i.  routine
- ii.  high risk
- iii.  school-based
- iv.  travel

b.  Adult

- i.  routine
- ii.  high risk
- iii.  travel

15. Have you received any education on immunization provision during your academic preparation (i.e. nursing or medical school)?

a.  No

b.  Yes; please describe: \_\_\_\_\_  
# of hours: \_\_\_\_\_

c.  Do not remember

16. Have you received any training on immunization provision outside of your academic preparation (e.g. conference workshops, inservicing, orientation, etc)?

a.  No

b.  Yes please describe: \_\_\_\_\_  
# of hours: \_\_\_\_\_

c.  Do not remember

17. Please rank the following in terms of how often you seek immunization information from that source. A '1' indicates the source most often used, a '2' the second-most often used, etc. Rank only those you use.

I do not use immunization information sources.

- a. \_\_\_ Medical Organization (Medical Society of Nova Scotia, Nova Scotia College of Family Physicians, Canadian Paediatric Society, etc)
- b. \_\_\_ Public Health Agency of Canada (Health Canada)
- c. \_\_\_ Local Department of Health
- d. \_\_\_ The Canadian Immunization Guide
- e. \_\_\_ Colleagues
- f. \_\_\_ Peer-reviewed Journals
- g. \_\_\_ Continuing Medical Education Sessions
- h. \_\_\_ Internet
- i. \_\_\_ Other; please specify \_\_\_\_\_

**A. MULTIPLE VACCINES**

- (1) Administering multiple injections (giving all recommended vaccines) to an infant at one clinic visit will cause more adverse reactions to the vaccines than if the vaccines were given on separate occasions.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (2) Causing more adverse reactions would be...
- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable
- (3) Administering multiple injections to an infant at one clinic visit will make the vaccines less effective than if they were given on separate occasions.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (4) Making vaccines less effective would be...
- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable
- (5) Administering multiple injections to an infant at one clinic visit will increase provider errors.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (6) Increasing provider errors would be...
- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable
- (7) Administering multiple injections to an infant at one clinic visit will overwhelm the infant's immune system.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (8) Overwhelming the infant's immune system would be...
- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable

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(9) Giving multiple injections to an infant at one office visit is... (please answer for each scale)

- (9.1) a.  Extremely unimportant      b.  Unimportant      c.  Neither      d.  Important      e.  Extremely important
- (9.2) a.  Extremely harmful      b.  Harmful      c.  Neither      d.  Beneficial      e.  Extremely beneficial
- (9.3) a.  Extremely bad      b.  Bad      c.  Neither      d.  Good      e.  Extremely good

(10) Parents of infants expect me to give all recommended vaccines to their infant at one clinic visit.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(11) Parental expectation to give all recommended vaccines at one clinic visit influences my practice.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(12) It takes too much time to deal with parental concerns about multiple injections for their infant.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(13) I intend to administer multiple injections (give all recommended vaccines) to an infant at one clinic visit.

- a.  Extremely unlikely      b.  Unlikely      c.  Neither      d.  Likely      e.  Extremely likely

(14) I give multiple injections (all recommended vaccines) to infants at one clinic visit

- a.  0-24 %      b.  25-49 %      c.  50-74 %      d.  75-100 % of the time.

### 3. HEALTH CARE PROVIDERS AND INFLUENZA VACCINATION

(1) Receipt of influenza vaccine in advance of each influenza season will give me the flu.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(2) My getting the flu from influenza vaccine would be...

- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable

(3) Receipt of influenza vaccine in advance of each influenza season will increase my risk for Guillain Barre Syndrome.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

- (4) My having an increased risk for Guillain Barre Syndrome would be...
- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable
- (5) Receipt of influenza vaccine in advance of each influenza season will increase my risk for oculo-respiratory syndrome.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (6) My having an increased risk for oculo-respiratory syndrome would be...
- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable
- (7) Health care provider receipt of influenza vaccine in advance of each influenza season should be mandatory.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (8) Mandatory receipt of influenza vaccine for health care providers (in advance of each influenza season) would be...
- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable
- (9) As a health care provider, my receipt of influenza vaccine in advance of each influenza season is... (please answer for each scale)
- (9.1) a.  Extremely unimportant      b.  Unimportant      c.  Neither      d.  Important      e.  Extremely important
- (9.2) a.  Extremely harmful      b.  Harmful      c.  Neither      d.  Beneficial      e.  Extremely beneficial
- (9.3) a.  Extremely bad      b.  Bad      c.  Neither      d.  Good      e.  Extremely good
- (10) My colleagues think that, as a health care provider, I should receive influenza vaccine in advance of each influenza season.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (11) My colleagues' opinion influences my decision about receipt of the influenza vaccine.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree



(12) My employer thinks that, as a health care provider, I should receive influenza vaccine in advance of each influenza season.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(13) My employer's opinion influences my decision about receipt of the influenza vaccine.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(14) I am afraid of the pain of receiving an influenza vaccine in advance of each influenza season.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(15) As a health care provider, I feel that I should receive influenza vaccine in advance of each influenza season.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(16) As a health care provider, I intend to receive influenza vaccine in advance of each influenza season.

- a.  Extremely unlikely      b.  Unlikely      c.  Neither      d.  Likely      e.  Extremely likely

(17) As a health care provider, I have received influenza vaccine in advance of each influenza season

- a.  0-24 %      b.  25-49 %      c.  50-74 %      d.  75-100 %      of the time.

**C. AVOIDING MISSED OPPORTUNITIES FOR IMMUNIZATION**

(1) Using every encounter with a client to offer any needed immunizations will make health care providers feel they are pushing immunization at every client interaction.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(2) Health care providers feeling they are pushing immunization at every client interaction would be...

- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable

(3) Using every encounter with a client to offer any needed immunizations will narrow the scope of Public Health Nursing (PHN) practice and perpetuate the perception that PHNs are only immunizing nurses.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

- (4) Narrowing the scope of PHN practice and perpetuating the perception that PHNs are only immunizing nurses would be...
- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable
- (5) As a health care provider, using every encounter with a client to offer any needed immunizations is...(please answer for each scale).
- (5.1) a.  Extremely unimportant      b.  Unimportant      c.  Neither      d.  Important      e.  Extremely important
- (5.2) a.  Extremely harmful      b.  Harmful      c.  Neither      d.  Beneficial      e.  Extremely beneficial
- (5.3) a.  Extremely bad      b.  Bad      c.  Neither      d.  Good      e.  Extremely good
- (6) My colleagues think that, as a health care provider, I should use every encounter with a client to offer any needed immunizations.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (7) My colleagues' opinion about offering any needed immunizations at every encounter influences my practice.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (8) My clients think that, as a health care provider, I should use every encounter to offer any needed immunizations.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (9) My clients' opinion about offering any needed immunizations at every encounter influences my practice.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (10) It takes too much time to offer any needed immunizations at every encounter.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (11) Access to immunization records is a barrier to offering any needed immunizations.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(12) As a health care provider, I feel I should use every encounter with a client to offer any needed immunizations.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(13) As a health care provider, I intend to use every encounter with a client to offer any needed immunizations.

- a.  Extremely unlikely      b.  Unlikely      c.  Neither      d.  Likely      e.  Extremely likely

(14) As a health care provider, I use every encounter with a client to offer any needed immunizations

- a.  0-24 %      b.  25-49 %      c.  50-74 %      d.  75-100 %      of the time.

**D. MMR VACCINE**

(1) It is not necessary to immunize children against measles, mumps, and rubella (MMR) anymore because the diseases are so rare.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(2) When the diseases MMR vaccine prevents are so rare, to keep immunizing children with MMR vaccine would be...

- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable

(3) The MMR vaccine has the potential to cause autism.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(4) The potential to cause autism would be...

- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable

(5) Administering MMR vaccine to children is... (please answer for all scales)

(5.1) a.  Extremely unimportant      b.  Unimportant      c.  Neither      d.  Important      e.  Extremely important

(5.2) a.  Extremely harmful      b.  Harmful      c.  Neither      d.  Beneficial      e.  Extremely beneficial

(5.3) a.  Extremely bad      b.  Bad      c.  Neither      d.  Good      e.  Extremely good

- (6) Parents think I should administer MMR vaccine to their children.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (7) Parental opinion about administering MMR vaccine to their children influences my practice.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (8) It takes too much time to deal with parental concerns regarding MMR vaccine.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (9) As a health care provider, I feel I should administer MMR vaccine to children.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (10) I intend to administer MMR vaccine to children.
- a.  Extremely unlikely      b.  Unlikely      c.  Neither      d.  Likely      e.  Extremely likely
- (11) In the past year I have administered MMR vaccine to
- a.  0-24 %      b.  25-49 %      c.  50-74 %      d.  75-100 % of eligible children.

**REPORTING ADVERSE EVENTS FOLLOWING IMMUNIZATION**

- (1) Reporting all adverse events following immunization that meet the national criteria for reporting will increase public confidence in vaccine safety.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (2) Increasing public confidence in vaccine safety would be...
- a.  Extremely unimportant      b.  Unimportant      c.  Neither      d.  Important      e.  Extremely important

- (3) Reporting all adverse reactions following immunization that meet the national criteria for reporting is... (please answer all scales)
- (3.1) a.  Extremely unimportant      b.  Unimportant      c.  Neither      d.  Important      e.  Extremely important
- (3.2) a.  Extremely harmful      b.  Harmful      c.  Neither      d.  Beneficial      e.  Extremely beneficial
- (3.3) a.  Extremely bad      b.  Bad      c.  Neither      d.  Good      e.  Extremely good
- (4) The Public Health Agency of Canada (Health Canada) expects health care providers to report all adverse events following immunization that meet the national criteria for reporting.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (5) The Public Health Agency of Canada's (Health Canada's) expectation about reporting all adverse events following immunization influences my practice.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (6) It takes too much time to report all adverse reactions to immunization that meet the national criteria for reporting.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (7) I feel I do not have access to the national criteria for reporting adverse reactions following immunization.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (8) I feel I do not have access to the required forms to facilitate adverse event reporting.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (9) As a health care provider, I feel I should report all adverse reactions following immunization that meet the national criteria for reporting.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (10) I intend to report all adverse reactions following immunization that meet the national criteria for reporting.
- a.  Extremely unlikely      b.  Unlikely      c.  Neither      d.  Likely      e.  Extremely likely

- (1) I report all adverse reactions following immunization that meet the national criteria for reporting
- a.  0-24 %      b.  25-49 %      c.  50-74 %      d.  75-100 % of the time.

**F. BENEFIT-RISK COMMUNICATION**

- (1) Providing benefit-risk information about immunization will increase client trust in the vaccination provider.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

- (2) Increasing client trust in vaccination providers would be...

- a.  Extremely unimportant      b.  Unimportant      c.  Neither      d.  Important      e.  Extremely important

- (3) Providing benefit-risk information about immunization will increase client anxiety when they hear about immunization related risks.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

- (4) Increasing client anxiety about immunization-related risks would be...

- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable

- (5) Providing benefit-risk information about immunization is... (please answer all scales)

- (5.1) a.  Extremely unimportant      b.  Unimportant      c.  Neither      d.  Important      e.  Extremely important

- (5.2) a.  Extremely harmful      b.  Harmful      c.  Neither      d.  Beneficial      e.  Extremely beneficial

- (5.3) a.  Extremely bad      b.  Bad      c.  Neither      d.  Good      e.  Extremely good

- (6) Clients want me to provide them with benefit-risk information about immunization.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

- (7) Client opinion about providing them with benefit-risk information about immunization influences my practice.

- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

- (8) It is too time consuming to provide benefit-risk information about immunization to clients.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (9) As a health care provider, I feel it is important to provide clients with benefit-risk information about immunization.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (10) I intend to provide benefit-risk information about immunization to clients before I administer any vaccine.
- a.  Extremely unlikely      b.  Unlikely      c.  Neither      d.  Likely      e.  Extremely likely
- (11) I provide benefit-risk information to clients about immunizations before administering vaccines
- a.  0-24 %      b.  25-49 %      c.  50-74 %      d.  75-100 % of the time.

**G. IMMUNIZING A CLIENT WITH A MINOR ILLNESS**

- (1) Administering routinely scheduled immunizations to a client with a minor illness helps maintain adherence to the schedule.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (2) Maintaining adherence to the routine immunization schedule would be...
- a.  Extremely unimportant      b.  Unimportant      c.  Neither      d.  Important      e.  Extremely important
- (3) Administering routinely scheduled immunizations to a client with a minor illness increases the risk of adverse reactions from immunization.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (4) Increasing the risk of adverse reactions from immunization would be...
- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable
- (5) Administering routinely scheduled immunizations to a client with a minor illness may complicate the interpretation of side effects.
- a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree
- (6) Complicating the interpretation of side effects would be...
- a.  Extremely unacceptable      b.  Unacceptable      c.  Neither      d.  Acceptable      e.  Extremely acceptable

(7) Administering routinely scheduled immunizations to a client with a minor illness is...(please answer all scales)

(7.1) a.  Extremely unimportant      b.  Unimportant      c.  Neither      d.  Important      e.  Extremely important

(7.2) a.  Extremely harmful      b.  Harmful      c.  Neither      d.  Beneficial      e.  Extremely beneficial

(7.3) a.  Extremely bad      b.  Bad      c.  Neither      d.  Good      e.  Extremely good

(8) Clients think I should administer routinely scheduled immunizations when they have a minor illness.

a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(9) My client's opinion about administering routinely scheduled immunizations when they have a minor illness influences my practice.

a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(10) It takes too much time to deal with client concerns regarding immunizing them when they have a minor illness.

a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(11) As a health care provider, I feel I should administer routinely scheduled immunizations to clients with a minor illness.

a.  Strongly disagree      b.  Disagree      c.  Neither      d.  Agree      e.  Strongly agree

(12) I intend to administer routinely scheduled immunizations to clients who have a minor illness.

a.  Extremely unlikely      b.  Unlikely      c.  Neither      d.  Likely      e.  Extremely likely

(13) I administer routinely scheduled immunizations to clients who have a minor illness

a.  0-24 %      b.  25-49 %      c.  50-74 %      d.  75-100 %      of the time.

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