C. Proposal

1. Overall Goal & Objectives:

Vaccines, which have been lauded as the greatest achievement in public health, are declining in public confidence.[1, 2] For vaccines to reach their full potential to protect public health, health care providers need to be able to effectively understand patient concerns and cognitive styles and communicate the importance of immunization in order to overcome barriers to acceptance. Some of the most influential factors in the acceptance of immunization are the patient's relationship and trust with his or her health care provider, the provider's recommendations, and the provider's responses to patient questions and concerns about immunization.[3-5] In a recent study of internal medicine, family medicine, and pediatric residents, **83% reported wanting more education on vaccine risk and benefit communication in their residency programs**.[6] There has been greater emphasis on vaccine education for pediatric residents than for internal medicine residents.[6] Vaccine educational efforts have generally used a unimodal fact-based and highly analytic approach and have rarely adapted to the preferred cognitive or decision-making style of the person being taught—a problem that has been coined as "vaccine education spectrum disorder."[7] Understanding the psychology of how patients make decisions about vaccines is critical to training physicians how to address barriers to immunization acceptance.[7-9] The Preferred Cognitive Styles and Decision-Making (PCSDM) model is an empirically developed model based on the large literature base in psychology, cognitive linguistics, health psychology, and clinical experience. Unlike traditional educational interventions that assume that all individuals intake and process information identically to arrive at a decision, the PCSDM model acknowledges the data demonstrating that individuals appeal to and utilize a preferred cognitive style when making decisions or judgments under conditions of uncertainty. The PCSDM model turns the traditional doctor-patient education role in reverse and advocates for the educator to first understand the preferred cognitive decision-making style of the learner, and then model the educational information around the needs of the learner in order to meet the learner's preferred style.[7-9] ***Our goal is to develop an innovative, scientifically informed educational model, based on observations of internal medicine residents' and patients' perceptions of immunizations and preferred cognitive styles, that teaches internal medicine residents how to effectively motivate and educate patients to overcome barriers to immunization. Secondly, we seek to do this in a manner that is both highly generalizable and feasible in all healthcare settings.***

Objectives:

1) To assess internal medicine residents' knowledge, attitudes, and practices of immunizations pre- and post-vaccine educational intervention.

2) To develop a practical, low-cost, and generalizable vaccine educational intervention based on the Preferred Cognitive Styles and Decision-Making model that is useful to internal medicine residents in effectively educating patients on immunizations.

3) To perform a cluster-randomized controlled trial evaluating the effect of the preferred cognitive styles and decision-making vaccine educational intervention versus "usual educational procedures" administered to internal medicine residents on the outcome of proportion of residents in the control and intervention groups achieving 90% immunization coverage for influenza, pneumococcal, tetanus, and pertussis among their continuity clinic panel. We will also evaluate for improvement in zoster vaccine rates, but due to payment issues, it is unclear what rates can be achieved in this population.

2. Technical Approach

a. Current Assessment of Need in Target Area

i. Baseline Data Summary

In a recent multi-site study of U.S. medical residents in pediatrics, family medicine, and internal medicine, 95% of residents reported that they thought vaccine safety communication would be very or somewhat important in their careers.[6] However, **only 17% of internal and family medicine residents reported learning or somewhat learning about vaccine risk communication during their residency training.**[6] Focus groups revealed that the training that they had received had generally been informal. The most common mode of education on vaccine risk communication was reported as self-education.[6] The education methods most desired by the residents for learning about vaccine communication were in-person cases and role modeling (65%).[6] When queried specifically about what vaccine topics they would like to learn more about, 79% reported wanting to learn data on the risk of adverse effects from vaccines; **76% wanted to learn about strategies for communicating with patients about vaccine risks and benefits**; 74% wanted more data on vaccine safety and efficacy; and 63% wanted to know about resources for up-to-date vaccine-related information that one can refer to now and in the future.[6]

We conducted an electronic survey of 144 internal medicine residents at Mayo Clinic in Rochester, Minnesota. Forty eight (33%) of the residents completed the survey. The results of this survey are presented in Table 1.

Table 1: Mayo Clinic internal medicine resident survey on vaccine importance, previous vaccine education, and future vaccine educational needs

Survey statement	Strongly disagree	Some-what disagree	Neutral	Some-what agree	Strongly Agree
Vaccines are an important part of the care of adult patients	8%	0%	0%	10%	81%
I have learned how to discuss vaccine **risks** with my adult patients during residency training.	6%	33%	10%	42%	8%
I have learned how to discuss vaccine **benefits** with my adult patients during residency training.	0%	8%	2%	60%	29%

I am confident in answering my adult patients' questions about vaccines.	6%	21%	8%	56%	8%
I would like to learn more about vaccines that are recommended for adults.	0%	8%	6%	46%	40%
I would like to learn more about communicating the **risks** of vaccines with my patients.	0%	6%	2%	40%	52%
I would like to learn more about communicating the **benefits** of vaccines with my patients.	0%	6%	8%	56%	29%

Overall, 86% of residents wanted to learn more about vaccines recommended for adults; 92% wanted to learn more about communicating vaccine risks; and 85% wanted to learn more about discussing the benefits of vaccines with their patients. The preferred educational methods were discussion based learning using cases (45%) and didactic presentations (i.e. lectures) (34%). Less preferred methods were online and paper materials.

Baseline Immunization Rates

Internal medicine resident continuity clinics are structured into six firms: 4 in the Division of Primary Care Internal Medicine (PCIM) and 2 in the Division of General Internal Medicine (GIM). Baseline immunization rates for influenza, pneumococcal (conjugate and polysaccharide vaccine data were combined) were collected via the electronic medical record system using the Caradigm Intelligence System (previously known as the Microsoft Amalga Unified Intelligence System), for each resident's panel of patients as of 5/31/3013. Data are available for each internal medicine resident, and also for each practice, and are reported in Table 2.

Table 2: Immunization rates of patients for Mayo Clinic internal medicine resident firms (as of May 31, 2013), expressed as % vaccinated of those who were eligible for each immunization

Division	Role	Residents N	Patients N	Influenza vaccine receipt for age ≥ 50 years Eligible N	%	Done N	%	Pneumococcal vaccine receipt for age ≥ 65 years Eligible N	%	Done N	%
GIM	Residents	48	3,417	2,663	77.9%	1808	67.9%	1,694	49.6%	1,418	83.7%
PCIM	Residents	97	11,533	3,618	31.4%	2,723	75.3%	1,181	10.2%	878	74.3%
	Faculty	*46*	*28,967*	*19,145*	*66.1%*	*14,731*	*76.9%*	*11,295*	*39.0%*	*10,165*	*90.0%*
GIM and PCIM Residents Combined	PGY-1	48	3,846	1,901	49.4%	1367	71.9%	949	24.7%	761	80.2%
	PGY-2	48	5,461	2,170	39.7%	1557	71.8%	982	18.0%	772	78.6%
	PGY-3	49	5,643	2,210	39.2%	1607	72.7%	944	16.7%	763	80.8%
	Overall	145	14,950	6,281	42.0%	4531	72.1%	2875	19.2%	2296	79.9%

Division	Role	Tetanus vaccine receipt within past 10 years				Zoster vaccine receipt for age ≥ 60 years				Pertussis vaccine receipt ever in adulthood			
		Eligible		Done		Eligible		Done		Eligible		Done	
		N	%	N	%	N	%	N	%	N	%	N	%
GIM	Overall	3,294	96.4%	2,592	78.7%	2,046	59.9%	1,266	61.9%	3,417	100.0%	2,411	70.6%
PCIM	Overall	11,191	97.0%	9,316	83.2%	1,812	15.7%	1,237	68.3%	11,533	100.0%	9,597	83.2%
	Faculty	*27,697*	*95.6%*	*25,666*	*92.7%*	*14,042*	*48.5%*	*11,633*	*82.8%*	*28,967*	*100.0%*	*25,054*	*86.5%*
GIM and PCIM Residents Combined	PGY-1	3721	96.7%	3082	82.8%	1241	32.3%	826	66.6%	3846	100.0%	3092	80.4%
	PGY-2	5308	97.2%	4295	80.9%	1295	23.7%	801	61.9%	5461	100.0%	4326	79.2%
	PGY-3	5456	96.7%	4531	83.0%	1322	23.4%	876	66.3%	5643	100.0%	4590	81.3%
	Overall	14485	96.9%	11908	(82.2%)	3858	25.8%	2503	(64.9%)	14950	100.0%	12008	(80.3%)

Table 3: Percentage of internal medicine residents achieving ≥ 90% immunization coverage of eligible patients for each indicated vaccine

Division	Role	Residents	FLU >=90%		PNEU >=90%		TET >=90%		Zoster >=90%		Pertussis >=90%	
		N	N	%	N	%	N	%	N	%	N	%
GIM	PGY-1	16	0	0.0%	4	25.0%	1	6.3%	0	0.0%	0	0.0%
	PGY-2	16	0	0.0%	3	18.8%	1	6.3%	0	0.0%	0	0.0%
	PGY-3	16	0	0.0%	4	25.0%	2	12.5%	0	0.0%	0	0.0%
	Overall	48	0	0.0%	11	22.9%	4	8.3%	0	0.0%	0	0.0%
PCIM	PGY-1	32	1	3.1%	2	6.3%	4	12.5%	1	3.1%	3	9.4%
	PGY-2	32	0	0.0%	5	15.6%	0	0.0%	2	6.3%	1	3.1%
	PGY-3	33	0	0.0%	5	15.2%	0	0.0%	1	3.0%	0	0.0%
	Overall	97	0	0.0%	12	12.4%	4	4.1%	4	4.1%	4	4.1%
	Faculty	*46*	*0*	*0.0%*	*21*	*45.7%*	*41*	*89.1%*	*0*	*0.0%*	*12*	*26.1%*

ii. Audiences for This Intervention

The immediate audiences for this intervention are internal medicine residents at Mayo Clinic Rochester and the patients seen in these resident clinics.

The Mayo Internal Medicine Residency Program is structured to include 50% of training in inpatient settings and 50% of training in ambulatory settings throughout all three years of residency training. Resident continuity clinics are structured into six firms, each containing 24 residents (eight post-graduate year [PGY]1, eight PGY2, and eight PGY3 residents) supervised by eight to ten dedicated faculty preceptors. Within each resident firm, four care teams (sub-firms) have been developed and are comprised of two PGY1, two PGY2, and two PGY3 residents

who are responsible for the care for their personal panel of patients as well as acute care needs for patients impanelled by their team members.

Approximately 15,000 patients have internal medicine residents as their primary provider. The demographics for the GIM and PCIM residency clinics are described in table 4. The PCIM clinic firms consist of patients primarily of local patients from Olmsted County. The GIM firms primarily consist of patients who live within a two hour driving radius from Rochester, MN.

Table 4: Demographics of patients seen in internal medicine resident clinics

Division	Residents N	Patients N	Gender Female		Age	
			N	%	Mean	SD
GIM	48	3,417	1786	52.3%	62.4	15.2
PCIM	97	11,533	5918	51.3%	42.8	15.6

The wider audiences that will be reached by this intervention are leaders in medical resident education, health care providers in primary care fields, who are on the frontline for communicating with patients about vaccines, and others interested in the psychology of medical decision making. To our knowledge, this is the first study that has formally evaluated the impact of addressing the patient's preferred cognitive and decision-making style on the outcome of medical decision making. This study will be an important addition to the medical literature on the feasibility and efficacy of this type of healthcare provider-patient educational model.

b. Intervention Design and Methods

> **Objective #1: To assess internal medicine residents' knowledge, attitudes, and practices of immunizations pre- and post-vaccine educational intervention.**

The first component of our study will be to determine the knowledge, attitudes, and practices (KAP) of internal medicine residents toward immunizations, prior to the initiation of the PCSDM vaccine educational module. One of the outcomes of the study is to see how residents' knowledge, attitudes and practices towards immunizations changes after being exposed to this educational module. This KAP survey is under development. We hypothesize that residents' knowledge of vaccine indications will increase, their attitudes of comfort in discussing vaccine risks and benefits with patients, and their practice of addressing and documenting immunization status during their patient encounters will increase after the educational intervention for those residents in the PCSDM educational intervention arm of the study.

Data will be collected via electronic survey that will link to individual resident demographic data (gender, PGY level, age, and whether the resident is in the intervention or control group in RCT). Participants will be de-identified and tracked using numerical codes assigned by statistical support staff and unknown to the study investigators. Analysis of the data will be presented only in aggregate, so that it will not be possible to identify data from any individual study participant. The same survey will be administered pre- and post- intervention.

Objective #2: To develop a highly practical, low-cost, and generalizable vaccine educational module based on the Preferred Cognitive Styles and Decision-Making model that is useful to internal medicine residents in effectively educating patients on immunizations.

The PCSDM educational intervention will be in the format of a learning module and will be designed in a way such that it can be easily transferrable to other healthcare settings. The primary goals of the module are to teach the healthcare learner the importance of understanding their patient learners' cognitive and decision making styles, how to recognize the various styles, how these styles impact the patient-provider interaction in the clinic, how the health care provider can identify the patient's preferred cognitive style for decision making in an efficient manner during the patient visit, and how the PCDM model relates to vaccine education, counseling, and vaccine acceptance.

The PCSDM educational module will be designed using Microsoft Powerpoint presentation, such that the didactic can be given by different members of the study team, and such that it could be transferred to other teams or settings, even online, in the future. We are using the preferred learning methods of our audience (discussion based and didactic presentation). The first session will give background on the need for the PCSDM model, examples of cognitive styles and decision making, and information on how to identify each of the different cognitive styles. This session will last approximately one hour. The second session will provide case-study examples of each cognitive style and examples of how persons with each cognitive style might respond to counseling on immunizations. This session will provide examples of how the healthcare provider might engage the patient based on their cognitive style to address their questions and concerns regarding immunizations. The second session will also last approximately one hour. By completing these two educational modules, internal medicine residents will have access to more information about the cognitive styles of their patients, as well as be equipped with the necessary tools for meeting the patient where he or she is at in the decision making process.

Table 5 shows examples of cognitive styles, how individuals with these styles might express concern about vaccines, and approaches to counseling these individuals on vaccines.[7]

Table 5: Examples of cognitive styles in vaccine decision making[7]

Cognitive style	Main effect	Verbal expression	Approach
Denialist	Disbelieves accepted scientific facts, despite overwhelming evidence. Prone to believe conspiracy theories	"I don't care what the data show, I don't believe the vaccine is safe"	Provide consistent messaging repeatedly over time from trustworthy sources, provide educational materials, solicit questions, avoid "hard sell" approach, use motivational interviewing approaches
Innumerate	Cannot understand or has difficulty manipulating numbers, probabilities, or risks	"One in a million risk sounds high, for sure I'll be the 1 in a million that has a side effect, I'll avoid the vaccine"	Provide nonmathematical information, analogies, or comparators using a more holistic "right brain" or emotive approach
Fear-based	Decision making based on fears	"I heard vaccines are harmful and I'm not going to get them"	Understand source of fear, provide consistent positive approach, show risks in comparison to other daily risks, demonstrate risks of not receiving vaccines, use social norming approaches
Heuristic	Often appeals to availability heuristic (what I can recall equates with how commonly it occurs)	"I remember GBS happened in 1977 after flu vaccines, that must be common, and therefore I'm not getting a flu vaccine"	Point out inconsistencies and fallacy of heuristic thinking, provide educational materials, appeal to other heuristics
Bandwagoning	Primarily influenced by what others are doing or saying	"If others are refusing the vaccine there must be something to it, I'm going to skip getting the vaccine"	Understand primary influencers, point out logical inconsistencies, use social norming and self-efficacy approaches
Analytical	Left brain thinking, facts are paramount	"I want to see the data so I can make a decision"	Provide data requested, review analytically with patient

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> **Objective #3: To perform a cluster-randomized controlled trial evaluating the effect of the preferred cognitive styles and decision-making vaccine educational intervention versus "usual educational procedures" administered to internal medicine residents on the outcome of proportion of residents in control and intervention groups achieving 90% immunization coverage for influenza, pneumococcal, tetanus, and pertussis, among their continuity clinic panel. We will also evaluate for improvement in zoster vaccine rates.**

We will conduct a cluster-randomized controlled trial of internal medicine residents (including all PGY1, PGY2, and PGY3 levels) at Mayo Clinic Rochester. We have chosen to do a cluster-randomized controlled trial by clinic firm because randomization by individual residents would likely lead to spreading of the effect of the intervention to different residents in the same clinic. Randomization will be performed by clinic firm. Because there are different numbers of residents in GIM and PCIM clinic firms, and because these two settings serve different patient populations, we will randomly select two PCIM firms and one GIM firm to be in the control group and two PCIM firms and one GIM firm to be in the intervention group. There will be no blinding in this trial, because investigators will need to know which firms are receiving the educational intervention versus the usual vaccine education in order to conduct these sessions.

Each PCIM and GIM firm is separated in that they are conducted at different times. The PCIM and GIM firms are conducted in completely different buildings. The four PCIM firms have unique faculty preceptors for each firm. The two GIM firms do share common faculty preceptors. The preceptors will not be included in either the intervention or control vaccine educational activities, so as to not introduce spreading of the interventional educational material to the control group.

The interventional educational vaccine curriculum will consist of the PCSDM module as described under objective 2. The "usual educational procedures" will consist of an hour long

fact-based educational module on influenza, pneumococcal, tetanus, pertussis, and zoster vaccines with links to ACIP online resources. Each group will receive the "usual educational procedures" module. During the vaccine education sessions, each resident (in control and intervention groups) will receive a printout of their individual immunization rates for their clinic panel and a list of patients who are in need of influenza, pneumococcal, pertussis, tetanus, and zoster immunizations. We have designed the educational interventions such that the only variable that will differ between intervention and control educational modules will be that the intervention group receives the PCSDM module. This way will can test the effect of this educational intervention.

- Primary outcome: Proportion of residents in intervention versus control groups who achieve ≥ 90 % immunization coverage among their clinic patient panel with influenza vaccine (adults ≥ 50 years), pneumococcal vaccine (adults ≥ 65 years), tetanus (receipt of vaccine within last 10 years), and pertussis (receipt of vaccine once in adulthood for all adults).

- Secondary outcomes: Absolute increase in immunization coverage percentage for each vaccine type: influenza vaccine (adults ≥ 50 years), pneumococcal vaccine (adults ≥ 65 years), tetanus (receipt of vaccine within last 10 years), pertussis (receipt of vaccine once in adulthood for all adults), and zoster (for adults ≥ 60 years) among intervention and control groups.

Sample size calculations:
- Primary outcome: A sample size of 144 (72 in each group), will give us at least 87% power to detect a ≥20% absolute increase in proportion of residents reaching ≥ 90% immunization coverage for their panel of clinic patients for the intervention group versus control group, with 95% confidence.

- Secondary outcomes: Additionally, with n=72 in each group, we 90% power to detect a 5% increase in vaccination rate following intervention.

c. Evaluation Design

Objective #1: To assess internal medicine residents' knowledge, attitudes, and practices of immunizations pre- and post-vaccine educational intervention.

We hypothesize that residents' knowledge of vaccine indications will increase, their attitudes of comfort in discussing vaccine risks and benefits with patients, and their practice of addressing and documenting immunization status during their patient encounters will increase after the

educational intervention for those residents in the PCSDM educational intervention arm of the study compared to the control group.

Statistical analysis:

The attitudes and practices questions of the KAP survey will be scored using a 5-point Likert scale. Pre-and post-scores will be assessed for magnitude of intra-individual change for residents and overall magnitude of change among intervention and control groups for knowledge of vaccine indications, attitudes of comfort in discussing vaccine risks and benefits with patients, and practices of addressing and documenting immunization status during their patient encounters. Chi square analyses will be used to analyze categorical variables. The paired t-test will be used to evaluate for within-group mean score changes pre- and post-intervention. The two sample t-test will be performed to evaluate for changes in mean scores between intervention and control groups. Regression analysis will be used to explore relationship between predictors of post-intervention knowledge, attitudes, and practices scores on outcome of achieving 90% immunization coverage for influenza, pneumococcal vaccines, and Tdap.

> **Objective #2: To develop a highly practical, low-cost, and generalizable vaccine educational module based on the Preferred Cognitive Styles and Decision-Making model that is useful to internal medicine residents in effectively educating patients on immunizations.**

The evaluation of the PCSDM educational model will largely be evaluated through the cluster-randomized controlled trial on immunization coverage outcomes. Additional evaluation will be conducted via internal medicine resident feedback questionnaires on the utility and quality of the educational module.

If this model proves to be beneficial for internal medicine residents, then we plan to introduce it to family medicine residents and pediatrics residents. We will also query these groups for feedback on utility in their practices.

> **Objective #3: To perform a cluster-randomized controlled trial evaluating the effect of the preferred cognitive styles and decision-making vaccine educational intervention versus "usual educational procedures" administered to internal medicine residents on the outcome number of residents in control and intervention groups achieving 90% immunization coverage for influenza, pneumococcal, and Tdap, among their continuity clinic panel. We will also evaluate for improvement in zoster vaccine rates.**

- Primary outcome: Proportion of residents in intervention versus control groups who achieve ≥ 90 % immunization coverage among their clinic patient panel with influenza vaccine (adults ≥ 50 years), pneumococcal vaccine (adults ≥ 65 years), tetanus (receipt of vaccine within last 10 years), and pertussis (receipt of vaccine once in adulthood for all adults).

- Secondary outcomes: Absolute increase in immunization coverage percentage for each vaccine type: influenza vaccine (adults ≥ 50 years), pneumococcal vaccine (adults ≥ 65 years), tetanus (receipt of vaccine within last 10 years), pertussis (receipt of vaccine once in adulthood for all adults), and zoster (for adults ≥ 60 years) among intervention and control groups.

Statistical analysis:

Baseline immunization rates for influenza, pneumococcal vaccine, tetanus, pertussis and zoster will be determined and reported pre-intervention for each resident, for each PCIM and GIM firm, and in aggregate for the intervention and control groups. Post-intervention immunization rates will be determined and reported in the same manner. The primary outcome will be assessed using Chi-square analysis will be used to compare proportion of residents in intervention versus the control who achieve 90% immunization coverage for the indicated vaccines. The secondary outcome will by determining the absolute increase in immunization coverage for each vaccine type pre- and post-intervention. Chi-square analyses will be used to compare absolute proportion increases between the intervention and control groups for each vaccine type.

i. Evaluation of improvement in practice gaps

Improvement in internal medicine resident knowledge, attitudes, and practices toward adult immunizations will be assessed as described via analysis of the KAP survey. The ultimate practice gap of lower-than-desired adult immunization rates in the internal medicine residents' clinics will be rigorously assessed through the primary and secondary outcome measures of the randomized controlled clinical trial.

ii. Expected amount of change

This is the first study evaluating the PCSDM educational module on the outcome of immunization rates; therefore, there are no previous studies on which to estimate an effect size of the intervention. We have set a high target of achievement of 90% immunization coverage for influenza (all adults), pneumococcal vaccine (adults ≥ 65 years), tetanus, and pertussis among patients seen in the past year, because we believe that this is achievable with motivation and is a desirable target for patient outcomes. Table 2 demonstrates that faculty in the PCIM Division have been able to achieve 76% immunization coverage for influenza, 90% for pneumococcal vaccines, 92% for tetanus, 83% for zoster, and 87% for pertussis. Therefore, we believe 90% immunization coverage is feasible. In the event that it is not possible for residents to achieve these rates, we will also be analyzing the absolute increase for each type of vaccine. Due to some third party payers not offering reimbursement for zoster vaccine, we decided not to include this vaccine in the target for 90% immunization coverage. We thought that there would be a significant number of patients who might decline the vaccine simply due to cost concerns rather than concerns due to the vaccine itself. We will, however, evaluate changes in zoster vaccine coverage in this study as a secondary objective. Our study is powered to be able to detect a 5% effect size of absolute increase in immunization rate for each individual vaccine.

Whereas there are no studies based on the PCSDM educational intervention, other vaccine quality improvement studies have shown >20% absolute increase in immunization rates.[11-14] Therefore, we feel that our study is adequately powered.

iii. Audience engagement

Internal medicine resident audience engagement will be determined through KAP surveys, through their evaluation of the PCSDM educational intervention module, and ultimately through the outcome of immunization rates in their continuity clinic panel. At the end of the trial, we will incorporate resident feedback in order to further improve the educational module. Patient engagement will be measured indirectly through their immunization rates.

iv. Outcome dissemination

The members of our research team represent audiences that will be important to reach with the results from our study: medical resident education, the vaccine research field, primary care internal medicine, psychology, and infectious diseases. We will disseminate our findings through abstract/research presentations at national meetings and through peer-reviewed publication. Furthermore, if we are able to demonstrate that the PCSDM model is effective in improving immunization rates, then we plan to discuss larger collaborations with other internal medicine residency programs, medical school programs, family medicine, and pediatrics programs.   As a member of the ACGME Educational Innovations Project, the Mayo Clinic Internal Medicine Residency is well positioned to disseminate innovations among the other 21 members of this important collaborative whose innovations have been well received and incorporated throughout ACGME accredited Internal Medicine Residencies. We feel that this educational intervention could be very important in training the next generation of physicians how to engage their patients in vaccine decision making. In addition, we anticipate disseminating this information through several specific activities:

1. Workshops at primary care medical conferences (example: Society for General Internal Medicine, American Academy of Pediatrics, Annual Meeting of the American College of Physicians)
2. Oral presentations and workshops at the national Immunization Conference held each year by the Centers for Disease Control and Prevention.
3. Working with primary care professional societies (AAP, ACP, AAFP, ACOG, etc.) to disseminate the PCSDM modules to their members, or providing online access to these learning modules.

3. Detailed Work Plan and Deliverables Schedule

During October 2013 through June 2014, we will design and PCSDM vaccine educational module and the control group "usual vaccine educational" modules. We will design the internal medicine resident KAP surveys during this time. We will submit the protocol to the IRB and obtain either IRB approval or exemption. During July 2014-August 2014, we will administer pre-

intervention resident KAP surveys and determine pre-intervention immunization rates for each resident. During September 2014-October 2014, we will conduct the control and intervention vaccine educational sessions. We have elected to do this early in the year, just at the beginning of influenza season, so we can see the impact on the immunization coverage rates during the 2014-2015 influenza season. During June 2015, we will collect data on individual resident immunization rates (post-intervention) and will collect data on post-interventional KAP surveys. During July 2015-June 2016, we will analyze the data and prepare and submit abstracts to national meetings, and submit manuscripts for publication. During this time, we will also explore the spread of this educational intervention to medical student education programs and other residency programs.

Table 5: Detailed Work Plan and Deliverables Schedule

	Oct 2013-June 2014	July 2014-August 2014	Sept 2014-Oct 2014	Nov 2014-June 2015	July 2015-Nov 2015	Dec 2015-June 2016
IRB submission and approval	X					
Design PCSDM vaccine educational module [intervention]	X					
Design "usual vaccine education" module [control]	X					
Perform pre-intervention resident KAP surveys		X				
Collect baseline data on individual resident immunization rates (pre-intervention)		X				
Conduct control and intervention vaccine educational sessions			X			
Collect data on individual resident immunization rates (post-intervention)				X		
Post-intervention resident KAP surveys				X		
Data Analysis		X			X	
Submit abstracts and disseminate results at national meetings						X
Manuscript(s) preparation and submission to peer-reviewed journal(s)						X

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