

Grant ID 15448819

**Connecting the Silos:  
A Partnership to Improve Immunization  
Rates among Adolescents with  
High-Risk (Chronic and  
Immunocompromising) Conditions**

Submitted as a collaboration of the University of Cincinnati  
and Cincinnati Children's Hospital Medical Center



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**ABSTRACT:** *The overall goal of this project is to improve the delivery and documentation of immunizations to adolescents with high-risk (chronic and immunocompromising) conditions. The primary target audience is adolescents with high-risk conditions cared for at Cincinnati Children's Hospital Medical Center (CCHMC), along with their parents, Primary Care Physicians (PCPs), and specialists. We have assembled a Project Team at CCHMC that includes key members from six specialty clinics and Quality Improvement (QI) support. This team will address common barriers related to immunization in high-risk adolescents, including knowledge gaps and access to immunization records. Also, each clinic will address barriers that are unique to their patient population including differing vaccination requirements. We will survey practitioners, patients, and parents at baseline and several points throughout the project to assess acquisition of knowledge regarding vaccine recommendations, benefits, and risks. QI outcomes data (run charts) and process data (PDSA rapid cycles) will be employed to assess improvement in immunization rates among targeted teens who receive care in the six specialty clinics. Electronic health records (EHR) review will assess completeness of immunization records and adherence to guidelines. Surveys will be used to evaluate knowledge and practice patterns of specialists and PCPs, including the level of use of IMPACT-SIIS. In addition, a log of immunization data transfer between PCPs and specialists will be kept. The primary outcome metric of this project will be the appropriate immunization of high-risk adolescent patients cared for in six specialty clinics at CCHMC. Our outcome goal is an overall 80% appropriate immunization rate.*

**Submitted to Pfizer by  
University of Cincinnati**

**Center for Continuous Professional Development**

**July 18, 2014**

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**C.3: OVERALL GOALS AND OBJECTIVES:** Goal: To improve the delivery and documentation of immunizations to adolescents with high-risk (chronic and immunocompromising) conditions. These high-risk teens often require additional vaccinations and/or schedule modifications to meet Advisory Committee on Immunization Practices (ACIP) guidelines.<sup>1</sup>

The project's objectives address the barriers to proper delivery and documentation of immunizations to high-risk teens.

**Objective 1:** To identify and enhance provider/patient/parent-level educational tools to optimize communication about vaccine recommendations, benefits, and risks.

**Objective 2:** To develop quality improvement (QI) strategies that will improve immunization rates among teens with high-risk conditions who receive care from specialists at Cincinnati Children's Hospital Medical Center (CCHMC). This strategy will include system-level interventions, e.g. algorithms in electronic health records (EHRs) specific to this population.

**Objective 3:** To improve coordination of care between primary care providers (PCPs) and specialists, including the maintenance of immunization records in a centralized database, e.g. the Ohio central immunization database, IMPACT-SIIS.

**C.4.A: CURRENT ASSESSMENT OF NEED IN TARGET AREA: i. Baseline Data:** Immunizations currently save an estimated three million lives per year throughout the world.<sup>2</sup> Meningococcal, Tdap, influenza, and human papillomavirus virus (HPV) vaccines are recommended for all adolescents.<sup>3</sup> Teens with high-risk (chronic and immunocompromising conditions) need additional vaccinations and/or schedule modifications.<sup>1</sup>

**1. Adolescents with High-Risk Conditions:** **First**, they often require either additional vaccines or omission of vaccines.<sup>1</sup> For example, teens with systemic lupus erythematosus (SLE) are at increased risk for infections with encapsulated organisms, and therefore, pneumococcal vaccines are recommended.<sup>4</sup> If they are receiving immunosuppressive therapy, catch-up live varicella and MMR vaccines are contraindicated.<sup>1</sup> Specialists and PCPs are aware of some, but not necessarily all, of these special immunization requirements. In addition, EHRs do not have modules for these high-risk patient immunization schedules so providers erroneously believe the patient's vaccines are up-to-date. **Second**, these patients receive care from specialists in addition to their PCP and responsibility for administering vaccines is often unclear. The 2013 Infectious Diseases Society of America (IDSA) Clinical Practice Guideline for Vaccination of the Immunocompromised Host recommends that specialists share responsibility with the PCP for ensuring that appropriate vaccinations are administered to patients.<sup>1</sup> However, there is not a standard process for communicating between the PCP and specialist, despite IDSA guidelines. **Third**, immunizations are often missed. As specialty care increases, PCP visits often decrease. When the teen is seen by the PCP, the provider may be uncomfortable with administering immunizations due to fear that the vaccine may trigger a flare of SLE.<sup>4</sup> Furthermore, specialists often do not include vaccine requirements in the education provided to patients. **Fourth**, because these teens may be receiving vaccines at multiple points of care, the need to use a central repository such as Ohio's IMPACT-SIIS is critical. However, not all clinics have EHRs that can communicate directly with IMPACT-SIIS. This creates a need for duplicate data entry, which is time-consuming and has more potential for errors. Hence, not all clinics use IMPACT-SIIS.

**2. Ohio Data:** Rates of adolescent immunizations are relatively low across the US. Nationally, Tdap/Td coverage for 13-17 year olds is 84.6%, while Ohio is at 73.8%.<sup>5</sup> For meningococcal conjugate vaccine  $\geq 1$  dose, national coverage is 74%, while Ohio is at 66.4%.<sup>5</sup>

**3. Local Data:** Preliminary data from two CCHMC high-risk adolescent clinic populations show a significantly lower immunization rate than the general Ohio population. **CCHMC Rheumatology Clinic:** The SLE and Juvenile Idiopathic Arthritis (JIA) registries have 123 and 227 active (seen in clinic in the past 15 months) adolescent and young adult patients (13 to 29 years), respectively. From reviewing our EHR, IMPACT-SIIS, and records obtained from PCPs, only 38% of SLE and 21% of JIA patients have received any prior pneumococcal vaccine. A QI project has been started to improve receipt of pneumococcal vaccine among teens with SLE. **CCHMC Transplant Infectious Diseases Clinic:** Over the past 12 months, 99 liver transplant recipients ages 12-18 years have been seen in clinic. Four patients were receiving intravenous immunoglobulin (IVIG) replacement therapy. They are not able to mount antibody responses to vaccines and therefore, additional vaccinations were not recommended.<sup>1</sup> Of the remaining 95 patients, only one (1%) was up-to-date with all ACIP-recommended immunizations. Only 48% had received Tdap, 42% had received a two-dose hepatitis A vaccine series, and 63% had received  $\geq$  one dose of meningococcal conjugate vaccine.

These reviews provide a general model that can be expanded to all specialty clinics at CCHMC and are generalizable to other specialty care environments, regionally and nationally. The immunization rates for high-risk teens at CCHMC are low and therefore, this project is needed.

**ii. Primary Target Audiences:** The primary target audience is adolescents with high-risk conditions cared for at CCHMC, along with their parents, PCPs, and specialists. CCHMC is the primary pediatric specialty provider for the greater Cincinnati metropolitan area of approximately 2.1 million (2010 US census).<sup>6</sup> Between 12% and 26% of US children <21 years of age have a chronic condition.<sup>7</sup> Over 1,500 PCPs in the Greater Cincinnati area care for teens. The anticipation is that adolescents, their parents, PCPs, specialists and clinic staff will benefit from the project outcomes and the project results can be easily implemented in other clinical environments.

**C.4.B: PROJECT DESIGN AND METHODS:** We have assembled a Project Team at CCHMC that includes key members from six specialty clinics and QI support. This team will address common barriers related to immunization in high-risk adolescents, including knowledge gaps and access to immunization records. Also, each clinic will address barriers that are unique to their patient population. Specifically, the Project Team members have recognized the need to:

- i.) enhance their knowledge of immunization requirements specific for their patients;
- ii.) share this knowledge with patients and their families as well as their PCPs;
- iii.) improve access to patient immunization records;
- iv.) incorporate system-level interventions in their practices that will permit them to provide information about the benefits and risks of specific vaccines in an efficient manner; and
- v.) improve coordination of care with their patients' PCPs.

Our intervention will be to expand the QI strategy used for improving SLE patient vaccination rates to include all adolescents in six CCHMC specialty clinics. Each clinic will have a Provider Champion (indicated in parenthesis) and a Staff Champion:

- Transplant Infectious Diseases Clinic
- Rheumatology Clinic
- Endocrinology Clinic
- Family Care Center (HIV)
- Neuromuscular Diseases Clinic
- Inflammatory Bowel Disease Clinic

Clinic	Approximate Number of Adolescent Patients	Vaccinations Currently Being Monitored	Vaccinations Not Currently Being Monitored but are of Interest
<b>Transplant Infectious Diseases</b>	99	All	
<b>Rheumatology</b>	123 SLE 227 JIA	Influenza Pneumococcal	Meningococcal
<b>Endocrinology (Diabetes Mellitus)</b>	1215	Influenza	Pneumococcal
<b>Family Care Center (HIV)</b>	32	All with an emphasis on pneumococcal protein conjugate vaccine	
<b>Neuromuscular Diseases</b>	451	Influenza	Pneumococcal
<b>Inflammatory Bowel Disease</b>	420	Influenza Hepatitis B	Pneumococcal Meningococcal Hepatitis A

We will begin the study with 3 of the clinics (“early adopters”) enrolling in the interventions for approximately the first 6 months. The clinics not enrolled will serve as a “control” for the study—providing usual care and making no changes at the request of the study team. The second 6 months, all 6 clinics will participate in the interventions. We will examine how the 3 late intervention clinics compare to their pre-intervention performance, and how all clinics compare to the US Healthy People 2020 Objectives targets.<sup>8</sup>

A Project Advisory group will be formed which will meet quarterly to independently review the progress of the interventions and provide constructive feedback. The individuals who will be invited to serve on the Project Advisory Group include:

- Co-Director of the CCHMC  
Infectious Diseases Division, Medical Director of the Ohio AAP Teen Immunization Education Sessions (TIES) Program
- Adolescent Medicine representative
- Quality Improvement, Anderson Center representative
- Ohio Department of Health representative
- Community Pediatrician representative
- CCHMC Family representatives (Adolescent with a High-Risk Condition and their Parent)

**We will accomplish our objectives through the following activities related to the project objectives:**

**Objective 1. Identify and enhance provider/patient/parent-level educational tools to optimize communication about vaccine recommendations, benefits, and risks.**

Specific needs addressed through the interventions in this objective include:

(i) enhancing knowledge of immunization requirements specific for high-risk adolescents, and (ii) sharing this knowledge with patients and their families as well as their PCPs.

**Provider and Clinic Staff:** The Centers for Disease Control and Prevention (CDC) publishes annual updates on immunizations to help providers stay current on vaccines and immunization schedules.<sup>3</sup> This guidance includes a chart and footnotes for each specific vaccine. Many of the adolescent vaccines (Tdap, HPV, and meningococcal conjugate vaccines) have been introduced within the past 10 years.<sup>9</sup> As is true for any new intervention, there is a learning curve that must be climbed before the intervention becomes part of everyday patient care. Much of the information regarding vaccines for high-risk populations is in footnotes that require time to search by the patient's age and specific condition, specific vaccine, and history of prior vaccine receipt.<sup>3</sup> The MD providers at each specialty clinic are the experts who decide which vaccines are provided to patients, which vaccines are appropriate for specific patients, and when vaccines should be administered. CCHMC has a Physician Priority Link hotline which they can call to ask an Infectious Diseases physician questions about specific vaccines. This usually requires about 2-5 minutes to link the providers.

To accomplish this objective, we will first survey providers to assess their baseline knowledge about vaccines for high-risk adolescents. An Infectious Disease physician and Project PI) will provide academic detailing sessions for the specialty clinic providers and their staff to review the current recommended immunization schedule as it relates to their patients. For example, teens with inflammatory bowel disease (IBD) are at risk for development of sclerosing cholangitis, an inflammatory condition affecting the bile ducts and liver.<sup>10</sup> Thus, immunization against viral hepatitis viruses (hepatitis A and B) is a high priority for teens with IBD.<sup>3,11</sup> In contrast, teens with Duchenne muscular dystrophy lose respiratory muscle strength<sup>12</sup> and therefore, vaccines that protect against pneumonia (influenza and *Streptococcus pneumoniae*) are emphasized.<sup>3,12</sup> We will enhance the providers' and staffs' knowledge about vaccines so that they can advise patients and parents about the benefits, risks, and appropriate scheduling of vaccines. The mother's trust in the provider's recommendations has been shown to be a major factor in her decision to vaccinate her child.<sup>13</sup> Providers will complete a follow-up survey to evaluate the utility of these educational tools.

**Patient:** Adolescent patients are a unique population. Although teens are still dependent on their parents for advice regarding vaccines and other healthcare decisions, they are being encouraged to accept more responsibility for their own health.<sup>14</sup> Discussions about the HPV vaccine, in particular, open up conversations about sexually transmitted infections and future cervical and anal cancer risk prevention.<sup>15</sup> HPV vaccination is a target area for the Ohio AAP because acceptance of this vaccine is low.<sup>5</sup> We will use available patient education materials for vaccines and assess their effectiveness through a questionnaire that will be completed at specialty clinic visits.

**Parent/Guardian:** Parents are concerned about vaccine safety,<sup>13</sup> and they expect an assessment of the benefits of the vaccine for their child. The ability to schedule vaccine receipt with other visit types is also a benefit. We will provide parents with current CDC Vaccine Information Sheets (VISs). We will also review existing patient/parent educational materials regarding vaccines and, where available, information regarding the special immunization needs of their child. If we deem the available educational information inadequate, we will develop materials to meet the needs of parents in our specialty clinics. We will assess (by paper or electronic survey) the effectiveness of the written and verbal communications provided in addressing their concerns about vaccines.

**Objective 2. Develop quality improvement (QI) strategies to improve immunization rates among teens with high-risk conditions who receive care from specialists at CCHMC. This strategy will include system-level interventions, e.g. algorithms in electronic health records (EHRs) specific to this population.**

Specific needs addressed through the interventions in this objective include: (iii) improve access to patient immunization records, and (iv) incorporate system-level interventions in practices, that will permit them to provide information about the benefits and risks of specific vaccines to patients/parents in an efficient manner.

**Current Immunization Status of Clinic Patients:** Some of our project clinics will have existing registries but for others, this database will need to be created as part of this project. Utilizing CCHMC's EHR system, IMPACT-SIIS (for Ohio residents), and the immunization records provided by patients and their PCPs, we will determine the current or baseline immunization receipt status of the clinic population. This information will be provided to the specialist provider and clinic staff so they can make informed decisions about vaccines to target in the intervention.

**Target Vaccinations for Each Clinic:** It is not the responsibility of the specialty clinic to provide all needed adolescent vaccines. All teens require Tdap at age 11-12 years so their PCP may be providing this vaccine.<sup>3</sup> But they may not be. Therefore, for each clinic, we will identify target vaccines that either are additional requirements or require schedule modifications for their population. For example, a teen who has Duchenne muscular dystrophy requires pneumococcal polysaccharide vaccine and an annual inactivated influenza vaccine, in addition to catching up missed vaccines.<sup>3</sup>

**Development of Clinic-Specific Strategies:** We will work with providers and staff to identify and develop clinic-specific strategies. The goal will be to improve immunization receipt without compromising other care at the specialty clinic visit or overly burdening the staff. We anticipate that each clinic will have unique challenges. We will identify a Provider Champion and a Staff Champion at each clinic. We will enroll providers and staff in CCHMC Rapid Cycle Improvement Collaboratives (RCICs) which use a QI Improvement Roadmap that includes the development of SMART (Specific, Measurable, Actionable, Relevant, and Time-bound) Aims and Measures, the identification of Key Drivers, and the design and execution of PDSA (Plan-Do-Study-Act) cycles. This approach is already in progress in the CCHMC Rheumatology Clinic. Strategies that may be considered include selecting specific visit types to review immunizations (i.e., initial diagnosis visits, visits prior to starting immunosuppressive therapies, or annual visits for transplant recipients), reminders (mail, telephone, electronic media) to patients/parents about recommended vaccines, and recall of patients who have missed vaccines. We have several

project team members who can work closely with specialty clinics who need education, support, or assistance in implementing RCICs.

**Design of EHR Enhancements and other Strategies for Multiple Clinics:** CCHMC's EHR system (EPIC) has two sections related to immunizations: (1) Health Maintenance; and (2) Immunizations. The Health Maintenance section provides a list of all due immunizations with an expected date of receipt based on the immunization schedule for healthy children. If the child has received immunizations outside of CCHMC, the immunizations have to be manually entered into the EHR to remove them from the "due" list. This section does not account for special immunization requirements of immunocompromised patients and thus, sets up the potential for harm to the patient. For example, if live varicella vaccine shows up as "due" for an immunocompromised patient and is inadvertently administered, the patient may require hospitalization for disseminated varicella or delay of a needed transplant.<sup>1</sup> The second section, Immunizations, provides a list of vaccines received at CCHMC or entered by a CCHMC provider. This section has a one-way interface with Ohio's IMPACT-SIIS registry such that vaccines received at CCHMC are directly entered into IMPACT-SIIS. However, CCHMC providers are not able to access IMPACT-SIIS records without directly going into the IMPACT-SIIS system.

We will discuss with CCHMC Information Services (IS) personnel and Ohio Department of Health (ODH) IMPACT-SIIS staff, methods to modify current immunization modules to accommodate immunization schedules for high-risk patient populations.

**Performance of Interventions:** Performance goals will be set at the beginning of each intervention and outcome metrics will be measured throughout the project. Run charts will be analyzed biweekly to guide improvement. Failures will be identified and PDSA cycles will be completed.

**Feedback about Effectiveness of Interventions:** We will provide feedback to each clinic about the effectiveness of interventions in improving receipt of immunizations in their population.

**Objective 3. Improve coordination of care between primary care providers (PCPs) and specialists, including the maintenance of immunization records in a centralized database, e.g. the Ohio central immunization database, IMPACT-SIIS.**

**Baseline Exchange of Immunization Data between PCPs and Specialists:** As previously mentioned, the recent IDSA guidelines call for both the PCP and the specialist to share in the vaccination responsibility of high-risk patients.<sup>1</sup> Specialists do not always include guidance about specific vaccinations for high-risk patients in their correspondence to PCPs. Specialists usually do not have access to local PCP's EHRs and thus, cannot see a patient's immunization record unless it has been entered in a central repository. Specialty clinics often request immunization records from the PCP by telephone or electronic media. This slows clinic work flow and increases the potential for vaccines to be omitted or duplicated.

For each clinic, we will examine the baseline exchange of immunization data between PCPs and specialists including telephone and electronic media exchange of immunization records, providing patients with copies of vaccine records and/or recommendations, and daily clinic correspondence. We will develop population-specific phrases that can be sent in clinic notes to PCPs in order to facilitate the exchange of immunization information.

**Analysis of Current Coordination of Care for Immunizations:** We will work with each specialty clinic, considering its unique patient population, to analyze the current coordination of care for



immunizations with PCPs. We will include Christopher Bolling, a community-based pediatrician on the Project Advisory group to provide the PCP's perspective on preferences for immunization communications.

**Development of Strategies to Improve Coordination of Care for Immunizations:** Recognizing that Ohio's immunization rates were below the national average, the Ohio Department of Health (ODH) provided grant funding to the Ohio chapter of the American Academy of Pediatrics (AAP) for the Teen Immunization Education Sessions (TIES) program.<sup>16</sup> This is a statewide program to educate providers on ways to improve adolescent immunization rates. Local educators are trained by the Ohio AAP and annually provide education to >150 practices through webinars and regional training. The TIES program focuses on vaccines that are recommended for all teens with no accommodation for high-risk patients whose recommended immunization schedules are different. Furthermore, TIES' efforts are aimed at PCPs, not specialists. We will include someone from the Ohio TIES program and ODH representatives on our Project Advisory group. This will allow ongoing dialogue and collaboration with the Ohio AAP so we can incorporate their successes from the TIES initiative into our project, and vice versa. We will explore whether the TIES program can be expanded to include vaccines (i.e., pneumococcal vaccines) that are only recommended for high-risk teens. We will also discuss with ODH strategies to encourage increased use of IMPACT-SIIS by both PCPs and specialty clinics.

Another venue will be a planned Grand Rounds presentation sponsored by CCHMC on immunizations and other issues that arise in the co-management of teens with high-risk conditions. These strategies are designed to reach groups of PCPs and specialists to complement the clinic-specific interventions. Grand Rounds at CCHMC is unique in that it has a very high attendance by community practitioners who care for children and adolescents.

**Performance of Strategies:** As strategies are implemented, we will evaluate their ease of performance. If they are difficult to implement or sustain, other strategies will be considered.

**Feedback about Effectiveness of Strategies:** We will provide each clinic feedback about the effectiveness of the strategies in improving coordination of vaccine receipt between specialists and PCPs.

**C.4.c.: EVALUATION DESIGN i. Assessing Impact on Practice Gap:** The primary gaps that this project addresses include: **a)** a knowledge gap by providers and patients related to the heightened risk for immunocompromised patients who do not receive complete immunizations as outlined in practice guidelines; **b)** an understanding by providers, patients, and parents of the unique immunization schedule for immunocompromised patients; **c)** communication and coordination among specialists and PCPs to ensure that patients are receiving complete and appropriate immunizations and that the records are available for all providers; and **d)** increase in utilization of Ohio's central database (IMPACT-SIIS) for recording and accessing patient immunization information. In addition to these primary gaps, we will also be evaluating the use of selected patient educational materials and the utilization of recording and reporting tools embedded in CCHMC's EHR. The following table identifies our primary evaluation measures, our data sources, our process for collecting and analyzing data, and our strategies for controlling outside factors that may interfere with our ability to measure the impact of our project interventions.

<b>Objective</b>	<b>Evaluation Measure/Source of Data</b>	<b>Process of Data Collection and Management</b>	<b>Data Analysis Strategy</b>	<b>Study Design to Limit Extraneous Variable Impact</b>
Identify and enhance educational tools to optimize communication about vaccine recommendations, benefits, and risks	Surveys of practitioners, patients, and parents collected at baseline and several points throughout the project	Surveys available online, through the mail, or in the specialty clinics. Data organized and managed in a REDCap database	Analysis of variance and non-parametric equivalents will compare pre- and post-intervention survey results	Several clinics selected as “early adopters” and compared with clinics that receive the interventions at six months
Develop QI strategies to improve immunization rates among teens with high-risk conditions who receive care from specialists at CCHMC	QI outcomes data (run charts) and process data (PDSA rapid cycles) EHR reports of immunization rates sorted by clinic and type of vaccine. Rates of guideline-adherent immunizations by clinic and immunization type	Run chart data managed in a REDCap database PDSA rapid cycle data captured in interviews of practice champions Electronic chart review of completeness of immunization record and adherence to guidelines	Time series analysis to analyze the run chart data within each clinic Analysis of variance to compare intervention and control clinics at baseline and at six months Interview data analyzed using NVIVO (qualitative analysis tool)	Comparison of immunization rates between “early adopter” clinics and “control” clinics for the first six months of the project
Improve coordination of care between primary care providers (PCPs) and specialists, including the maintenance of immunization records in a centralized database	Surveys of specialists and PCPs related to knowledge and practice patterns Examination of usage of IMPACT-SIIS by primary care providers Log of transfer of immunization data between PCPs and specialists Rates of use of IMPACT-SIIS database by PCPs and Specialists	E-mailed/online survey of PCPs and specialists, with survey results maintained in REDCap database Comparison of baseline level of communication (number of immunization records transferred between PCPs and Specialists: extracted from EHR and maintained in REDCap database)	Comparison of survey responses between baseline and Post-intervention (t-tests and ANOVA) Comparison of specialist and PCP responses pre, post, and pre-post change (ANOVA) Comparison of pre-intervention immunization records-sharing rates with post-intervention sharing rates (t-tests and ANOVA) Comparison of PCP-initiated vs. Specialist-initiated sharing rates (ANOVA)	Comparison of clinics in the “early adopter” group to those who begin the education/QI intervention at the six-month period Use of a time-series design to examine immunization rates, and communication/ records transfer/ use of IMPACT-SIIS over a long time period; starting approximately 3-6 months prior to the start of the intervention through 3-6 months post-intervention

**ii: Expected Levels of Change:** There are a number of metrics in which we expect to see change as a result of this project. The primary outcome metric of this project will be the appropriate immunization of high-risk adolescent patients cared for in six specialty clinics at Cincinnati Children’s Hospital Medical Center. Our outcome goal (and expected level of change) is an overall 80% appropriate immunization rate that is documented and available to all providers who care for these patients. This is an average increase of 30% over the current rate of immunization in these clinics. A second major outcome metric related to direct patient care is an increased use of the IMPACT-SIIS statewide immunization database, by both specialists and PCPs. We do not have accurate data on the current level of use of IMPACT-SIIS but we expect to reach a level of 50% of patients having accurate records in the database by the end of the project. We also expect that at least 80% of the providers receiving educational interventions in this project will know the immunization schedules and needs for high-risk adolescents. Finally, we expect to have a major impact on the level of communication between PCPs and specialists, especially regarding the immunization of high-risk patients. We expect to increase the number of communications that share immunization data by 50%.

**iii: Target Audience Engagement:** The Project Team includes the clinical directors of the six CCHMC specialty clinics that will participate in this project. We will use the insights of the Project Team as well as participation rates in educational activities to assess the level of interest and engagement of the medical staff of these clinics. Additionally, we will use key informants from among the clinical staff (eg., nurse supervisors and clinic administrative directors) to gain additional insight regarding any problems or barriers related to implementing system changes to improve patient care.

**iv: Dissemination of Project Results:** Our primary target for dissemination of the results of this project is the State of Ohio. We have created a project Advisory Group with representatives from state-wide initiatives aimed at improving pediatric immunizations and the use of the IMPACT-SIIS database. State-wide initiatives by the ODH and the Ohio AAP will receive regular updates regarding our project and ways in which we can integrate our efforts. In addition, we will use the state-wide pediatric hospital network to disseminate the educational materials and the results of our project to the other major pediatric specialty clinics throughout Ohio. We also intend to present the results of this project at several national meetings and we will submit at least two manuscripts with the results of this project to peer-reviewed journals.

#### **C.5: DETAILED WORK PLAN AND DELIVERABLES**

This a two-year project with integrated deliverables that fall into three fundamental areas:

**1)** Identifying and enhancing provider/patient/parent-level educational tools to optimize communication about vaccine recommendations, benefits, and risks; **2)** developing quality improvement (QI) strategies to improve immunization rates among teens with high-risk conditions who receive care from specialists at CCHMC; and **3)** improving coordination of care between primary care providers (PCPs) and specialists, including the maintenance of immunization records in a centralized database. The first six to eight months will focus on receiving IRB approval (hopefully receiving and exemption), researching available literature, and developing an Academic Detailing curriculum. We will also use that time to gather baseline data and assess the systems changes that will be needed in the clinics as we prepare for our “early adopters” to begin the intervention. During the Implementation phase of the project, we

will provide practices with a variety of materials and practice-driven system changes to achieve the three project aims. Qualitative and quantitative data will be collected throughout this period. In the final six months of the project, we will help practices integrate changes for long-term impact as we analyze data, prepare manuscripts and develop wider plans for dissemination to other practices and systems.

<b>Activity</b>	<b>Project Month</b>	<b>Responsible Person(s) (all to include Program Mgr.)</b>	<b>Anticipated Outcomes</b>
<b>Create and submit IRB protocol</b>	1-2		IRB approval/exemption
<b>Recruit key members of 3 of the specialty clinics</b>	1-2		3 clinics will commit to participate; each practice will identify a Provider Champion and Staff Champion
<b>Establish patient registry for each clinic and complete data analysis of immunizations currently given in all 6 specialty clinics</b>	2-3		Vaccine needs analysis for each clinic will be completed
<b>Administer surveys to providers before process initiation</b>	2-3		>80% of surveys will be returned; analysis of results within one month of receipt
<b>Education of providers of 3 specialty clinics regarding unique vaccine schedules</b>	3-4		Knowledge of vaccinations needed for 3 of the specialty clinics
<b>Access adolescent educational materials regarding specific vaccines</b>	3-4		Provide the initial 3 specialty clinics with available educational materials for adolescents
<b>Development of educational materials for adolescents not already available</b>	3-6		Completion of educational materials for adolescents regarding specific vaccinations
<b>Access educational materials for parents regarding specific vaccinations and administer survey to parents and adolescents</b>	3-4		Provide the initial 3 specialty clinics with available educational materials for parents. Analysis of results from returned surveys within one month of receipt

<b>Develop specialty clinic specific PCP educational phrases to be sent with routine letters to PCP</b>	3-4		Clinic specific smart phrases in the EHR will be created that will be sent with letters to PCP
<b>Enrollment of Provider Champions/Staff Champions of 3 specialty clinics in Rapid Cycle Improvement Collaborative(RCIC)</b>	3 - 8		RCIC application deadline 1/5/2015 Course begins 1/23/15 and ends 5/3/15
<b>Kick-off session for Provider Champions and Advisory Group</b>	4		All practices will be represented at the kick-off event including all Provider and Staff Champions
<b>QI Project conducted at each clinic</b>	3-20		Biweekly contacts with analysis of run charts to guide improvement; Key driver diagrams created for each site with associated PDSA cycles and ramps
<b>Obtain patient specific vaccination history from PCP and record in central database (e.g. IMPACT SIIS)</b>	5-20		This will be an ongoing process throughout the project
<b>Work with CCHMC Information System (IS) and IMPACT SIIS staff to provide high-risk patient immunization schedule in EHR</b>	5-20		Accurate high-risk specific immunization schedule in EHR
<b>Work with CCHMC Information System (IS) and IMPACT SIIS staff to coordinate data entry of administered vaccines by PCP and specialist</b>	5-20		Centralized database of patient specific vaccination data
<b>Enrollment of Provider Champions/Staff Champions of other 3 specialty clinics in RCIC</b>	5-10		Application deadline 3/23/15 Course begins 4/10/15 and ends 8/6/15

<b>Administer surveys to providers before process initiation</b>	5		>80% of surveys will be returned; analysis of results within one month of receipt
<b>Education of providers of 3 specialty clinics regarding unique vaccine schedules</b>	5-6		Knowledge of vaccinations needed for 3 of the specialty clinics
<b>Grand Rounds presentation to educate PCP and specialists</b>	8		Education of specific vaccination needs for high-risk adolescents Presentation of QI Project results to date
<b>Session for Provider Champions and Advisory Group</b>	8;12;16;20;24		Report progress to date Identify failures Begin discussions of incorporation of knowledge gained from this project to all specialty clinics at CCHMC and all ages
<b><i>QI Project conducted at each practice</i></b>	8-20		Biweekly contacts with analysis of run charts to guide improvement; Key driver diagrams created for each site with associated PDSA cycles and ramps
<b>Final Learning Session open to all practices</b>	23		Presentation of QI Project by each pair of Provider and Staff Champions; dissemination of final chart review and survey results and aggregate findings across practices
<b>Administer surveys to providers after process completion</b>	20-22		>80% of surveys will be returned; analysis of results within one month of receipt
<b>Prepare final reports and disseminate learning</b>	20-24		Timely submission of final report; Submission of findings for presentation/publication to at least 2 scholarly venues

## References

1. Rubin LG, Levin MJ, Ljungman P, et al. Infectious Diseases Society of America clinical practice guideline for vaccination of the immunocompromised host. *Clin Infect Dis* 2014;58(1 February):e44-e100.
2. Georgousakis M, Leask J, McIntyre P, Ward K. *Myths and Realities: Responding to Arguments against Vaccination. A Guide for Providers*, 5<sup>th</sup> ed. Canberra, Australia: Australian Government Department of Health and Ageing, 2013.
3. Department of Health and Human Services. Centers for Disease Control and Prevention. Recommended immunization schedule for children aged 7 through 18 years—United States, 2014. Available at: <http://www.cdc.gov/vaccines/who/teens/downloads/parent-version-schedule-7-18yrs.pdf>. Accessed July 3, 2014.
4. Murdaca G, Orsi A, Spanó F, et al. Influenza and pneumococcal vaccinations of patients with systemic lupus erythematosus: Current views upon safety and immunogenicity. *Autoimmun Rev* 2014;13:75-84.
5. Centers for Disease Control and Prevention. National and state vaccination coverage among adolescents aged 13-17 years—United States, 2012. *MMWR* 2013;62(34):685-693.
6. United States Census Bureau. Metropolitan and micropolitan statistical areas main. Available at: <http://www.census.gov/population/metro/>. Accessed July 4, 2014.
7. Van Cleave J, Gortmaker SL, Perrin JM. Dynamics of obesity and chronic health conditions among children and youth. *JAMA* 2010;303(7):623-630.
8. United States Department of Health and Human Services. Healthy People 2020 objectives. Accessed July 4 2014. Available at: <http://www.healthypeople.gov/2020/topicsobjectives2020/pdfs/Immunization.pdf>.
9. Immunization Action Coalition. Historic dates and events related to vaccines and immunization. Available at: <http://www.immunize.org/timeline/>. Accessed July 11, 2014.
10. Loftus EV, Harewood GC, Loftus CG, et al. PSC-IBD: a unique form of inflammatory bowel disease associated with primary sclerosing cholangitis. *Gut* 2005;54:91-96.
11. Park SH, Yang SK, Park SK, et al. Efficacy of hepatitis A vaccination and factors impacting on seroconversion in patients with inflammatory bowel disease. *Inflamm Bowel Dis* 2014;20(1):69-74.
12. Birnkrant DJ, Bushby KMD, Amin RS, et al. The respiratory management of patients with Duchenne muscular dystrophy: a DMD Care Considerations Working Group Specialty article. *Pediatr Pulmonol* 2010;45:739-748.
13. Benin AL, Wisler-Scher DJ, Colson E, Shapiro ED, Holmboe ES. Qualitative analysis of mothers' decision-making about vaccines for infants: the importance of trust. *Pediatrics* 2006;117(5):1532-1541.
14. American Academy of Pediatrics. Adolescent health. Available at: <http://www2.aap.org/sections/adolescenthealth/>. Accessed July 11, 2014.
15. Griffioen AM, Glynn S, Mullins TK, et al. Perspectives on decision making about human papillomavirus vaccination among 11- to 12-year-old girls and their mothers. *Clin Pediatr* 2012;51(6):560-568.
16. Ohio American Academy of Pediatrics. Give your teens a shot: Teen immunization seminars with the Ohio AAP. Available at: <http://www.ohioafp.org/wfmu-article/give-teens-shot-teen-immunization-seminars-ohio-aap/>. Accessed May 20, 2014.

## **ORGANIZATIONAL DETAILS:**

This is a joint project between the **University of Cincinnati (UC)** and **Cincinnati Children's Hospital Medical Center (CCHMC)**. The project partners include the UC Department of Pediatrics and the UC Center for Continuous Professional Development. Project PIs are: **Rebecca Brady, MD** (Infectious Diseases), and **Jennifer Huggins, MD** (Pediatric Rheumatology).

**i. Leadership and Organizational Capability:** With over 1000 active medical staff members, CCHMC is the major pediatric care provider for approximately 3 million persons in the Greater Cincinnati area. This project focuses on the clinical practices and systems at CCHMC. Cincinnati Children's Hospital is consistently ranked in the top three pediatric hospitals in the US. Thirteen of its specialty divisions are ranked in the top 10. Children's was the first pediatric hospital to win the American Hospital Association-McKesson Quest for Quality Prize (2006) and has received numerous other awards for quality and clinical excellence. The Cincinnati Children's James M. Anderson Center for Health Systems Excellence was created in 2010 to support and accelerate improvements while training future healthcare leaders to do the same.

In chronic care, measurement is not simply a method to determine effectiveness, but a goal in itself. Patient registries exist at CCHMC for many chronic conditions and are used for both improving patient care and outcomes research. Patient self-management is also the focus of several CCHMC initiatives. Care teams enroll in a two-component program of education: ACCEPT (Advancing Communication and Care by Engaging Patients) and BTS (Breakthrough Series) Collaborative (focused on inter-team collaboration). Team training will be the foundation of improved engagement of parents/patients and coordination of care between primary care and specialty care. Additionally, Children's Hospital has a number of HIT (health information technology) initiatives that share EHR information among CCHMC inpatient/outpatient services and local physicians. These resources will be used to coordinate efforts to complete immunizations and share information across healthcare providers. The project team also has extensive experience in conducting QI initiatives in primary care settings. Both CCHMC and UC have initiatives to certify primary care practices as patient-centered medical homes (PCMH).

CCHMC is a major affiliate of the University of Cincinnati Medical Center (UCMC), where its faculty have their academic appointments. It is a member of the UC Clinical and Translational Science Award (CTSA) site. Substantial multidisciplinary collaborations will be required to complete the proposed research. CCHMC and UCMC provide an environment conducive to multidisciplinary research by providing opportunities for interactions with many departments in the medical center. Both institutions are in close proximity to each other, being located on the same medical campus. The climate of multidisciplinary collaboration and academic scholarship on the medical campus will provide strong support to the proposed study.

The **UC Center for Continuous Professional Development** seeks to improve the quality of patient health by developing and implementing interprofessional strategies to narrow identified gaps between current and optimal clinical performance and patient outcomes. With a focus on QI, recent initiatives undertaken by the CCPD include Improving chronic pain for patients in primary care; Improving adult immunization rates in underserved populations; Implementation of a Decision Support Tool for patients with Atrial Fibrillation; and Improving Adult Immunization Rates.

We will draw our patient population from the following six CCHMC clinics:



**Transplant Infectious Diseases Clinic** provides care for approximately 100 adolescent liver transplant recipients, including pre-transplant consultations and post-transplant care for infection monitoring. Over 500 children have received liver transplants at Cincinnati Children's Hospital since 1985. This clinic also actively collaborates with other transplant teams, including the bone marrow, cardiac, renal, and multi-visceral solid organ transplant teams.

**Endocrinology Clinic** provides care for children with diabetes mellitus, thyroid disorders, and other endocrine pathology. Over 1215 adolescents receive care for type I diabetes mellitus. There is also an increasing population of teens with type II diabetes. This center has been a lead site for large NIH-funded studies in diabetes. The center was ranked #6 in a recent US News and World Report ranking Pediatric Diabetes and Endocrinology Centers.

**Rheumatology Clinic** provides care to children and adolescents with juvenile idiopathic arthritis (JIA), systemic lupus erythematosus (SLE), and other autoimmune conditions. About 227 teens are followed in JIA clinic and about 123 in SLE clinic. The Rheumatology Division is home to several NIH-funded pediatric rheumatology centers. The Clinical Trials Unit within the division currently serves as the coordinating center of the Pediatric Rheumatology Collaborative Study Group (PRCSG), a group of pediatric rheumatology professionals dedicated to performing high-quality clinical research in pediatric rheumatic diseases.

**Comprehensive Neuromuscular Center and Muscular Dystrophy Association Clinic** comprises an interdisciplinary team that provides coordinated care for about 1000 patients with pediatric neuromuscular diseases, including various muscular dystrophies, spinal muscular atrophy, and neuropathies. Approximately 451 adolescents receive care at this center. The clinicians are national leaders in clinical and translational research in Duchenne muscular dystrophy. This center was ranked #7 in a recent US News and World Report ranking Pediatric Neurology Centers.

**Family Care Center in the Division of Adolescent and Transition Medicine** provides care to about 32 adolescents infected by HIV by using a multidisciplinary treatment approach including mental health, social work, case management, and medical care services all in one office environment. Through collaborations with Obstetrics/Gynecology, and local health departments, perinatal HIV transmission has decreased dramatically and therefore, most of the current adolescent patients acquired HIV infection as teens.

**Schubert-Martin Inflammatory Bowel Disease Center** provides care for children with inflammatory bowel diseases (IBD), including Crohn disease and ulcerative colitis and has approximately 420 adolescent patients. The center was ranked #3 in a recent US News and World Report ranking Pediatric Gastroenterology centers.