Engaging Primary Care Providers in Chlamydia Screening Quality Improvement

The New York State Department of Health received funding through CDC's STD Assessment, Assurance, Policy Development and Prevention Strategies (STD AAPPS) Enhanced Program Evaluation supplement to evaluate a quality improvement (QI) framework for the delivery of sexual health services by pediatric primary care providers. QI activities focused on improvements in sexual risk assessment and delivery of annual Chlamydia screening to adolescent and young adult clients of primary care pediatric offices in Buffalo, New York.

KEY SUCCESSES

Quality improvement methodology led to successful change in provider capacity to conduct a sexual history assessment of adolescent patients and increases in chlamydia screening coverage. Both clinic cohorts exceeded the 80% goal for improving the documentation of sexual health risk assessment and annual CT screening of sexually-active adolescents. Overall, documentation of sexual health history increased from 64% at baseline to 94% and CT screening increased from 73% at baseline to 94%. During the final Learning Collaborative, clinic teams identified the interventions which were most successful in promoting quality improvement in the two key performance measures. A summary of the successful QI interventions is listed below.

EMR Changes	• Use EMR sexual health history (SHH) template • Provider records EMR SHH at *all* visits, including sick visits • EMR "care card" includes sexual history and CT/GC screening for patients age 13-24 • EMR "Pop-ups" to remind providers and nurses to ask sex history questions and conduct CT screening
Communication Changes	• Clinic signage posted on confidentiality policy • Posters geared towards teens • Educational handouts provided to teen patients during physicals e.g., AAP NYS District "teen health care bill of rights" pamphlets (Brochure and Poster)
Registration Changes	• Urine specimen collected at registration for all teens at all visits • Brochure provided to parent and teen at registration about what to expect during an adolescent visit
Operations Changes	• Morning huddles to identify adolescents on day of visit • Medical assistant/nurse asks SHH routinely • Train all new staff on sex history and CT testing process • New SOP for all providers for CT testing • Reconfigure screening/vital sign room into teen "safe intake room" • Offer confidential, sexual education information, condoms • Establish test of re-infection and Expedited Partner Therapy follow up process for STI cases

Resources and examples are labeled and linked throughout

INTRODUCTION

Chlamydia in New York and Erie County

Chlamydia (CT) is the most common bacterial sexually transmitted infection in the United States with 1.7 million new cases reported in 2017 and two thirds among persons 15-24 years of age. New York has a disproportionate burden of CT infections, ranking among the top ten states for CT morbidity. In 2017, 21,103 cases of CT were reported among young women, 15-24 years of age, in New York State (NYS) outside New York City for a case rate of 2,750. Erie County, situated in western New York and bordering Canada, typically experiences the highest rates of CT out of the 57 counties in the NYS project area. In 2017, Erie County women ages 15-24 accounted for 2,675 CT cases, ranking first among NYS counties.[1]

Why is Chlamydia Important?
Chlamydia infection is easily treated with a single dose antibiotic regimen however, infections are often asymptomatic and thus, undetected. If left untreated, CT can cause serious long-term sequelae including pelvic inflammatory disease, ectopic pregnancy and infertility.

Chlamydia Screening Recommendations
Chlamydia screening is a cost-effective standard of care that is recommended by the Centers for Disease Control and Prevention for all sexually active women age 24 and younger on an annual basis.[2] The U.S. Preventive Services Task Force also provides a B-level recommendation for annual CT screening of sexually active women 24 years of age and younger and older women who are at increased risk.[3] The Healthcare Effectiveness and Data Information System (HEDIS) assesses health plan performance on achieving CT screening recommendations with annual estimates of CT screening coverage among young women who receive medical care through commercial or Medicaid managed care health plans. In 2017, NYS CT screening rates for women 16-20 years of age and 21-24 years of age, was 55% and 63%, respectively, among commercially insured enrollees, and 73% and 76%, respectively, among Medicaid managed care enrollees. Erie County CT screening data also highlight missed opportunities for CT screening. Among health plans in Western New York, reported CT screening among 16-20 year old and 21-24 year old female Medicaid Managed Care enrollees was 63-70% and 66-73%, respectively, and was lower among commercially-insured enrollees, with 44-53% and 51-60% screened, respectively. Factors contributing to this outcome include lack of awareness among health care providers, patient confidentiality concerns and limited public health resources to support screening.

Sexual Health Risk Assessment
CDC's clinical prevention guidelines recommend risk assessment, education and counseling for persons at risk of STIs.[4] In addition, the USPSTF also recommends that health care providers obtain a sexual risk assessment for all sexually active adolescents (ref). Previous reports have documented wide variation in health care provider practices with factors such as patient concerns about confidentiality, need for sexual/reproductive health services and provider discomfort in asking about patient's sexual practices impacting the delivery of sexual risk assessments in clinical settings. Data from the National Survey of

Family Growth indicate that 65% of 15-19 year old and 63% of 20-24 year old females reporting sexual activity received a sexual risk assessment in the prior 12 months. Among sexually active males, 44% of 15-19 year olds and 31% of 20-24 year olds received a sexual risk assessment in the past year.[5]

For minors and young adults, privacy issues are especially significant and may force individuals to delay or forgo needed reproductive health care services. Under New York State Public Health Law, minors may be tested or treated for STDs without parental or guardian's consent. Furthermore, state law forbids the disclosure of information about STDs to parents or guardians without the patient's permission. Despite statutory language to protect confidentiality, data indicate that minors are unwilling to use their insurance coverage to pay for sensitive health services. A national survey of adolescents 12-17 years of age found that concerns about disclosure of information to parents was a frequently cited barrier to seeking STD testing.

METHODS AND RESULTS

Strategic Approach
The purpose of the Chlamydia Screening Quality Improvement Project (CSQIP) was to identify QI strategies to improve CT screening among young women and men seen in high volume pediatric primary care settings in Erie County, New York. The CSQIP was a collaboration between the New York State Department of Health, Erie County Department of Health, New York City STD/HIV Prevention Training Center and Population Health Improvement Partners, an organization that provides technical assistance, customized training and coaching to organizations to improve service delivery and programs. The CSQIP team partnered with two separate groups of pediatric primary care providers to improve systems for the delivery of sexual risk assessment and CT screening services to eligible patients. The first QI project ran from May 2015 to March 2016 in an academic-affiliated pediatric clinic, an FQHC and a private pediatric/family medicine clinic. The second cohort ran from August 2016 to June 2017 in one private pediatric clinic, one FQHC and two community pediatric clinics. The following information provides an outline of the methodologic approach and resources which the CSQIP team used to implement the QI project.

Clinical Partners
The initial criterion for clinic selection was based on location in a ZIP code with high CT morbidity. ZIP-code level maps of CT rates among women, 15-24 years of age, was used to define the catchment area. Pediatric provider offices located within or serving the catchment area neighborhoods were targeted for recruitment. In addition to geographic criteria, the following checklist was used to further prioritize potential clinical partners.

Clinic QI Team Member Selection Guidelines

Selection Guidelines (R=Required, P=Preferred)			Clinic A: _____
Priority Alignment	R	• Goals of this project align with existing requirements or goals of clinic	❏
Ready to Engage	R	• At least one internal champion with authority (QI leader, clinician, etc.)	❏
		• Senior leader (e.g. CEO) is supportive of project	❏
		• Mid-level manager (e.g. Nursing Director) is supportive of project	❏
		• Provider staff are supportive of project	❏
		• The clinic is willing to commit time and staff to the project	❏
		• Leaders understand requirements and are willing to follow through	❏
Need for Improvement	R	• Serves target population (e.g. patients in the 13-24 years old)	❏
	P	• Clinic data shows a need to improve (e.g. HEDIS measures) • High morbidity area	❏
Established Relationship	P	• You or colleagues have a good working relationship with clinic	❏
Learning Minded	P	• Willingness to be transparent and expose deficiencies to improve	❏
		• Staff work together to identify problems and take action to improve	❏
		• Leaders, managers, and staff are open minded about trying new things	❏
Data Minded	P	• Clinic uses data to monitor performance and make improvements	❏
		• Clinic currently collects data to track performance	❏
Site Logistics	P	• Clinic has a projector, conference phone, laptops, access to IT, etc.	❏
		• Clinic site location is easy to travel to and within driving distance	❏
		• Clinic has a conference room available for the entire on-site*	❏
⚠ **Cautions****	⚠	• Organizational structure (e.g. union based, in a larger health system, etc.) • Competing priorities (e.g. EMR rollout, accreditation, all-hands on meeting, limited staff capacity, etc.)	

Recruitment of Clinical Partners

Use a local champion to recruit clinical partners. The CSQIP team included the Erie County Commissioner of Health who was a practicing pediatrician and was well-known in the provider community. She approached the medical directors at each of the targeted pediatric provider offices to provide information about the QI project and gauge their interest.

Create a pitch packet that can be provided in advance to targeted clinics and starts the conversation with clinics during recruitment calls. The pitch packet summarizes:
– the purpose of the QI project,
– the structure of the QI event,
– the clinic's role, and
– anticipated outcomes and benefits for the clinic

Establish an MOU: this bi-directional formal agreement moves clinics beyond interest to a commitment to the QI project. The CSQIP MOU clearly defined the deliverable for both the CSQIP team and the clinic.

Preparation for the On-Site Qi Event

The QI project kick-off was a one-day in-person event which the CSQIP team held with each clinic with the goal of identifying QI intervention/s to improve the delivery of sexual risk assessment and CT screening services. Ensuring the success of the on-site QI event required 2-3 planning calls with clinic QI team members. The CSQIP held these one-hour calls with the clinic sponsor and QI Team Lead 6-8 weeks before the on-site event. These prep calls focused on the following key activities.

Assembling a Clinic QI Team: Teamwork is essential in QI and selecting the right team members with the right skills will impact the success of the project and the overall QI culture within the organization. Team member experience in QI is helpful but not essential. Successful teams include individuals who are willing to take risks and accept change. The team should include 4-6 individuals. Membership should be cross-functional, representing different staff roles in the clinic. The following table lists important roles and characteristics of an effective QI team.

Clinic QI Team Roles and Characteristics

Team Member Role	Characteristics
Project Sponsor	• Instrumental in removing obstacles. • Oversees the team and improvements. • Not a day to day team member. CSQIP examples: Clinic medical director, chief executive officer
Process Owner	• Person who is primarily responsible for the process being improved and sustained (manager level). CSQIP example: Clinic office manager
Team Lead	• Plans the project and coordinates team activities. CSQIP example: head nurse, pediatrician, clinic QI/QA coordinator
Front Line Staff	• Participants who have hands-on daily use of the process; often subject matter experts. CSQIP examples: registration clerk, medical assistant, RN/LPN
Fresh Perspective	• Team member who is not intimately involved with the process. CSQIP example: billing clerk
Customer	• User of the product or service who can offer ideas based on first-hand experience with the process.

Developing an AIM statement: The AIM statement concisely describes what the team hopes to accomplish with its QI effort. The CSQIP team used the SMART (Specific, Measurable, Achievable, Relevant and Time-bound) framework that is a familiar component of public health funding opportunity applications or programming activities to help guide clinic QI teams in developing the AIM statement.

SMART Framework

S	**Specific:** Who is the target population? Who will be impacted by improvements?
M	**Measurable:** How will change be quantified? How will you know the project has been successful?
A	**Achievable**: What tools and resources are needed to complete the project?
R	**Relevant**: Why is it important? How would you sell this project to others who question the time investment?
T	**Time-bound**: What is the timeline for the change? When will the goals be reached?

The following AIM statement was developed for the QI event:

Project AIM Statement

"Our team will ask about and document in the medical record, the sexual activity status of **all patients ages 13-24 years** at all medical or office visits. For all sexually active patients ages 13-24 years that did not have a chlamydia test performed within the last 12 months, a chlamydia test will be ordered at all medical or office visits. We will aim to achieve **documentation of sexual activity status** and **Chlamydia screening** in **80%** of **medical or office visits** within 12 months of baseline data collection."

Developing performance measures: The AIM statement referenced performance measures for increasing sexual risk assessment and CT screening which are quantifiable benchmarks for tracking improvement during the QI project. The prep call provided an opportunity to define the measures and methods for calculating them, data sources and the frequency of data collection. The teams also developed balancing measures to provide a marker of potential unintended consequences of improvement activities or gaps in improvement that require additional attention. Balancing measures for this project included unnecessary CT screening of clients who were not documented as sexually active and no CT screening for a sexually active client. The Performance Measures document defines the measures used for the QI project.

Create agenda for on-site QI event: As facilitators of the on-site event, the CSQIP team took the lead in developing an agenda for the one-day on-site event which served as the kickoff for the QI project. The clinic's review and input was key to ensuring that the proposed date presented no conflicts and that the clinic QI team members set aside the time to attend. As part of the agenda planning, it was important to establish an on-site meeting room that could be reserved for the entire day, would adequately accommodate the size of the group and had the necessary wall space and technology to support event activities. The discussion of the event logistics also allowed the CSQIP team to identify the supplies and equipment (projector, printer, etc.) that the team would need to bring to the on-site (On-Site Session Supply List). The CSQIP team was responsible for bringing the supplies to the on-site event.

The agenda included training in CT epidemiology and best practices for CT testing and treatment as well as an orientation to QI principles and methodology. The agenda also incorporated time to conduct clinic observations to understand the clinic flow and processes during a patient visit, referred to as the 'current state'. Additional working sessions were allocated to the development of a Visual Stream Map that depicts the current state and serves as the basis for identifying possible interventions for improving the process.

Establish timeline for QI project: Establishing a timeline for project activities was a mechanism to visualize the process and the necessary investment of the clinic QI team. The clinic sponsor and QI Team Lead needed to agree to the timeline in advance of the on-site QI event as part of their commitment to the project activities. It was an important tool for setting the stage as well as managing the expectations of the clinic QI team. The following timeline displays the activities that were planned for the first clinic cohort.

CSQIP Timeline
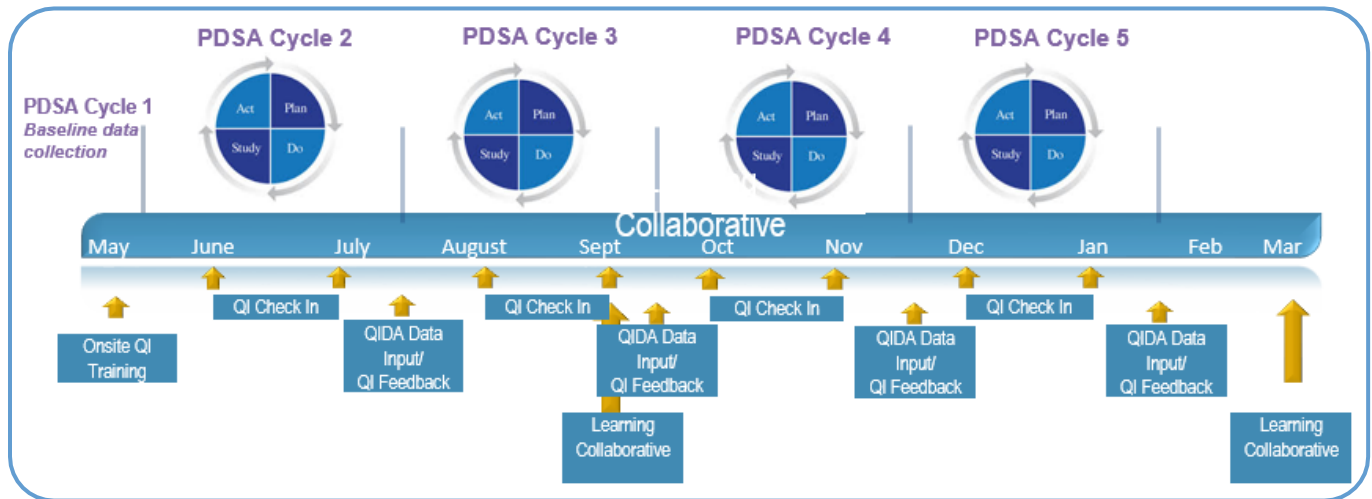
Timeline Legend

QI Check In	QI Nurse contacts site in-person or by telephone to assess progress/offer TA
PDSA Cycle 1 (Baseline) Data	Enter baseline charts (20/provider) in AAP QIDA
QIDA Data Input	Each PDSA cycle, select 20 charts/provider for 13-24 year old patients. Enter data in QIDA
QI Feedback	QI Nurse to conduct review with clinic and assess QI strategies for next PDSA
Learning Collaborative	Half-day peer-to-peer in-person meeting to review data and discuss QI challenges/successes

Pre-on-site webinar: Based on experience gained during the CSQIP project with the first cohort of clinical partners, the CSQIP team modified the on-site event agenda and removed the Chlamydia clinical training that was delivered to clinic QI team members. In year two, the CSQIP team delivered this presentation as a webinar held two to three weeks prior to the on-site QI event. The webinar provided an overview of CT epidemiology in the city of Buffalo to orient clinic staff to the problem. In addition, the webinar focused on the clinical diagnosis and management of patients infected with CT;

CT treatment recommendations; specimen collection, transport and diagnostic methods; and, adolescent sexual behavior, prevention counseling and recommendations and tools for conducting a sexual risk assessment.

Baseline Clinic Assessment: Each clinic was asked to complete a short survey on clinic characteristics and staffing. The results provided the CSQIP with baseline data on the number of clinicians, patient population and insurance type/coverage, medical records systems, and adolescent sexual health screening practices and tools.

QI Dashboard: The CSQIP team partnered with the American Academy of Pediatrics (AAP) to use the AAP's Quality Improvement Data Aggregator (QIDA), a web-based data aggregation and project management tool for the QI project. QIDA served as a centralized hub or dashboard for the secure collection, collation and reporting of QI performance data. Each of the two CSQIP projects had its own QIDA url and the CSQIP team members as well as the clinic QI team members were given a unique ID and password to access the QIDA project. Clinic QI teams utilized QIDA to collect data on the performance measures at baseline and during the three additional data cycles. Participants could view real-time performance reports or run charts, at the individual physician- and practice-level. Data were also available to all participating practices to compare performance across sites but coded to protect the identity of the participating sites.   In addition to serving as a data dashboard, the QIDA project site also allowed users to upload project documents and tools, utilize a message board for communication and administer project surveys. AAP QIDA staff provided assistance with the set-up and maintenance of the QI project on the web-based system. In addition, QIDA staff provided training to clinic QI teams for navigating QIDA and entering QI data. This training was delivered during the orientation webinar delivered prior to the on-site event. Furthermore, QIDA staff generated run charts and raw data reports as well as status reports to monitor clinic team's compliance with data reporting requirements. The CSQIP team worked with QIDA staff to build out the QI project in the system based on the CSQIP team's desired specifications. AAP charges a QIDA utilization cost which ranges depending on the number of users and measures associated with the project. More information about QIDA and QI project registration is available through the AAP at https://www.aap.org/en-us/continuing-medical-education/mocportfolio/Pages/ getinvolved.aspx.

CME/MOC Part IV Certification: The CSQIP team submitted an application to the AAP Division of Quality to register the CSQIP with the AAP as a Maintenance of Certification (MOC) Part 4 activity. The criteria for MOC certification included provider participation in the in-person training or QI webinars provided as part of the on-site event; meet with the QI nurse consultant to review data and discuss planned interventions at least once per Plan-Do-Study-Act (PDSA) cycle; participate in two Learning Collaboratives; and, participate in QI activities for a minimum of 6 months. The providers also needed to demonstrate active engagement in project planning and implementation including the development of the intervention designed to improve care, attend team meetings (telephone or in-person) and review project data. The AAP approved the CSQIP for 25 MOC Part 4 points. In addition to MOC Part 4 certification, 20 CME were provided to those providers that participated in the in-person, on-site event; conducted medical chart reviews after each of the PDSA cycles and planned next steps for change improvements; and participated in meeting with the QI nurse consultant during each cycle. The MOC Part 4 application and reporting process was rigorous but the MOC credits were a significant incentive to clinic participation.

On-Site QI Intervention

This one-day kickoff event was held with each of the clinics at the clinic site. The on-site event served as a structured, team-based, problem-solving activity to identify clinic processes which would improve sexual risk assessment documentation and Chlamydia screening. The clinic QI team members were required to attend; however, the clinic did not close during the on-site event. Health care providers who were not on the QI team were not pulled from their clinic responsibilities but they were encouraged to attend to evaluate the proposed interventions since they would be involved in testing the intervention(s). The following activities were conducted during the on-site.

Event Overview: The day started with group introductions and Sponsor Welcome delivered by the Clinic QI Team Sponsor to orient members to the goals of the project and day's activities. The overview also included a review of the AIM statement and QI Performance Measures as well as guiding principles or ground rules for how the team would operate.

QI Training: A short training session was held to provide an overview of QI principles and methods. This overview provided the key foundational aspects of QI principles and the QI activities that team members would conduct during the on-site.

Gemba: This term refers to seeing where the work is done and is critical to effective process improvement. While each team member knew their own role in the clinic visit, no one had a complete understanding of the entire process. The clinic gemba involved observation and documentation of all of the process steps that were performed during a patient visit. The team used a time study tool to document each of the steps in a patient visit, the time to conduct each step and the staff member(s) responsible for each step (NYS Time Study Example). The time study not only contributed to an understanding of the entire patient visit process, it also helped to identify value-added and non-value added (waste) steps. With the first clinic cohort, the time study was performed during the on-site event. With the second clinic cohort, clinic teams were asked to perform the time study as part of the pre-work prior to the on-site.

Value Stream Map: Each team created a value stream map (VSM) which was both the most time-intensive and important session of the on-site event. The VSM is a visual representation of every step, the directional flow, and the information needed to conduct a patient clinic visit. It served as a visual translation of the what was observed during the gemba. The VSM also identified bottlenecks, delays, and quality problems, essentially, a root cause analysis that helped to identify waste in the process and thus, design a tactical solution. Creating the VSM was an interactive exercise which engaged every member of the team and highlighted the importance of having team members with diverse roles and different perspectives.

Value Stream Map

To establish the VSM, it was important to have a room with adequate wall space (On-Site Session Supply List). Supplies needed to create the VSM were provided by the CSQIP team and included a 36" wide roll of paper, scissors, masking tape, Post-It notes in various shapes, sizes and colors, and sharpie markers in various colors. The CSQIP team prepared the room for mapping before the clinic QI team arrived. The VSM was constructed in phases. The first phase was used to define the how the process currently operated. During this phase, the team tracked how the data, materials and people being served flowed through the process. During the second phase, the team added 'data' to the map, including process or cycle time (how long the step took), and lead time (or wait time). The VSM Legend and Icons document defines the different icons and legends that are used to document the process on a VSM using Post-It notes. This second phase, or analysis phase, was also used to identify to determine the overall lead time and the steps that contributed the most time. This analysis phase also helped to identify non-value-added steps, some of which are necessary to serve the patient and others which can be eliminated. The third phase involved designing the 'future' state and identifying interventions that would lead to improvements in sexual risk documentation and CT screening. This phase was a brain-storming session designed to stimulate innovative thinking. As is the case with most changes, every team demonstrated some resistance and it was essential that the facilitator reminded the team to generate ideas without judgment or logic which is one of the guiding principles. A no-holds barred thought session gave members the freedom to build on each other's ideas. The image below is the final VSM from one of the participating clinics with the starburst Post-Its representing the clinic team's ideas for improvement.

Impact Matrix: Identifying all possible interventions to improve CT screening leads to a reality session in which the ideas are reviewed and prioritized. An impact matrix was used to eliminate ideas that were not practical, would not achieve the desired outcome or were outside the scope of the QI event. The Impact Matrix Template displays the four quadrants of the Impact Matrix based on impact on the

goals/objectives (vertical axis) and ease of implementation (horizontal axis). Each idea was evaluated and placed in the appropriate quadrant. This exercise allowed team members to identify those interventions that represented low-hanging fruit or 'quick wins' and were prioritized for implementation by the team. Ideally, the resulting impact matrix was shared with the other clinic staff and providers, who were not part of the clinic QI team, in order to make them aware of the possible interventions and obtain their buy-in and feedback.

Plan-Do-Study-Act (PDSA) Cycle: Based on the impact matrix, the CSQIP team worked with each clinic team to select one intervention to test in the clinic setting using a Plan-Do-Study-Act (PDSA) methodology. PDSA cycles allowed clinic teams to try a change on a small scale before wide-scale implementation. The PDSA tracking tool was used to document the planned intervention (Example of one of the clinic's PDSA plans).

Each PDSA cycle was two months in duration (see CSQIP Timeline). During each PDSA cycle, the CSQIP QI nurse consultant conducted site visits and telephone check-ins to assess each clinic's progress and provide technical assistance. The QI nurse tracked her clinic visits on an activity log. At the end of the PDSA cycle, providers selected a random sample of 20 medical charts to measure performance on the two key performance measures: documentation of sexual risk assessment in the medical chart and CT screening of sexually-active patients. Data were abstracted and entered in the QIDA dashboard for each provider. The CSQIP QI nurse consultant assisted with chart abstraction and QIDA entry and also prepared run charts. The QI nurse consultant held individual in-person coaching sessions with each team to review the run charts, discuss PDSA successes and challenges, and plan for the next PDSA cycle. Each clinic participated in five PDSA cycles of which the first PDSA was a baseline measurement of clinic performance on the two outcome measures conducted prior to the one-day on-site event. During the four subsequent PDSAs, some of the clinics tested the same intervention in all four cycles, refining their approach and systems, while other clinics tested a different intervention in each cycle.

Learning Collaborative: During the CSQIP, clinic QI teams participated in two Learning Collaboratives. These half-day, in-person learning sessions were held mid-way and at the conclusion of the QI project (CSQIP Timeline). The agenda included clinic introductions, review of data for key performance measures with a reflection on positive findings, clinic QI team presentations and dedicated time for clinic sharing and learning. The CSQIP team provided a presentation template to the clinics and assisted each clinic QI team with preparing their slides. Each clinic QI team presented an overview of the clinic characteristics, QI tests of change, a summary of Strengths, Weaknesses, Opportunities and Threats (SWOT), and future QI plans. The final Learning Collaborative also included QI training on sustaining improvements. The presentation of de-identified clinic QI performance data promoted positive peer pressure to improve clinic practices and systems for sexual health care. The Learning Collaboratives provided motivation and inspiration by celebrating the QI accomplishments of each clinic; creating a collaborative, non-judgmental environment for team sharing; and discussing strategies to sustain change.

EVALUATION

Process Evaluation: What strategies facilitate QI implementation for Chlamydia Screening?	
Are comparative data available to clinic staff to assess progress toward outcome measures?	
The baseline clinic assessment survey provided information about each clinic's EMR and experience with using EMR data to evaluate service delivery. The CSQIP team requested copies or a guided tour of the EMR to review SHH templates and determine if the EMR captured data on the Performance Measures of interest.	
Lessons Learned	Each clinic had an EMR although software applications and IT support varied across clinics. Few of the staff had had prior experience with extracting or interpreting data from the EMR for evaluation purposes. An important consideration for implementation was the QI nurse's technical assistance to clinics to abstract data from EMR systems, enter the data in QIDA and provide run charts of performance. The TA was not a one-time offer but was necessary for the duration of the project.
Is clinic staffing and time sufficient to implement the intervention?	
The baseline clinic assessment survey provided quantitative data on clinic staffing for specific job titles. During the pre-on-site planning calls, CSQIP also interviewed the QI Sponsor and QI champion to obtain information about staffing and schedules as part of the process for establishing the clinic's QI team. The QI nurse also obtained anecdotal staffing updates during follow up visits/calls with the clinic QI teams.	
Lessons Learned	Each of the clinics experienced staff turnover which was cited as one of the most significant barriers to the continuity of the QI project. Staffing transition that directly impacted the clinic QI team resulted in lost momentum and interruption of QI activities. Staffing changes that impacted the clinic were less intrusive but training/orienting new staff to the QI project was necessary and often less of a priority than other training. Again, the QI nurse played an integral role in working with new staff to orient them to the QI project and activities. It should be mentioned that paraprofessional and nursing staff in one clinic cited collective bargaining agreements as a barrier to their participation in QI implementation. Following concerted time and effort, the QI activities were determined to be within the scope of the staff's duties and the project proceeded.
Did clinic staff increase their awareness of chlamydia morbidity in their community?	
The CSQIP team provided an overview of CT morbidity data as part of the QI overview presentation with maps displaying CT incidence by ZIP code as well as clinic location. As part of the routine data feedback to clinics over the course of the QI project, the QI nurse also reviewed data on the number of clinic patients who were diagnosed with CT.	
Lessons Learned	Most providers did not believe that their adolescent patients were at risk of CT, particularly adolescents 13-14 years of age. Visualization of CT morbidity data for their 'neighborhood' was an effective method for changing perception and CT screening behavior as was the inclusion of data from the Youth Risk Behavior Surveillance System (YRBSS) documenting sexual activity by school grade. Buffalo City schools participated in YRBSS therefore the data was directly relevant and thus, emphatic.

	Have clinic staff increased their knowledge of appropriate specimen collection for Chlamydia?
	The QI overview of CT best practices included information on the types of FDA-approved diagnostic tests and specimen sources. Few clinicians were aware that urine specimens were approved for CT/GC nucleic acid amplification testing, a knowledge gap that was determined during the Q&A following the presentation.
Lessons Learned	The lack of provider knowledge of CT test types and specimen sources highlighted an additional training need for clinics in order to deliver quality CT screening services. CSQIP arranged for a laboratory representative from a local laboratory to provide an in-service for each of the clinics.

	Was the volume of adolescent clinic visits sufficient to test QI interventions?
	The baseline clinic assessment collected data on the proportion of each clinic's patient population that were 15-24 years of age. In selected sites, EMR queries and/or appointment schedules were used to document the number of clients 13-24 years of age.
Lessons Learned	On a daily basis, it was typical to have only 1-2 adolescent well visits scheduled which limited the opportunity to test changes. As defined by the AIM statement, adolescents, regardless of visit type, were administered a sexual history assessment and if eligible, CT test. Routinizing these activities was more difficult during adolescent sick visits. Parents were more likely to question the length of the acute care visit since screening activities added time to the visit. In addition, parents objected to clinician alone-time with their teen. CSQIP worked with clinic teams to develop clinical scripts and role plays to mitigate these situations.

Outcome Evaluation:
What QI strategies lead to improvement in Chlamydia screening coverage?

	Were resources available to implement modifications to the clinic's EMR?
	Using a systems approach to implement adolescent sexual history documentation and CT screening was more sustainable than interventions that relied on human intervention. Consequently, understanding the type of EMR and resources available to modify the system was an important component of the baseline clinic assessment. The PDSA tracking tool also provided information about EMR systems, ownership/staff responsibilities, and resources for those clinics choosing an intervention that involved EMR changes.
Lessons Learned	The type of EMR software, maintenance agreements, and opportunities to upgrade, varied across clinic sites and influenced the clinic's ability to implement EMR solutions including customization of care cards and 'pop up' reminders for clinicians. EMR solutions were also contingent upon clinic fiscal resources as maintenance/modification by an external vendor had an associated cost.

	Were the screening protocols and materials adequate?
	Pre-work for the on-site event included the collection of sexual health history templates or screening questionnaires. These documents were evaluated by CSQIP members to assess compliance with federal screening guidelines. The documents were also incorporated into the VSM. Performance measures data on SHH documentation was used to evaluate the uptake of SHH screening by clinic staff.
Lessons Learned	Most clinics needed assistance from CSQIP to develop an appropriate sexual health history tool. AAP's Bright Futures (BF) was a trusted resource and clinicians agreed to incorporate BF SHH questions into the clinic tool. Bright Futures Adolescent Medical Screening reference and CDC's guide to taking a sexual history are included as Appendices IV. A-B, respectively.

Was there a decline in Chlamydia screening gaps as measured by unnecessary screening and missed opportunities for screening?	
The primary outcomes of interest were documentation of SHH and CT screening of sexually active adolescents. In addition, data was also collected on balancing measures to assess unintended consequences of QI interventions. These balancing measures included the number of adolescents without documentation of sexual activity who were screened, the number of sexually active adolescents who did not receive a CT test and the number of adolescents who refused CT screening. These data were reviewed at the end of each PDSA to identify potential areas for continued improvement or to further refine existing QI interventions.	
Lessons Learned	In a couple of situations, clinicians opted to universally screen all adolescents regardless of sexual activity status, primarily because it was less cumbersome. This trend was immediately evident from performance measure outcomes and usually resolved through discussion with the QI nurse. Patient refusals pointed to potential gaps in confidentiality protections and led to a review of procedures and messaging about confidentiality.
Were structural interventions successful in promoting adolescent confidentiality?	
Use of data from the time study and VSM was an important foundation for understanding clinician interactions with adolescent clients and their parents/guardians as well as identifying points of contact that would potentially breach an adolescent's confidentiality. The PDSA tracking tool clearly defined the steps, process owners and supporting tools to enable clinics to test changes that addressed adolescent confidentiality. Clinical interventions ranged from full disclosure with clinicians informing parents, either verbally after the teen was roomed or via documents that were provided at the time of visit registration, of their intent to conduct a sexual activity screen/CT test or through changes in the clinic flow that would remove teens from the exam room for a height/weight check at which time the sexual health history would be collected. Data collected on the performance measures as well as the previously-described balancing measures served as evidence of successful interventions.	
Lessons Learned	Coaching provided by CSQIP SMEs increased clinician comfort with these sensitive parent-clinician discussions. CSQIP also provided a short video that demonstrated this parent-clinician interaction through role-play.

REPLICATION AND DISSEMINATION

This guide is intended to assist other jurisdictions or agencies in implementing a similar CT QI project with a clinical partner. The American Academy of Pediatrics' approval of Maintenance of Certification Part IV credits was a significant incentive for clinic participation in the CT QI project. Successful replication, with or without MOC credit, would benefit from integrity to the components listed below. Clinic QI team members attested to the importance of these components as measured through interviews with clinic staff, follow up survey data and clinic storyboards delivered at the Learning Collaboratives.

Provider Training
As part of the project deliverables, the CSQIP provided training in CT epidemiology and clinical best practices. In addition, training in QI principles and methodology was also provided as few of the teams had prior QI experience. With the first cohort, the CSQIP provided training for both topics as part of the on-site event. With the second cohort, the CT epidemiology and clinical management training was

delivered via webinar. It should be noted that provider knowledge of approved CT lab tests and appropriate specimen collection was limited which became apparent during the on-site event with the first cohort of clinics. As a result, CSQIP arranged for a laboratorian to provide an overview of CT test methods and specimen collection, handling and transport for each participating clinic. This discovery also led to modifications in the webinar content for the second cohort.

On-site Event

Observing and documenting the current clinic visit process is a critical team activity. Each staff person understands their own role in the clinic visit but participating in the Gemba provides an understanding of the entire process from the patient's point of view. The VSM is a visual translation of the gemba and serves as the framework for plotting every step in the process, identifying where and why the process breaks down, and seeing opportunities for improving the delivery of sexual health services to adolescents. Active participation in VSM also serves as a team bonding exercise and the launch pad for identifying interventions to test during PDSA cycles. Applying the Impact Matrix allows the team to prioritize ideas for improving sexual health services, focusing on the quick wins or low-hanging fruit. The Impact Matrix is a short exercise and allows the team to build consensus around their improvement plan. Concluding the on-site event with a PDSA planning session is critical to developing a plan of action to test, refine and implement change ideas. This facilitated session, with QI SME present, also sets the team up to successfully plan future PDSAs on their own.

Performance Measurement

Assessment of clinic performance should be data-driven with clear methodology and systems for measurement. Requiring providers to conduct chart reviews after each PDSA cycle to assess performance is critical to engaging providers in the QI process and motivating them to 'own' their role in advancing improvements. Establishing a QI dashboard or data management system for data collection, analysis and reporting is essential to operationalizing performance measurement and promoting sustainability of the project. Few of the clinics had staff who were experienced in data systems or analysis therefore the CSQIP team created the dashboard and trained clinic teams to use the dashboard. In addition, CSQIP had to provide significant hands-on assistance to clinics to select a random sample of charts, extract data and enter it in QIDA. To provide this TA, CSQIP had to become familiar with each clinic's EMR system and often served as the liaison to IT support to troubleshoot EMR issues. Clinic QI teams were required to adhere to a timeline for periodic data review/feedback in order to discuss QI progress and use the findings to develop the intervention(s) for the next PDSA. As stated previously, actively engaging the clinic QI team members in this QI review and planning process was essential.

Learning Collaborative

These half-day in-person meetings provide several benefits. First, they provide an opportunity to celebrate the QI successes of the clinic teams. Performance data and team storyboards serve to highlight interventions that achieved improvements in adolescent sexual health service delivery. Second, the Learning Collaborative provides a forum for peer-to-peer sharing of best practices and innovative solutions to address continuing challenges. Finally, the Learning Collaborative also provides another training opportunity; the final Learning Collaborative, held at the conclusion of the QI project, included training on QI methods for sustaining change.

Additional Lessons Learned

In addition to these core components, some additional factors were key to implementing this QI project. The CSQIP team included a local health department champion who was an adolescent provider and knew many of the providers in the community. She was effective in recruiting clinics for the project. As an adolescent sexual health subject matter expert and peer, the clinical providers trusted her. The CSQIP team also hired a nurse with public health, QI and adolescent health experience. She coordinated the QI implementation at each of the clinics and provided ongoing technical assistance, frequently on-site. Most of the clinics cited her assistance as the reason they were able to implement the project and a key driver of their success. Providers were familiar with Chlamydia screening recommendations but were under the general impression that their clinic population was not at risk. Providing information about CT burden in their neighborhood was eye-opening for the majority of the clinicians and motivated them to change their behavior. Another significant barrier was physician skill in conducting an adolescent sexual health history. CSQIP conducted a baseline scan of clinic EMRs to assess SHH templates; several clinics did not have an SHH template or if populated, did not include recommended SHH questions. Few providers were knowledgeable of minor consent laws or potential threats to adolescent confidentiality such as insurance claims and explanation of benefits or EMRs and associated online patient portals. Furthermore, providers were uncomfortable navigating the process of separating parent and child during a clinic visit to conduct a confidential sexual health history. CSQIP provided many resources to the clinics to improve provider skills for conducting an adolescent sexual risk assessment, including office policies for protecting the sensitive health information of adolescent patients; educational resources for patients and parents; clinic signage and posters; and, a video role-play of provider-parent conversation to navigate alone-time with the adolescent.

Barriers

During the course of the QI projects, several barriers emerged. Clinic staff turnover impeded continuous quality improvement efforts. New staff needed training and orientation to the QI project which was often difficult to schedule given other training and busy clinic operations. The loss of QI team members necessitated rebuilding relationships and trust. In most situations, the CSQIP QI nurse played a key role in ensuring the continuation of the QI project, often assuming responsibility for orienting new staff to the goals and key QI interventions. Modifying EMRs was also challenging. Some clinics relied on outside vendors for EMR support and changes to the EMR were expensive and time-consuming. A few clinics had a locally-developed EMR system but lacked the technical expertise to update the system. CSQIP worked with the clinics to identify resources for the EMR updates. As previously stated, providers lacked comfort with asking sexual history questions and separating parents to permit alone-time with the teen. Overcoming these attitudinal or behavioral barriers required a considerable investment of time by the CSQIP team.

Reductions in funding to state and local public health agencies for STI preventive services has reduced the availability of STI testing, including Chlamydia screening, for at-risk adolescents and young adults. This evaluation project supported the development of public health-primary care partnerships to identify models for increasing appropriate Chlamydia screening in primary care settings. The focus for our project were high volume pediatric providers in private and community pediatric clinics as well as Federally-Qualified Health Centers. Other primary care settings in which this project could be replicated are family practice clinics and school-based health centers. Juvenile justice centers represent another setting for adaptation. Establishing partnerships with health plans to implement this QI project could influence Chlamydia screening coverage across a broader geographic area.

Replication of this QI project is most relevant for other public health STI or Family Planning programs; however, the QI framework could be adapted by other agencies interested in improving the quality of preventive health services.

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3. *Final Update Summary: Chlamydia and Gonorrhea: Screening*. U.S. Preventive Services Task Force. September 2016. https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/chlamydia-and-gonorrhea-screening
4. Centers for Disease Control and Prevention. Sexually Transmitted Diseases Treatment Guidelines, 2015. MMWR Recomm Rep 2015;64(No. RR-3): 1-137.
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Additional Resources

Bedsider.org has interactive contraceptive info: https://www.bedsider.org/methods
CDC contraceptive handout:
https://www.cdc.gov/reproductivehealth/contraception/mmwr/spr/summary.html
Teen friendly adolescent health visit infographic: https://www.cdc.gov/teenpregnancy/health-care-providers/teen-friendly-health-visit.htm
Free posters and other resources:
https://www.cdc.gov/teenpregnancy/teens/index.htm
Resources for serving adolescent patients:
https://npin.cdc.gov/stdawareness/Adolescents.aspx
STD info posters and other info materials:
https://npin.cdc.gov/stdawareness/GYT_Materials.aspx
STD info brochures: https://npin.cdc.gov/stdawareness/Brochures.aspx