Children's Mercy KANSAS CITY
Evidence Based Practice

Critically Appraised Topic (CAT): Screening Considerations for Sexually Transmitted Infections

Specific Care Question
In patients 14 – 21 years of age, does the use of a private screening questionnaire on a digital device versus an in-person, provider interview increase the identification and/or testing of sexually transmitted infections (STIs)?

Recommendations from the STI Clinical Practice Guideline Committe

A conditional recommendation is made for use of STI screening on a digital device, based on expert opinion and review of current literature by the subject matter experts and the Department of EBP. While only a limited number of studies of low quality[a] were available to review the process of implementing digital STI screening, it provides guidance and direction to the STI CPG committee to enhance processes across the hospital system towards improvement in adolescent sexual healthcare.

When there is a lack of scientific evidence, standard work should be developed, implemented, and monitored.

Literature Summary

Background

Sexually transmitted diseases (STDs), or sexually transmitted infections (STIs), affect people of all ages, although the prevalence rates for certain STIs are reported to be highest in adolescents and young adults (CDC, 2021). Of 26 million newly recorded cases of STIs occurring in the United States during 2018, nearly half (46%) were found to impact individuals between the ages of 15-24 (CDC, 2021). While many STIs are considered easily treated and curable if detected early, many adolescents are not seeking or receiving the high-quality sexual health care needed (Hogben & Leichliter, 2008; Miller et al., 2011; Wilson & Klein, 2000). Addressing adolescent sexual health care is vital to preventing STIs and the complications resulting from these infections (Miller et al., 2019). Furthermore, a breakdown in early detection, diagnosis, and treatment of STIs can result in severe consequences for adolescents which include chronic abdominal pain, infertility, or premature births (Howe, 2021).

To address adolescent sexual health care, factors to consider are provider- and system-level barriers such as access to care, as well as economic and geographical barriers (Miller et al., 2019). These barriers contribute to the increased incidence of STIs among adolescents (Miller et al., 2019). The STI Clinical Practice Guideline (CPG) serves to bridge the gap between addressing the concern of rising STI incidence among adolescents and intervention, including improved screening and testing processes. This review will summarize identified literature to answer the specific care question and summarize current literature on the topic.

Study characteristics

The search for suitable studies was completed on July 14, 2022. Katie Berg, MD reviewed the 19 titles and/or abstracts found in the search and identified[b] seven single studies believed to answer the question. After an in-depth review of the single studies[b], four answered the question.

Race/Ethnicity The literature reviewed discussed potential barriers of access to sexual health care for adolescents based on race and ethnicity. There are no expected differences in the relative effectiveness of the intervention for disadvantaged subgroups that affect the absolute effectiveness of the intervention or the importance of the problem.

Literature Overview of Studies Answering the Question.

Ahmad et al. (2014) completed a quality improvement study on patients 15 – 21 years of age visiting a mid-west pediatric Emergency Department (ED) (*N* = 8,421). The study authors assessed if STI testing was increased when screening was completed by a private self-screening questionnaire versus a provider interview. The authors compared testing rates 3 months prior to implementation of the private self-screening, during private self-screening implementation, and 3 months after the private self-screening was withdrawn.

Goyal et al. (2017) completed a two-arm randomized controlled trial with adolescent patients at an urban pediatric ED (*N* = 720). The study team assessed the impact on physicians' rate of ordering STI tests for patients identified at high STI risk with the use of a private, computerized sexual health survey (SHS) compared to a face-to-face provider interview. The intervention arm of patients completed a private, computerized sexual health screening while the control group received the standard care (face-to-face provider interview).

Miller et al. (2019) completed a quality improvement study with parallel mixed methodology of usability and acceptability of a computerized clinical decision support system (CDS) to review sexual health. Both the clinicians working in the pediatric EDs and patients 14 – 19 years of age visiting pediatric EDs were recruited into the study (*N* = 114). The study authors' main objective was to develop an acceptable CDS to facilitate evidence-based sexual health care for adolescents. The computerized system allowed the patients to answer questions about their sexual health through a private, self-screening questionnaire. The clinicians reported usefulness of the system via a Likert scale and patients reported acceptability of the system by answering open-ended questions.

Reed et al. (2020) completed a quality improvement study on patients 14 – 21 years of age visiting a mid-west pediatric ED (*N* = 14,370). The study authors assessed the usability and acceptability of a CDS for gonorrhoea and chlamydia that was embedded in the ED processes and triggered by privately entered patient data. The study authors analyzed the number of patients that completed the private, self-screening to the number of patients that then agreed to STI testing. The provider acceptability was measured by the number of STI testing agreed to by the patient to the number of STI tests ordered.

Summary by Outcome

Four studies (Ahmad et al., 2014; Goyal et al., 2017; Miller et al., 2019; Reed et al., 2020) assessed the value of providing sexual health care screening through a private digital platform for adolescent patients visiting Emergency Departments (EDs).

STI Testing

Three studies (Ahmad et al., 2014; Goyal et al., 2017; Reed et al., 2020) measured STI test rates following patient screening via an in-person interview or answering sexual health history privately on a digital device. Rates of STI testing were compared based on the screening platform used. The two quality improvement studies (Ahmad et al., 2014; Reed et al., 2020) reported rates of STI testing. Ahmad et al. (2014) reported a change in STI testing rates from 9.3% to 17.8% with the addition of private screening via a digital device. Reed et al. (2020) reported a difference in testing rates of provider-based (face-to-face) sexual health screening compared to a private, self-screening (tablet-based) for sexual health history. The results at the main ED were of 7.9% compared to 9.9%. The results at the satellite ED were 2.6% compared to 4.4%. Goyal et al. (2017), a RCT, demonstrated an increase in ordered STI testing with access to a printed report of the patient's private, computerized, STI self-screening. This was compared to STI tests ordered from physicians who did not have the report. STI testing rates were 52.5% in the report-provided group compared to 42.0% in the no report group, *OR* = 2.0, 95% CI [1.1, 3.8], *p* = .03, indicating the intervention of report-provided was favorable to no report.

	STI Testing Rates with In-Person, Provider Screening		**STI Testing Rates with Private, Digital Screening**	
Ahmad et al. (2014)	9.3%		17.8%	
Reed et al. (2020)	7.9% main ED	2.6% satellite ED	9.9% main ED	4.4% satellite ED

	STI Testing Rates with *No* Report Provided from Private Screening	STI Testing Rates with Report Provided from Private Patient Screening
Goyal et al. (2017)	42.0%	52.5%

Certainty Of The Evidence For Patient Capture Rate For STI Testing[a]. The certainty of the body of evidence was low[a]. The body of the evidence was assessed to not have serious inconsistency, indirectness or imprecision. However, it was found to have serious risk of bias due to lack of blinding of the outcome assessment.

Patient Acceptance of Self-Screening

Two quality improvement studies (Ahmad et al., 2014; Miller et al., 2019) assessed the patient acceptability rate of a private, digital screening process for sexual health. Ahmad et al. (2014) noted acceptability of the private digital screening platform, though no percentage was provided. In addition, the study participants reported favorability of the private, digital screening of 89%. Miller et al. (2019) reported a preference of STI screening via a private, digital device over in-person, provider interview of 69% for adolescents and stated favorability of 95% for the digital platform.

	Acceptability Rate	Reported Ease of Use
Ahmad et al. (2014)	Reported acceptability but no percentage given	89%
Miller et al. (2019)	69%	95%

Certainty Of The Evidence For Patient Capture Rate For STI Testing[a]. The certainty of the body of evidence was low[a]. The body of the evidence was assessed to not have serious risk of bias, inconsistency, or imprecision. However, was found to have serious indirectness due to use of data from both adult and pediatric perspectives.

Identification of Studies

Search Strategy and Results (see Figure 1)

An informal search was completed looking through related citations, Google Scholar, and PubMed with search terms of 'sexual health screening' and 'adolescents' and a time frame of January 2014 through July 2022.

Records identified through database searching *n* = 19

Additional records identified through other sources *n* = 0

Studies Included in this Review

Citation	Study Type
Ahmad et al. (2014)	Quality Improvement
Goyal et al. (2017)	RCT
Miller et al. (2019)	Quality Improvement
Reed et al. (2020)	Quality Improvement

Studies Not Included in this Review with Exclusion Rationale

Citation	Reason for exclusion
Ahmad et al. (2020)	Wrong comparison
Goyal et al. (2016)	Wrong outcome
Howe et al. (2021)	Wrong process

Methods Used for Appraisal and Synthesis

[a]The GRADEpro Guideline Development Tool (GDT) is the tool used to create the Summary of Findings (SOF) table(s) for this analysis. Using the GDT, the author of this CAT rates the certainty of the evidence based on four factors: *within-study risk of bias*, *consistency among studies, directness of evidence*, and *precision of effect estimates*. Each factor is subjectively judged against the author's confidence of the estimated treatment effect. Confidence is assessed as not serious, serious or very serious. If the attribute of serious or very serious is assessed, the author will provide an explanation.

[b]Rayyan is a web-based software used for the initial screening of titles and / or abstracts for this analysis (Ouzzani, Hammady, Fedorowicz & Elmagarmid, 2017).

[c]Review Manager (Higgins & Green, 2011) is a Cochrane Collaborative computer program used to assess the study characteristics as well as the risk of bias and create the forest plots found in this analysis.

[d]The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram depicts the process in which literature is searched, screened, and eligibility criteria is applied (Moher, Liberati, Tetzlaff, & Altman, 2009).

References to Appraisal and Synthesis Methods

[a]GRADEpro GDT: GRADEpro Guideline Development Tool (2015). McMaster University, (developed by Evidence Prime, Inc.). [Software]. Available from gradepro.org.

[b]Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan-a web and mobile app for systematic reviews. *Systematic Reviews, 5*(1), 210. doi:10.1186/s13643-016-0384-4

[c]Higgins, J. P. T., & Green, S. e. (2011). *Cochrane Handbook for Systematic Reviews of Interventions [updated March 2011]* (Version 5.1.0 ed.): The Cochrane Collaboration, 2011.

[d]Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097 **For more information, visit www.prisma-statement.org.**

Findings from this review were presented with the question originator and XXXx on (Month, Day, Year).

Question Originator

STI CPG committee

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Acronyms Used in this Document

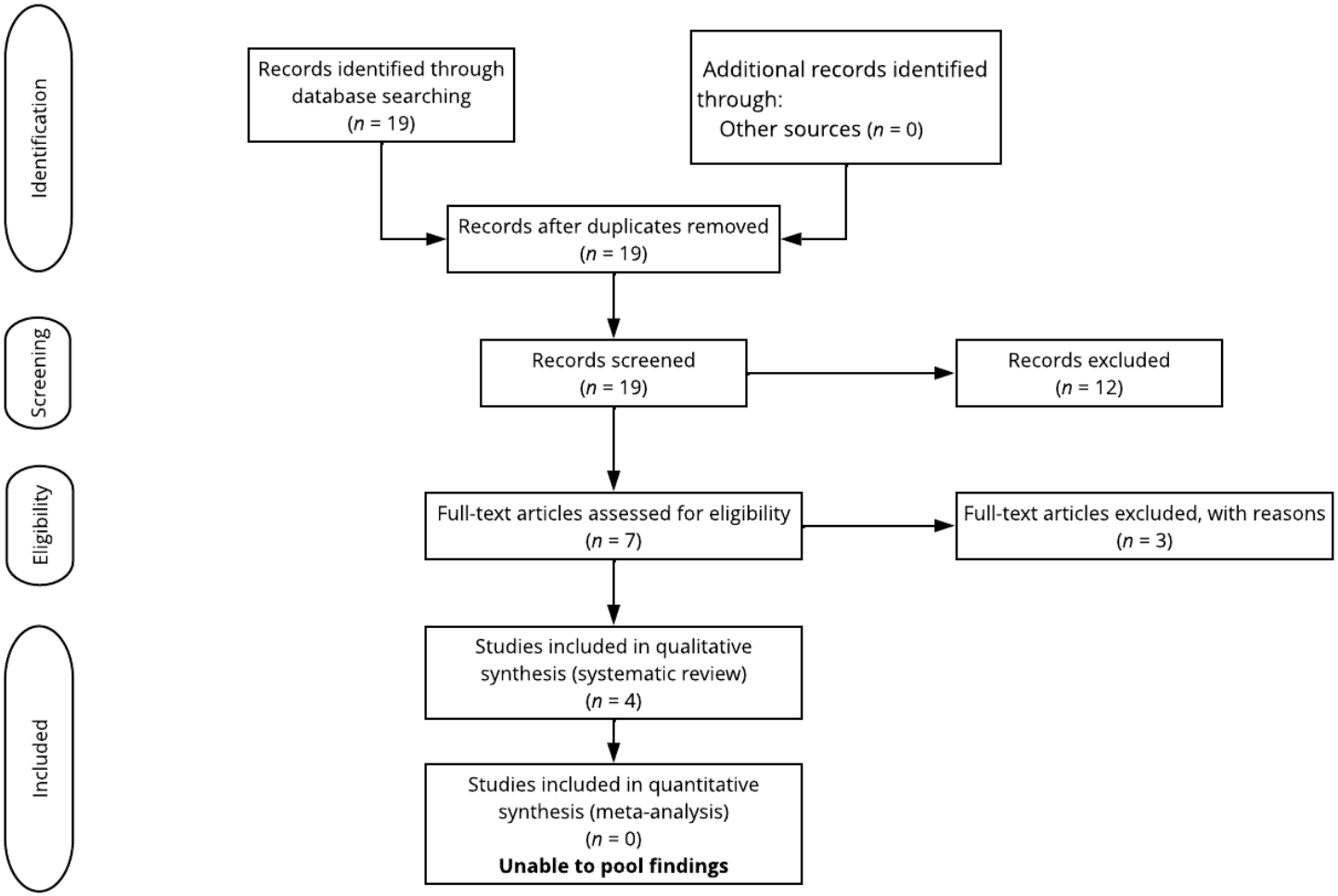
Acronym	Explanation
ACASI	Audio-enhanced Computer-Assisted Self-Interview
CAT	Critically Appraised Topic
EBP	Evidence Based Practice
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SHS	Sexual Health Survey
STI	Sexually Transmitted Infection

Statistical Acronyms Used in this Document

Statistical Acronym	Explanation
CI	Confidence Interval
IQR	Interquartile Range
Mdn	Median
n	Number of cases in a subsample
N	Total number in sample
OR	Odds Ratio
P or p	Probability of success in a binary trial
RCT	Randomized controlled trial
SR	Systematic Review

Figure 1

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRIMSA)[d]



Characteristics of Intervention
Ahmad et al., 2014

Methods	**Quality Improvement**
Participants	**Participants:** Patients visiting the Emergency Department (ED) from January 2010-December 2012 **Setting:** USA, St. Louis, tertiary care, freestanding urban children's hospital **Number enrolled into study:** *N* = 8421 • **Pre-intervention, Historical control:** *n* = 3929 • **Pre-intervention, Education only** *n* = 982 • **Post-intervention, Audio-enhanced computer-assisted self-interview (ACASI) + education:** *n* = 2601 **Gender, males (as defined by researchers):** • **Pre-intervention, Historical control:** *n* = 1780 (45.3%) • **Pre-intervention, Education only:** *n* = 428 (43.6%) • **Post-intervention, ACASI + education:** *n* = 1433 (55.1%) **Race / ethnicity or nationality (as defined by researchers):** • See table **Age, median in years, (IQR)** • **Pre-intervention, Historical control:** 16.8 (15.9-17.7) • **Pre-intervention, Education only:** 16.6 (15.8-17.6) • **Post-intervention, ACASI + education:** 16.8 (15.8-17.7) **Inclusion Criteria:** • Patients aged 15-21 years seeking care in the ED **Exclusion Criteria:** • Patients presenting for evaluation of abuse or sexual assault • Patients requiring activation of the trauma system • Patients with level-1 or level-2 triage scores • Patients with disabilities that prevented independent computer use • Patients with psychiatric chief complaints • Inability to speak English

Interventions	• **Pre-intervention, Historical control:** Usual care (providers interview patients as they are able)
	• **Pre-intervention, Education only:** educational lectures provided about youth and STI testing, how to discuss sensitive issues and importance of sexually transmitted infection (STI) testing with focus on chlamydia and gonorrhoeae
	• **Post-intervention, ACASI:** Educational lectures plus overview of ACASI process and how to use ACASI information
	  ○ ACASI is a branch-logic questionnaire to identify patients who meet criteria for testing
	  ○ Enrolled patients received answer summary with testing recommendations
	  ○ Recommendations sent to electronic medical record (EMR) for review by provider, who could order STI testing

Outcomes	**Primary outcome(s):** • Proportion of chlamydia and gonorrhea ED testing among all patients eligible to use the ACASI* **Secondary outcome(s):** • Testing recommendations • Proportion of participants receiving testing with positive tests • Participant evaluation of the ACASI system **Safety outcome(s):** • Not reported *Outcomes of interest to the CMH CPG /CAT development team
Notes	**Results:** • STI testing among all adolescent patients coming through the ED increased from 9.3% to 17.8% once the ACASI screening option was available. • Of the 800 patients enrolled to participate in ue of the ACASI system, 419 patients were referred for STI testing with 221 completing testing. • Eighty-nine percent of the study participants rated the ACASI system as easy to use. • Post-ACASI intervention education period not included in this summary (*n* = 909) **Limitations:** • For patients with multiple visits during the study period, only first visits were analyzed • As a single-center study in city with high incidence of STIs, results may not be generalizable to other settings • ACASI relies on accuracy and veracity of participants' recall • Screening opportunities missed when physicians and nurses did not respond to EMR prompts to review recommendations

Goyal et al., 2017

Methods	**Randomized Controlled Trial (NCT02509572)**
Participants	**Participants:** Adolescent patients **Setting:** Single, urban pediatric ED **Randomized into study:** *N* = 720 • **Group 1, Intervention, physicians received results of sexual health screen (SHS):** *n* = 367 (323 that had evaluable data) • **Group 2, Usual care, no SHS results shared with physicians:** *n* = 353 (312 that had evaluable data) **Completed Study:** *N* = 635 • **Group 1:** *n* = 323 • **Group 2:** *n* = 312 **Gender, males (as defined by researchers):** • **Group 1:** *n* = 137 (28.8%) • **Group 2:** *n* = 139 (31.4%) **Race / ethnicity or nationality (as defined by researchers):**

	All (*N* = 635)	**Intervention (*n* = 367)**	**Usual Care (*n* = 353)**
White	29 (4.6%)	17 (5.3%)	12 (3.9%)
Black	472 (74.7%)	240 (75.0%)	232 (74.4%)
Hispanic	108 (17.1%)	52 (16.3%)	56 (18.0%)
Other	23 (3.6%)	11 (3.4%)	12 (3.9%)

Age, mean in years ± SD
- **Group 1:** 16.17 ± 1.5
- **Group 2:** 16.17 ± 1.6

Inclusion Criteria:
- Patients aged 14 - 19 years of age, presenting to the local ED between 7am to 11pm daily during the study period

Exclusion Criteria:
- Critically ill patients
- Developmentally or neuro-cognitively delayed patients
- Patients in police custody
- Patients presenting with altered mental status
- Patients with a psychiatric emergency
- Patients presenting following an acute sexual assault
- Illiterate patients, including English illiterate patients
- Patients under the clinical care of any of the study investigators

Power Analysis: A sample size of 600 was determined to provide 90% power to detect a 10% absolute difference between the two groups.

Interventions	**Both:** All enrolled patients completed the sexual health screen • **Group 1:** The physician received decision support from a printed report derived from the patients input on the computerized screening • **Group 2:** The physicians received no decision support
Outcomes	**Primary outcome(s):** • STI testing frequencies* for the entire cohort • STI testing frequencies for asymptomatic patients who screened at high risk for sexually transmitted infections (STIs). **Secondary outcome(s)** • Length of stay in the ED **Safety outcome(s):** • None reported *Outcomes of interest to the CMH CPG or CAT development team
Notes	**Results:** • Of the entire cohort, 211 patients were classified at high risk for STIs. Of these patients, the intervention arm patients were tested at a higher rate than the usual care arm patients (*OR* = 2.0 95% CI [1.1, 3.8]). • For the patients that were asymptomatic (435/635),105 were classified as high-risk following completion of the SHS. Twenty-eight percent of these patients were in the intervention group and received STI testing compared to eight percent in the usual care arm. • No difference was found in the median length of stay in the ED between enrolled patients and those that declined to participate in the study. **Limitations:** • Screening recommendations to test for STI were followed for only half of the participants. • Decision support was provided in a printed report rather than integrated into the electronic health record. • Implementation of the study did not provide the usual support offered to study personnel.

Risk of Bias		
Bias	**Judgment**	**Support for judgment**
Random sequence generation (selection bias)	Low risk	Randomization sequence created by DatStat Illume using random permuted blocks, ranging from 2 to 6.
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment of low or high risk

Blinding of participants and personnel (performance bias)	Unclear risk	Insufficient information to permit judgment of low or high risk. Although not described in the study, it would appear the physicians would know who was in the intervention group or usual care group due to their receipt of the SHS report. The participants all completed the SHS and therefore, would be unaware of which group they were assigned.
Blinding of outcome assessment (detection bias)	High risk	The physicians would be aware of which group the participant was assigned based on their receipt of the SHS printed report. This could impact ordering of STI testing.
Incomplete outcome data (attrition bias)	Low risk	There is no missing data
Selective reporting (reporting bias)	Low risk	All outcomes were reported in a pre-specified way
Other bias	Low risk	The study appears to be free of other sources of bias

Miller et al., 2019

Methods	**Quality Improvement: Cross-Sectional Survey**
Participants	**Participants:** Emergency department (ED) clinicians (physicians, nurses and nurse practitioners; Adolescents aged 14 to 19 years seeking care at an ED **Setting:** Four urban EDs within academic, tertiary care hospitals (two general and one pediatric located in Midwestern U.S.; one pediatric located in Northeast U.S.) **Number Completed Survey:** (*N* = 114) • **Group 1, Clinicians:** *n* = 57 • **Group 2, Adolescents:** *n* = 57 **Gender, males (as defined by researchers):** • **Group 1:** *n = 26* (46%) • **Group 2:** *n = 14* (25%) **Race/ethnicity or nationality (as defined by researchers):** • Not reported **Age, mean in years** • **Group 1:** Mean/median not reported (65% <40 years of age) • **Group 2:** Mean = 16.2 years **Inclusion Criteria:** • **Group 1:** ○ Physicians who have completed residency in emergency medicine or pediatrics ○ Nurse practitioners who care for patients in ED ○ Nurses in ED specialized in acute care or pediatric acute care • **Group 2**: ○ Age 14-19 years seeking care at ED **Exclusion Criteria:** • **Group 1:** ○ Resident physicians ○ Nursing trainees • **Group 2:** ○ Non-English speakers ○ Have significant impairment that would impede participation as determined by ED provider (e.g., severe illness, developmental delay, intoxication) ○ Complaints involving sexual assault ○ Complaints involving psychiatric issues ○ Wards of the state *Purposive sampling was used to include diverse perspectives
Interventions	• **Group 1:** The research assistant (RA) demonstrates the CDS system, assuming the hypothetical identity of an adolescent female with recent unprotected intercourse. Then the clinicians interacted with the CDS system by independently entering hypothetical behavior data and reviewed additional tailored service recommendations with the

	RA. Participants then completed a computerized survey about the CDS system. For open-ended questions, clinicians directly entered their responses with RAs available for assistance if needed • **Group 2:** After observing a RA demonstrate how to use the CDS system, the adolescent participants independently entered actual or hypothetical behavior data and reviewed tailored service recommendations with the RA. The RA read the open-ended questions and typed adolescent responses verbatim to increase efficiency
Outcomes	**Primary outcome(s):** • CDS system usefulness* • Preference* • Ease of use* • Interest In Use • Time resources *Outcomes of interest to the CMH CPG /CAT development team
Notes	**Results:** • Providers preferred the use of the private, computer screening system over in-person interviews; 65% to 26%. • Adolescents preferred the use of the private, computer screening system over in-person interviews at a rate of 69% to 9%. • The majority of the adolscents screened reported the private, computer screening system was easy to use; 95%. **Limitations:** • Clinicians recruited from four EDs, but adolescent recruitment was limited to single ED due to staffing and budget constraints • Participant responses were subject to social desirability bias

Reed et al., 2020

Methods	**Quality Improvement**

Participants	**Participants:** ED patients 14-21 years of age
	Setting: USA, Midwestern hospital pediatric Emergency Department with urban center and suburban satellite campuses
	Number eligible to be enrolled into study: *N* = 15,252 (main ED), 7,003 (satellite ED) *only provided with post-intervention numbers
	• **Pre-intervention, Standard of Care:** *n = population per group not reported*
	• **Post-intervention enrollment numbers, Tablet screening:** *n = 9,854 at the main ED; 4,516 at the satellite ED were provided with tablet for screening*
	Gender, males (as defined by researchers):
	• **Pre-intervention:** not specified for pre-intervention
	• **Post-intervention:** At the main ED, those that agreed to STI testing were more likely to be female versus male. At the satellite ED, for those that agreed to STI testing, there was no difference in gender
	Race / ethnicity or nationality (as defined by researchers):
	• **Pre-intervention:** At main ED clinic: 41% Black, 56% White, 2.8% Hispanic; at satellite ED: 15% Black, 78% White, 6.8% Hispanic
	• **Post-intervention:** At the main ED clinic, listed as black versus white or other races (*p = .01*); At the satellite ED, listed as other or white race vs. black
	Age, mean/median in years:
	• **Pre-intervention:** Approximately 25% of patients at the main ED and 20% at the satellite ED were 14-21 years of age.
	• **Post-intervention:** At the main ED, more likely to be ages 18-21 years vs. younger age groups; at the satellite ED, more likely to be 16-17 years of age
	Inclusion Criteria:
	• All patients presenting to the ED aged 14-21 years were offered a tablet by registration staff unless meeting exclusion criteria
	Exclusion Criteria:
	• Registration staff declined to offer a tablet for the following reasons:
	  ○ Violent patient
	  ○ Critically ill
	  ○ Developmentally delayed
	  ○ Non-English speaking
	  ○ Parent declined
	  ○ Patient declined
	  ○ Alleged sexual abuse
	  ○ Tablet not functioning
	  ○ Patient condition (e.g., Migraine)
	  ○ Psychiatric patient
	  ○ Staff/care interruption

Interventions	• **Pre-intervention:** Authors did not describe what the process was for STI screening prior to introduction of the tablet. • **Post-intervention:** At both facilities, a tablet was offered to appropriately aged patients by registration personnel. The first screen of the tablet provided a standardized script for registration staff to introduce the tablet.
Outcomes	**Primary outcome(s):** • Patient capture rate defined as the number of patients seen in the ED 14-21 years of age with any tablet data recorded vs. all 14–21-year old's who presented to the ED during the same time frame. * **Secondary outcome(s):** • Rate of healthcare providers ordering STI testing • Proportion of patients agreeing to STI testing **Safety outcome(s):** • Not specified *Outcomes of interest to the CMH CPG development team
Notes	**Results:** • Capture rates were 64.6% at the main ED and 64.5% at the satellite ED • Of the patients that agreed to STI testing, rates were 9.9% at the main ED and 4.4% at the satellite ED • *For pre-intervention: 7.9% testing rate at main ED; 2.6% at the satellite ED; < 1% for asymptomatic screening rates at both sites* • *For post-intervention: 979 (9.9%) testing rate at the main ED; 200 (4.4%) testing rate at the satellite ED; Screening rates for both asymptomatic and symptomatic patients were 64.6% at the main ED and 64.5% at the satellite ED* **Limitations:** • Not all registration staff felt comfortable discussing sexual health and some did not offer the tablet • Not all data on demographic information (percentages vs. number of patients) were provided. • Pre-intervention data was described in percentages vs. number of patients or events

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