TITLE: Screening for Sexually Transmitted Infections: A Review of Guidelines

DATE: 25 April 2013

CONTEXT AND POLICY ISSUES

Sexually transmitted infections (STIs) are a major public health problem.[1] The most common STIs include infections with *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Treponema pallidum*, herpes simplex viruses, human papillomavirus and HIV.[2] In 2009, it was estimated that 258.5 in 100.000 of the Canadian population had chlamydia infection, 33.1 in 100.000 had syphilis and 5.0 in 100.000 had gonorrhea infections.[3-5] Complications of untreated STIs include infertility, fetal wastage, ectopic pregnancy, ano-genital cancer and premature death.[1] Early diagnosis and treatment is believed to reduce the incidence of STI transmission and its complications. However, many of these infections are asymptomatic, especially in their early stages. Screening asymptomatic patients based on their medical history and their individual risk factors was proposed as an alternative for universal screening.

The current review was conducted to inform the development a screening decision tool that can used by healthcare providers. The scope of this review will be focused on evaluating the available guidelines and recommendations on STI screening.

RESEARCH QUESTIONS

1. What are the evidence-based algorithms for identifying sexually transmitted infection risk factors and testing requirements in adult patients presenting to primary care?

2. What are the evidence-based guidelines regarding optimal risk grouping, age cohorts, risk categories, and timing of screening for sexually transmitted infections in adult patients?

KEY FINDINGS

A total of 18 guidelines provided recommendations on screening of sexually transmitted infections. The evidence supporting these recommendations was not consistent and ranged from strong evidence to expert opinions.

METHODS

Literature Search Strategy

A focused literature search (with the screening/algorithm concept appearing in title or subject heading) was conducted on key resources including PubMed, The Cochrane Library (2013, Issue 3), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. Methodological filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, and guidelines. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 01, 2008 and March 21, 2013.

Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed for relevance. Full texts of any relevant titles/abstracts were retrieved, and assessed for inclusion. The final article selection was based on the inclusion criteria presented in **Table 1**.

Table 1: Selection Criteria

Population	Adult patients in primary care with or without symptoms of sexually transmitted infections
Intervention	STI screening
Comparator	Not applicable
Outcomes	Early detection, appropriate screening, accuracy of screening procedures (not the screening tests). Guidelines, algorithms to decide which patients to screen and when and how.
Study Designs	Health technology assessments, systematic reviews, meta-analyses, and evidence based guidelines

Exclusion Criteria

Studies were excluded if they did not meet the selection criteria. Duplicate reports of the same guideline or study were also excluded. Additionally, guidelines and systematic reviews were excluded if their focus was on the accuracy of screening tests and not the screening procedure/ algorithm. Reports on guidelines implementation and uptake were excluded.

Critical Appraisal of Individual Studies

Critical appraisal of the included studies was based on study design. The methodological quality of the included systematic reviews was evaluated using the “assessment of multiple systematic reviews” (AMSTAR).[6] AMSTAR is an 11-item checklist that has been developed to ensure reliability and construct validity of systematic reviews. The Appraisal of Guidelines Research

and Evaluation (AGREE) instrument[7] was used to evaluate the quality of the included guidelines. The AGREE instrument is provided in APPENDIX **1**.

For the included studies a numeric score was not calculated. Instead, the strengths and limitations of the study were described.

SUMMARY OF EVIDENCE

Quantity of Research Available

A total of 268 potential citations were identified by searching the bibliographic database, with 243 citations being excluded during the title and abstract screening based on their irrelevance to the questions of interest. The full text documents of the remaining 25 articles were retrieved. Twenty-three additional articles were identified in the grey literature search. Of the 48 articles, 26 did not meet the inclusion criteria and were excluded, leaving 22 reports of four systematic reviews and 18 guidelines.

A PRISMA diagram demonstrating the study selection process is presented in APPENDIX 2.

Summary of Study Characteristics

The included studies and guidelines were grouped based on the STI they provided information on. Six guidelines provided recommendations general for all STIs,[2,8-12] two systematic reviews[13,14] and two guidelines reported HIV-specific recommendations,[15,16] three guidelines provided recommendations on hepatitis management.[17,18] Recommendations on screening for genital herpes were provided in a guideline that targeted gynecology healthcare providers,[19] and another systematic review provided evidence on the treatment and prevention of genital herpes in the general healthcare settings.[20] One guideline specific for syphilis[21] and one for gonorrhea were also included.[22] Recommendations for chlamydia screening were covered in four guidelines[23-26] and a systematic review.[27] Details on the included reports characteristics are tabulated in APPENDIX 3.

General STI guidelines:

Three guidelines were developed in the United States.[8,9,11] The first was developed in 2008 by the U.S. Preventive Services Task Forces (USPSTF);[11] the guideline provided recommendations for STI screening for adults. The two others were produced by the Centers for Disease Control and Prevention (CDC). Their focus was to provided recommendations on the management of individuals with STDs; one guideline targeted adult individuals in general,[9] and the other targeted patients who use drugs illicitly.[8]

The Public Health Agency of Canada (PHAC) produced a guideline in 2010 to inform clinical and public health professionals on issues related to the diagnosis, treatment, and management of the most common STIs.[2] The National Institute for Health and Clinical Excellence (NICE) issued a guideline specific for the management and care of pregnant women in the United Kingdom.[10] Bourne et al. published an Australian guideline for the screening and early detection of STI in men who have sex with men.[12]

HIV-specific guidelines and systematic reviews:

In 2012, Chou et al. published two systematic reviews to update the 2005 USPSTF guidelines on HIV screening and early treatment in asymptomatic adults[13] and pregnant women.[14] The reviews attempted to answer questions about the benefits of universal or targeted HIV screening as compared with no screening in asymptomatic adults and pregnant women.

The British HIV Association, the British Association of Sexual Health and HIV, and the British Infection Society produced a common guideline to facilitate an increase in HIV screening in all healthcare settings.[15,28] In contrast, Poljak et al. published a guideline to provide advice on HIV testing in sexually transmitted infection services and dermatovenereology clinics.[16]

Hepatitis-specific guidelines and systematic review:

Recommendations on hepatitis screening were provided in three guidelines; the target population differed in each guideline. The USPSTF guideline provided guidance on hepatitis B screening in pregnant women.[17] Lok et al. published guideline on the diagnosis and management of hepatitis B in adult patients.[29] The third guideline was published by Rockstoch et al.,[18] and it provided recommendations on the management of hepatitis B and C in HIV patients.[18]

Herpes-specific Systematic Review and Guideline:

Hollier et al. published a systematic review to synthetize evidence on the treatment and prevention of sexually transmitted herpes.[20] Physicians and the general public were the targeted audience for the review, while the guideline published by Money et al. targeted gynecologist by their recommendations on the management of genital herpes.[19]

Syphilis and gonorrhea guidelines:

The USPSTF produced a guideline for healthcare providers who treat pregnant women;[21] the guideline updated the previous USPSTF guidance about syphilis screening during pregnancy.

Bignell et al. published a guideline for the management of *Neisseria gonorrhea* infection; the guideline targeted a wide variety of healthcare providers.[22]

Chlamydia-specific guidelines and systematic review:

The four guidelines on the management of chlamydia infections shared a common audience and potential end users.[23,24,26,30] They all provided general recommendations applicable to adults seeking medical services from general physicians. The systematic review by Low et al. evaluated the effectiveness of register based as compared with opportunistic chlamydia screening interventions.[27]

Summary of Critical Appraisal

Details on the limitations and strengths of the included reports are provided in APPENDIX 4.

General STI guidelines:

The six guidelines were developed by working groups that included experts in the clinical and community aspects of STI as well as experts in public health and research methodology.[2,8-12] Systematic reviews were used to provide and synthetize evidence in five guidelines;[8-12] the PHAC guideline did not report the methods used for evidence synthesis and recommendation formulation.[2] The strength of evidence and recommendations was reported in three guidelines.[8,9,12]

HIV-specific guidelines and systematic reviews:

Chou et al. conducted and published two systematic reviews based on predefined protocols.[13,14] The literature search strategies were provided and indicated a systematic and comprehensive approach; data extraction and quality evaluation of the included studies were verified by a second reviewer, and the results were reported with the overall rating of the evidence.[13,14]

The source of evidence was not reported in two guidelines.[15,17] One guideline did not report the strength of the evidence or recommendations,[15] and another guideline did not report on the process used for evidence synthesis and recommendation formulation.[16]

Hepatitis-specific guidelines and systematic review:

The guideline published by Lok et al. was based on a systematic review of the literature.[29] however, neither Lok's guideline nor the one published by Rochstoch et al. reported the protocol or methods used to synthetize the evidence.[18,29]

Herpes-specific Systematic Review and Guideline

Hollier et al.[20] conducted a systematic review according to the GRADE guidelines for the development of systematic reviews. The authors evaluated the quality of evidence available for each review question, and this evaluation was considered in the interpretation of the review findings.[20]

The guideline produced by Money et al.[19] reported an assessment of the evidence and recommendation strength; however, the report did not provide details on the methodology used for the evidence search and synthesis, or the validation process of the guideline.[19]

Syphilis and gonorrhea guidelines:

The syphilis-management guideline produced by the USPSTF was based on a systematic review to collect and synthetize the evidence.[21] The quality of evidence and strength of recommendations were evaluated and reported in the guideline. However, the report did not provide the source of evidence.[21]

The guideline by Bignell et al. on gonorrhea infections evaluated the strength of evidence, but it did not report the source of evidence or the methods used to synthetize it.[22]

Chlamydia-specific guidelines and systematic review:

Three guidelines were developed based on systematic review methods for the evidence search and synthesis;[23,24,26] the fourth guideline published by the Group Health Cooperative did not report on the method used for evidence synthesis.[25]

The methodology and reporting of three reports provided sufficient confidence to adopt their results and recommendations. This was case for the guidelines published by Wilkinson et al.,[23] the Scottish Intercollegiate Guideline Network,[26] and the systematic review of Low et al.[27] The three reports were based on a systematic review of the literature; these reviews were conducted according to predefined protocols.[23,25,27] They also considered the quality of evidence in the interpretation of findings and recommendations development.[23,25,27]

Summary of Findings

Details on the results and recommendations of the included reports are provided in APPENDIX 5.

According to the identified guidelines, risk assessment for STIs should focus on patient's sexual behavior and orientation, history of previous STI episodes, pregnancy history, substance use and psychosocial history.[2,9,15,16] The prevalence of STI in the population is also considered in the risk assessment and STI screening provision.[15]

According to the identified guidelines, asymptomatic adults seeking testing for any sexually transmitted disease should be offered screening for all STIs.[9,16] The evidence supporting this recommendation or its benefits were not reported. Asymptomatic men who present a high risk for STIs, based on the risk assessment, should be screened for HIV,[8,15,16] hepatitis B,[8,18,29] hepatitis C,[8,18] and syphilis.[11] Expert opinions and observational studies were the bases of almost all these recommendations.

The guidelines stated that a symptomatic non-pregnant women who present high risk for STI should be granted the same STI screenings offered for men at high risk; in addition, they should be screened for gonorrhea.[22,27] Chlamydia testing should be granted for all sexually active women younger than 25 years;[23,25,26] the strength of supporting evidence ranged from very strong evidence to expert opinions. Based on very strong evidence, women older than 25 years should be screened for chlamydia if they present high risk factors.[25]

According to the identified guidelines, asymptomatic pregnant women should benefit, at early stages of pregnancy, from screening for HIV,[9-11,15,16] syphilis,[9,11,21] hepatitis B.[9-11,31] Pregnant women at high risk for STI should be screened also for chlamydia,[9,11,25] gonorrhea,[9,11] and hepatitis C.[9]

Chou et al. conducted two systematic reviews to evaluate the benefits of universal HIV screening as compared with targeted screening in adults[13] and pregnant women.[14] The two reviews did not identify any relevant published trials that would provide information on the benefits of HIV screening in asymptomatic adults and pregnant women.[13,14] Hollier et al.

attempted to evaluate the effects of genital herpes serology screening on the incidence of maternal genital herpes in late pregnancy.[20] The review did not identify any relevant RCTs.[20]

The guideline by Money et al. did not recommend routine or targeted screening for herpes simplex virus.[19] The recommendation was based on the opinions of respected authorities, clinical experience, descriptive studies or reports of expert committees.[19]

The frequency of screening was not systematically reported in the included studies and guidelines. Screening frequency was most commonly reported in guidelines for men who have sex with men and pregnant women. When screening was recommended, annual screening was indicated for men who have sex with men.[9,12,15,26,29] For pregnant women who are at high risk, repeated testing is recommended at the 3rd trimester.[9]

Limitations

The current review evaluated the screening recommendations for a broad group of infections or diseases; the only common factor is their transmission route. However, individual diseases or infections may have specific risk factors, and treating the research question collectively may overlook these factors.

CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING

This report evaluated guidelines and recommendations on sexually transmitted infections screening. A total of 22 guidelines and systematic reviews were retrieved.

Screening of asymptomatic patients based on their individual risk factors was recommended in several guidelines. Targeted risk factors included patient's sexual behavior, medical history, age, and the prevalence of the STI in the population. The evidence supporting these recommendations ranged from strong evidence to expert opinions.

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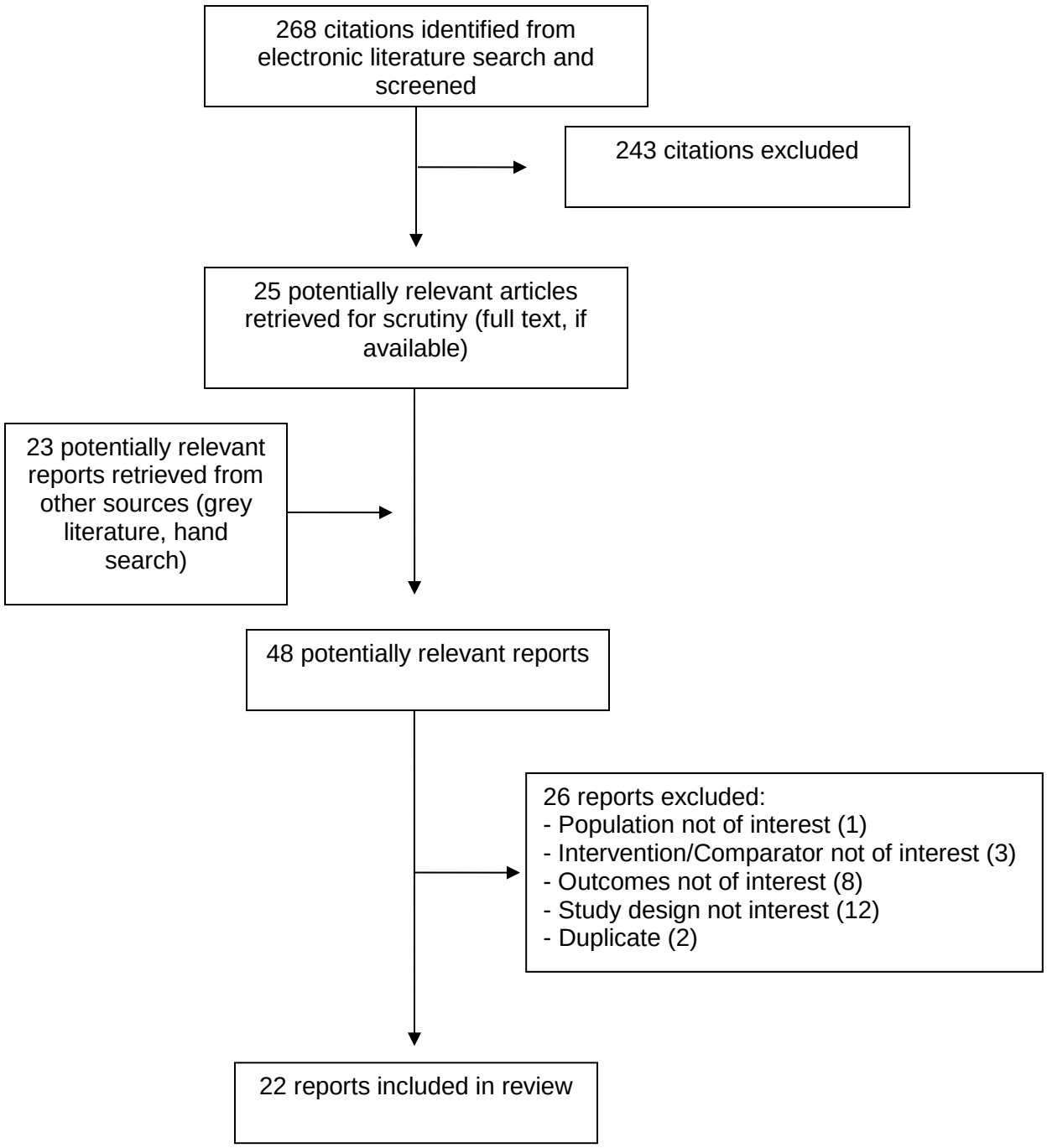
APPENDIX 1: Agree tool for the critical appraisal of guidelines

Table 1. Domains and Items of the AGREE Tool

Item
Scope and purpose
1. The overall objective(s) of the guideline is (are) specifically described
2. The clinical question(s) covered by the guideline is(are) specifically described
3. The patients to whom the guideline is meant to apply are specifically described
Stakeholder Involvement
4. The guideline development group includes individuals from all the relevant professional groups
5. The patients' views and preferences have been sought
6. The target users of the guideline are clearly defined.
7. The guideline has been piloted among target users
Rigor of Development
8. Systematic methods were used to search for evidence
9. The criteria for selecting the evidence are clearly described
10. The methods used for formulating the recommendations are clearly described
11. The health benefits, side effects and risks have been considered in formulating the recommendations
12. There is an explicit link between the recommendations and the supporting evidence
13. The guideline has been externally reviewed by experts prior to its publication.
14. A procedure for updating the guideline is provided
Clarity and Presentation
15. The recommendations are specific and unambiguous
16. The different options for management of the condition are clearly presented
17. Key recommendations are easily identifiable
18. The guideline is supported with tools for application
Applicability
19. The potential organizational barriers in applying the recommendations have been discussed.
20. The potential cost implications of applying the recommendations have been considered
21. The guideline presents key review criteria for monitoring and/or audit purposes
Editorial Independence
22. The guideline is editorially independent from the funding body
23. Conflicts of interest of guideline development members have been recorded

AGREE = Appraisal of Guidelines Research and Evaluation

APPENDIX 2: SELECTION OF INCLUDED STUDIES



APPENDIX 3: Characteristics of the Included Studies and Guidelines

Scope and purpose	Intended users	Development process
General STI Guidelines		
1. Centers for Disease Control and Prevention (CDC) – USA, 2012[8]		
• Guideline • To summarize recommendations and guidelines from multiple agencies of the U.S. DHHS • for the prevention of HIV infection, viral hepatitis, STDs, and TB • among persons who use drugs illicitly and their contacts (sex and drug partners)	"*The guidance is intended for public health officials at all levels, leaders and mangers of programs, program providers, health-care providers, and prevention and treatment support groups for persons who use drugs illicitly*" (page 3/34)	• Guideline was developed by a work group composed from health-care professionals, public health scientists, and public health analysts experienced in prevention of HIV infection, viral hepatitis, STDs, and TB in persons who use drugs illicitly • The guidelines were based on a systematic literature review, expert opinion, and field experience. • A draft of the guidelines was reviewed by representatives of the intended users • The final guidelines were approved by • AHRQ, CDC, the Centers for Medicare and Medicaid Services, FDA, NIDA, NIH and SAMHSA
AHRQ = Agency for Healthcare Research and Quality; **DHHS =** Department of Health and Human Services; **FDA =** Food and Drug Administration ; **HIV =** human immunodeficiency virus; **NIDA =** National Institute on Drug Abuse; **NIH =** National Institutes of Health; **SAMHSA =** Substance Abuse and Mental Health Services Administration; **STDs =** sexually transmitted diseases; **TB =** tuberculosis		
2. Centers for Disease Control and Prevention (CDC) – USA, 2010[9]		
• Guideline • To assist in the prevention and treatment of STDs • The guideline focus on the treatment and counseling of individual patients rather than community services and interventions	The guideline is applicable to family planning clinics, private physicians' offices, managed care organizations, and other primary health care facilities.	• Guideline was developed by a work group composed of CDC staff and experts in the field of STDs • Development started by a systematic review of the literature • The group summarized the evidence in tables that included information about the included studies and their methodological weaknesses and bias • A draft was prepared and presented in front of different stakeholders and potential end users of the document. Discussion and feedback were used to finalize the guideline.
STD = sexually transmitted diseases		
3. Public Health Agency of Canada (PHAC) – Canada, 2010[2]		
• Guideline • To inform health professionals on issues related to the management of the most common STIs	Clinical an public health professionals	• Guideline was developed by a working group composed of STI experts from the fields of medicine, nursing, laboratory, public health and research

Scope and purpose	Intended users	Development process
4. National Institute for Health and Clinical Excellence (NICE) – UK, 2008, last modified in 2010[10]		
• Guideline • To provide information on best practice for clinical care of pregnant women	The guideline provide information for use by clinicians and pregnant women to make decisions about treatments in specific circumstances	• The guideline was developed in accordance with NICE process for guideline development[32] • The development group included several experts in public health and in women's and children's health • Development started by a systematic review of the literature • The development group reviewed the available evidence and provided ratings for the strength of evidence and recommendations • The guideline was reviewed by stakeholders, nominated individuals. Comments and responses were reviewed by an independent guideline review panel
5. U.S. Preventive Services Task Forces (USPSTF) – US, 2008[11]		
• Guideline • To provide recommendations for STIs screening in nonpregnant women, pregnant women, and men.	Physicians treating nonpregnant women, pregnant women, and men.	• The guideline was developed in accordance with the USPSTF process for guideline development[33] • The guideline summarizes eight clinical recommendation statements • Each statement was based on systematic review of the literature • The evidence supporting each recommendation was evaluated, and the strength of recommendations was graded • Draft recommendations, according to the USPSTF methods, are submitted for public assessment. Comments can be provided from professional society/organization, advocacy group, and clinicians on behalf of self, clinical delivery systems, health insurers, and health care consumers.
6. Bourne et al. Australia, 2008[12]		
• Guideline • To summarize recommendations of the STI in gay men action group (STIGMA). • The guidelines focus on screening and early detection of STI in men who have sex with men	Physicians who provide care for MSM	• Guideline was developed by a working group composed of sexual health physicians, sexual health promotion specialists, public health physicians, general practitioners, patients and patients representatives, and health authorities • The development followed the Australian National Health and Medical Research Council guidelines. • The guideline was based on systematic literature review and expert opinion. • The guideline is updated frequently based on the most recent research and clinical practice

MSM= men who have sex with men

Scope and purpose	Intended users	Development process
HIV-Specific Systemic Reviews and Guidelines		
7. Chou et al. US, 2012[13]		
• Systematic review • To update the 2005 USPSTF review on HIV screening and early treatment in adolescents and adults.	The USPSTF working groups on guidelines development	• The systematic review attempted to answer questions on the benefits and harms of HIV screening and early treatment. Screening questions included o What are the benefits of universal or targeted HIV screening versus no screening in asymptomatic, nonpregnant adolescents and adults o What is the yield (number of new diagnoses) of HIV screening at different intervals in nonpregnant adolescents and adults?
8. Chou et al. US, 2012[14]		
• Systematic review • To update the 2005 USPSTF review on HIV screening and early treatment in asymptomatic pregnant women.	The USPSTF working groups on guidelines development	• The review focused on the benefits and harms of screening and early anti-retroviral therapy in pregnant women. Screening questions included: o What are the benefits of HIV screening versus no screening in asymptomatic pregnant women? o What is the yield (number of new diagnoses) of repeat HIV screening in asymptomatic pregnant women? o What are the adverse effects of rapid versus standard HIV testing in asymptomatic pregnant women?
9. British HIV Association/ British Association of Sexual Health and HIV/ British Infection Society. UK, 2008[15,28]		
• Guideline • To facilitate an increase in HIV screening in all healthcare settings	All doctors, nurses and midwives in the UK	• The guideline was developed according to the Appraisal of Guidelines Research and Evaluation (AGREE) principles • It was developed by a committee composed form relevant specialists societies • Evidence was collection was based on systematic review of the literature. • The guideline was validated by internal and external peer review
10. Poljak et al. UK, 2009[16]		
• Guideline • To provide advice on HIV testing in adults	Clinicians in sexually transmitted infection services and dermato-venereology clinics	• The guideline was based on a systematic review of the literature • The strength of evidence and recommendation were based on the grading system of the US Department of Health and Human Services Agency for Healthcare Research and Quality

Scope and purpose	Intended users	Development process
Hepatitis-specific Guideline and Systematic Reviews		
11. U.S. Preventive Services Task Force (USPSTF). US, 2009[17]		
• Guideline • To provide recommendations about preventive care services for pregnant women • The focus of this guideline was on hepatitis B screening	Primary care clinicians, delivery and maternal healthcare setting	• The guideline was developed in accordance with the USPSTF process for guideline development[33] • The guidance was based on systematic review of the literature • The evidence supporting the recommendation was evaluated, and the strength of recommendations was graded • Draft recommendation, according to the USPSTF methods, is submitted for public assessment. Comments can be provided from professional society/organization, advocacy group, and clinicians on behalf of self, clinical delivery systems, health insurers, and health care consumers.
12. Lok et al. US, 2009[29]		
• Guideline • To assist clinicians in the recognition, diagnosis, and management of patients with hepatitis B virus.	Physicians and other healthcare providers	• The guideline was based on a systematic review of the literature, and it was developed according to the American College of Physicians manual for assessing health practices and designing practice guidelines.
13. Rockstoch et al. Denmark, France, Germany, Italy, Spain and UK, 2008[18]		
• Guideline • To update the European guidelines for the management of hepatitis B and C in HIV patients	Physicians treating HIV patients	• Methodology of the guideline development was not reported

Scope and purpose	Intended users	Development process
Herpes-specific Systematic Review and Guideline		
14. Hollier et al. USA, 2010[20]		
• Systematic review • To provide evidence on the treatment and prevention of sexually transmitted herpes simplex viruses	Physicians and general public	• The review included published systematic reviews of RCTs and primary RCTs. • The quality of the included studies was evaluated according to the GRADE method
15. Money et al. Canada, 2008[19]		
• Guideline • To provide recommendations on optimal management of genital herpes	Gynecology healthcare provides	• Methodology of the guideline development was not reported
Syphilis-specific Guidelines		
16. U.S. Preventive Services Task Force (USPSTF). US, 2009[21]		
• Guideline • To update the USPSTF statement about screening for syphilis in pregnancy	Healthcare providers treating pregnant women	• The guideline was developed in accordance with the USPSTF process for guideline development[33] • The guidance was based on systematic review of the literature • The evidence supporting the recommendation was evaluated, and the strength of recommendations was graded • Draft recommendation, according to the USPSTF methods, is submitted for public assessment. Comments can be provided from professional society/organization, advocacy group, and clinicians on behalf of self, clinical delivery systems, health insurers, and health care consumers.
Gonorrhea-specific Guidelines		
17. Bignell et al. Sweden and UK, 2012[22,34,35]		
• Guideline • To provide recommendations and principals for Neisseria gonorrhea	Advanced practice nurses, allied health personnel, clinical laboratory personnel , nurses, physician, assistants, physicians, public health departments	• It was developed by a committee composed form relevant specialists societies • Evidence was collection was based on systematic review of the literature. • The guideline was validated by internal and external peer review

Scope and purpose	Intended users	Development process
Chlamydia-specific Guidelines		
18. Wilkinson et al. USA, 2012[23]		
• Guideline • To provide a comprehensive approach to the provision of evidence-based preventive services	Healthcare organizations and care providers	• The guideline was based on a systematic review of the literature and expert opinions • The quality of the included studies was evaluated according to the GRADE method • The guideline is validated by an internal and external peer review process
19. Finnish Medical Society Duodecim – as reported by the National Guideline Clearinghouse (NGC). Finland, 2011[24]		
• Guideline • To summarize and update the scientific evidence on the management of men and women at risk of developing chlamydia urethritis and cervicitis.	Healthcare providers and physicians	• The guideline was based on a systematic review of the literature supplemented with hand-searches • The quality of evidence was weighted according a predefined scheme • The document was finalized and validated by a peer review process
20. Group Health Cooperative. USA, 2011[25]		
• Guideline • To assist patients and providers in choosing appropriate management for chlamydia infections	Healthcare providers and physicians	• The guideline reported that it developed using an explicit evidence-based process, including systematic literature search, critical appraisal with evidence grading, and evidence synthesis. However, there were no details on how these processes were conducted
21. Scottish Intercollegiate Guidelines Network. Scotland, 2009[26]		
• Guideline • To provide guidance on the management of chlamydial infection of the genital tract and rectum	"*Primary care practitioners, patients, people at risk of infection, charities and voluntary organisations with an interest in sexual health, microbiologists, pharmacists, medical and nursing specialists in sexual health, medical and nursing specialists in genitourinary medicine (GUM), gynaecologists, sexual*	• The guideline was developed according to the SIGN 50 method • It was based on a systematic review of the literature and expert opinion • The strength of evidence and recommendations was weighted according to a predefined scheme • The guideline was validated according to a peer review process

Scope and purpose	Intended users	Development process
	health advisers, public health specialists, and academic researchers" p.8/48	
22. Low et al. Switzerland, 2009[27]		
• Systematic review • To evaluate the effectiveness of register-based and opportunistic chlamydia screening interventions	To inform the development of clinical practice guidelines	• The review included published systematic reviews, RCTs, non-randomized comparative studies and observational time trend studies. • Two reviewer participated in data extraction and synthesis • The quality of the included studies was evaluated based on NICE guidelines

APPENDIX 4: CRITICAL APPRAISAL OF THE INCLUDED GUIDELINES

Strengths	Limitations
General STI Guidelines	
1. Centers for Disease Control and Prevention (CDC) – USA, 2012[8]	
• The development was based on a systematic review of the literature and previous guidelines • The guideline was developed by individuals experienced in public health research, and it was reviewed by stakeholders who are the eventual end users.	• The protocol and methodology used to synthetize the evidence was not reported • It was not clear if the methodological quality of the used resources was evaluated • The strength of recommendations or the justifying evidence were not reported
2. Centers for Disease Control and Prevention (CDC) – USA, 2010[9]	
• The development was based on a systematic review of the literature and previous guidelines • The guideline was developed by individuals experienced in public health research, and it was reviewed by stakeholders who are the eventual end users. • The methodological quality of the included studies was considered in the development of recommendations	• The strength of recommendations was not reported
3. Public Health Agency of Canada (PHAC) – Canada, 2010[2]	
• The guideline was developed by individuals experienced in public health research and STI • The strength of evidence and recommendations were weighted based on predefined scheme.	• The source of evidence was not reported • The methods used to for evidence synthesis and recommendations formulation were not provided
4. National Institute for Health and Clinical Excellence (NICE) – UK, 2008, last modified in 2010[10] **5. U.S. Preventive Services Task Forces (USPSTF) – US, 2008[11]**	
• The development was based on a systematic review of the literature and previous guidelines • The guideline was developed by individuals experienced in public health research, and it was reviewed by stakeholders who are the eventual end users. • The methodological quality of the included studies was considered in the development of recommendations • Strength of evidence and recommendations were provided	• The source of evidence was not reported
6. Bourne et al. Australia, 2008[12]	
• The development was based on a systematic review of the literature and previous guidelines • The guideline was developed by individuals experienced in public health research, and it was reviewed by stakeholders who are the eventual end users.	• It was not clear if the methodological quality of the used resources was evaluated • The strength of recommendationsv or the justifying evidence were not reported

Strengths	Limitations
HIV-specific Systematic Reviews and Guidelines	
7. Chou et al. US, 2012[13] **8. Chou et al. US, 2012[14]**	
• The systematic review had a predefined scope and protocol • Literature search was systematic and comprehensive • The extracted data was verified by a second reviewer and the quality of evidence was evaluated according to the USPSTF criteria • Results were reported with the overall assessment of the evidence quality	Nothing to report
9. British HIV Association/ British Association of Sexual Health and HIV/ British Infection Society. UK, 2008[15,28]	
• A systematic review of the literature was used to analyze the evidence • Recommendations were formulated through expert consensus process	• The evidence source documents were not provided • The strengths and limitations of the evidence was not reported or discussed • The strength of the provided recommendations was not reported
10. Poljak et al. UK, 2009[16]	
• A systematic review of the literature was used to analyze the evidence • The strength of evidence and recommendations was provided	• The process of evidence synthesis and recommendation development was not provided • Guideline validation process was not reported
11. U.S. Preventive Services Task Force (USPSTF). US, 2009[17]	
• The development was based on a systematic review of the literature and previous guidelines • The guideline was developed by individuals experienced in public health research, and it was reviewed by stakeholders who are the eventual end users. • The methodological quality of the included studies was considered in the development of recommendations • Strength of evidence and recommendations were provided	• The source of evidence was not reported
Hepatitis-specific Guidelines	
12. Lok et al. US, 2009[29]	
• A systematic review of the literature was used to analyze the evidence	• The protocol and methodology used to synthetize the evidence was not reported • The guideline did not report the quality and strength of evidence for the all the recommendations of the guideline
13. Rockstoch et al. Denmark, France, Germany, Italy, Spain and UK, 2008[18]	
Nothing to report	• The protocol and methodology used to synthetize the evidence was not reported

Strengths	Limitations
Herpes-specific Guidelines	
14. Hollier et al. USA, 2010[20]	
• A systematic review of the literature was conducted • The quality of the included studies were evaluated according the GRADE system	Nothing to report
15. Money et al. Canada, 2008[19]	
• The strength of evidence and recommendations were assessed and reported	• The methodology used to search and synthetize the evidence was not reported • The guideline validation process was not reported
Syphilis-specific Guideline	
16. U.S. Preventive Services Task Force (USPSTF). US, 2009[21]	
• The development was based on a systematic review of the literature and previous guidelines • The guideline was developed by individuals experienced in public health research, and it was reviewed by stakeholders who are the eventual end users. • The methodological quality of the included studies was considered in the development of recommendations • Strength of evidence and recommendations were provided	• The source of evidence was not reported
Gonorrhea-specific Guidelines	
17. Bignell et al. UK, 2012[22,34,35]	
• The guideline was developed by individuals experienced in public health research, and it was reviewed by stakeholders who are the eventual end users. • Strength of evidence and recommendations were provided	• The source of evidence was not reported • The method used to analyze the evidence was not reported
Chlamydia-specific Guidelines	
18. Wilkinson et al. USA, 2012[23]	
• The development was based on a systematic review of the literature and previous guidelines • The guideline was developed by individuals experienced in public health research, and it was reviewed by stakeholders who are the eventual end users • The methodological quality of the included studies was considered in the development of recommendations • Strength of evidence and recommendations were provided	Nothing to report

Strengths	Limitations
19. Finnish Medical Society Duodecim – as reported by the National Guideline Clearinghouse (NGC). Finland, 2011[24]	
• The development was based on a systematic review of the literature and previous guidelines	• The methods used to analyze the evidence and recommendation formulation were not reported • The methods for guideline validation was not provided • The quality of evidence supporting the screening recommendations was not reported
20. Group Health Cooperative. USA, 2011[25]	
• The working group consisted of different specialists in related fields	• The literature search strategy was not reproted • The methods used to analyze the evidence and recommendation formulation were not reported • The methods for guideline validation was not provided • The quality of evidence supporting the screening recommendations was not reported
21. Scottish Intercollegiate Guidelines Network. Scotland, 2009[26]	
• The development was based on a systematic review of the literature and previous guidelines • The guideline was developed by individuals experienced in public health research, and it was reviewed by stakeholders who are the eventual end users. • The methodological quality of the included studies was considered in the development of recommendations • Strength of evidence and recommendations were provided	Nothing to report
22. Low et al. Switzerland, 2009[27]	
• The systematic review had a predefined scope and protocol • Literature search was systematic and comprehensive • The extracted data was verified by a second reviewer and the quality of evidence was	Nothing to report

APPENDIX 5. SUMMARY OF FINDINGS

Table 2. Sexually Transmitted Infections Screening for Asymptomatic Patients Based on Patient's Characteristics

Targeted STI Etiology	Men	Non-Pregnant Women		Pregnant Women		MSM	High Risk for STI[a]	History of Previous/ current STI	History of Substance Abuse	High Prevalence of STI
		≤25	>25	≤25	>25					
HIV		If high risk[11]		x[9-11]		x[9,12,15]	x[2,15,16]	x[15,16]	x[8,15]	x[15]
Frequency				Retest at 3rd trimester if at high risk[9]		Annual[9,12]			Annual[8]	
Hepatitis A						x[12]	x[2]			
Frequency						Annual[12]				
Hepatitis B				x[9-11,17,29]		x[12,29]	x[2,29]	HIV infected patients[18]	x[8,29]	x[29]
Frequency				Retest at 3rd trimester if at high risk[9]		Annual[12]				
Hepatitis C				Women at high risk[9]		x[12]	x[2]	HIV infected patients[18]	x[8]	
Frequency						Annual[12]				
HBV							x[2]			
Frequency										
Herpes virus							x[2]		x[8b]	
Frequency										
T. pallidum	High-risk sexual behavior[11]	x[11]	High-risk sexual behavior[11]	x[9,11,21]		x[9,12]	x[2]		x[8c]	x[11]
Frequency				Retest at 3rd trimester if at high risk[9]		Annual[9]				
N. gonorrhoeae		If high risk[11]	If high risk[11]	x[9]		x[9,12,22]	x[2]	x[22]	x[8d]	
Frequency				Retest at 3rd trimester[9]		Annual[9,12]				
C. trachomatis		x[23-25] If high risk[11,27]	If high risk[11,25,27]	x[9,10,23,25] If high risk[11]	x[9] If high risk[11,25]	x[9,12,26]	x[2,26]	x[26]	x[8e]	x[24]
Frequency				Retest at 3rd trimester[9]	Retest at 3rd trimester if at high risk[9]	Annual[9,12]			Women: annual MSM: 3-6 months	

(x) indicates general indication for screening of the specified patient's category; MSM = men who have sex with men

[a] Public Health Agency of Canada reported a detailed questionnaires on risk assessment[2]. These were reported in table 4.

[b] screening for MSM and HIV patients.[8]

[c] screening for MSM and pregnant women.[8]

[d] screening is recommended for all sexually active women if they are at increased risk, pregnant women, and MSM.[8]

[e] screening for women <25 years and for older women with risk factors, pregnant women, and MSM[8]

Table 3. Sexually Transmitted Infections Screening Based on Patient's Signs and Symptoms

HBV	Herpes	T. Pallidum	N. gonorrhoea	C. trachomatis	Coliforms	Pseudomonas	Chancroid (H. ducreyi)	K. granulomatis
Syndrome: Cervicitis:[2,9,22,26] Signs and symptoms: Purulent/mucopurulent cervical/ vaginal exudate;[2,9] Sustained endocervical bleeding;[9] Cervival friability;[2] Strawberry cervix[2]								
x[9]	x[2,9]	x[2,9]	x[2,9,22]	x[2,9,26]				
Syndrome: Epididymitis:[2,9] Signs and symptoms: Testicular pain and swelling;[2,9] May have erythema and edema of the overlaying skin and urethral discharge;[2] Fever[2]								
			x[2,9]	x[2,9]	x[2,9]	x[2,9]		
Syndrome: Genital Ulcers:[2,9] Signs and symptoms: Erosive or pustular ulcers;[2] vesicles;[2] papules;[2] inguinal lymphadenopathy[2]								
	x[2,9]	x[2,9]		x[2,9]			In high risk patients[2] If syphilis and HSV were negative[9]	x[9] In high risk patients[2]
Syndrome: Genital/anal popular lesions:[2] Signs and symptoms: Growth in anal/genital region or on mucus membranes, may be accompanied by pruritis, bleeding or obstruction[2]								
x[2]		x[2]						
Syndrome: Intestinal and Enteric Syndromes (Proctitis, Proctocolitis, Enteritis):[2] Signs and symptoms – depending on the syndrome: mucopurulent rectal discharge, anorectal pain, constipation, bloody stools, diarrhea, nausea, abdominal pain, bloating, fever								
	x[2]	x[2]	x[2]	x[2]				
Syndrome: Pelvic Inflammatory Disease:[2,9,22,26a] Signs and symptoms: Lower abdominal pain, deep dyspareunia, abdominal bleeding, fever[2]								
			x[2,9,22]	x[2,9,26]				
Syndrome: Urethritis[2,9,22,26] Signs and symptoms: urethral discharge,[2,9] dysuria,[9] urethral pruritus,[2,9] burning on urination[2]								
			x[2,9,22]	x[2,9,26]				
Syndrome: Vaginal Discharge[2,9,22,26b] Signs and symptoms: Vaginal discharge, vaginal odor, vaginal/vulvar pruritus, vaginal/vulvar erythema, dysuria[2]								
			In high risk patients[2,22]	x[26] In high risk patients[2]				

(x) indicates general indication for screening of the specified patient's category

[a] Multiple etiologic germs can cause pelvic inflammatory disease (PID); if suspected cervical swabs and vaginal cultures are used to detect the causal agent. Serological tests were recommended by PHAC, but the target agents were not specified.[2]

[b] Diagnostic testing should include tests for bacterial vaginosis, Vulvovaginal candidiasis, and trichomoniasis[2,9]

Table 4. Risk Assessment Questionnaires

Domain	Items
Public Health Agency of Canada – Canada 2010[2]	
Risk factors	Sexual contact with person(s) with a known STI.
	Sexually active youth under 25 years of age.
	A new sexual partner or more than two sexual partners in the past year.
	Serially monogamous individuals who have one partner at present but who have had a series of one-partner relationships over time.
	No contraception or sole use of non-barrier methods of contraception (i.e., oral contraceptives, Depo Provera, intrauterine device).
	Injection drug use.
	Other substance use, such as alcohol or chemicals (pot, cocaine, ecstasy, crystal meth), especially if associated with having sex.
	Any individual who is engaging in unsafe sexual practices (i.e., unprotected sex, oral, genital or anal; sex with blood exchange, including sadomasochism; sharing sex toys).
	Sex workers and their clients.
	"Survival sex": exchanging sex for money, drugs, shelter or food.
	Street involvement, homelessness.
	Anonymous sexual partnering (i.e., Internet, bathhouse, rave party).
	Victims of sexual assault/abuse.
	Previous STI.
General principles for a brief patient history	Identifying localized symptoms of STIs (discharge, dysuria, abdominal pain, testicular pain, rashes and lesions)
	Identifying systemic symptoms of STIs (unexplained fever, weight loss, lymphadenopathy)
	Identifying personal risk factors and prevention (condom use, vaccination against hepatitis B/A)
	Evaluating patient's knowledge of increased risk of STIs
Relationships	• Presence of a regular partner, and the duration of the current relationship • Evaluate any potential concerns related to the present relationship
Sexual risk behaviors	• Number of partners • Sexual preference and orientation • Personal risk evaluation (occasional sexual partners, use of condoms, self-evaluation of STI risk)
STI history	• Previous STI episodes/ screening • Current concerns due to exposure to risk factor or the appearance of symptoms
Reproductive health history	• The use of contraceptives • Reproductive system problems • PAP testing • Pregnancy history and outcomes
Substance use	• Shared equipment for injection • Sex under influence • Percutaneous risk other than drug injection (tattoos or piercing)
Psychosocial history	• Has the patient ever been a sex trade worker or client • Has the patient ever been subject of sexual abuse • Housing status
Centers for Disease Control and Prevention (CDC) – USA, 2012[9] *- page 3/110*	
Partners	• *Do you have sex with men, women, or both?* • *In the past 2 months, how many partners have you had sex with?* • *In the past 12 months, how many partners have you had sex with?* • *Is it possible that any of your sex partners in the past 12 months had sex with someone else while they were still in a sexual relationship with you?*
Prevention of pregnancy	• *What are you doing to prevent pregnancy?*
Protection from STDs	• *What do you do to protect yourself from STDs and HIV?*
Practices	• *To understand your risks for STDs, I need to understand the kind of sex you have had recently.*

Table 4. Risk Assessment Questionnaires

Domain	Items
	• *Have you had vaginal sex, meaning 'penis in vagina sex'?" If yes, "Do you use condoms: never, sometimes, or always?* • *Have you had anal sex, meaning 'penis in rectum/anus sex'?" If yes, "Do you use condoms: never, sometimes, or always?* • *Have you had oral sex, meaning 'mouth on penis/vagina'?* • *For condom answers:* o *If "never:" "Why don't you use condoms?* o *If "sometimes:" "In what situations (or with whom) do you not use condoms?*
Past history of STDs	• *Have you ever had an STD?* • *Have any of your partners had an STD?*
Additional questions to identify HIV and viral hepatitis risk include	• Have you or any of your partners ever injected drugs? • Have any of your partners exchanged money or drugs for sex? • Is there anything else about your sexual practices that I need to know about?