The Medical Value of Laboratory Testing for STI Management

Edward W. Hook III M.D.
Departments of Medicine. Microbiology and Epidemiology
University of Alabama at Birmingham

Edward W. Hook, III, M.D.

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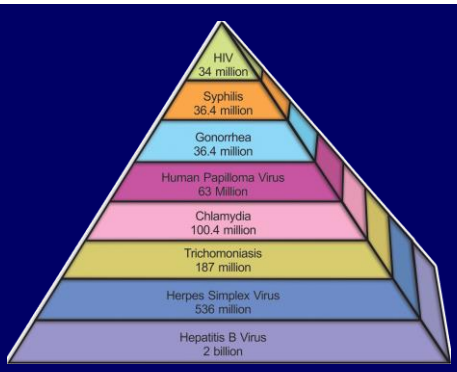


Estimated Global Prevalence of Sexually Transmitted Infections (Total 2,993,200,000)

Contributors To Sustained STD Morbidity

- **Biological Factors**
  - **Host**
  - **Pathogen**
- **Behavioral Factors**
  - **Acquisition**
  - **Transmission**
- **Social Factors**
  - **Stigma**
  - **Cross Cutting Societal Problems**

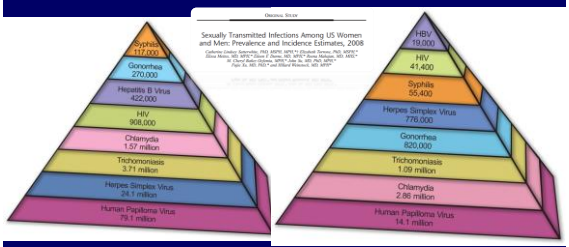
Principles of STI Management

Prevent acquisition

Prevent transmission

Prevent complications

Background: U.S. Estimates

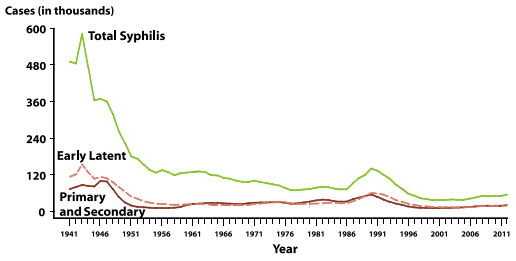


Estimated Prevalence of Sexually Transmitted Infections in the U.S. (Total 110,197,000)

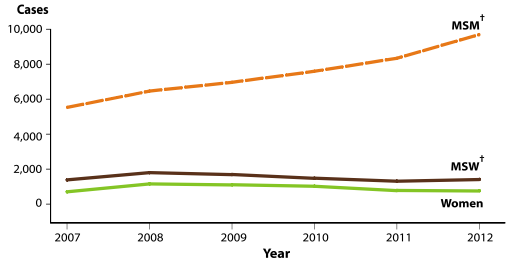
Estimated New Sexually Transmitted Infections in the U.S. Each Year (Total 19,738,800)

Satterwhite CL et al. Sexually Transmitted Diseases 2013;40:187-93

Syphilis—Reported Cases by Stage of Infection, United States, 1941–2012



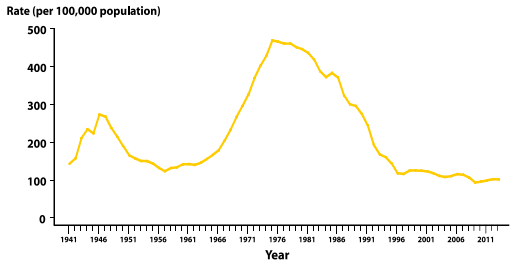
Primary and Secondary Syphilis—by Sex and Sexual Behavior, 33 Areas*, 2007–2012



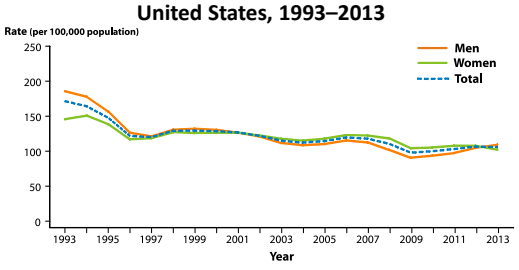
*32 states and Washington,DC reported sex of partner data for ≥70% of cases of P&S syphilis for each year during 2007-2012.

†**MSM**=men who have sex with men; **MSW**=men who have sex with women only.

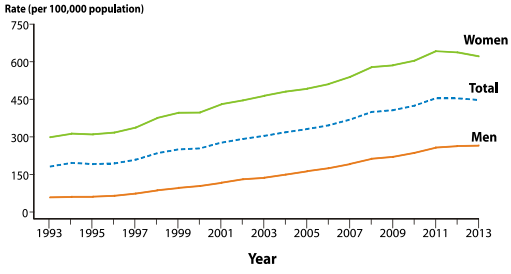
Gonorrhea — Rates of Reported Cases by Year, United States, 1941–2013



Gonorrhea — Rates of Reported Cases by Sex, United States, 1993–2013



Chlamydia — Rates of Reported Cases by Sex, United States, 1993–2013



NOTE: As of January 2000, all 50 states and the District of Columbia have regulations that require the reporting of chlamydia cases.

Principles of STD Management

- Prevent acquisition
- Prevent transmission
- Prevent complications

THE NEXT GREAT PLAGUE TO GO

Thomas Parran's Formula For Syphilis Control – 1936

1. Case Finding – Serologic Screening Programs
2. Prompt Therapy
3. Contact Identification, Testing, and Therapy
4. Mandatory Serological Evaluations – Premarital and Early Pregnancy
5. Public Education = Symptoms, Complications, Treatment

Etiologic vs. Syndromic STD Diagnosis

Etiologic : Demonstration of presence of potential pathogen
: Not all persons with STDs defined etiologically are symptomatic

Syndromic : Based on constellation of historical findings and signs
: Often due to multiple pathogens
: Not all persons with STD syndromes
- have demonstrable etiologic agents

Etiology of Genital Ulcers In 516 STD Clinic Patients

515 patients recruited from STD Clinics in 10 U.S Cities With High Syphilis Rates

PCR Result	Number (%)
HSV	320 (62%)
Syphilis	51 (10%)
HSV and Syphilis	13 (3%)
Chancroid	16 (3%)
PCR Negative	116 (22%)

Mertz K et al JID 1998: 178: 1795-9

STI SCREENING

Goal: Detection of unsuspected, often asymptomatic infections to prevent transmission and sequelae.

Therefore, even with imperfect tests, screening is important. However, it is also important for health care providers to know the limitations of the tests they use.

Etiologic Tests

Microscopy

Culture

NAATS

Serological Tests

Major STIs

Curable

Trichomonas vaginalis
Chlamydia trachomatis
Neisseria gonorrhoeae
Treponema pallidum

Incurable

Human papilloma virus
Herpes simplex virus
Human immunodeficiency virus
Hepatitis B virus

STI Screening Goals

Curable STIs	Incurable STIs
Bacteria& Protozoans	Viruses
Timely Treatment for Cure	Slow/Delay Progression
Prevention of Complications	Reduce Transmission
Partner Notification	Partner Notification

Changing Paradigms For Urogenital Specimen Collection

Pre-NAAT's: Specimen Quality Critical
- Endocervical Or Urethral Swabs
- Swab Order Impacts Test Results

: Culture > Non-Amplified Nucleic Acid Detection > Antigen Detection

NAAT's: More Forgiving Specimen Collection
- Vaginal Swab ≥ Endocervical Swab ≥ initial Void Urine

Etiologic Tests-Direct Detection

NAATs

Pros:
- **Most sensitive for detection of pathogens**
- **Highly specific, little need for confirmation**
- **Potential for pathogen subtyping (HPV, HCV)**
- **Test results in hours (laboratory time)**
- **Potential to test for multiple pathogens from a single specimen (Multiplex capability)**

Cons:
- **Potential for detection of dead organisms**
- **Difficulties in determining antimicrobial susceptibility**

Etiologic Tests- Detection of Host Response

Serological Testing

Pros:
- **Useful for prevalence estimates**
- **Useful for detection of chronic, difficult to directly detect infections (syphilis, HIV, HSV)**
- **Change in titers may reflect response to therapy**

Cons:
- **Potential for false positives without confirmatory testing**
- **Time required for host response to infection to develop**
- **Cure may be difficult to demonstrate (may remain positive long after successful treatment)**

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A Look to the Future: Room For Improvement

- **Faster time to test results**
- **Newer, Simpler Platforms and Test Formats**
- **Newer Technologies**
  - **Whole genome sequencing**
  - **Geneweave technology**
- **Expanded Mutiplex Assays**

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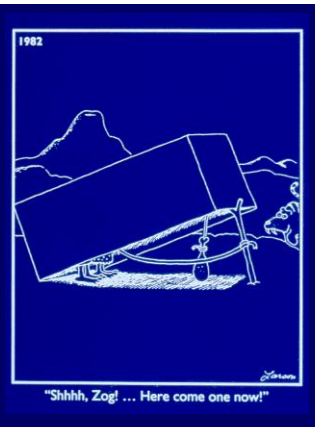
SUMMARY

- STIs remain common
- Detection and management of unrecognized STIs (screening) is a crucial element for effective control
- Screening using direct demonstration of the pathogen or serological testing for host response to infection must be prioritized depending on the pathogen



Genital Herpes Is Usually Unrecognized

Self-reported genital herpes, sexually active Americans 18-59[1]		2.1% (Women 2.9%) (Men 1.2%)
Serologic evidence of HSV-2 infection, Americans 16-74		
	1978 [2]	16.4% (Women 19.4%) (Men 13.2%)
	1990 [3]	21.7%

Laumann EO, et al. The Social Organization of Sexuality p.382-389
Johnson RE, et al. NEJM 1989. 321:7-12
Johnson RE, et al. Abstracts of the 10th ISSTDR, No. 22, Helsinki, 1993