

Repeat Bacterial Sexually Transmitted Infections (STIs)

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Outline

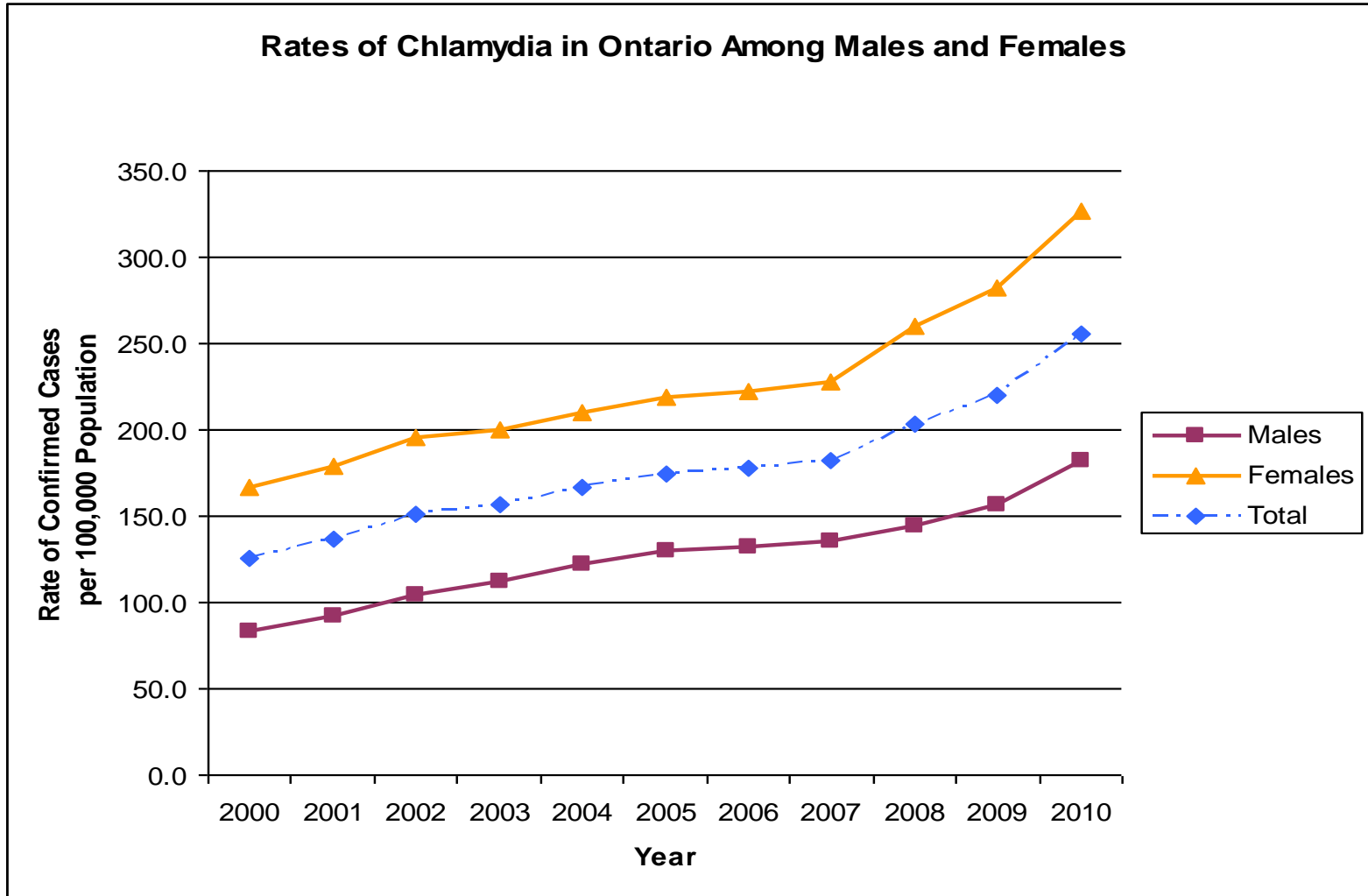
- Current epidemiology of bacterial STIs
 - Chlamydia
 - Gonorrhoea
 - Syphilis
- Potential factors associated with increasing chlamydia cases
- Current case and contact management strategies vs. other strategies?
- Epidemiology of persons with repeat bacterial STIs
- Results of repeat STI project to date
 - Some methodological considerations
 - Impact of repeat STIs
 - Characteristics of repeat STI clients
- Questions and discussion

Current Epidemiology of bacterial STIs

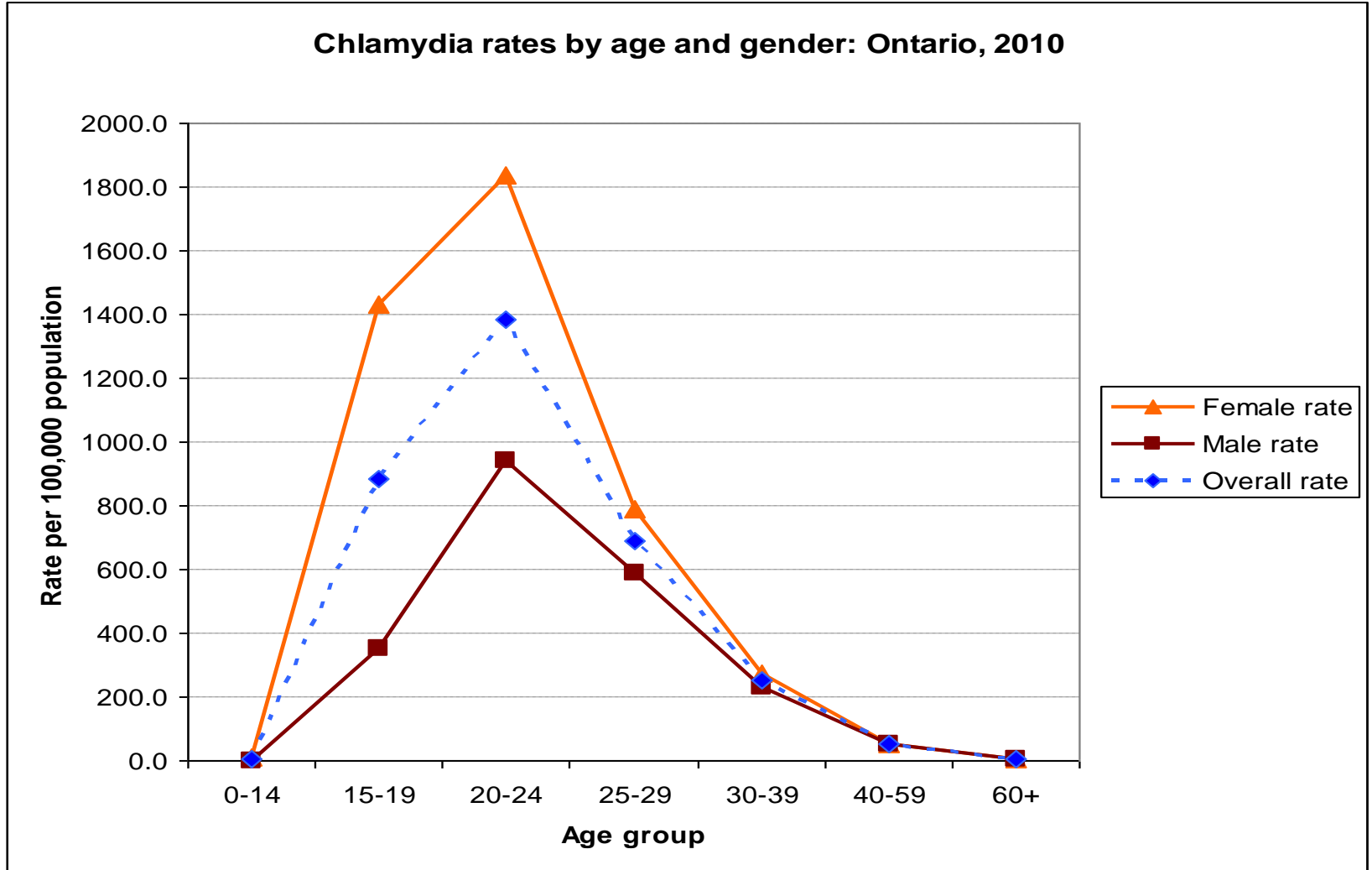
- In 2009, there were 33,000 reported cases of chlamydia, gonorrhoea and infectious syphilis in Ontario.
- These reportable bacterial STIs represented approximately 48% of all reportable disease cases reported in Ontario that year.
- Although the vast majority of infections do not lead to long-term sequelae, if left untreated, outcomes can be severe, such as pelvic inflammatory disease, chronic pelvic pain and infertility. Untreated infections may also lead to further infections in sexual partners.
- The Ontario Burden of Infectious Disease Study (ONBOIDS) ranked chlamydia and gonorrhoea 18th and 20th, respectively, out of 51 selected pathogens with respect to combined burden of morbidity and mortality.

Epidemiology of Chlamydia

- Chlamydia is the most commonly reported STI in Ontario
- Rates are higher in women vs. men
- Rates highest amongst young women 15- 24 years
- Rates in **Ontario**: 255.5 cases per 100,000 population (2010)
- Rates in **Canada**: 258.5 per 100,000 (2009)
- Most infections are asymptomatic, particularly in women



Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [03/14/2011]

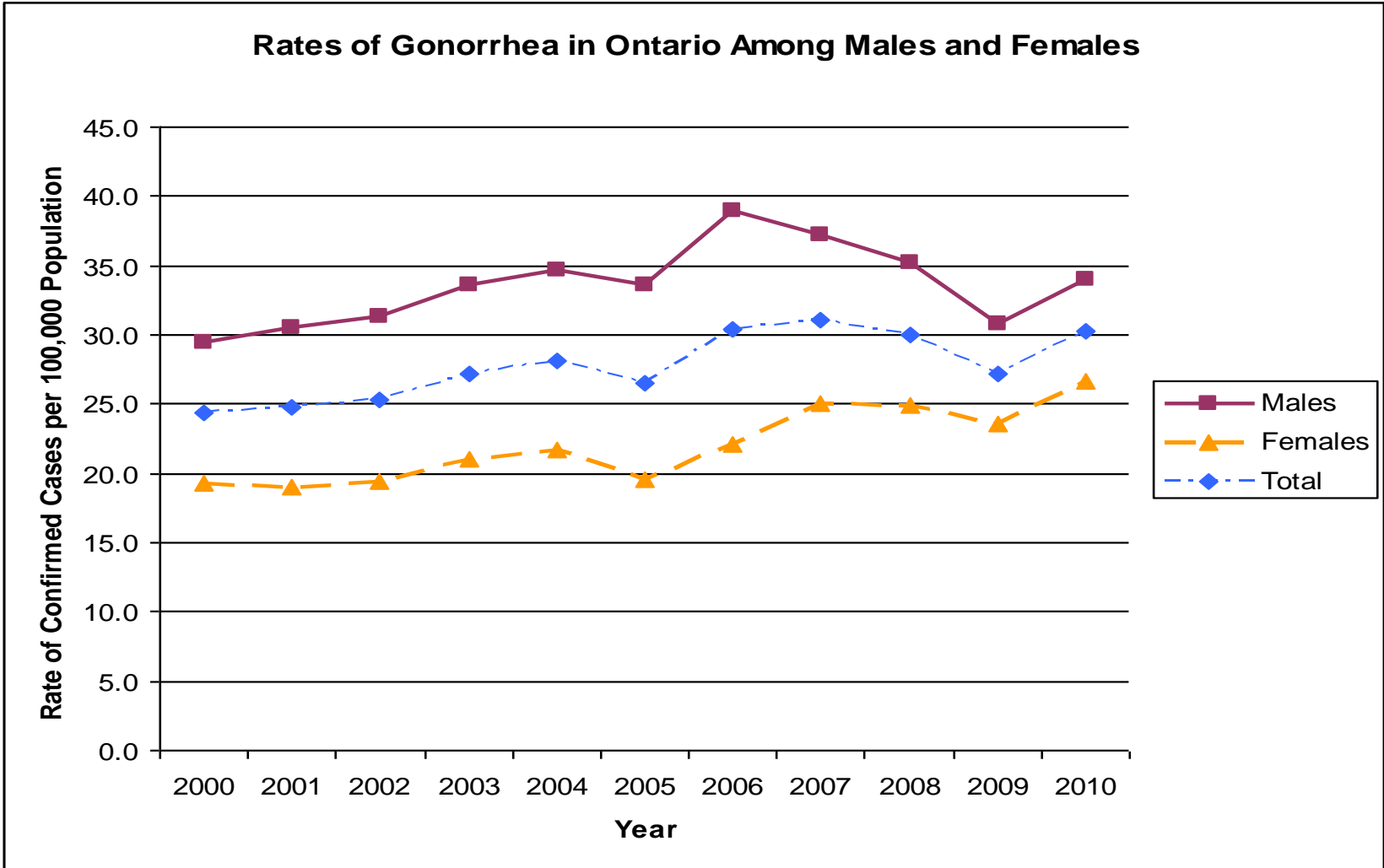


Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [03/14/2011]

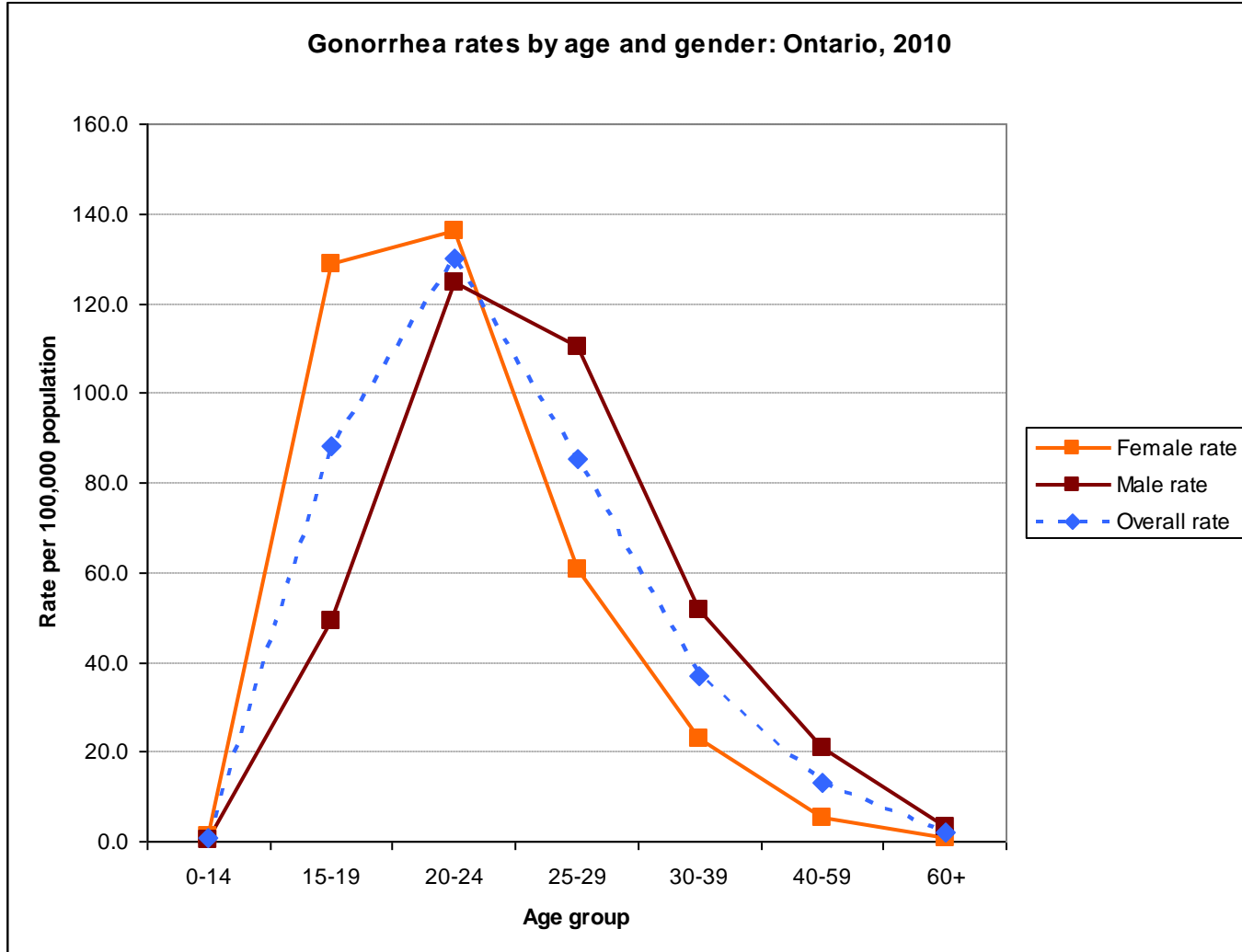
Epidemiology of Gonorrhoea

- Rates are highest amongst men 20-29 and women 15-24
- Rates in **Ontario**: 30.3 per 100,000 (2010)
- Rates in **Canada**: 33.1 per 100,000 (2009)
- Studies have shown that 30% to 60% of infections are asymptomatic or subclinical

Rates of Gonorrhoea in Ontario Among Males and Females



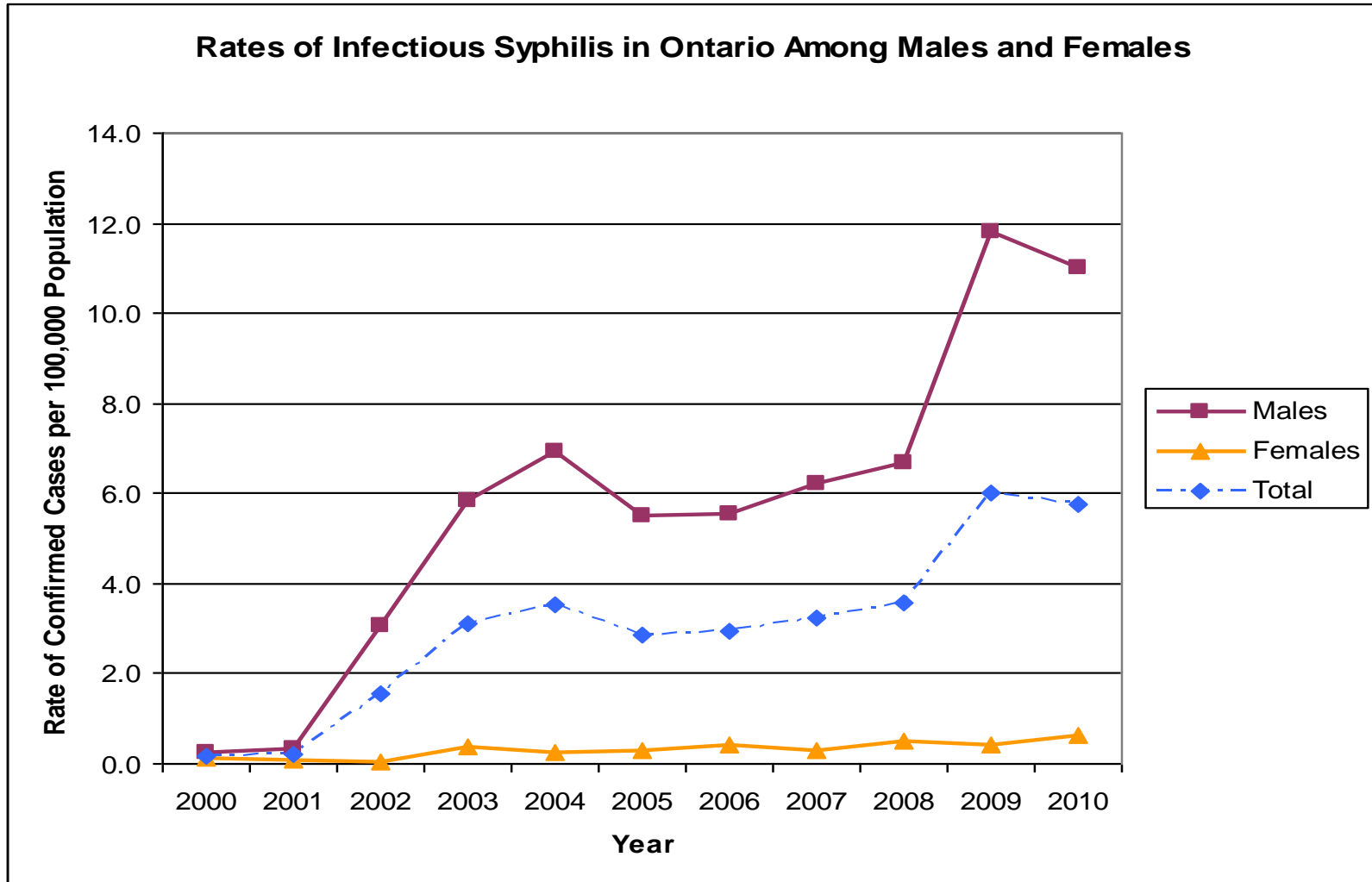
Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [03/14/2011]



Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [03/14/2011]

Epidemiology of Syphilis

- Rates are highest amongst men
- Rates in **Ontario**: 5.8 per 100,000 (2010)
- Rates in **Canada**: 5.0 per 100,000 (2009)
- ~74% of cases in 2010 were among men who have sex with men (MSM)



Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [03/14/2011]

Syphilis – Top 10 Reported Risk Factors in 2010*

Risk Factors	Female		Male	
	N	Percent of Cases Reporting Risk Factor	N	Percent of Cases Reporting Risk Factor
SEX WITH SAME SEX	0	0.0%	525	74.0%
NO CONDOM USED	23	54.8%	384	54.2%
MORE THAN ONE SEX CONTACT IN LAST 6 MONTHS	9	21.4%	324	45.7%
(I) PARTNER WITH MULTIPLE SEX PARTNERS	4	9.5%	84	11.8%
NEW CONTACT IN PAST 1 MONTHS	3	7.1%	73	10.3%
BATH HOUSE	0	0.0%	44	6.2%
TRAVEL OUTSIDE PROVINCE	0	0.0%	43	6.1%
MET CONTACT THROUGH INTERNET	1	2.4%	34	4.8%
SEX WITH OPPOSITE SEX	10	23.8%	31	4.4%
JUDGEMENT IMPAIRED BY ALCOHOL/DRUGS	1	2.4%	26	3.7%

Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [03/14/2011]

* These data are preliminary at this time

Potential Factors Associated with Increasing Chlamydia Cases

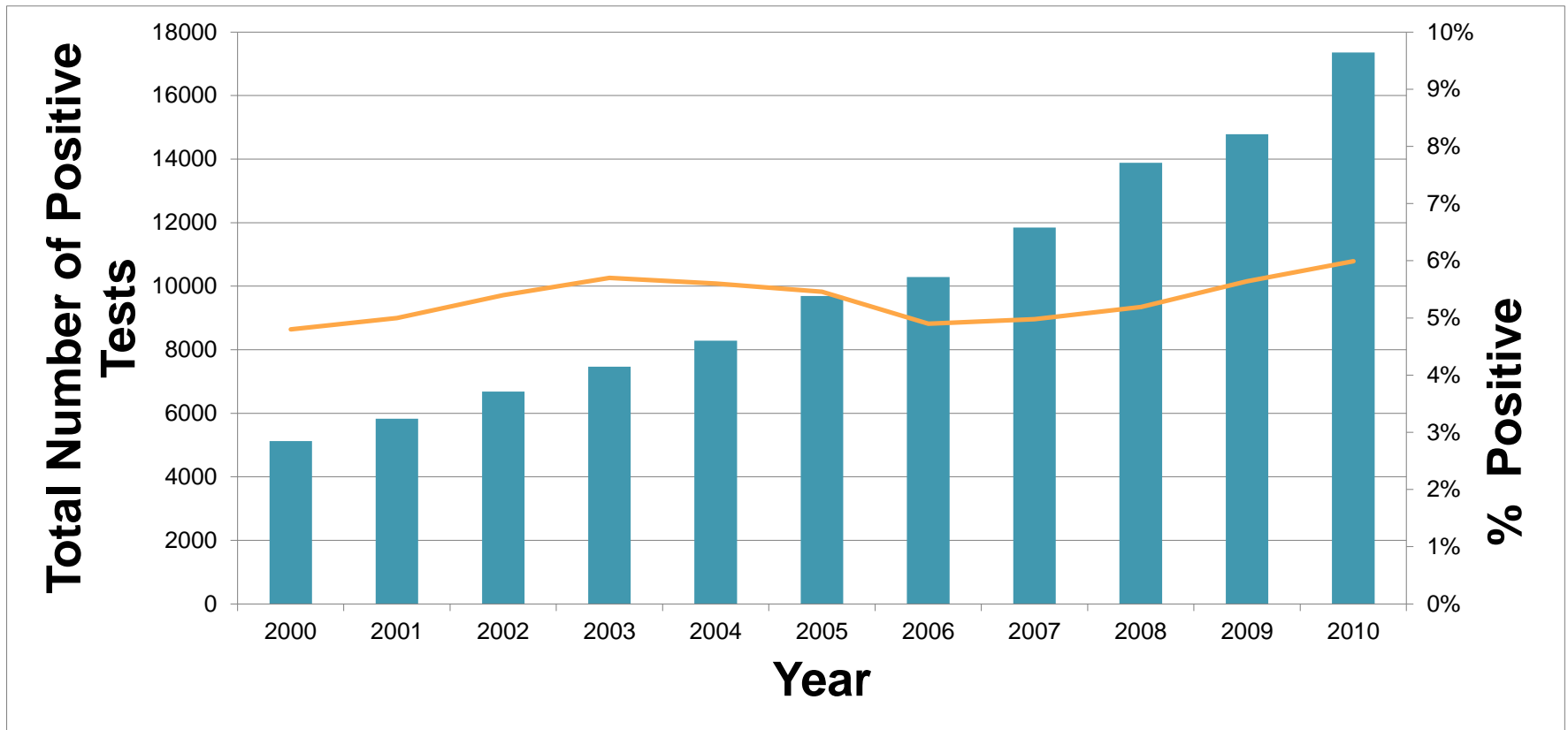
- Improved sensitivity of nucleic acid amplification testing (NAAT): introduced in late 90s in Ontario
- NAAT testing of urine and cervical specimens is more acceptable to patients
- Awareness and knowledge among clinicians and patients has increased
- Increased screening of asymptomatic patients

Potential Factors Associated with Increasing Chlamydia Cases (cont.)

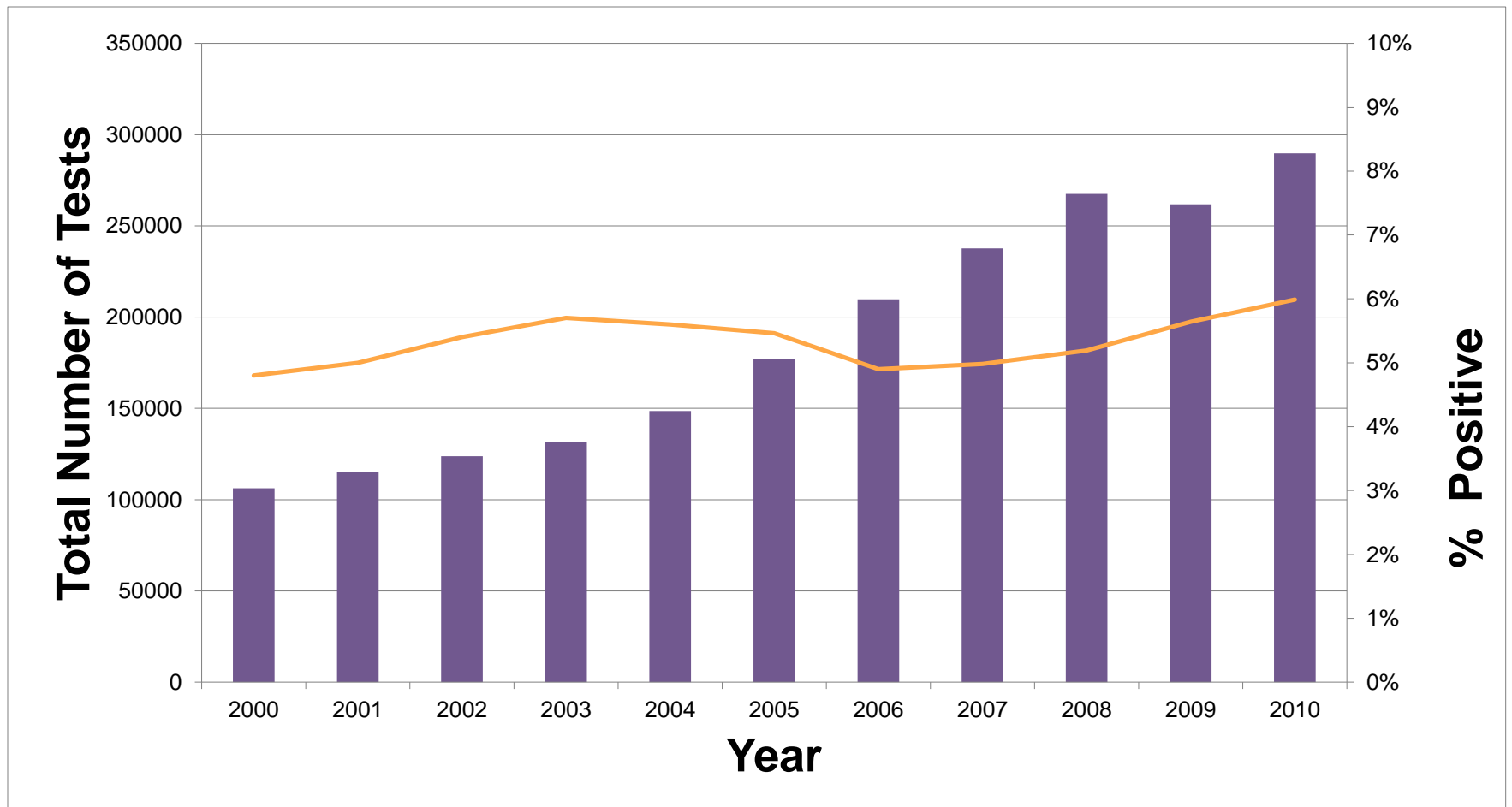
- Higher levels of risky sexual behaviour and therefore higher rates of transmission and cases
- Among a minority of researchers, there is an arrested immunity hypothesis: “Early expanded treatment of Chlamydia arrests the natural immune response and enhances susceptibility to re-infection”*

*Gilbert M, Rekart M. Recent trends in chlamydia and gonorrhoea in British Columbia. *BC Medical Journal*, 2009; 51: 435. <http://www.bcmj.org/recent-trends-chlamydia-and-gonorrhoea-british-columbia>

Yearly Total Number of Positive Chlamydia Tests and Percent Positive from the Public Health Laboratory (preliminary results from Dr Vanessa Allen)



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How to Interpret Public Health Laboratory (PHL) NAAT Testing Data for Chlamydia and Gonorrhea

- How much of the increase number of cases is due to:
 - an increase in prevalence and transmission vs.
 - increased testing of asymptomatic +/- symptomatic patients vs.
 - increase in use of more sensitive testing vs.
 - regional differences
- Difficult to interpret, as PHL only performs an estimated 35% to 55% of all CT/GC NAAT testing in Ontario, while private labs do the rest. We currently do not have access to the private lab data, but are pursuing it.

Interpreting lab data (cont.)

- Increase of 11% to 19% every year of testing volumes of chlamydia from 2004 to 2010. This increase in testing volume has contributed greatly to the increase in reported cases.
- % positive of chlamydia tests from 2004 to 2010 have ranged from 4.98% to 5.99%, with an increasing trend from 2007 to 2010. This increasing trend may represent a slight increase in the prevalence of chlamydia in the population in the past years.
- Dr Allen is working on providing similar graphs to each health unit for 2008 to present.
- We need better surveillance and epidemiological studies to better understand the prevalence and incidence of chlamydia.

The Ontario Conundrum

- The number of reported chlamydia cases continue to increase at a rate of 10% to 15% per year, while the percent-positive is trending slightly upwards since 2006 but not increasing as quickly.
- The increasing number of cases are exerting resource pressures on local public health units with respect to the public health follow-up of sexual contacts for potential testing, treatment and counseling.
- We don't know how effective the public health interventions are: screening, syndromic case management, case counseling, contact tracing and management.
- There are other competing public health priorities.

How effective and cost-effective are our current case and contact management strategies vs. other strategies?

Given the vast majority of our cases are in teenagers and 20s, we need to consider other non-traditional methods

- Patient-delivered partner therapy
- Patient-initiated contact follow-up vs. public health contact follow-up
- Text-messaging or email case and contact management vs. phone call
- Home urine lab screening kits
- Telephone or electronic message reminders for re-screening
- Electronic/internet-based partner notification such as

Beginning to tackle the conundrum by studying the epidemiology of persons who have repeat chlamydia and gonorrhea infections

- One can estimate the burden of disease in such persons relative to persons who only ever have one infection.
- One can potentially identify risk factors associated with this subpopulation.
- One can design and evaluate more geographically-specific or subpopulation-specific interventions to decrease the burden of infections.

Risk Factors for Multiple STIs

- Young age (<25 years of age)
- Resumption of sexual intercourse with an untreated partner
- Previous STI
- High prevalence of STIs in an individual's social networks
- Individuals engaging in high-risk sexual behaviour
- Unsafe sexual practices

Risk Factors for Multiple STIs cont.

- High rates of sexual partner change
- Men who have sex with men (MSM)
- First Nations

The Impact of Repeat Infections

Higher risk for:

- Pelvic inflammatory disease (PID)
- Ectopic pregnancy
- Infertility
- Chronic pelvic pain

Contributing members to repeat bacterial STIs epidemiology

OAHPP

- Colin Lee, Camille Achonu, Jenny Christian, Vanessa Allen, Anne-Luise Winter

MOHLTC

- Michael Whelan, Wendy Bhanich Supapol, Roger Prasad, Emily Karas, Jennifer Pritchard

Toronto Public Health

- Rita Shahin, Dana Al-Bargash, Anthony Leonard

Ottawa Public Health

- Mary Gordon, Dara Spatz Friedman, Andrew Hendriks, Julie Theriault

Algoma Public Health

- Carol Woods

Simcoe-Muskoka District Health Unit

- Jillian Fenik, Sandra Evans, Stephanie Wolfe

Repeat Bacterial Sexually Transmitted Infections

Results of Initial Analyses



Outline

- Results of Repeat STI Project to Date
 - Some Methodological Considerations
 - Impact of Repeat STIs
 - Characteristics of Repeat STI Clients
- Questions and Discussion

Definitions

- **Repeat STI infections**
 - For the same STI - Reported chlamydia or gonorrhoea infections with an encounter date more than 28 days after the encounter date of the first diagnosis.
 - For a different STI - Any chlamydia, gonorrhoea or syphilis infection reported with an encounter date following the encounter date of the first diagnosis.
- **STI co-infection**
 - Chlamydia and gonorrhoea infections diagnosed at the same time i.e. with the same encounter date.

Definitions: Challenges & Considerations

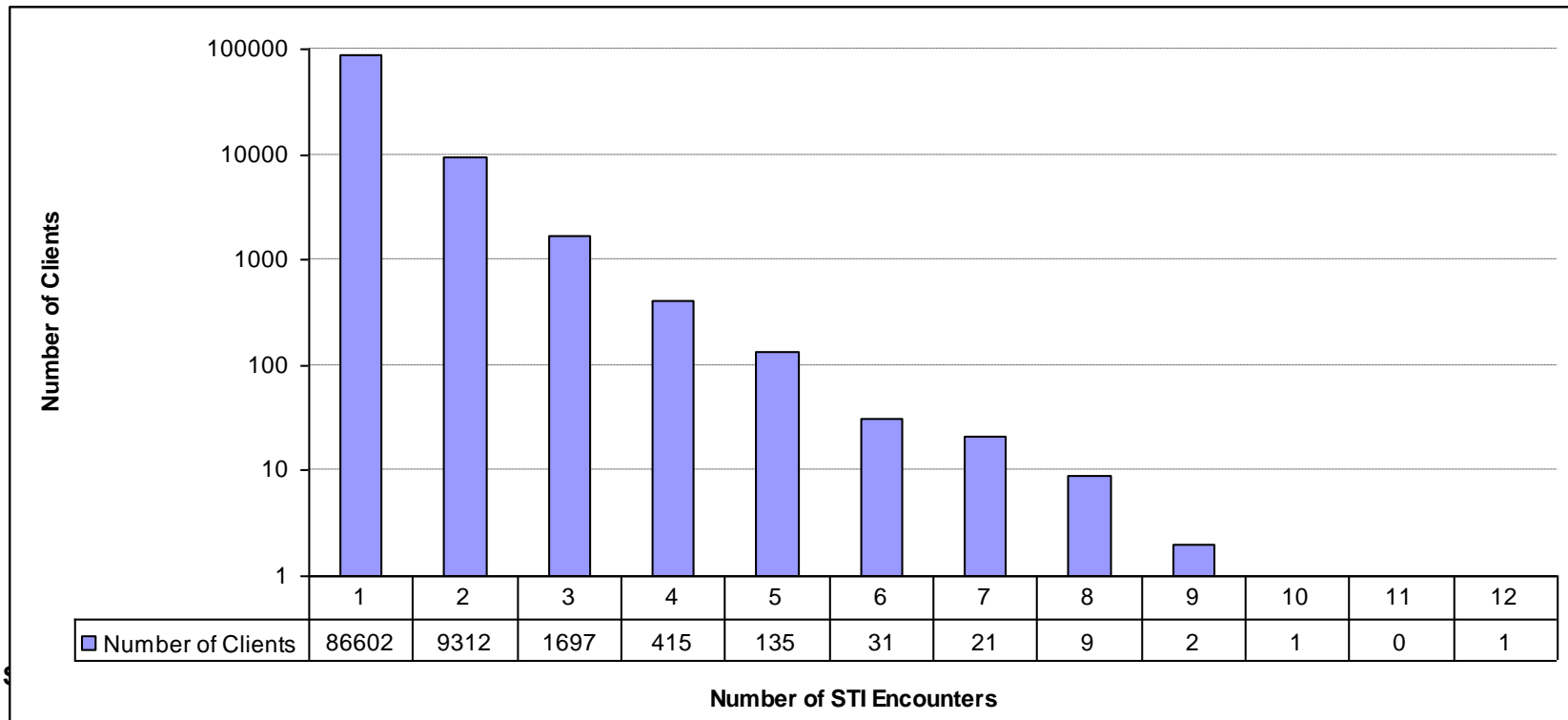
- How do HUs classify subsequent lab reports for an STI for the same client?
- What dates should we use to determine multiple STIs e.g. encounter date vs. treatment date?
- What are physician practices for retesting for an STI after an initial diagnosis?
- What are physician practices for testing for other STIs at the same time or after an initial diagnosis?
- Do these practices vary by region?
- How do we define a co-infection?

Results – Methodological Considerations

- Results are presented by client
- Repeat STIs are counted by encounter in iPHIS
 - Therefore chlamydia and gonorrhoea co-infections listed in one encounter are counted once
- The client's first confirmed STI case was the one used to place that client in time
 - Based on encounter date

Repeat STI Encounters

- Clients with two or more STI encounters accounted for 23.4% (26,495/113,097) of all STI encounters
- Only 2.4% of clients from 2006 to 2009 had 3 or more STI encounters



Clients by year of First STI Encounter

- Almost 100,000 unique clients with a bacterial STI from 2006 to 2009
- ~12% of clients had more than one STI encounter
- Over 18% of clients from 2006 had a repeat STI encounter versus 4.1% from 2009

Client Year of First STI	1 or more repeat STI	Percentage of Clients With Repeat STI	No Repeat STI	Percent of Clients without Repeat STI	Total Number of STI Clients
2006	4,528	18.6%	19,764	81.4%	24,292
2007	3,497	15.1%	19,727	84.9%	23,224
2008	2,533	10.3%	21,975	89.7%	24,508
2009	1,066	4.1%	25,136	95.9%	26,202
Total	11,624	11.8%	86,602	88.2%	98,226

Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [18/06/2010]
PublicHealthOntario.ca

Repeat STI Clients by Person Years at Risk

- Shows an opposite gradient compared to percentage of clients with repeat STI by year of first STI
- The rate in 2009 will likely come down as people who will only ever have one STI continue to add years at risk to the denominator
- Still, the gradient is suggestive of an increase in the number of people getting repeat STIs

Client Year of First STI	1 or more repeat STI	Total Person Years at Risk	Rate of Repeat STI per 1,000 Person Years at Risk
2006	4,528	75369.7	60.1
2007	3,497	53109.4	65.8
2008	2,533	34325.3	73.8
2009	1,066	12604.7	84.6
Total	11,624	175503.2	66.2

Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (IPHIS) database, extracted [18/06/2010]

Repeat STI by Age and Gender

- Nearly 30% of females who had their first STI between 10 and 14 had additional STI encounters compared to 10% in males
- A higher percentage of males than females with their first STI acquired between age 35 and 49 had additional STI encounters

Repeat STI by Age and Gender (cont.)

Age Groups	Percentage of Clients with one or more Repeat STI		
	Female	Male	Ontario Total
10-14	27.8	9.8	25.9
15-19	19.2	14.1	18.1
20-24	11.8	10.9	11.5
25-29	7.8	9.9	8.8
30-34	6.6	9.7	8.2
35-39	5.1	12.0	8.9
40-44	4.1	12.2	9.2
45-49	4.8	10.4	8.4
50-54	4.6	9.9	7.9
55-59	5.7	9.5	8.3
60-64	7.7	6.2	6.7
>65	9.1	5.9	6.7
Total	12.4	11.0	11.8

Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [18/06/2010]

Repeat STI by HU

- Six health units had a higher percentage of clients with repeat STIs than the provincial average
- These health units tend to have higher annual rates of STIs

Health Unit	Percentage of Clients with Repeat STI
NORTHWESTERN	17.1
TORONTO	14.4
THUNDER BAY DISTRICT	13.9
PEEL REGION	13.5
PORCUPINE	12.7
DURHAM REGION	11.9
MIDDLESEX-LONDON	11.4
KINGSTON, FRONTENAC, LENNOX & ADDINGTON	11.3
SUDBURY AND DISTRICT	11.1
CITY OF HAMILTON	11.1
BRANT COUNTY	10.8
ALGOMA DISTRICT	10.6
LAMBTON COUNTY	10.5
CITY OF OTTAWA	10.4
PETERBOROUGH COUNTY-CITY	10.0
NORTH BAY PARRY SOUND DISTRICT	9.9
YORK REGION	9.8
OXFORD COUNTY	9.5
WATERLOO REGION	9.5
WINDSOR-ESSEX COUNTY	9.4
GREY BRUCE	9.3
HALIBURTON, KAWARTHA, PINE RIDGE	9.1
HALTON REGION	8.9
WELLINGTON-DUFFERIN-GUELPH	8.8
EASTERN ONTARIO	8.7
HASTINGS & PRINCE EDWARD COUNTIES	8.7
CHATHAM-KENT	8.5
LEEDS, GRENVILLE AND LANARK DISTRICT	8.3
SIMCOE MUSKOKA DISTRICT	7.9
NIAGARA REGION	7.9
PERTH DISTRICT	7.8
ELGIN-ST. THOMAS	7.5
TIMISKAMING	6.7
HALDIMAND-NORFOLK	6.4
HURON COUNTY	6.1
RENFREW COUNTY AND DISTRICT	5.1
ONTARIO TOTAL	11.8

Lost to Follow-up Comparison

- No difference between the percentage of people with repeat STI lost to follow-up (11.8%) and people with one STI lost to follow-up (11.8%)
- Statistically, no difference ($p > 0.9$)

	<u>Repeat STI</u>		<u>Total</u>
	Yes	No	
Lost to Follow-up	996	7443	8439
Follow-up Occurred	10628	79159	89787
Total	11624	86602	98226

Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [18/06/2010]

Time to Repeat STI

- Majority of clients with a repeat STI had it within 1 year of their first STI
- Overall median time to repeat STI was 280 days
- Median time to repeat for clients with their first STI in 2006 was 318 days vs. 106 days for clients in 2009

Time to Repeat STI	Frequency	Percent	Cumulative Percent
< 3 months	1981	17.0	17.0
3 months to < 6 months	2076	17.9	34.9
6 months to < 1 year	2908	25.0	59.9
1 year to < 1.5 years	1862	16.0	75.9
> = 1.5 years	2797	24.1	100.0
Total	11624	100.0	

Comparison of Number of STI Contacts

- 45,290 (46%) clients had contact information entered for their first STI
- Most clients had 1 or 2 contacts recorded
- Clients with repeat STI had more contacts on average (1.44 vs 1.33, $p < 0.001$)

Comparison of Number of STI Contacts (cont.)

Number of Contacts	Repeat STI			
	Yes		No	
1	3543	72.8%	31537	78.1%
2	926	19.0%	6623	16.4%
3	223	4.6%	1366	3.4%
4	87	1.8%	419	1.0%
5	41	0.8%	168	0.4%
6	21	0.4%	88	0.2%
7	5	0.1%	36	0.1%
8	2	0.0%	23	0.1%
9	1	0.0%	15	0.0%
>=10	20	0.4%	100	0.2%

Source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [30/08/2010]

STI Risk Factor Comparison

- The most commonly reported risk factor for chlamydia and gonorrhoea cases is “No Condom Used”
 - To properly interpret this, additional information on condom use needs to be evaluated
- Most syphilis cases have MSM listed as a risk factor
- The site of STI infection will also be considered

Data Limitations

- Start point was 2006
 - Many clients likely had encounters prior to then
- Some separate chlamydia and gonorrhoea encounters may have been co-infections
- Based only on reported data
 - Clients may have had STIs that went unreported
 - Many clients do not report information to the health unit such as risk factors or number of contacts

Next Steps

- Continue analyses of iPHIS data, such as
 - Do repeat bacterial STIs have a higher risk toward HIV seroconversion?
 - More risk factor analyses
- Using analyses, look at potential interventions, such as
 - Screening intervals for higher risk groups
 - Do we concentrate resources on those who have repeat infections vs “first-timers”?

Questions or Comments?

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