Infection Control in the Community

Réka Gustafson, MD FRCPC
Medical Health Officer
Director of Communicable Disease Control
Vancouver

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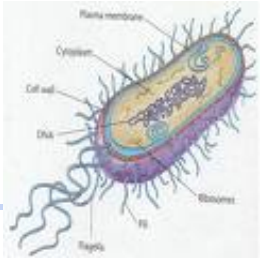
Outline

- Infection Control 101
- Routine practices
  - MRSA
  - HIV
  - Hepatitis C
  - Tuberculosis
  - Outbreaks
- How to stay healthy
- Summary
- Questions

Microorganisms



- They are everywhere
  - estimated at 5 x 10^{30} worldwide

- Include: bacteria, viruses, parasites, fungi, prions
- Most are harmless
- Many are useful part of the nitrogen and carbon cycles; used in baking and food-making;used in genetics, molecular biology
- A few cause disease or infection
  - 3 billion species of bacteria
  - we have speciated only about 0.5%.
  - of those there are about 40 species that cause disease in humans

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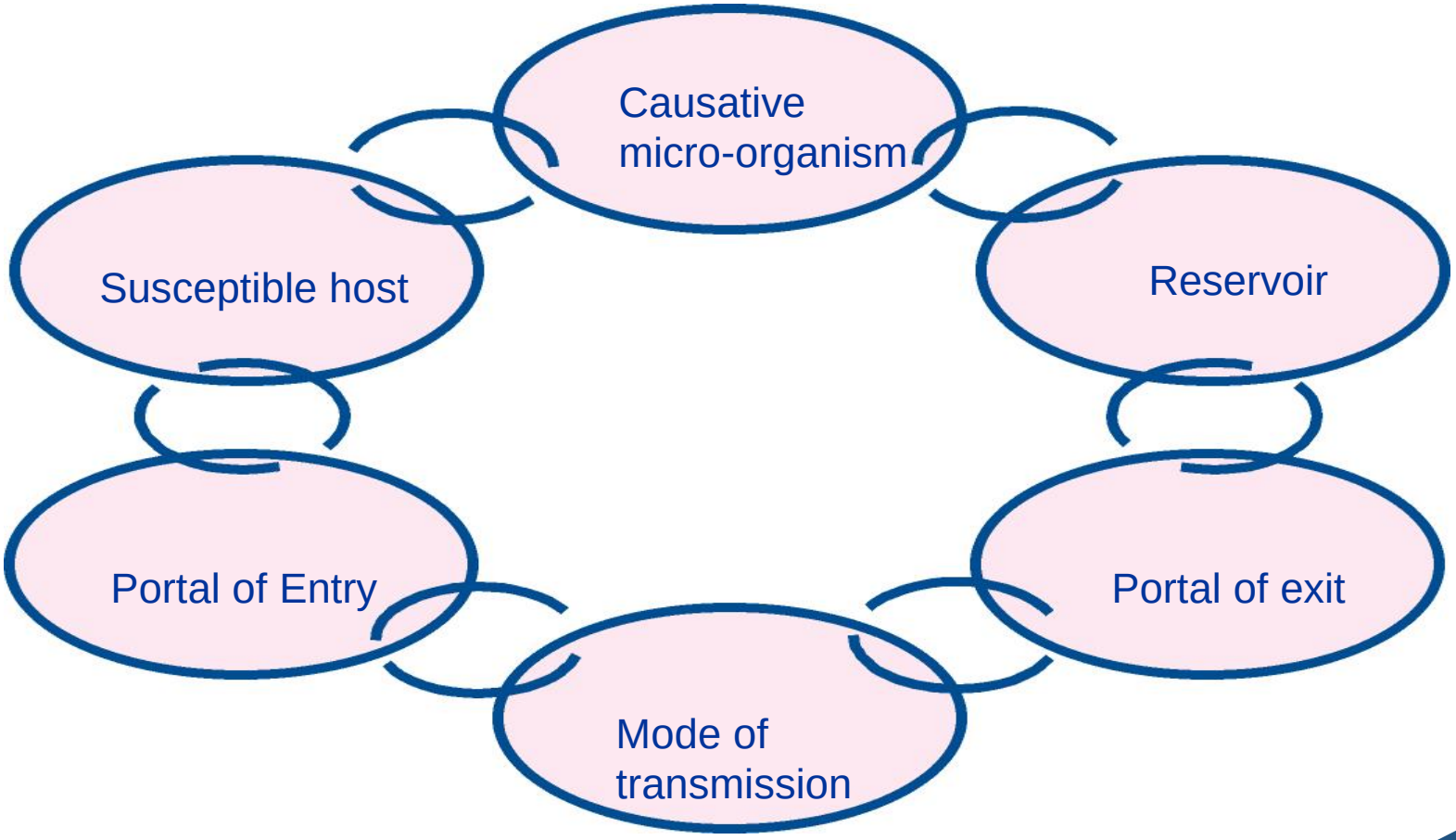
Chain of Infection



Breaking the chain

- Portal of entry
  - Personal protective equipment
- Susceptible host
  - Immunizations, good general health
- Microorganisms
  - Normal part of our environment
- Reservoir
  - Limiting contact with others while infectious
  - Education
- Portal of exit
  - Education
- Mode of transmission
  - Routine practices

Breaking the chain

- **Portal of entry**
  - **Personal protective equipment**
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  - Education
- Portal of exit
  - Education
- **Mode of transmission**
  - **Routine practices**

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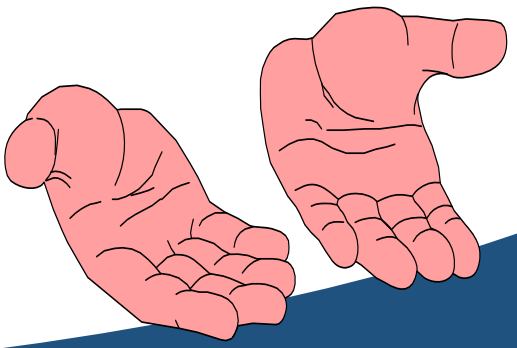
Modes of Transmission

- **Airborne**
  - Organism is spread by aerosolization to *droplet nuclei* (particles < 5 µm)
  - Remain suspended in the air, spread by air currents and inhaled by host
  - e.g. Tuberculosis, Measles, Varicella (chickenpox)
- **Droplet**
  - Generated from respiratory tract by coughing, sneezing into the air (> 5 µm diameter)
  - Travel < 1 meter and settle to the ground
  - May survive on environmental surfaces
  - Come in contact with mucous membrane of the host
  - e.g. Influenza

Contact Transmission

- Direct:
  - Skin to skin
  - Mucous membrane to mucous membrane
    - Sexual transmission
    - Kissing
  - Blood-stream to blood-stream
    - Needle sharing
  - Blood-stream to mucous membrane
    - Splashes of body fluids in eyes/mouth
- Indirect
  - **CONTAMINATED HANDS**
  - Sharing drinks, cigarettes, joints
  - Sharing needles for injection drug use
  - Environment
    - Norovirus



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Other Modes of Transmission

- **Common Vehicle**
  - Food, water
  - Medication, IV fluid
  - Equipment

- **Vector borne**
  - Insects
    - E.g. WNV,

Routine Practices

- Apply to all body substances, secretions, excretions, mucous membranes and non-intact skin on all clients, all the time, regardless of the diagnosis
- Effective, practical, common-sense

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Hand Hygiene

most effective

method to prevent the spread of infection

Access to:

- Sinks with warm water
- Self-contained pump soap dispenser (not bars)
  - Non-medicated
  - Not anti-microbial
- Disposable, one at a time paper towels
- Paper towel dispenser

- Alcohol-based hand sanitizers
- Hand lotions
- Reinforce hand hygiene with staff, clients, families, visitors, etc

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Reminder Signs

Hand Hygiene with Alcohol-based Hand Sanitizer

1. Remove jewelry. Apply enough product to open palms.** 	2. Rub hands together palms to palms 	3. Rub in between and around fingers 
4. Cover all surfaces of the hands and fingers 	5. Rub backs of hands and fingers. Rub each thumb. 	6. Rub fingertips of each hand in opposite palm 

7. Keep rubbing until hands are dry.

**The volume required to be effective varies from product to product. Enough product to keep hands moist for 15 seconds should be applied.

Do not use these products with water. Do not use paper towels to dry hands.

Note: Wash hands with soap and water if hands are visibly dirty or contaminated with blood or other body fluids. Certain manufacturers recommend washing hands with soap and water after 5-10 applications of gel.

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Hand washing

Seems obvious but…

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Personal Protective Equipment basics

- **Protect yourself from contact or splash or spray**
  - **Gloves**
    - **Gowns**
    - **Masks**
  - **Then wash your hands**

If it's moist and not yours, protect yourself

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Needles in the community

- To dispose of used needles safely:
  - Don’t touch used needles with your bare hands.
  - Wear disposable gloves or washable rubber gloves.
  - Use tongs to pick up the needle.
  - Put the needle in a container that cannot be punctured by the needle.
  - A plastic milk jug or large plastic pop bottle with a screw-on lid will do.

    (The best container is a “sharps container” which is made for used needles. A sharps container is hard-sided and there is less risk of theneedle poking through the container.)
  - Take the container to the needle; don’t carry the needle to the container.
  - Do not hold the container when you put the needle into it.
  - Close the container with a lid
  - Put container in garbage can, not recycling bin
- Wash your hands with soap and water

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The Coughing Client

- Provide tissues
- No-touch waste containers
- Alcohol hand sanitizer
- Consider-Masks for clients who are coughing
- Post signs on cough etiquette

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Your Health

- Minimize risk of acquiring and spreading an infection
- Immunization
  - Childhood (MMR, DPPT, etc)
  - Annual Influenza
  - Consider Hepatitis B, TB testir
- Education-Keep Informed
- Practice safe work habits
- Stay home if sick
- Blood and Body fluid exposure plan

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MRSA

Methicillin resistant
Staphylococcus aureus (MRSA)

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MRSA: what it is not

- It is *not a* superbug
- It is just a bacterium
- MRSA usually does not cause disease

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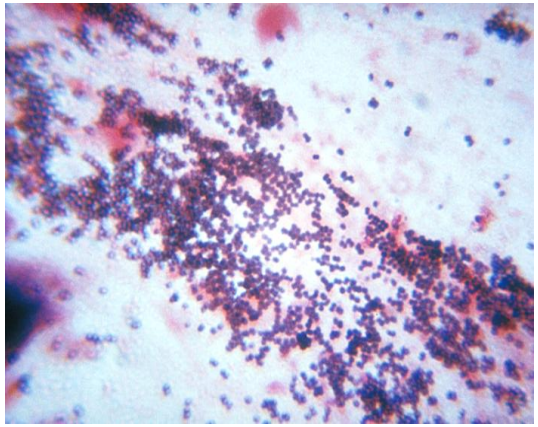
MRSA: What it is

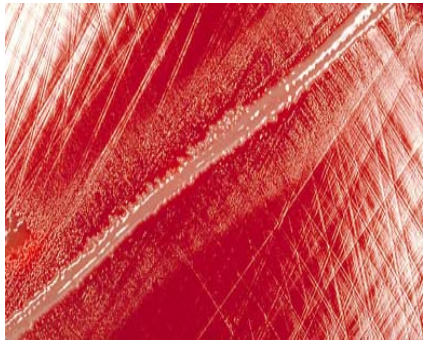
The 'SA' part: Staphylococcus aureus

- 32% nose or skin carriage in general population
- Can cause impetigo, skin infections, abscesses, wound infections, invasive infections
- Most of the time, it causes no symptoms at all
- Spread via direct skin-to-skin contact, contact with open wounds, contaminated surfaces

Methicillin Resistant *Staphylococcus aureus*

- MRSA: *S. aureus* that is resistant to the semisynthetic penicillins (methicillin, oxacillin, cloxacillin)
- Resistance to antibiotics is a normal evolutionary response to the use of antibiotics





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Time from Drug Introduction to Appearance of Resistant *S. aureus* Isolates

Drug	Year drug introduced	Years to report of resistance	Years until 25% rate in hospitals	Years until 25% rate in community
Penicillin	1941	1-2	6	15-20
Vancomycin	1956	40	?	?
Methicillin	1961	<1	25-30	40-50 (projected)

Chambers HF. EID 2001;7:178-182

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History of MRSA

- 1928: Antibiotics discovered
- 1940s: Antibiotics widely available
- **1950**s: *S. aureus* resistant to penicillin
- 1959: Methicillin and oxacillin available
- 1961: MRSA detected in UK
- 1980-90s: Increase in MRSA in hospitals
- 1993: First report of CA-MRSA-Australia
- 2000's CA-MRSA-gains national attention (outbreaks, sports teams, etc)

MRSA

- Initially, mostly seen in hospitals
- More recently, emergence of a strain of MRSA in the community: CA-MRSA
  - Outbreaks in:
  - Correctional facilities, military recruits, competitive sport participants, day care attendees, men who have sex with men, First Nation communities, Tattoo recipients, healthy newborns born in the same facility
- CA-MRSA is particularly likely to cause skin and soft–tissue infections, and occasionally severe invasive infections such as pneumonia
- But CA-MRSA is sensitive to more antibiotics

How common is MRSA?

- Not known, because not everyone is tested
- Believed to be increasing in the entire population
- 7.4% of IDU in the DTES in 2000; 18.6% in 2006
- This is believed to be a reflection of an increase in the general population
- Lack of access to hand washing and poor housing is likely a contributing factor

MRSA: Contact Transmission

- **Unwashed hands** - transiently colonized
- Contaminated environmental surfaces
- Contaminated medical devices

Leads to colonization or infection

How to Prevent Spread:

- Hand hygiene : wash hands
- Routine infection control practices
- Routine cleaning-environment, equipment
- Cover wounds

Do not exclude from community settings

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Issues in the Community

- Stigmatization
- Delay in Treatment and Care
- Refused admission to programs
- Cannot participate in activities
  - Play groups, day cares, swimming pools
- Fear
  - Pass it on to children, loved ones
  - Death
  - Never recover
- Breach of Confidentiality
  - Signs, labeling, “different”

MRSA Summary

Is MRSA more common in the DTES?

- Not known, but probably

Why?

- Individual vulnerabilities:
  - Poor housing
  - Lack of access to hand washing facilities, laundry
  - Chaotic lives that prevent people from practicing good hygiene

What about service providers?

- MRSA is everywhere, not just in the DTES
- Service providers do not have the same individual vulnerabilities
- Practice good hand hygiene always and everywhere

  ➔reduces risk

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Tuberculosis

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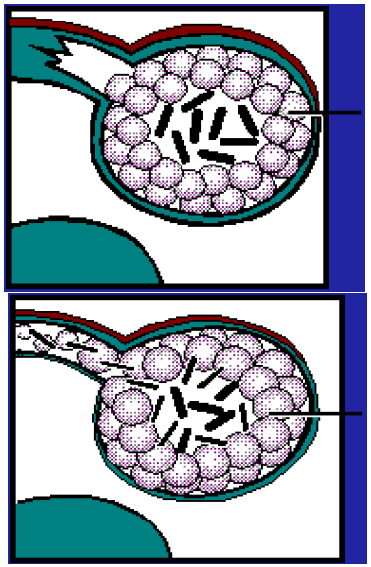
Pulmonary Tuberculosis

Causative organism: the bacterium *Mycobacterium tuberculosis*

Transmission: Airborne

- Spread from person to person when small droplets are expelled into the air during coughing or sneezing
- Droplets can remain in the air for prolonged periods
- Not as contagious as many other diseases, such as influenza or chicken pox, but daily exposure or close contact with an individual with TB can result in transmission
- Not everyone who is exposed to contagious TB will become infected; risk of transmission depends on
  - How contagious the case is
  - How long the exposure is
  - Ventilation
  - Virulence of the organism
  - Susceptibility of the host

Active versus Latent Tb



Latent Tb (LTBI)

- Most people who are infected with TB
- No symptoms
- Not infectious
- May progress to active TB (10% over lifetime)
- Can be treated to prevent development of active TB
- People on treatment for latent TB are NOT contagious

Active Tb

- Some people with latent TB infection (LTBI) go on to develop TB disease (active TB)
- Weight loss, fever, night sweats and cough
- Infectious (to varying degrees)
- Active TB is curable but treatment may be daily oral medication for 6-9months
- People on treatment for active TB are usually non-infectious by 2-4 weeks after beginning of treatment

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Relative Risk of TB reactivation

LTBI and no risk factors	~ 5% within 2 years of LTB1 10% over life
LTB1 and diabetes	30% over life
LTBI and HIV infection	7-10% per year

Who gets infected with TB?

- Anyone: but risk in the general population in Canada is low
- Born in countries where TB is common (China, Vietnam, Philippines, Hong Kong, India, East Europe, Africa, Mexico, Korea)
- Family, friends and those who are in **close** contact with TB diseased person
- Those living in substandard housing and in poverty

Who gets active TB disease?

Anyone infected with *Mycobacterium tuberculosis* can get active TB disease, especially if they have:

- HIV infection
- Diabetes
- Poor nutrition
- Chronic illnesses such as kidney failure
- Taken cancer medications and other immune suppressive medications

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TB in British Columbia-2006

- 331 new active cases
- 7.7 per 100,000 = 22% increase from 2005
- Vancouver (18.1) and Richmond (12.6) have the highest rates
  - Vancouver-108 cases
  - Richmond-22 cases

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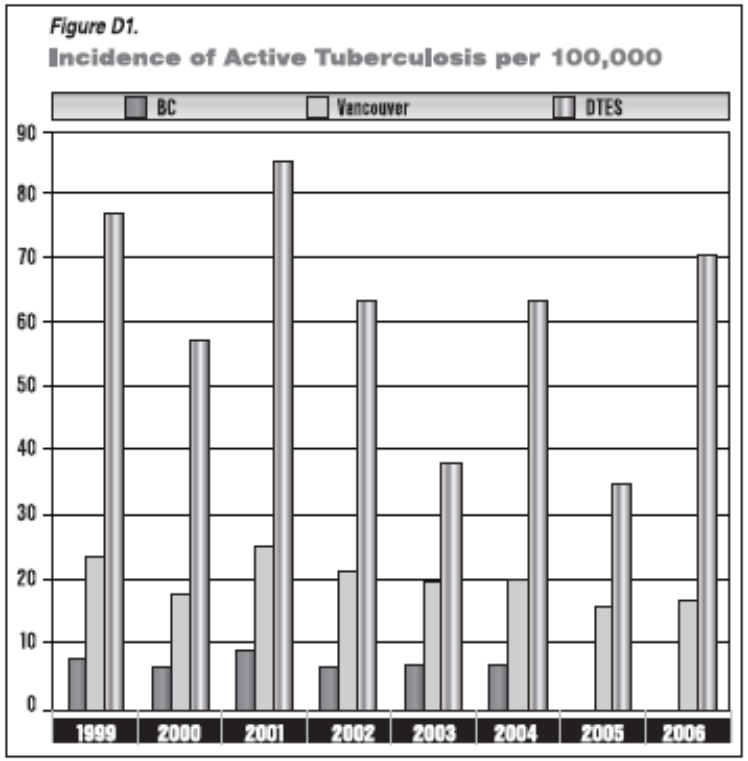
How common is TB in the DTES?

In BC ~ 300 cases/year

In Vancouver ~ 100 cases/year

In DTES ~ 12 cases/year

- Since the DTES is small, 12 cases per year makes for a very high rate of active TB
- But most cases of TB in BC and in Vancouver occur outside of the DTES



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Tuberculosis Summary

Is Tuberculosis more common in the DTES?

- Yes

Why?

- Individual vulnerability to reactivation such as HIV infection, alcohol abuse, diabetes, poor nutrition, substandard housing, poverty
- Some local transmission, but this is a lesser factor in the incidence of TB than the risk factors for reactivation

What about service providers?

- Service providers do not have the same individual vulnerabilities
- Be aware of the potential for TB and routine practices for prevention of transmission

How to prevent Tb?

- Stay healthy
- Routine practices
- Be aware of Tb as a possibility in someone with a persistent cough, especially when associated with weight loss, night sweats, and looking sick
  - Advise to seek medical care
  - Ask client to wear a mask (if appropriate)
  - Open windows
  - Limit duration of exposure

HIV

Causative organism: Human Immunodeficiency Virus

- HIV attacks the immune system, resulting in a chronic, progressive illness.
- Individuals infected with HIV are vulnerable to opportunistic infections and cancers
- Treatment with HAART, no cure
- No vaccine on the horizon

Transmission

- HIV is transmitted when blood or body fluids from an infected person come into contact with another person's mucous membrane, non-intact skin or through sharing needles or penetrating needle injury

- Most common routes of exposure:
  - Sex
  - Sharing contaminated needles

- Not transmitted via casual contact
- Needles found in the community pose minimal risk, because HIV does not survive well outside the body

How common is HIV?

In 2006

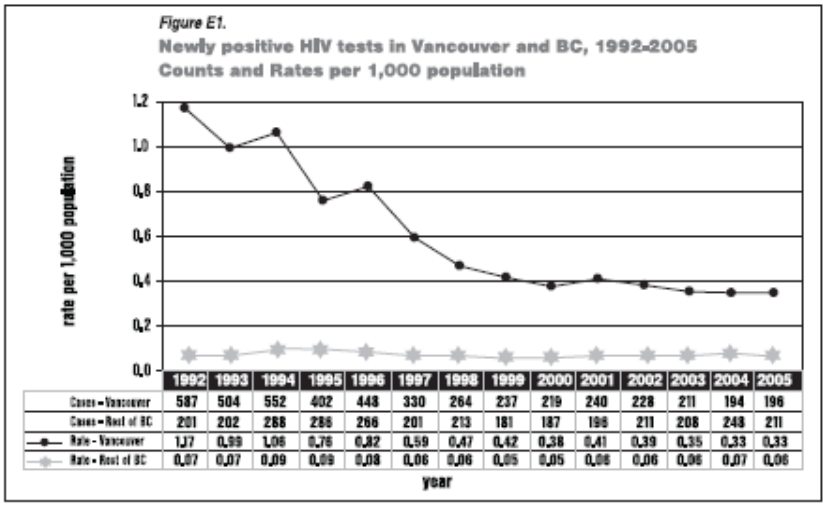
- In BC: 383 newly diagnosed cases
  - 147 in MSM
  - 95 in IDU
- In Vancouver
  - 183 newly diagnosed cases

VIDUS: Open cohort of 1,400 IDUs

- Prevalence of HIV
  - 35%

In Canada, HIV is

- Increasing among MSM
- Decreasing among IDU
- Increasing among women and aboriginal people



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Cases - Vancouver	587	504	552	402	448	330	264	237	219	240	228	211	194	196
Cases - Rest of BC	201	202	288	286	266	201	213	181	187	196	211	208	248	211
Rate - Vancouver	1,17	0,99	1,06	0,76	0,82	0,59	0,47	0,42	0,38	0,41	0,39	0,35	0,33	0,33
Rate - Rest of BC	0,07	0,07	0,09	0,09	0,08	0,06	0,06	0,05	0,05	0,06	0,06	0,06	0,07	0,06

Table E1.
Persons with newly positive HIV tests in Vancouver HSDA, 1995-2005, by CHA

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Vancouver - City Centre	245	284	214	158	144	141	146	132	126	112	113
Vancouver - DTES	96	102	66	55	45	40	41	38	34	38	40
Vancouver - North East	15	15	14	6	5	13	7	8	7	7	10
Vancouver - Westside	11	15	8	6	6	5	5	19	4	11	4
Vancouver - Midtown	23	18	9	16	4	6	11	19	16	13	20
Vancouver - South	9	5	3	8	6	0	4	4	2	6	5
Vancouver - CHA unknown	2	23	15	14	16	12	16	9	12	7	4
Vancouver HSDA total	401	462	329	263	226	217	230	229	201	194	196
% total Vancouver in DTES	23.9	22.1	20.1	20.9	19.9	18.4	17.8	16.6	16.9	19.6	20.4

HIV Summary

Is HIV more common in the DTES?

- Yes

Why?

- Individual vulnerabilities : injection drug use, sex trade

What about service providers?

- HIV is not transmitted via the type of contact that service providers normally have with their clients
- Accidental blood and body fluid exposures in non-medical settings are rare
- If blood and body fluid exposures are possible in the course of your work, have a plan

Blood and body fluid exposure plan example

- Allow wound to bleed freely, cleanse area/puncture site with warm water & soap
- If eye exposure or other mucous membranes flush with running water for 10-15 minutes
  - First aid
  - Emergency department-for assessment and treatment **within 2 hours**
  - Assess Risk-BCCDC Blood and Body Fluid Exposure Management in the Communicable Disease Manual at www.bccdc.org
  - Forms – HLTH-2339 (lab) HLTH 2340 (physician follow-up)

Hepatitis C

Causative Organism: Hepatitis c virus (hcv)

- a disease of the liver
- ~ 25% clear the virus within 6 months of becoming infected
- ~ 75% develop chronic hepatitis C
- Treatment is available : prolonged and does not always work
- No vaccine

Transmission: HCV is primarily transmitted through direct contact with blood

- sharing of needles and other injecting equipment during intravenous drug use
- sharing snorting and smoking equipment such as straws and pipes.
- blood transfusion, blood product or organ transplants, prior to 1992
- sex (uncommon)
  - sex with multiple partners, presence of other STIs or HIV ,sex with trauma
- infected mother to her baby at birth

Symptoms

- <25% have fatigue, anorexia, abdominal discomfort, nausea or jaundice after infection
- Liver disease usually progresses slowly
  - 10-20% will develop cirrhosis after 20 years
  - Some develop liver cancer or require liver transplantation

How common is Hepatitis C?

Prevalence of chronic HCV:

Worldwide : 170 million

Canada: 250,000

BC : 60 000 (with 1/3 unaware of their infection)

VIDUS: 90% have HCV

New cases?

– Very hard to measure, because people don't always test when they are first infected.

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HCV Summary

Is HCV more common in the DTES?

- Yes

Why?

- Individual vulnerability due to injection drug use

What about service providers?

- Service providers are unlikely to be exposed to Hepatitis C through routine activities
- Somewhat greater risk through community needles than HIV, because HCV is viable for longer outside the body, but risk is still small

How to protect yourself from HCV?

- Routine practices
- Safe sharps disposal
- Do not share personal items such as toothbrushes, razors, etc.

Outbreak of bacterial diseases in the DTES

Invasive Pneumococcal disease

- Largest community outbreak of invasive pneumococcal disease with 137 cases
  - Many required ICU admission
- Mass immunization campaign, with 6000 doses of vaccine distributed

Who got sick?

- Homeless, those addicted to crack cocaine or alcohol, HIV and/or HCV infected, those with chronic illnesses

Who did not get sick?

- Healthy people who provide services in the DTES

Shigellosis

- gastrointestinal illness with bloody diarrhea

Who got sick?

- Homeless, those who stay in shelters, those who use food kitchens

Who did not get sick?

- Most healthy people in the DTES
- Sporadic cases in the community

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Outbreaks of bacterial diseases in the DTES

Are they more common in the DTES?

- Yes

Who tends to get sick?

- Homeless, those addicted to crack cocaine or alcohol, HIV and/or HCV infected, those with chronic illnesses

Why?

- Poor housing, limited access to hand hygiene equipment, poor general health, addictions etc…

Who tends not get sick?

- Healthy people who provide services in the DTES

Why?

- Aware of risks
- Get vaccinated
- Access to basics of infection control such as hand-washing

What can you do to protect yourself?

- Routine practices
  - everywhere, all the time; not just in the DTES
  - Don’t spend 90% effort on 10% of the risk

- Transmission related precautions when needed
- Have routine immunizations up to date
- Good general health

Excellence is an art won by training and habituation. We do not act rightly because we have virtue or excellence, but we rather have those because we have acted rightly. **We are what we repeatedly do. Excellence, then, is not an act but a habit.**

– **Aristotle**

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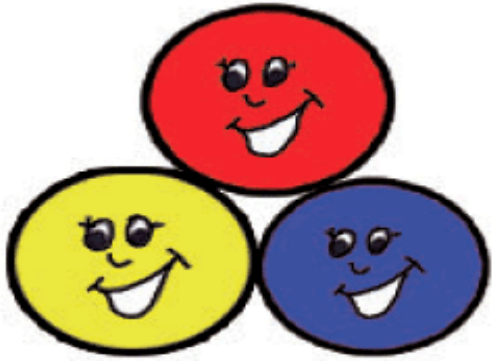
Acknowledgements

- Louise Holmes
- Dr. Edith Blondell-Hill



Questions?