Clostridium difficile infection surveillance: Applying the case definition

PICNet Conference March 3rd 2016

Presented by:
Tara Leigh Donovan, MSc

Managing Consultant (Former Epidemiologist)

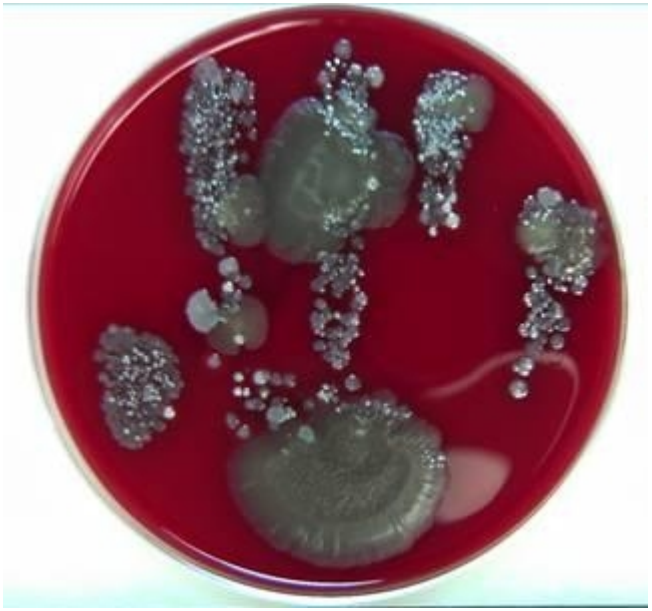
Disclaimer

- A UVGI technology is named in slide 30. The reason for selecting this device was because trials have been performed in two other regions using alternative devices. For the benefit of adding to the evidence available in the province, Fraser Health made a decision to trial a different system. IPC Program purchase of a UVGI device has not been determined at this time.

fraserhealth

Upcoming…

- CDI
  - Background/literature
  - Case definition
  - Fraser Health picture
  - Case review
  - Initiatives



fraserhealth

C difficile Infection Background

- *C. difficile* is the most common healthcare-associated pathogen in USA (Muto)
- CDC named *C. diff* as an urgent threat because of its association with antibiotic use and,
- CDI is a major cause of morbidity and mortality (Furuya-Kanamori)

fraserhealth

C difficile Infection Background

- Symptomatic CDI occurs through the generation of toxins that are cytotoxic to epithelial cells of the colon, causing widespread inflammation and epithelial tissue damage to the host
- Toxins A and B are implicated as the major virulence factors of *C difficile* as well as the binary toxin (associated with B1/NAP1/027) (Furuya-Kanamori)

fraserhealth

C. difficile Infection Background

- 3% to 7% of healthy adults are colonized with *C. diff*
- Asymptomatic colonization is more common among people with inpatient healthcare encounters
- 4.4% to 15% of people are colonized on admission to hospital
- CDI is the cause of diarrhea in 5%-10% of inpatients that have diarrhea and are tested for *C. diff*
- Diarrhea is frequent among people with healthcare encounters which complicates the matter of identifying an infection
- CDI affects less than ~1% of hospitalized patients

(Dubberke)

fraserhealth

C. difficile Infection Background

- 2/3 of patients with fecal *C. diff* colonization remain long-term carriers (Muto)
- Up to 50% of long-term care residents are colonized (Dubberke)
- Depending on the patient population, 1 - ~50% of patients are colonized with *C. diff*

fraserhealth

C. difficile Infection Background

- CDI diagnosis is challenging due to a higher number of people with asymptomatic *C. diff* colonization compared to people with CDI in the community and hospital (Dubberke)
- Asymptomatic *C. diff* colonized patients can shed spores, but there is disagreement in the literature about how much they do this and the impact of shedding in the environment or to other patients is unclear
- Asymptomatic *C. diff* colonized patients may be protected from progression to infection because they can increase an immune response to clostridial toxins (Furuya-Kanamori, Shim)

fraserhealth

C. difficile Infection Background

- Without clinical data it is impossible to determine if a positive *C difficile* diagnostic assay represents asymptomatic *C. diff* colonization or CDI (Dubberke)
- Patients that were C diff negative by toxin enzyme immunoassay (EIA) but PCR + had significantly;
  - less severe diarrhea at the time of testing,
  - more rapid resolution of diarrhea,
  - Fewer CDI-related complications or deaths

  Compared to patients positive by toxin EIA and PCR (Polage)
  - Risk of over-diagnosis if only testing with PCR

fraserhealth

C. difficile Infection Background

- According to a CDC *Clostridium difficile* Surveillance Working Group (2007), the gold standard for CDI surveillance is a chart review to match clinical symptoms with laboratory results
- Labor and resource intensive and difficult to implement consistently across facilities

fraserhealth

C. difficile Infection Background

- Gase et al. compared lab-identified reporting vs. clinical infection surveillance for CDI
- ~ 80% match between lab ID event data and clinical surveillance data
- Additional finding:
  - 14.6% of cases were unreported because of lack of documentation of symptoms; this can be addressed by stressing appropriate testing methods on only unformed stool, among other things

fraserhealth

C. difficile Infection
FH Case Definition

The case definition of *Clostridium difficile* infection is met when **one** of the following criteria is met:

1. Laboratory confirmation by positive toxin **AND**

a. Acute onset of diarrhea* above what is normal for the individual and cannot be attributed to another cause (e.g. laxatives, medication side effect, diet, or medical condition) **OR**

b. Diagnosis of toxic megacolon.

*defined as 3 or more unexplained liquid stools (that take the shape of the container / Bristol Stool Chart 6 - 7) that continue for a minimum of 24 hours

fraserhealth

C. difficile Infection Case Definition

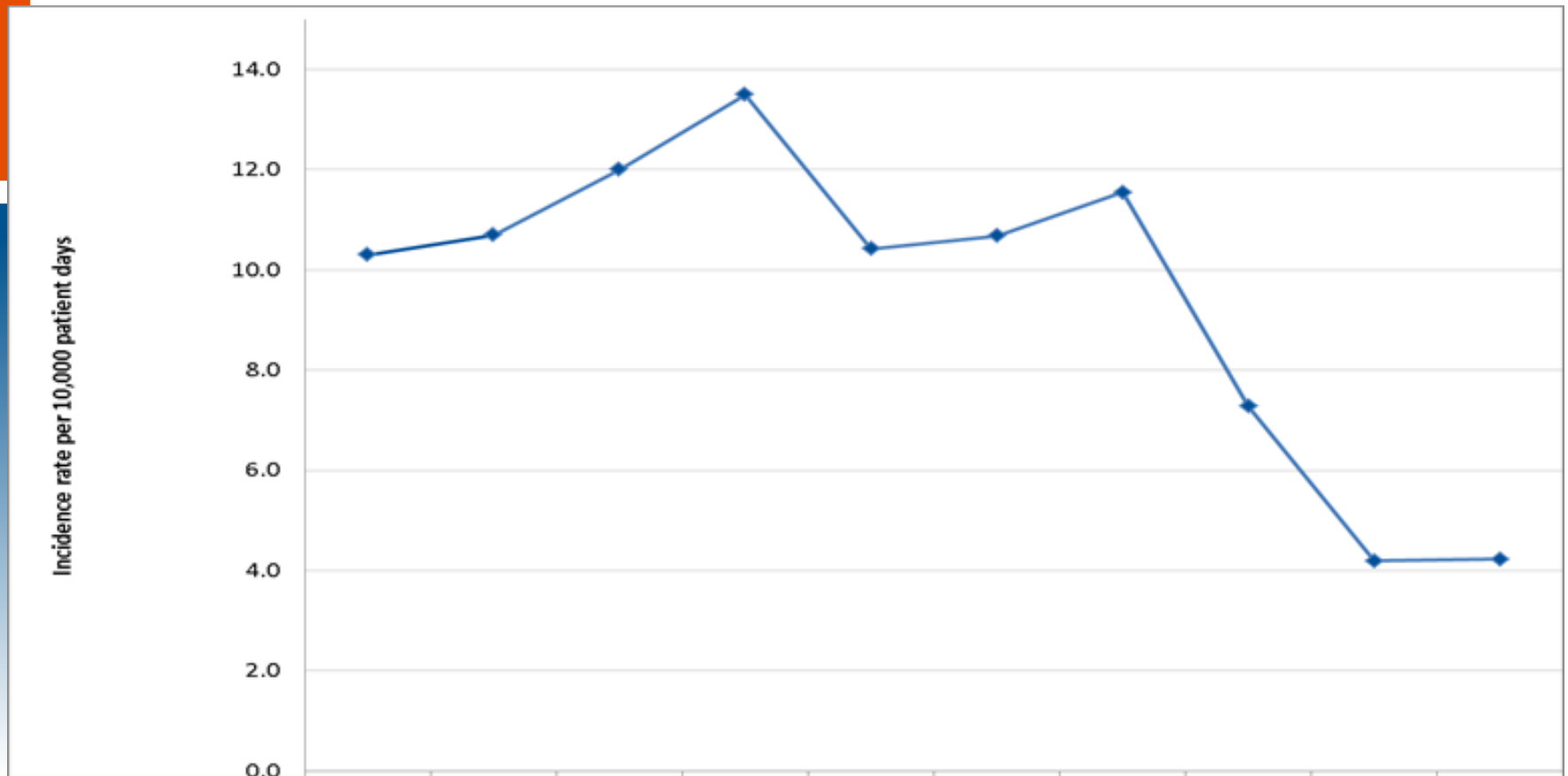
2. Diagnosis of typical pseudo-membranous colitis on sigmoidoscopy, colonoscopy

OR

3. Histological/pathological diagnosis of CDI with or without diarrhea

fraserhealth

CDI in Fraser Health



	FY 2005/06	FY 2006/07	FY 2007/08	FY 2008/09	FY 2009/10	FY 2010/11	FY 2011/12	FY 2012/13	FY 2013/14	FY 2014/15
# of New CDI	725	843	945	1150	908	1007	1141	737	435	443
CDI Incidence Rate	10.3	10.7	12.0	13.5	10.4	10.7	11.5	7.3	4.2	4.2

fraserhealth

CDI in Fraser Health

- A chart review and assessment of the case definition is completed for every lab confirmed C difficile result
- ~10-40% of *C. diff* positive laboratory results are deemed non-case after clinical review
- 80% of *C. diff* tests are negative

fraserhealth

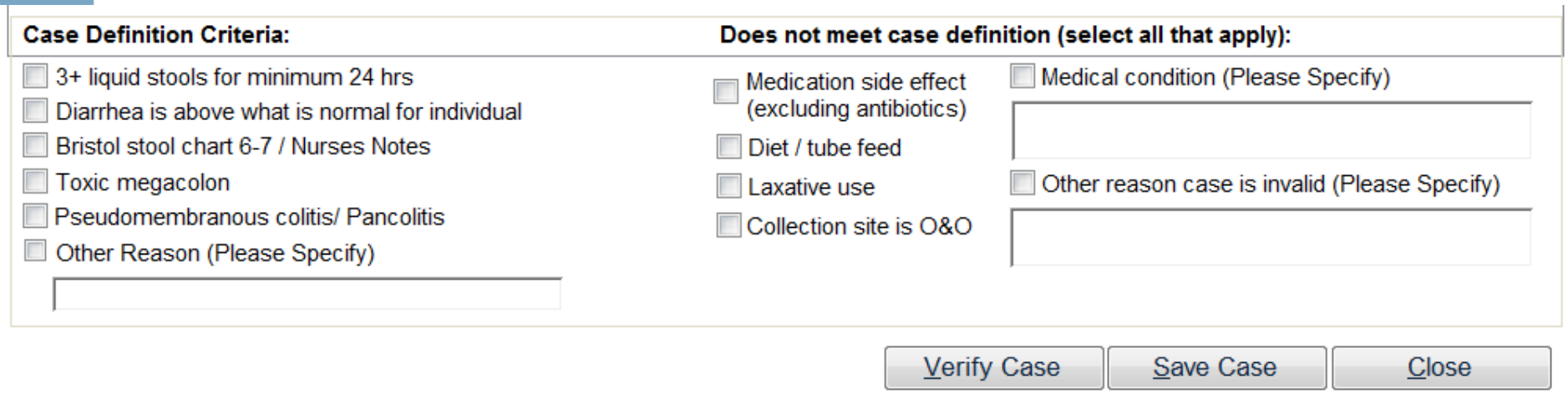
C. difficile Review

- Purpose: quality assurance of the appropriate application of the CDI case definition and to evaluate the review process of the new CDI surveillance system
- Methodology: Conservative random sample of non-cases selected from fiscal periods 1 to 7 2014/15
- Random sample of cases included to blind reviewer
- Experienced IPC Consultant reviewer

fraserhealth

FH *C. difficile* System

- FH implemented an enhanced electronic system that includes a process to review cases and capture relevant clinical information
- Negative *C. diff* lab results are stored
- Case definition is applied for all positive lab results



fraserhealth

CDI Case Review Results

Site#	Total Non-case	Total Case	Total Sample	Total Cases Assessed	Total Initial Discrepant	Total Non-cases changed to case*	% change
1	4		4	4	1	1	25%
2	11	2	13	11	4	1	9%
3	11	2	13	14	6	5	36%
4	7		7	6	1	1	17%
5	3		3	1	0	0	0%
6	17	1	18	18	2	0	0%
7	28	1	29	27	3	1	4%
8	14		14	12	6	5	42%
9	2	1	3	2	0	0	0%
10	11	1	12	10	0	0	0%
11	17	1	18	18	2	2	11%
12	17	1	18	16	2	0	0%
13	6		6	6	0		0%
	148	**10**	**158**	**145**	**27**	**16**	11%

fraserhealth

Results

- A portion of cases were not assessed by the reviewer (~8%)
- Case reviewer inquired with practitioner about rationale for initial decision
- Non-disclosure of case reviewer's decision
- Final decision established
- Case adjustment completed

fraserhealth

Discussion

- Two sites experienced the highest number of non-agreement (42% and 36% respectively)
- In total, 16 (11%) non-cases were changed to cases
- Only 6 (4%) non-cases were adjusted among 11/13 sites

fraserhealth

Issues Identified by Reviewer

- Poor and unclear documentation of nursing/unit notes
- Bristol Stool Chart delayed; difficult for practitioners to assess patients
- Laxative use or dosages in the nursing notes/MAR missing or unclear for some of the patients

fraserhealth

Suggested Stakeholder Improvements

- More detailed, legible and complete nursing notes
- Complete, accurate, and timely use of Bristol Stool Chart
- Improved documentation of laxative use and dosage

fraserhealth

Proposed Improvements for IPC

- Tube feeds make assessment of case definition difficult, however nutrition notes are a great resource for practitioners to review
- Colonized cases may require a follow-up review (~2 patients)

IPC Actions

- Targeted education where required
- Case review findings were shared with the team
- Emphasis on consistent documentation about case assessment in the CDI database

fraserhealth

Next steps for IPC program

- Annual review of cases will continue
- Continued discussion about CDI surveillance with team
- Provision of material and training targeting assessment of case definition for patients with *C. diff* positive results

fraserhealth

CDI Initiatives across FH

- Escalation of spore-reducing cleaning; CDI case, alert and outbreak
- Closure of hallway beds
- Closure of unit or patient cohorting is included in the Outbreak management protocol
- Education of new acute care manual: IPC Clinical Practice Guidelines, tools and algorithms

fraserhealth

CDI Initiatives across FH

- CDI Risk Assessment and Case Management tools for all healthcare-associated CDI cases
- CDI poor outcomes entered into PSLS
  - Toxic megacolon and colectomy (Level 4)
  - Death (Level 5)

fraserhealth

CDI Initiatives across FH

CDI Vulnerable Unit List and improvement plans

1. Assess the status of the actions on the VUL action plan
2. Develop a gap analysis
3. Develop an improvement plan to address the gaps
4. Collaborate with the site leadership and front line staff regarding culture change

fraserhealth

CDI Initiatives across FH

- Antimicrobial stewardship
  - Automatic stop orders
  - Restricted antimicrobials requiring use of Pre printed orders for *C. difficile*
  - Dedicated physician (Nov 2015)
- Fecal Microbiota Transplantation
- Various evaluations on a host of IPC best practices
- UVGI pilot at SMH

fraserhealth

UVGI Evaluation

Meet the Xenex Robot

Ultra-Violet Light Germicidal Irradiation (UVGI)

- FH launched a 4-month trial of an ultra-violet light (UV) disinfection irradiation system at SMH in October 2015
- Goals:
  - Understand the system processes for use
  - Provide recommendations for implementation
  - Develop a business case regarding UVGI technology for FH
- Sodexho partnered with Xenex UVGI systems to trial technology at FH
- Supports the current environmental cleaning practices

fraserhealth

Summary

- Ample literature about *Clostridium difficile* colonization and the potential of over-classifying infections
- Differing evidence about *C. diff* colonization whether it be statistics, testing methods, protection/risk to a person, environmental impact, etc.
- Chart review is a valuable method to identify symptomatic patients who test positive for *C. diff*
- Rationale for both use of lab data and chart review for CDI surveillance depends on resources
- *C. difficile* poses a noticeable impact to patients, residents, people in the community
- *C. difficile* is complex and evolving

fraserhealth

Acknowledgments

- FH IPC Practitioners for their data collection and valuable insight and feedback
- FH Consultant/Reviewer
- FH surveillance team for their continued support with data validation, analysis and advances to the surveillance system
- FH IPC Program Leadership for support and guidance

fraserhealth

References

Dubberk ER & Burnham CD. *JAMA Internal Medicine* (November 2015) 175;11:1801-1802

Furuya-Kanamori L et al. *BMC Infectious Diseases* (2015) 15:516

Gase KA et al. *ICHE* (March 2013) 34;3:284-290

Muto CA. *Clin Infect Dis* (2007) 45 (8): 999-1000

Polage CR et al. JAMA Inter Med ((2015) 175;11:1792-1801

Voth DE & Ballard JD. *Clin Micro Rev* (April 2005) 18;2:247-263

fraserhealth

Additional References of Interest

Donskey CJ et al. Inf Dise Clin 2015.

Eyre et al. N Engl J Med 2013; 369:1195-1205
http://www.nejm.org/doi/full/10.1056/NEJMoa1216064

Planche T, Wilcox MH, Inf Dis Clin N Am 2015.

fraserhealth

Questions?