

Current epidemiology of CDAD in Québec

***Presentation excluding slides with
provisional results***

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Presentation

- **Retrospective analysis**
 - MedEcho database 1998 – 2004
- **Current situation**
 - active surveillance province-wide since August 2004
 - special laboratory surveillance in February 2005
 - genotyping
 - antibiotic susceptibility

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Retrospective study 1998-2004 MedEcho database

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Methods

- **MedEcho database**
 - Hospitalizations in acute care hospitals
 - Coding of diagnoses and treatments
 - Fiscal year: April 1st to March 30
- **Analysis based on 82 hospitals
(≥ 1000 discharges/year)**
- **6 years : April 1998 – March 2004**

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Methods

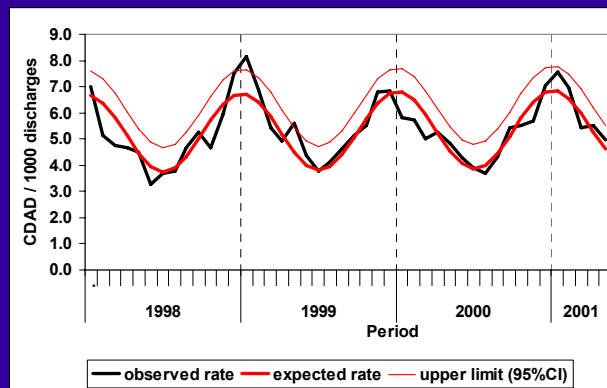
Population studied

- Patients with a CDAD code
- For each patient, selection of the first hospitalization with CDAD
- Incidence rate : new cases / 1000 discharges

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Methods

Modelling of incidence rate during a non-epidemic period with a periodic function
$$ICD(t) = a + bt + c \sin(2\pi t/13) + d \cos(2\pi t/13) + \varepsilon(t)$$



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Results

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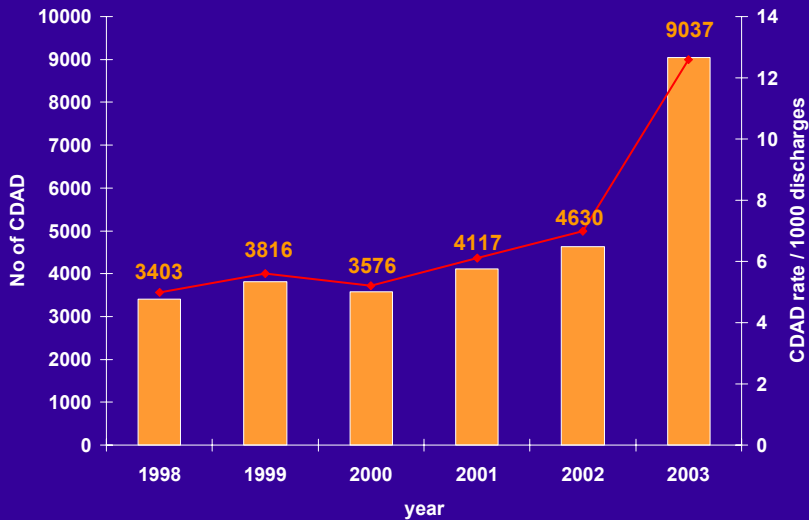
Data 1998-2004 (6 years)

- 3.5 million hospital discharges
- 28 500 discharges with a dx of CDAD
- 23 800 patients

- Significant increase in incidence
 - 5.5/1000 for 1998-2001
 - 7.0/1000 in 2002-3
 - 12.6/1000 in 2003-4

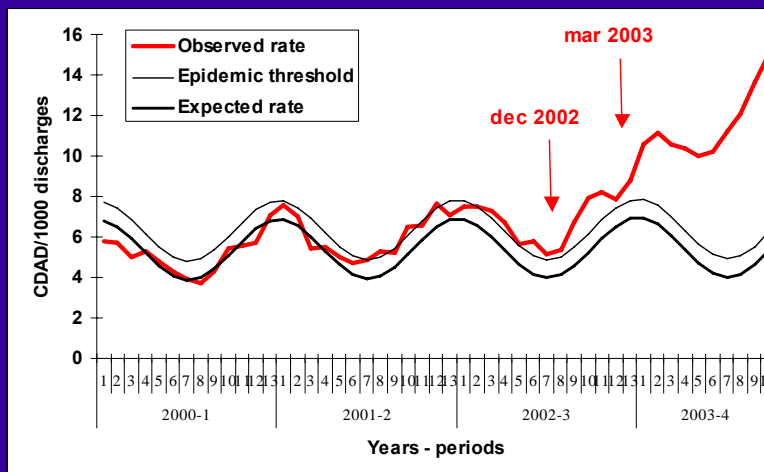
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Results

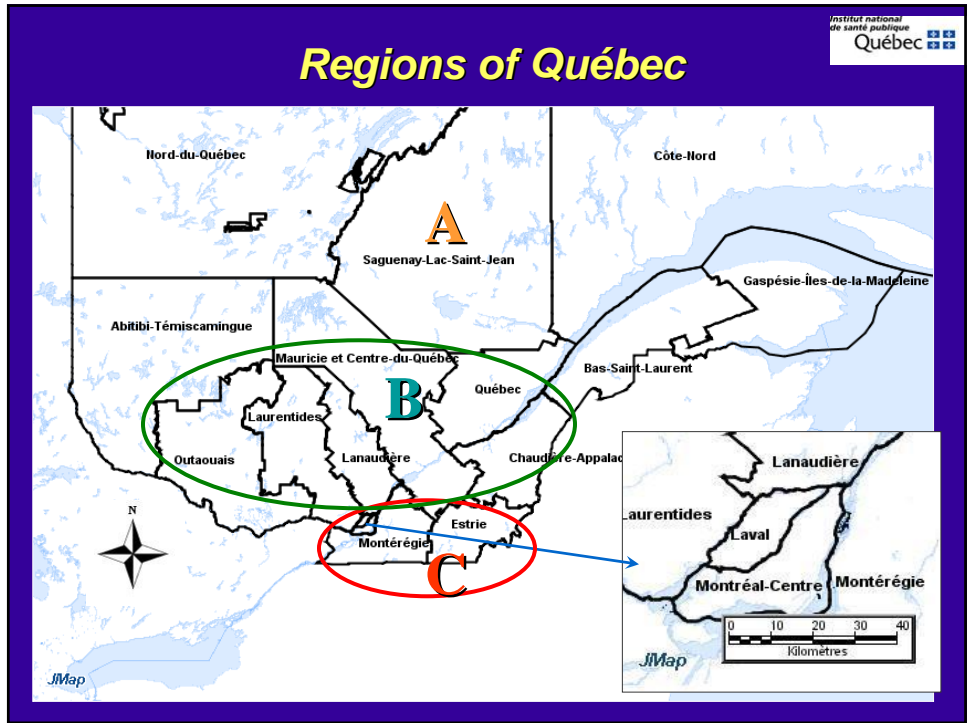


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Observed and expected rates of CDAD by period - Québec, 1999-2003



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CDAD rates according to hospital characteristics (1998-2001)

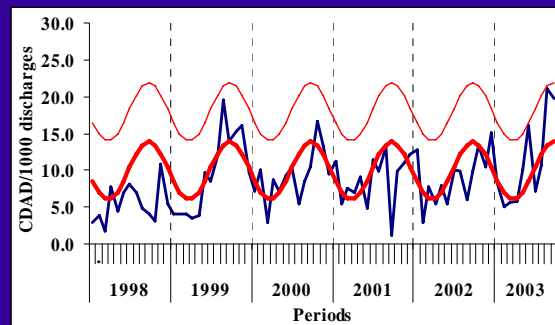
Characteristics	CDAD /1000 discharges	Crude rate ratio	Adjusted rate ratio
Region			
A (distant from Montreal)	2.7	1	1
B (surrounding Montreal)	5.0	1.9	1.1
C (Mtl and vicinity)	6.4	2.4	1.5
No of beds			
< 100 beds	2.8	1	1
100-249 beds	3.5	1.3	1.1
>= 250 beds	7.0	2.5	2.5
Total hospitals	5.4	-	-

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Looking for outbreaks in 37 hospitals

37 hospitals with >7000 discharges/year (500/period)
71% of admissions in Québec

Determination of an epidemic threshold with a periodic function for each hospital



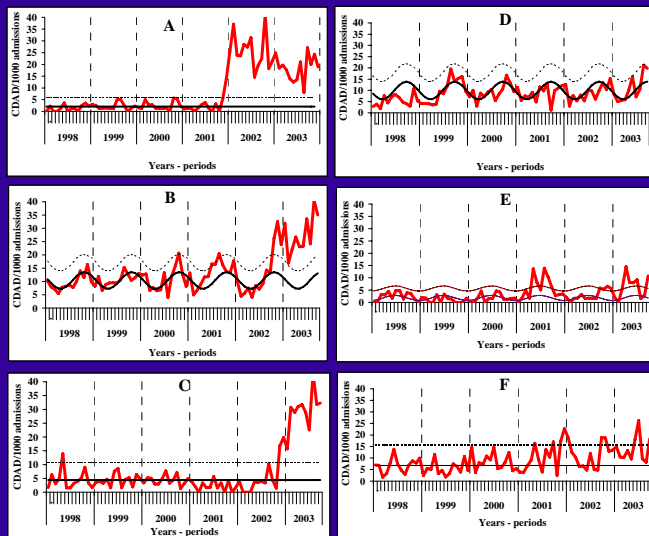
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Outbreaks in hospitals

- 37 hospitals > 7000 discharges/year
- 18 hospitals with rates above the epidemic threshold during ≥ 4 consecutive periods
 - 3 hosp with transient increase and max rate <20/1000
 - 15 hosp with persistent increase and rate $\geq 20 / 1000$ admissions

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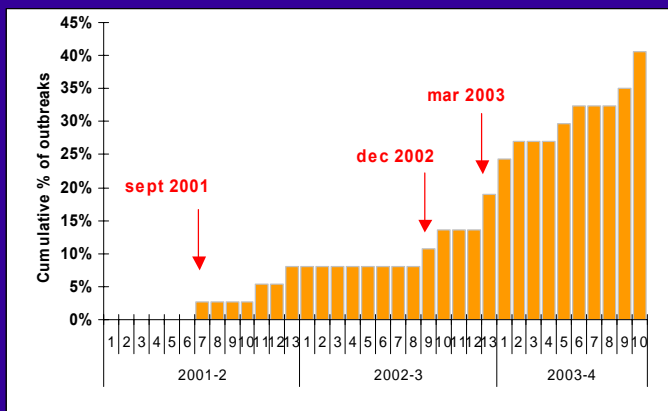
Different patterns of evolution



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Outbreaks chronology (1)

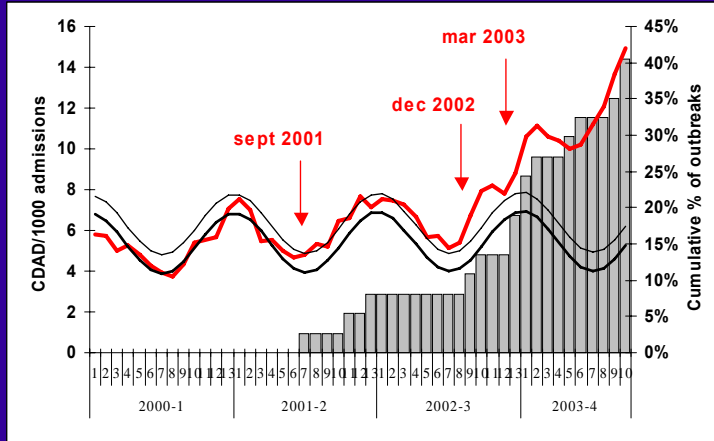
Cumulative % of outbreaks in 15 of 37 hospitals



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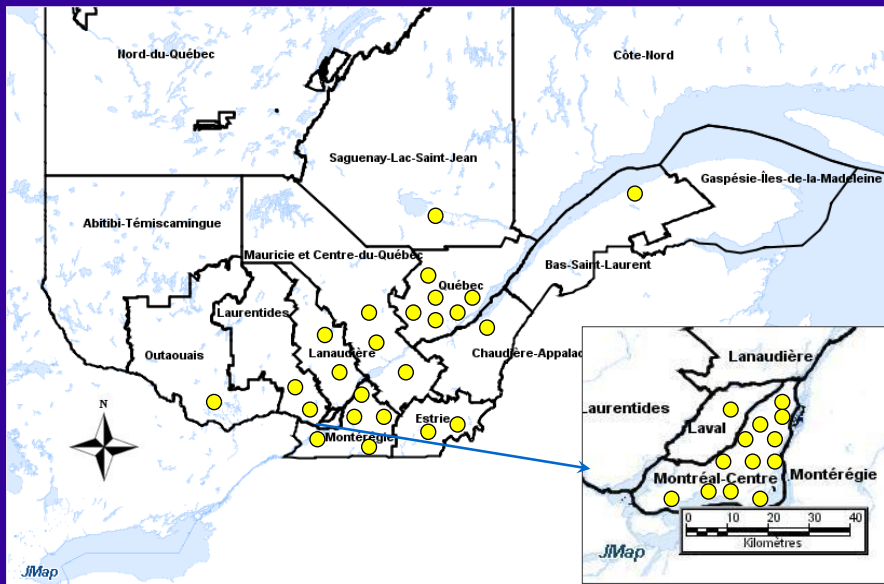
Outbreaks chronology (2)

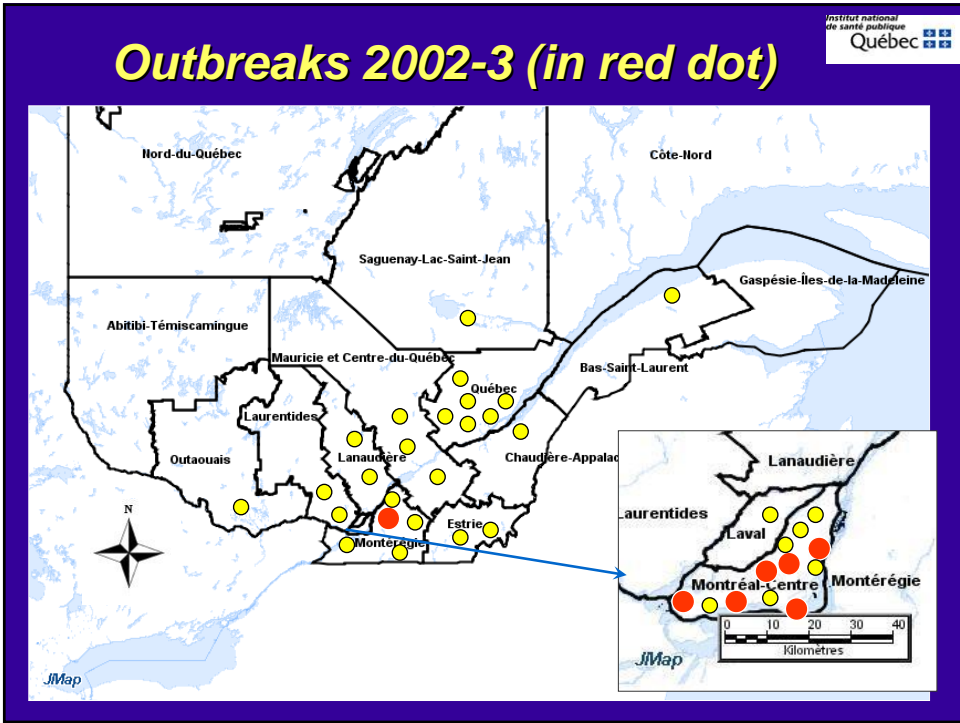
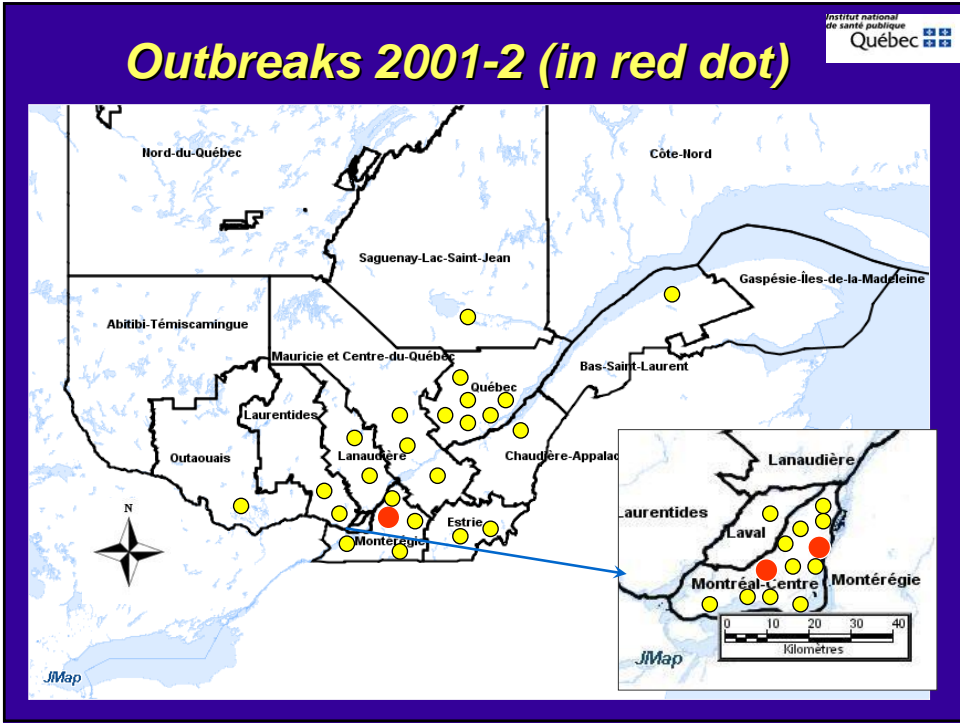
Incidence rate and cumulative % of outbreaks



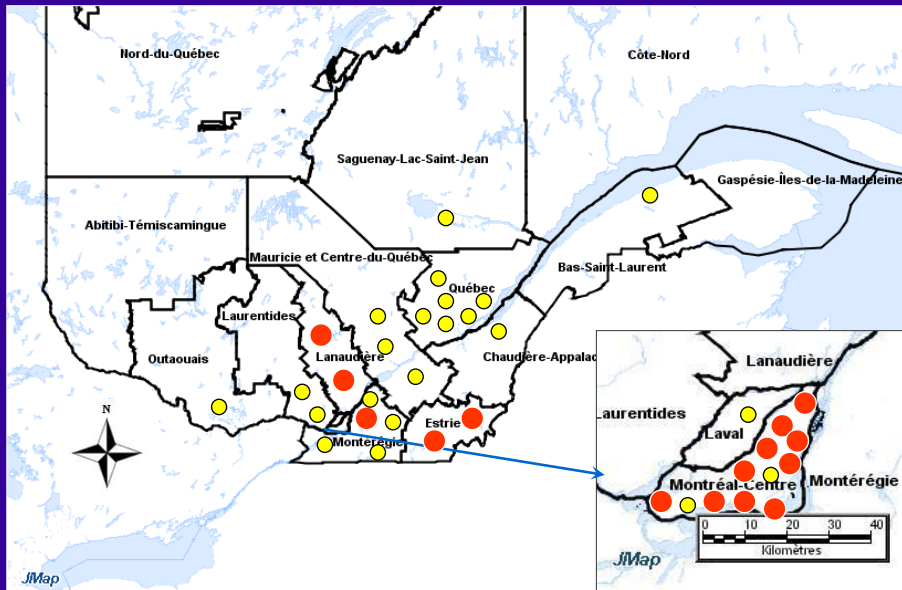
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Geographic distribution of the 37 hospitals





Outbreaks 2003-4 (in red dot)



Conclusions 1998-2004

- **“Epidemic” of outbreaks**
 - Sudden and localized outbreaks
 - Geographical spread from Montreal to surrounding regions
 - Stable incidence in « non-outbreak » hospitals
- **Consistent with the hypothesis of spread of a new strain**

Prospective surveillance

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Surveillance of CDAD in Québec 2004-2005

- **Study period**
 - Beginning in August 2004
- **Objectives**
 - Establish incidence rate of new CDAD cases
 - Differentiate nosocomial and community acquisition
 - Determine complication rate within 30 days following diagnosis

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Methods

- 88 hospitals > 1000 admissions in acute care
- Aggregated data by 4-weeks-period
- Basic surveillance
 - No of CDAD by origin : nosocomial and others
 - No of admissions and of person-days
- Surveillance of complications within 1 month
 - Death, colectomy, ICU for CDAD, new hospitalization for recurrence

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Web based data entry screen

Applications Quitter

Surveillance des diarrhées associées au *Clostridium difficile* (DACD)

Formulaire Rapports
Consulter Créer Modifier

Installation 9999

Année: Période 13 2004 - 2005 Du 6 mars au 31 mars

Activité de l'établissement pendant la période :
 Nombre de jours-présence au registre des bénéficiaires. Evénant: longue durée, psychiatrie, néonatalogie et pouponnière.
 Nombre d'admissions. Evénant: longue durée, psychiatrie, néonatalogie et pouponnière.

Définition d'infection à DACD ^(?)

Surveillance de base : ^(?)

Nombre de nouveaux cas de DACD diagnostiqués durant cette période :

Cat. 1. Cas nosocomial relié à l'installation déclarante ^(?)

Cat. 2. Autres cas hospitalisés non reliés à une hospitalisation récente dans l'installation déclarante

2a. Cas nosocomial, relié à un séjour dans une autre installation ou centre d'hébergement ^(?)

2b. Cas nosocomial, relié aux soins ambulatoires de l'installation déclarante ^(?)

2c. Origine communautaire non reliée aux milieux de soins ^(?)

2d. Cas d'origine inconnue ^(?)

Cat. 3. Autres tests de laboratoire non investigués ^(?)

Total de cas:

Documentation
Nous contacter

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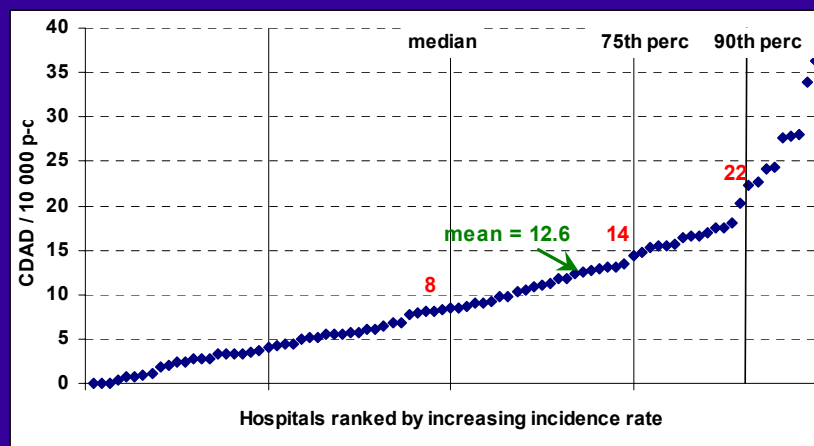
Results – 1st year of surveillance

- 8 673 new hospitalized cases (14/1000 admissions)
- 6 362 nosocomial cases (12.6/10 000 pt-days)

Source of acquisition	n	%
Nosocomial, same hospital	6362	73%
Nosocomial, another hospital	674	8%
Community-acquired or unknown	1637	17%
Total CDAD hospitalized	8673	100%

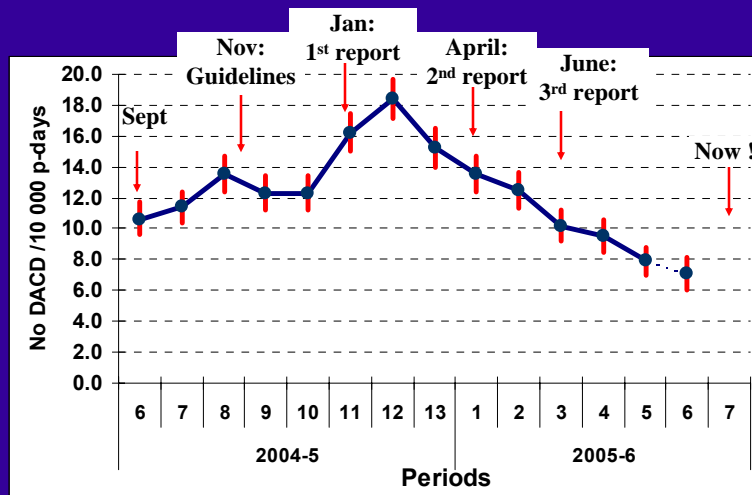
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CDAD/10 000 pt-days in 88 hospitals August 2004 – Aug 2005



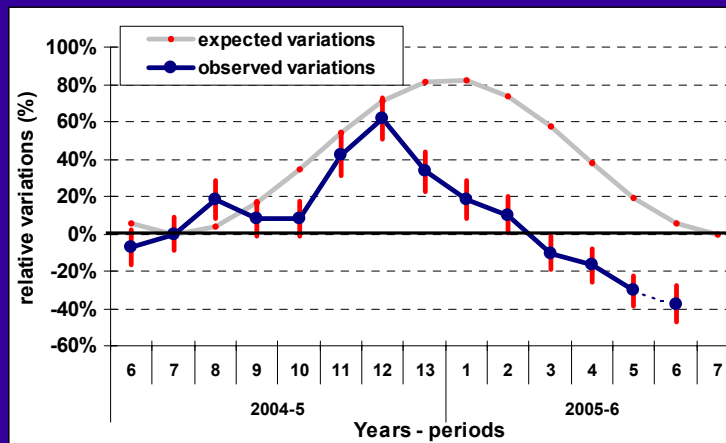
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Evolution of incidence rate



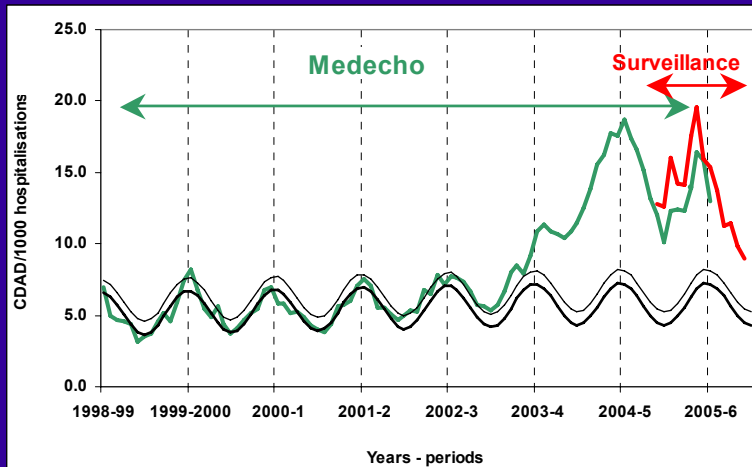
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Seasonal variations of CDAD incidence 2004-2005 observed vs. expected



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MedEcho and surveillance system DACD/1000 hospitalisations



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Case-fatality ratio in 5113 nosocomial CDAD (from surveillance data)

CDAD caused death	3.5%
CDAD contributed to death	4.6%
CDAD not related	10.4%
Overall deaths	18.4%

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Special laboratory surveillance in February 2005

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Genotypes and antibiotic susceptibility of *C. difficile*

- 490 toxin positive stools from nosocomial CDAD patients
 - Antibiotic susceptibility profile
 - PFGE typing
 - *cdtA* + *cdtB* (binary toxin) and *tcdC* genes (Montreal Jewish Hospital, in progress)
- Data collection on age and complications
- Analysis and validation still in progress

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Genotype distribution

57 genotypes :

- 3 major genotypes : A, B and B1 (closely related)
- 23 genotypes : 2 – 6 strains
- 31 genotypes : 1 strain

Genotypes	No	%
A	273	56%
B+B1	85	18%
Others	112	26%
Total	470	100%

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46 hospitals with ≥ 4 strains tested

- Definition of a « clonal situation » :
 $\geq 50\%$ of strains belonging to one genotype in the hospital

Genotype	No of hospitals with this genotype	No of hospitals with clonal situation
A	37	30 (81%)
B+B1	21	8 (38%)

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Conclusions - 1

- Sharp and widespread increase in outbreaks in 2003
- Geographical spread of genotype A from Montreal to other areas, except in Québec city
- Genotype B (resistant to clindamycin) predominant in Québec city

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Conclusions -2

- Two predominant genotypes in Québec hospitals in 2005 : A and B
- Comparison of genotype A vs. B
 - Higher incidence of CDAD in hospitals with clonal A situation
 - More severe disease
 - More frequent relapses
 - Susceptibility to clindamycin ≤ 8 mg/l

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Conclusion - 3

**Significant trend toward a decrease in
provincial CDAD incidence**

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Contributions

- Vivian LOO (Mc Gill University Health Centre)
 - Anne-Marie BOURGAULT (Hôpital St Luc)
 - Louise POIRIER (Hôpital Maisonneuve-Rosemond)
 - Manon LORANGE (LSPQ-INSPQ)
 - André DASCAL (Montreal Jewish Hospital)
 - Élise FORTIN (INSPQ)
 - Rodica GILCA (INSPQ)
 - Isabelle ROCHER (INSPQ)
 - Colette GAULIN (MSSS)
 - Charles FRENETTE (SPIN)
 - Marie GOURDEAU (CINQ)
 - Terry TANNENBAUM (Direction de Santé Publique Montréal)
 - Marc DIONNE (INSPQ)
- **and Québec's hospital infection control teams and microbiology laboratory personnel**

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