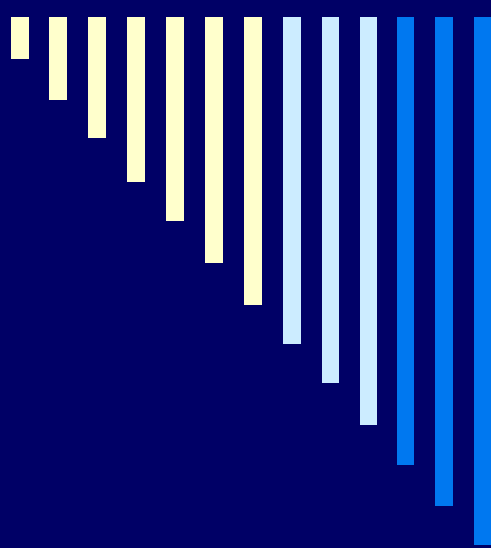



An outbreak of community-acquired *Clostridium difficile* infection in Australia, 2011-12

Riley, T.V.^{1, 2}, D.W. Eyre^{3,4}, D. Crook^{3,4},
W.N. Fawley⁵, M.H. Wilcox⁵

¹Microbiology & Infectious Diseases, PathWest Laboratory Medicine, Nedlands, WA, Australia.

²Microbiology & Immunology, The University of Western Australia, Nedlands, WA, Australia.

³Nuffield Department of Clinical Medicine, Oxford University, John Radcliffe Hospital, Oxford, United Kingdom, OX3 9DU.

⁴National Institute of for Health Research Oxford Biomedical Research Centre, John Radcliffe Hospital, Oxford, United Kingdom, OX3 9DU.

⁵Department of Microbiology, Old Medical School, Leeds Teaching Hospitals NHS Trust & University of Leeds, Leeds General Infirmary, Leeds, UK

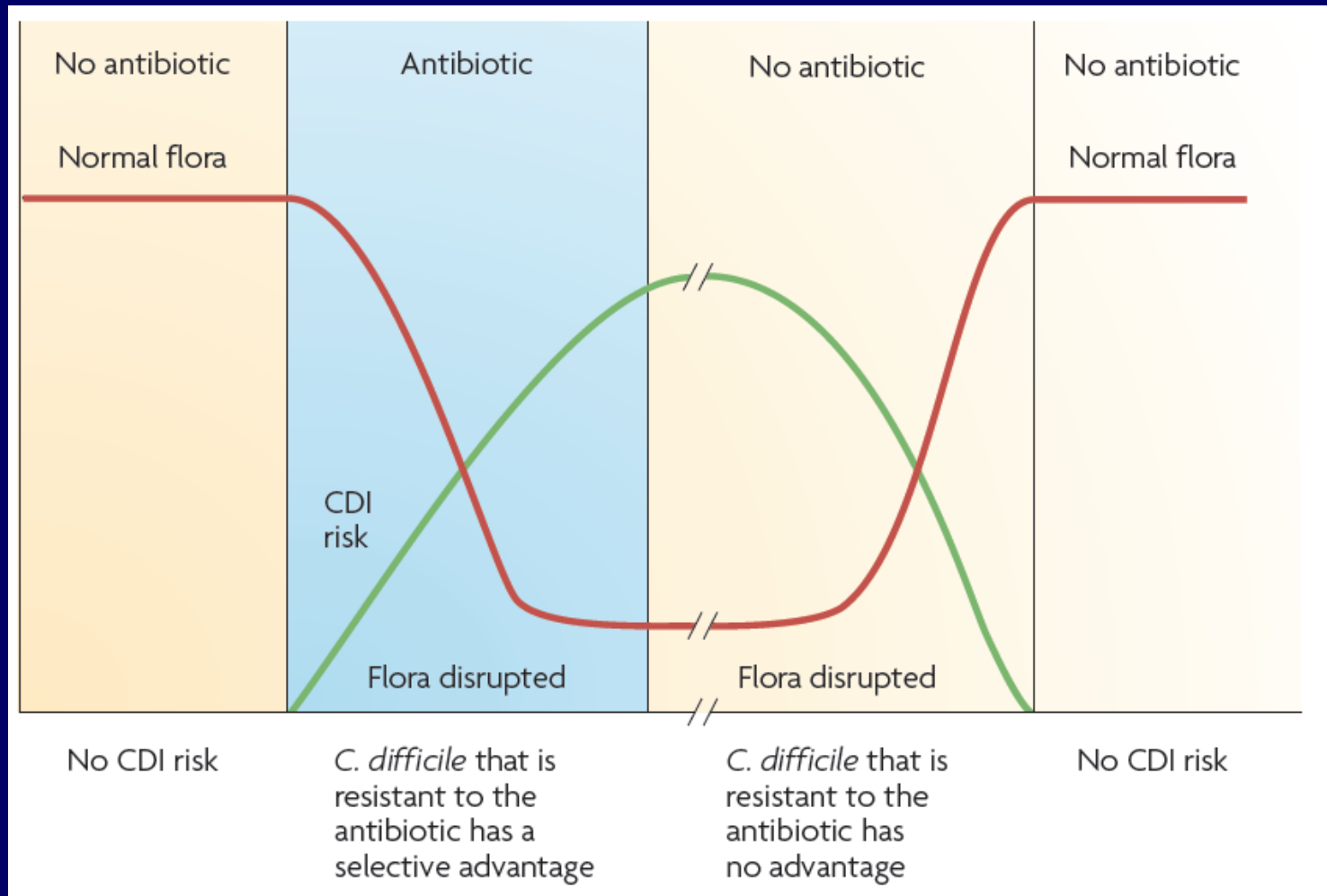
Risk factors for getting *C.difficile* ?

- ❑ Exposure to the organism – how much?
- ❑ Exposure to antibiotics – clindamycin, then cephalosporins, now fluoroquinolones
- ❑ Maybe others now?





Effect of antibiotics on normal flora



The Epidemiology of Community-Acquired *Clostridium difficile* Infection: A Population-Based Study

Sahil Khanna, MBBS¹, Darrell S. Pardi, MD, MS, FACP¹, Scott L. Aronson, MD^{1,2}, Patricia P. Kammer, CCRP¹, Robert Orenstein, DO³, Jennifer L. St Sauver, PhD⁴, W. Scott Harmsen, MS⁵ and Alan R. Zinsmeister, PhD⁵

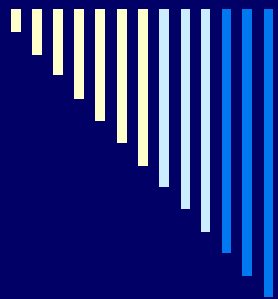
Study highlights

What is current knowledge?

- *Clostridium difficile* infection is increasing worldwide with hospitalization and antibiotic exposure as the most common risk factors.
- The epidemiology and characteristics of community-acquired *Clostridium difficile* infection are not well defined.

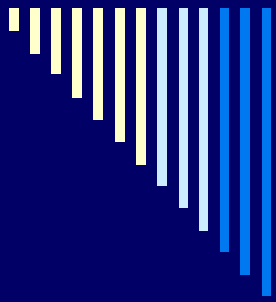
What is new here?

- A major proportion of *Clostridium difficile* infection patients is community-acquired.
- These patients are younger, often lack traditional risk factors, and have less severe disease than patients with hospital-acquired infection.



Community acquired CDI

- *C. difficile* was the most common enteric pathogen detected.
- Most patients had only mild to moderate diarrhoea.
- In the majority of patients the diarrhoea was protracted.
- 80-85% of patients had received antimicrobial agents in the 3 months preceding onset of diarrhoea.
- Most treated successfully with metronidazole.



Community acquired CDI

- This is not new!
- Very much under-diagnosed for years
- *C. difficile* is ubiquitous
- Many sources in the community
- All animals get colonised at birth incl. humans
- But – generally requires exposure to an infectious dose AND prior gut insult
- Risk factors need further investigation

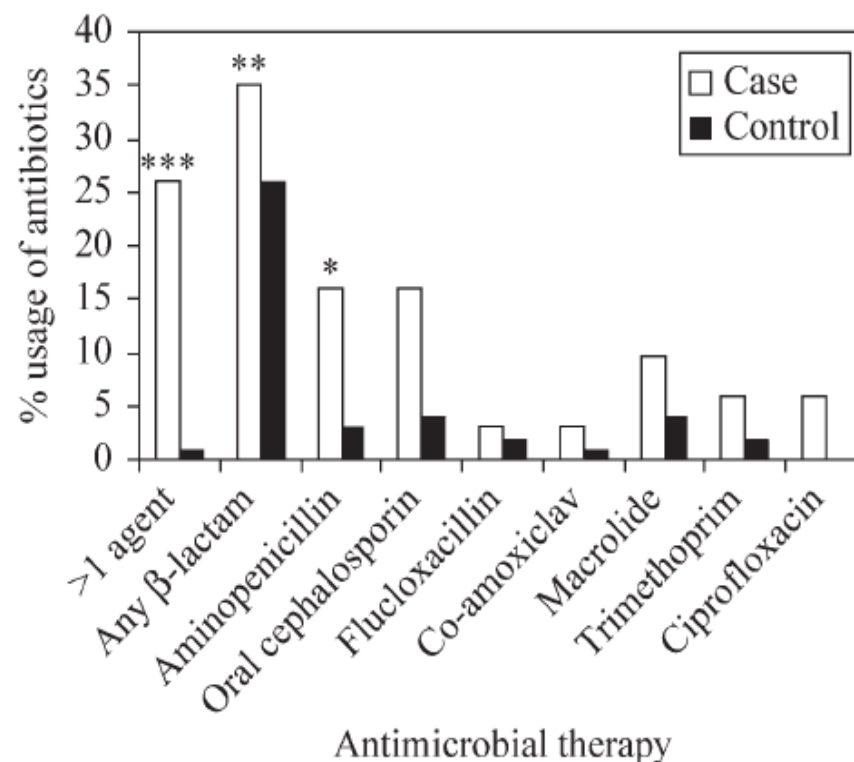
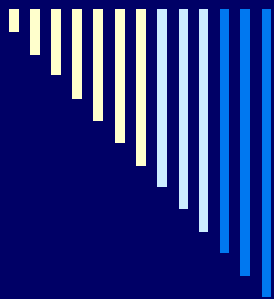
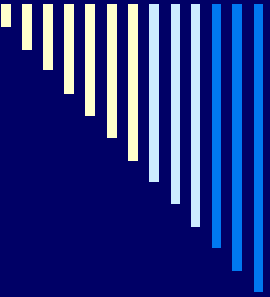


Figure 1. Comparative antibiotic usage in randomly selected community-associated CDI cases and controls. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Contact with infants <2 years old significantly associated with CDI

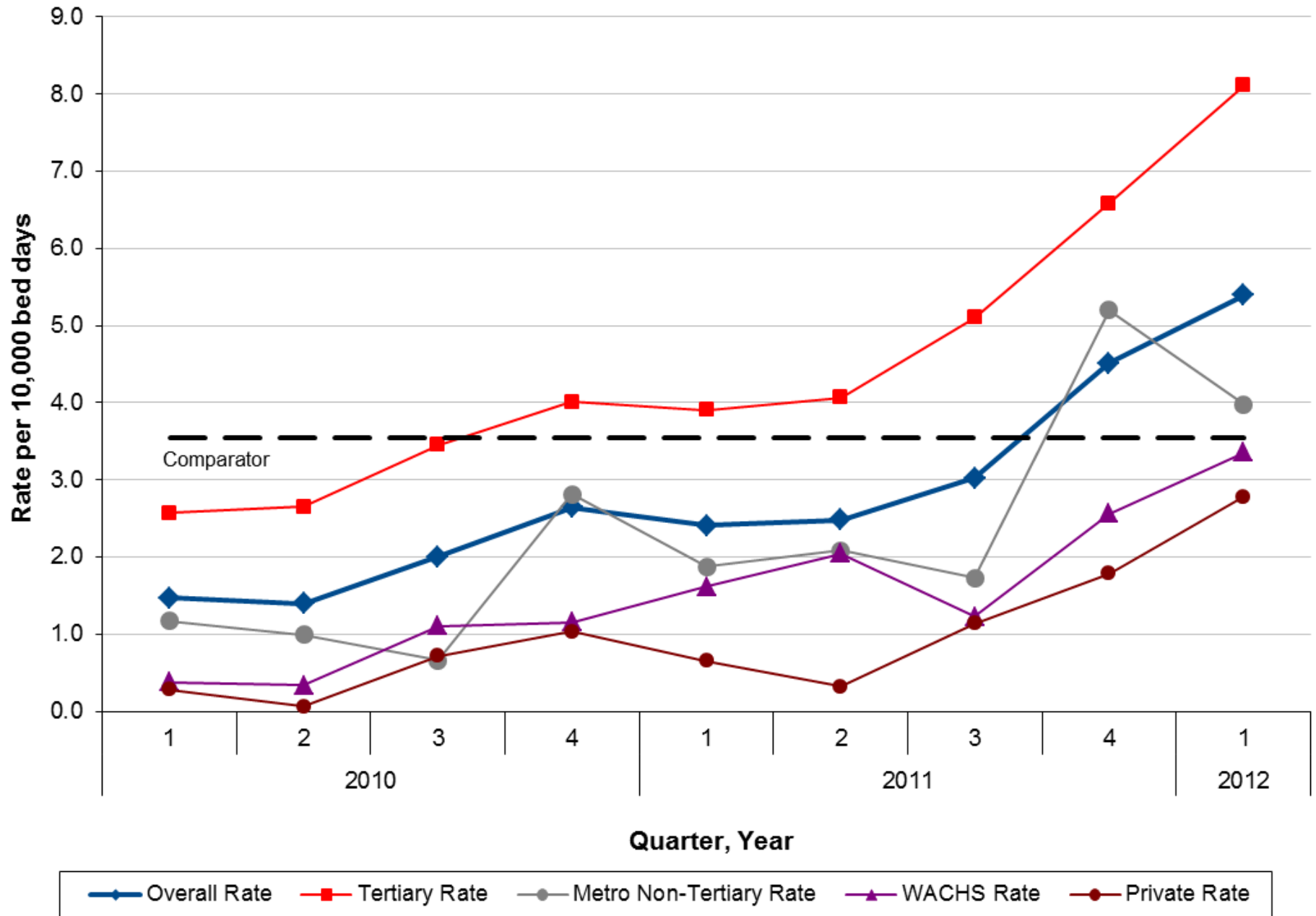


CDI in Australia

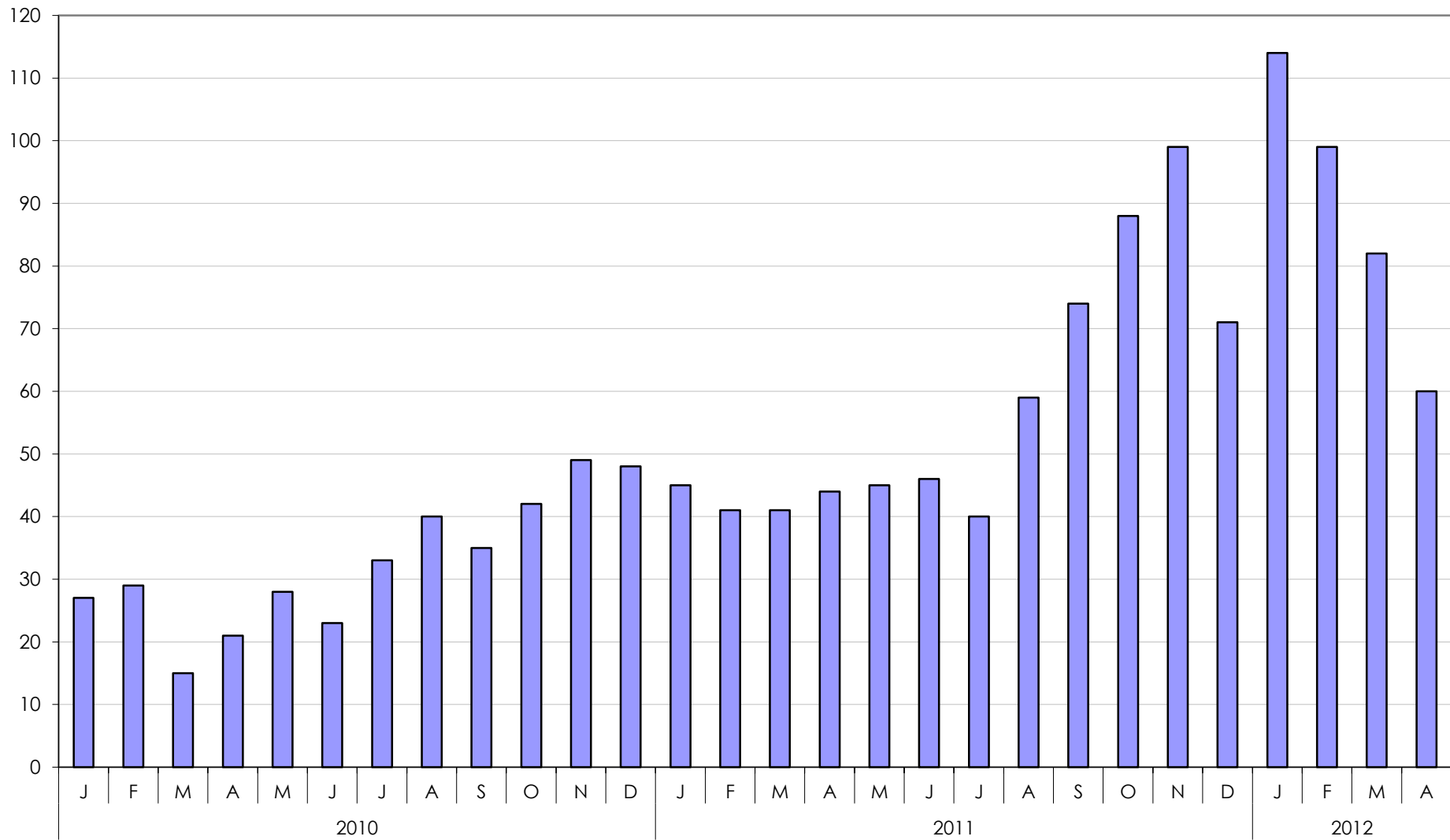
- Not a notifiable infection
 - But mandatory reporting by all hospitals as part of accreditation since 2010
 - Reporting of “hospital identified” cases of CDI
-

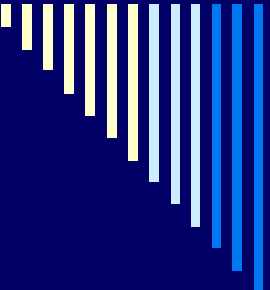
Aggregate *Clostridium difficile* Infection Rates

Western Australia



CDI CASES 2010 - 2012

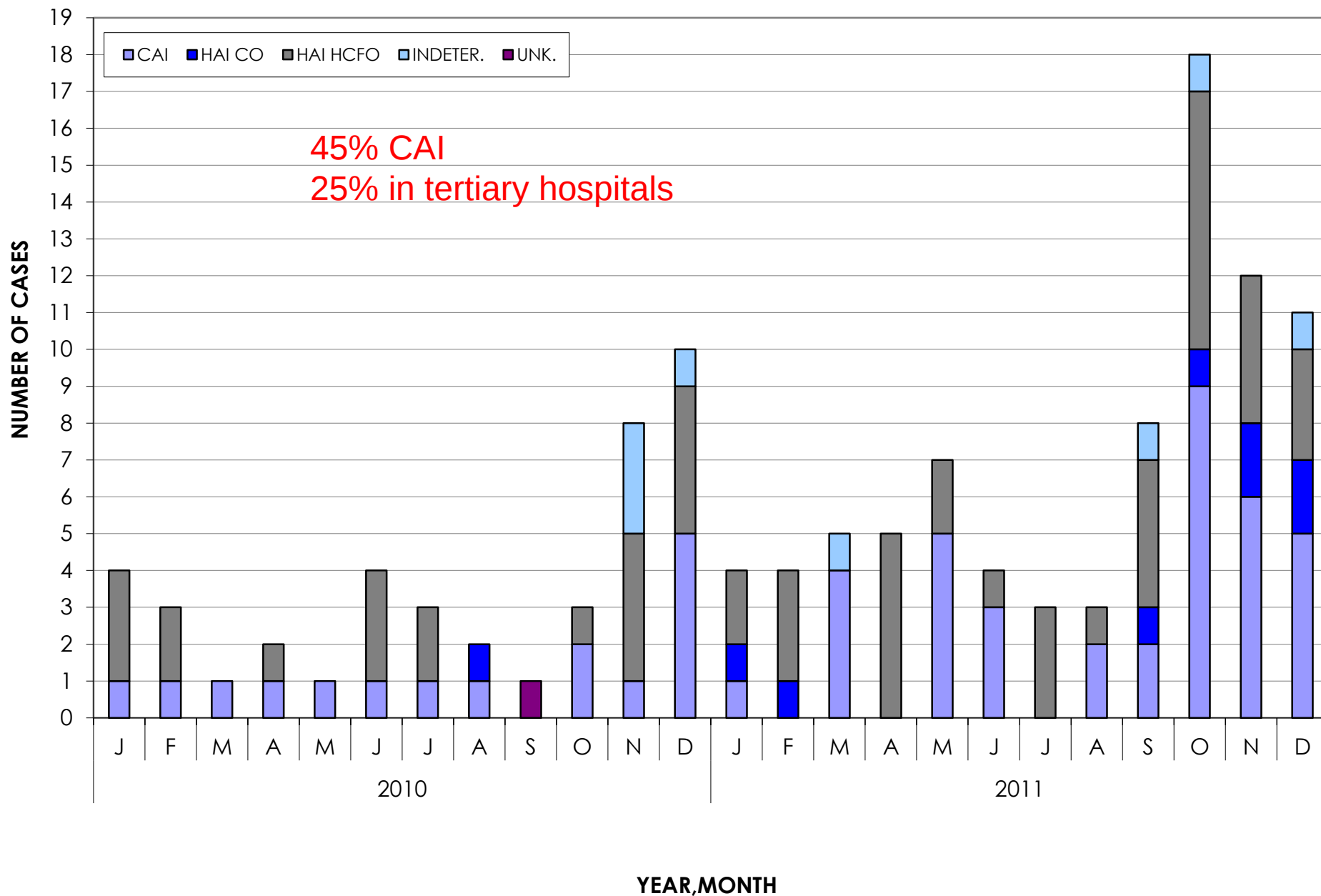




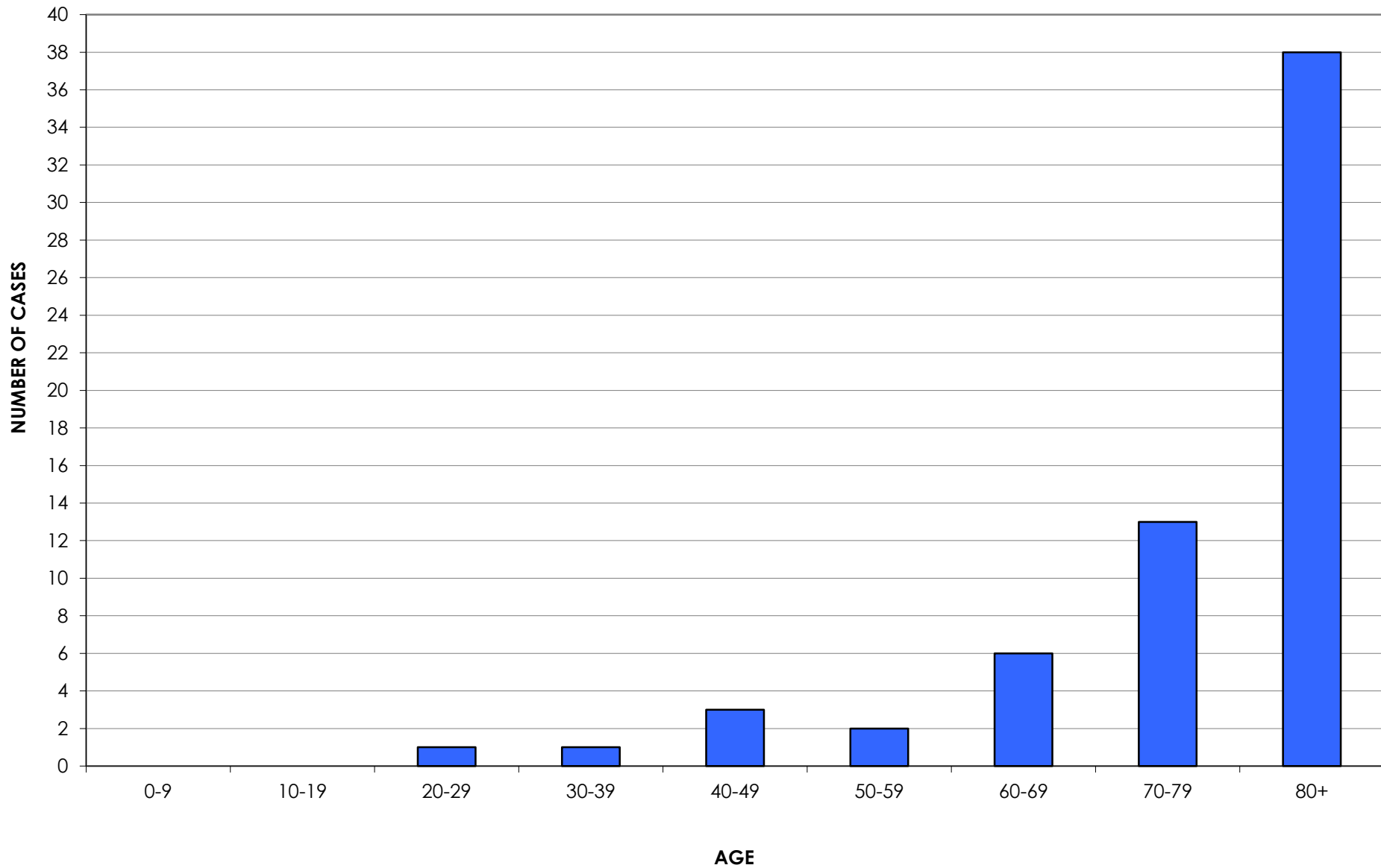
Reasons for increase

- Changes in test numbers
 - Some evidence of this
 - Greater awareness
 - Changes in testing methods
 - Yes – when and what impact?
 - If a real increase then why?
 - Healthcare associated vs community-associated
 - Changes in risk factors??????
-

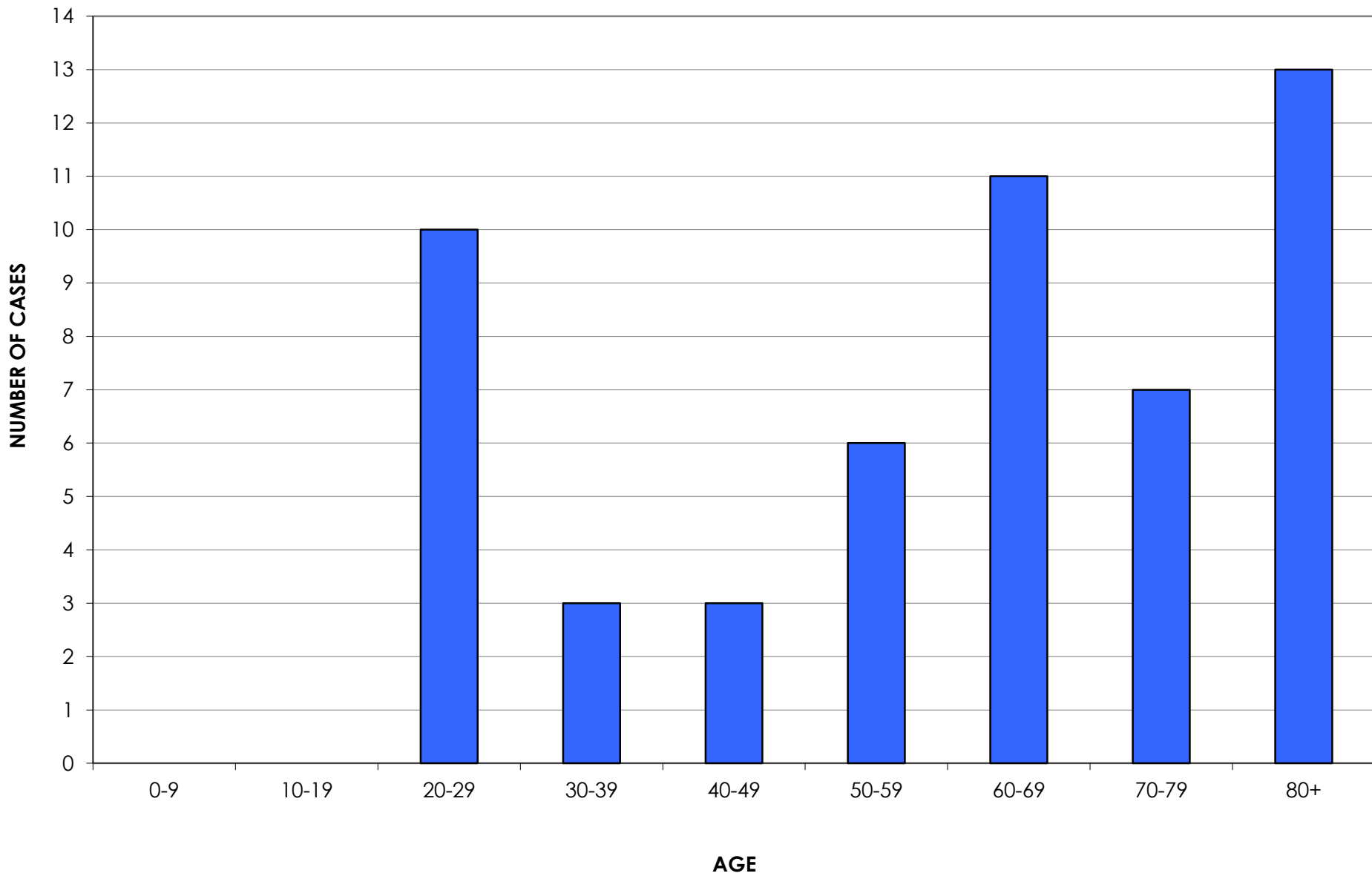
CDI CASES IDENTIFIED AT METRO NON-TERTIARY HOSPITALS 2010-2011



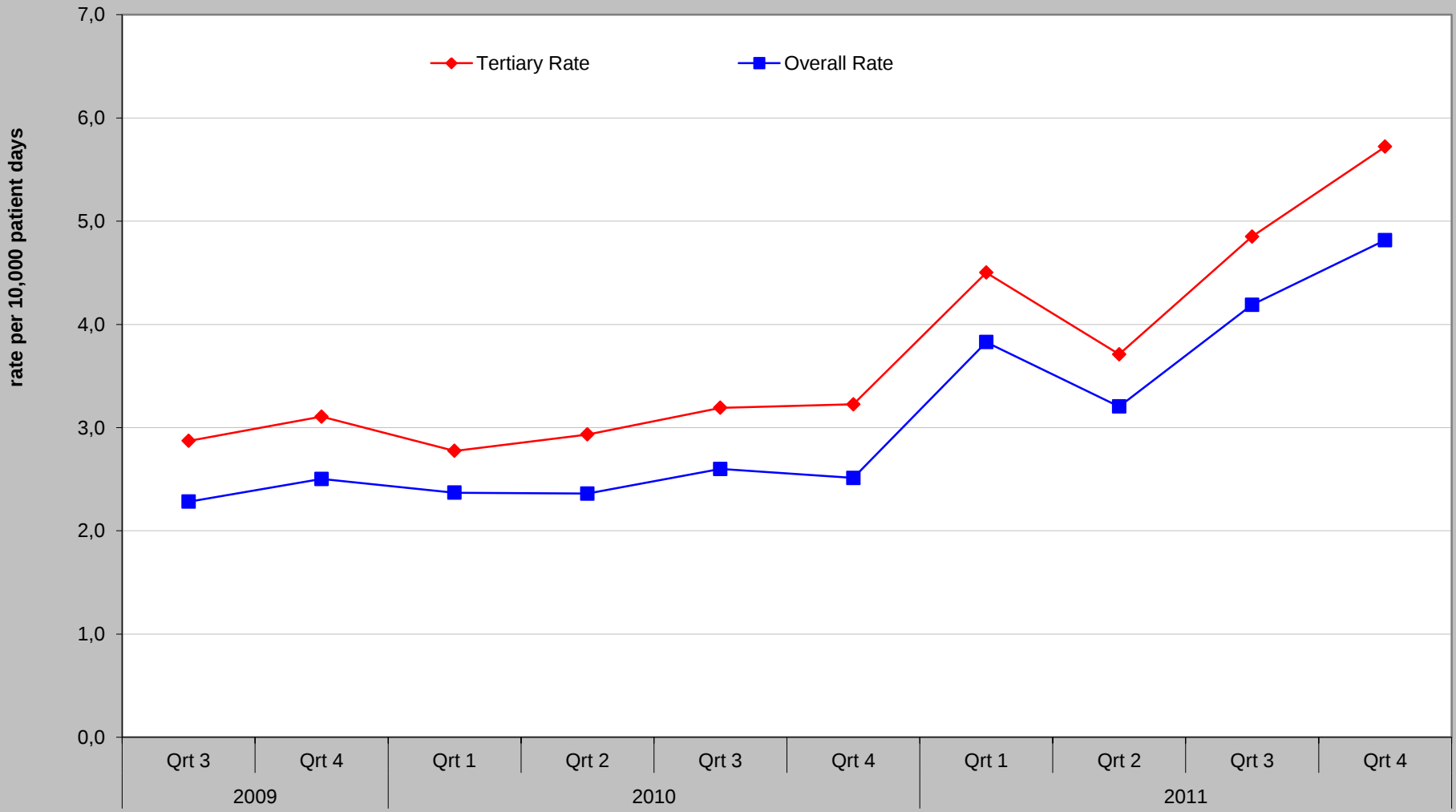
HA-CDI - MNT HOSPITALS - PATIENT DEMOGRAPHICS

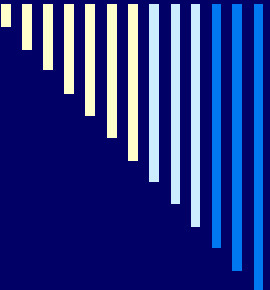


CA-CDI CASES - MNT HOSPITALS - PATIENT DEMOGRAPHICS



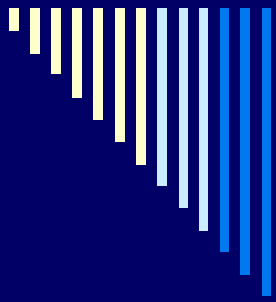
Aggregate *Clostridium difficile* Infection Rate for SA Public Hospitals





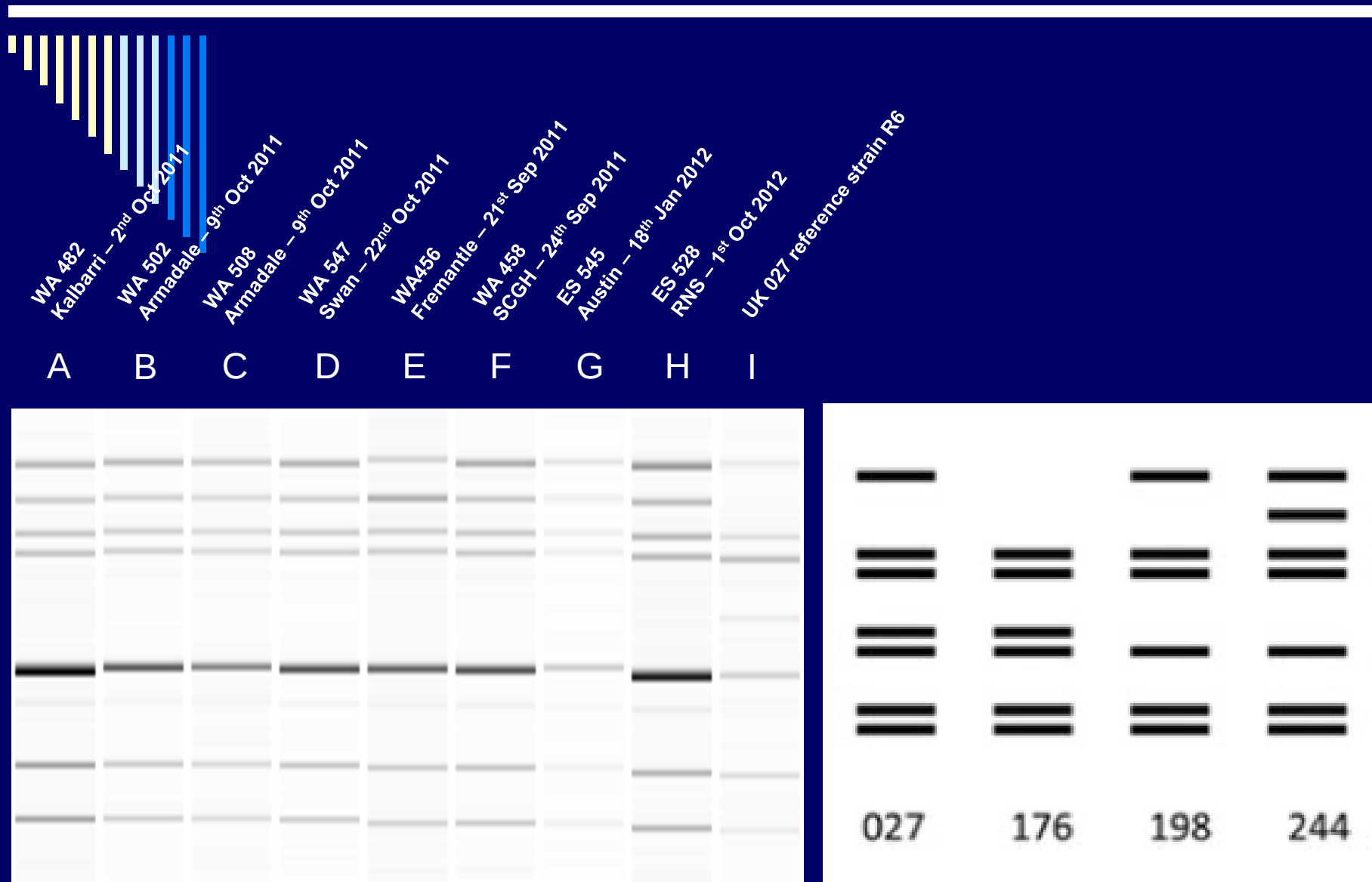
C. difficile in NSW, 2011

Hospital identified <i>C. difficile</i>		
Month	Number	Rate per 1000 separations
Jan-11	94	0.90
Feb-11	91	0.81
Mar-11	122	0.97
Apr-11	121	1.04
May-11	127	0.88
Jun-11	123	1.00
Jul-11	134	1.10
Aug-11	182	1.47
Sep-11	198	1.65
Oct-11	208	1.72
Nov-11	212	1.70
Dec-11	247	2.18

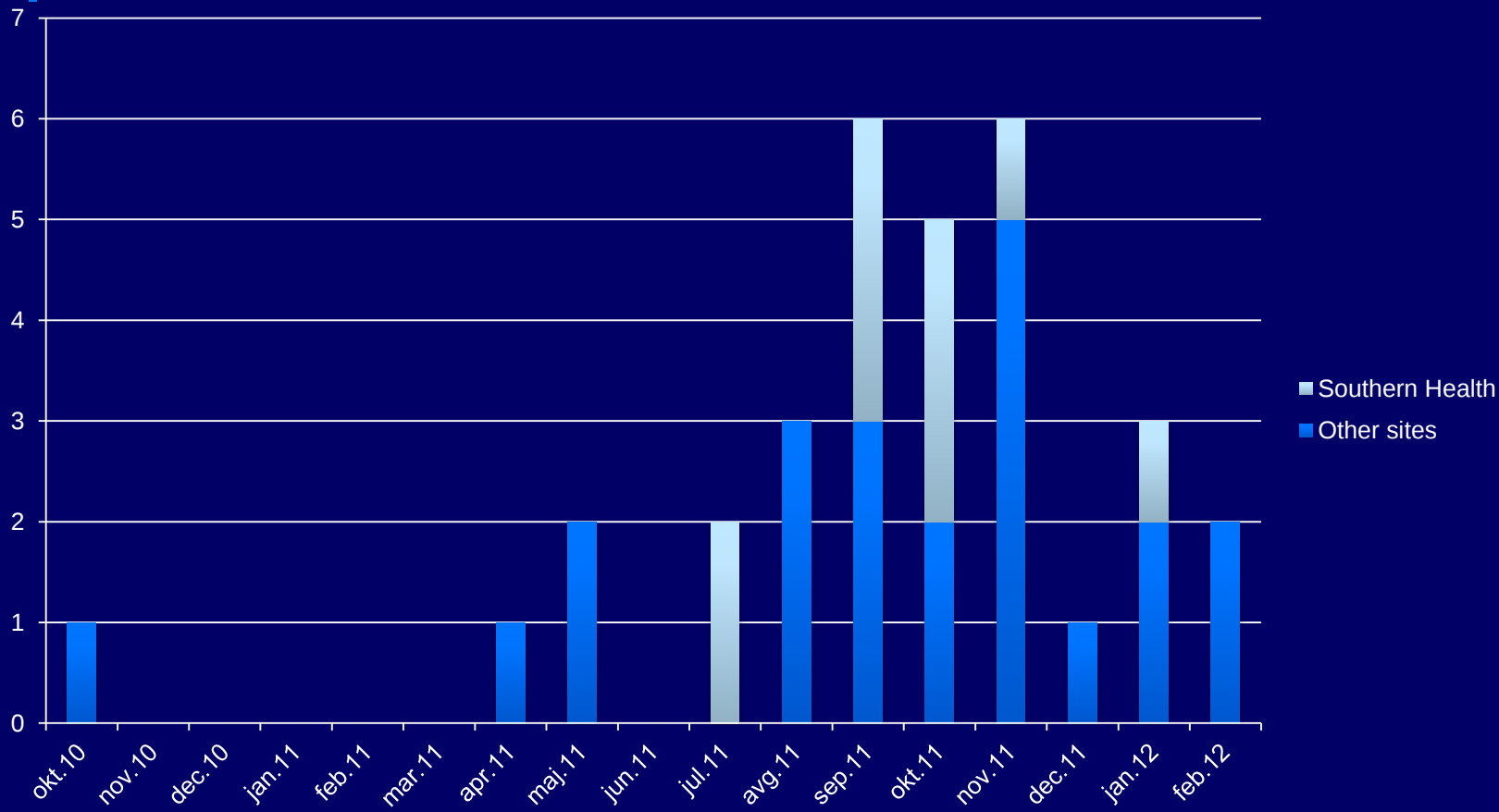


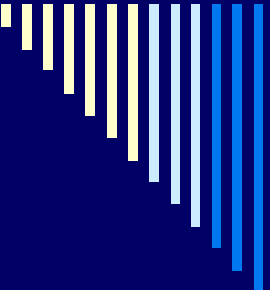
C. difficile PCR ribotype 244

- ❑ More severe disease – attributable mortality 30% (Dr Rhonda Stuart)
- ❑ Currently community acquired
- ❑ Produces more toxins A and B
- ❑ Produces binary toxin
- ❑ Fluoroquinolone susceptible
- ❑ Sept-Oct 2010 ACSQHC snapshot – one isolate
- ❑ Now 3rd most common ribotype in Australia ~5%



“MDU – 064” - Victoria

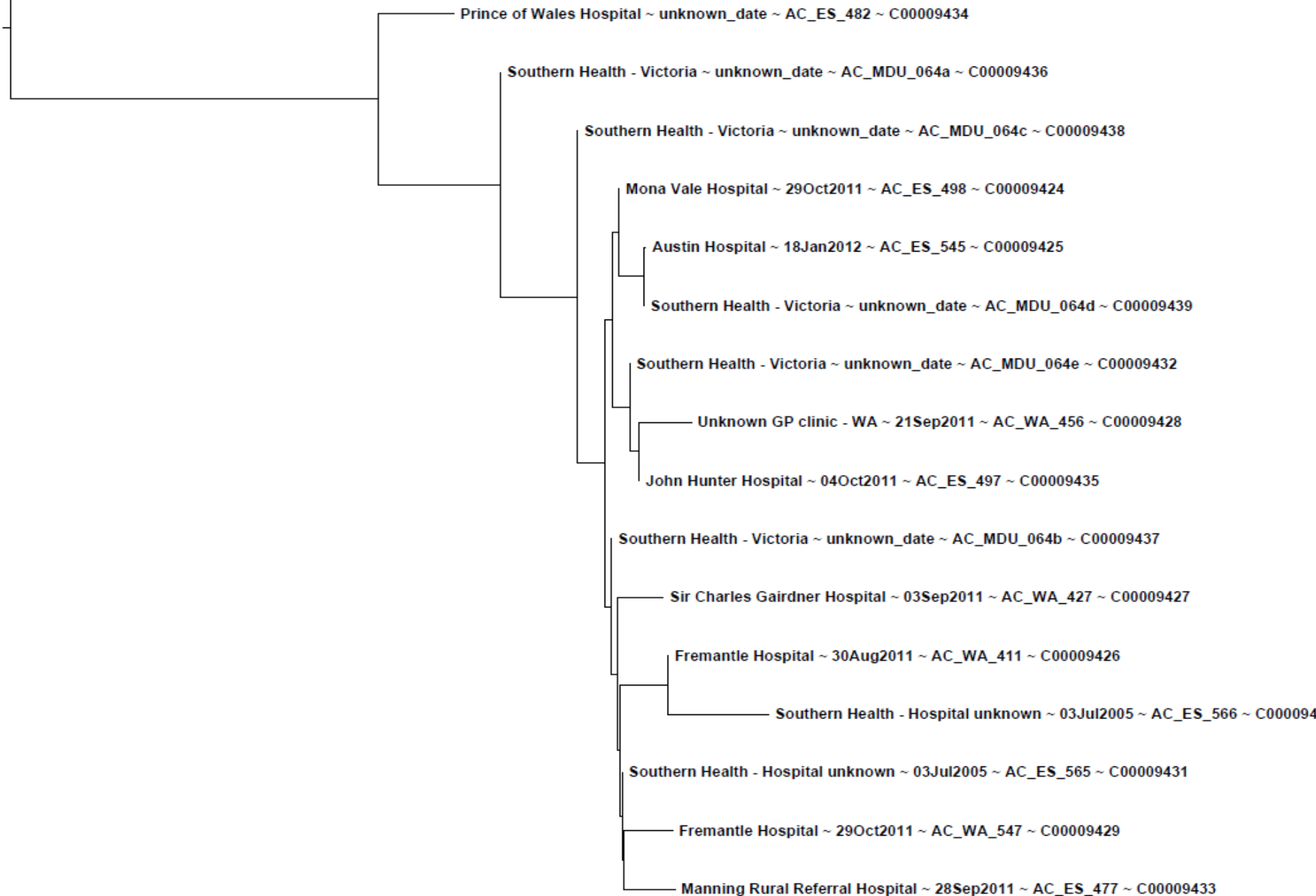




Case control study — Dr Rhonda Stuart

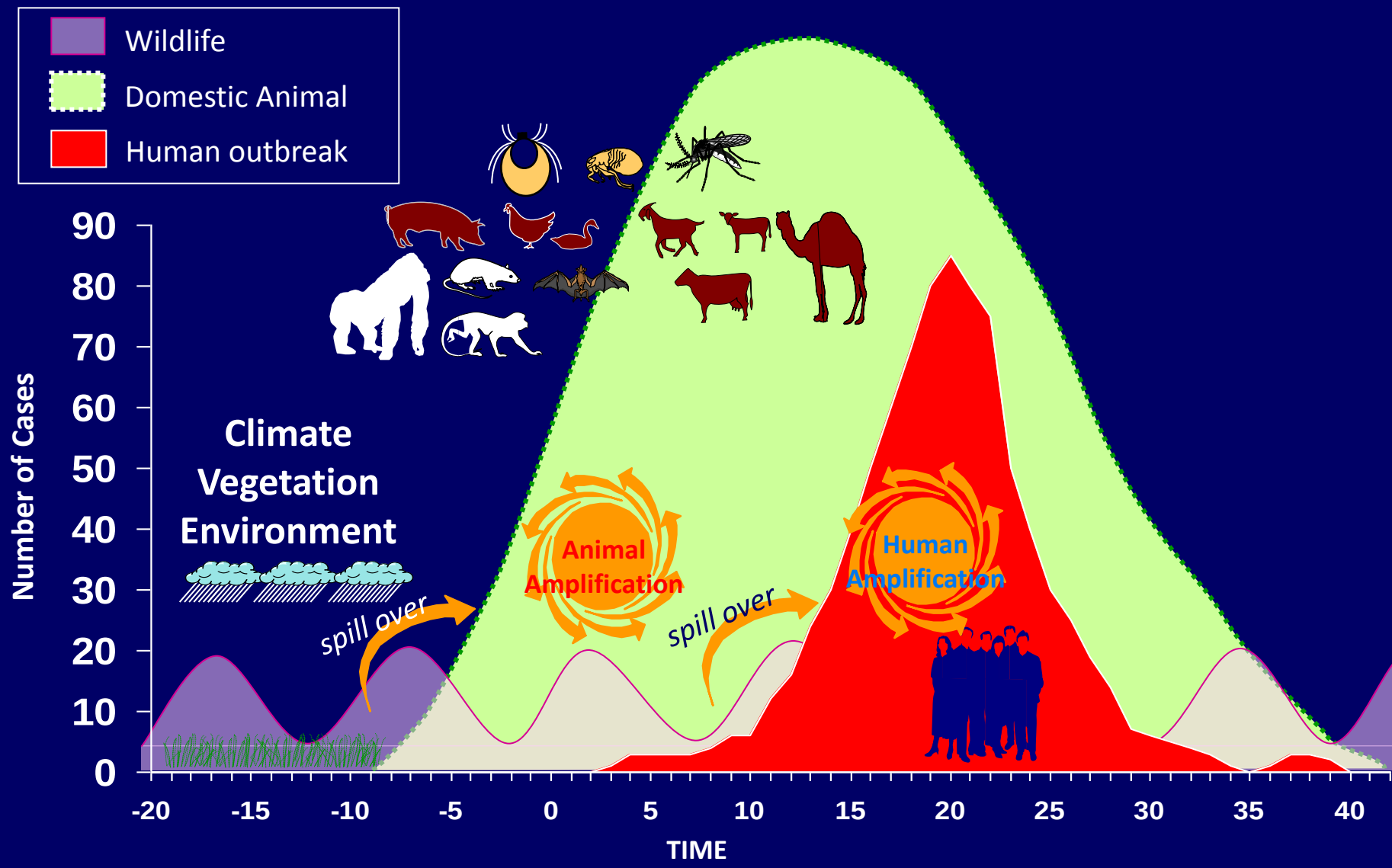
- 10 cases — July - December 2011
 - Mean age 74 years (range 38 – 92)
 - 80% > 65 years
 - Comorbidities
 - Diabetes 30%
 - Malignancy 20%
 - IHD 50%
 - No comorbidities 10%
 - Onset
 - Community onset = 80%
 - Community acquired = 40%
- 20 Controls
 - Matched to site and time (within 4 weeks) of isolate

	MDU - 064	Non- 064	P	OR (95% CI)
Disease Severity				
Creat > 200 or > 50% baseline	6/10 (60)	1/20 (5)	0.002	28 (2 – 306)
Albumin < 25	8/10 (80)	3/17 (18)	0.003	18 (2 – 136)
Fever > 38	3/10 (30)	5/20 (25)	NS	
WCC > 15	4/10 (40)	4/20 (20)	NS	
	MDU-064	Non-MDU 064	P	OR
Total June – Dec 11	10	246		
In Hospital Deaths	2	2	0.008	30 (4 – 244)
Severe disease (ESCRMB)	10/10 (100)	1/20 (5)	0.001	10 (1 – 1000)
Severe disease (Zar)	8/10 (80)	7/20 (35)	0.006	7 (1 – 84)
Treatment				
Vancomycin	8/10 (80)	2/20 (10)	< 0.001	36 (3 – 495)
Outcome				
Response	7/10 (70)	18/20 (90)	NS	
Death within 30 days	4/10 (40)	0/20 (0)	0.007	
Attributable mortality	3/10 (30)	0/13 (0)	0.029	

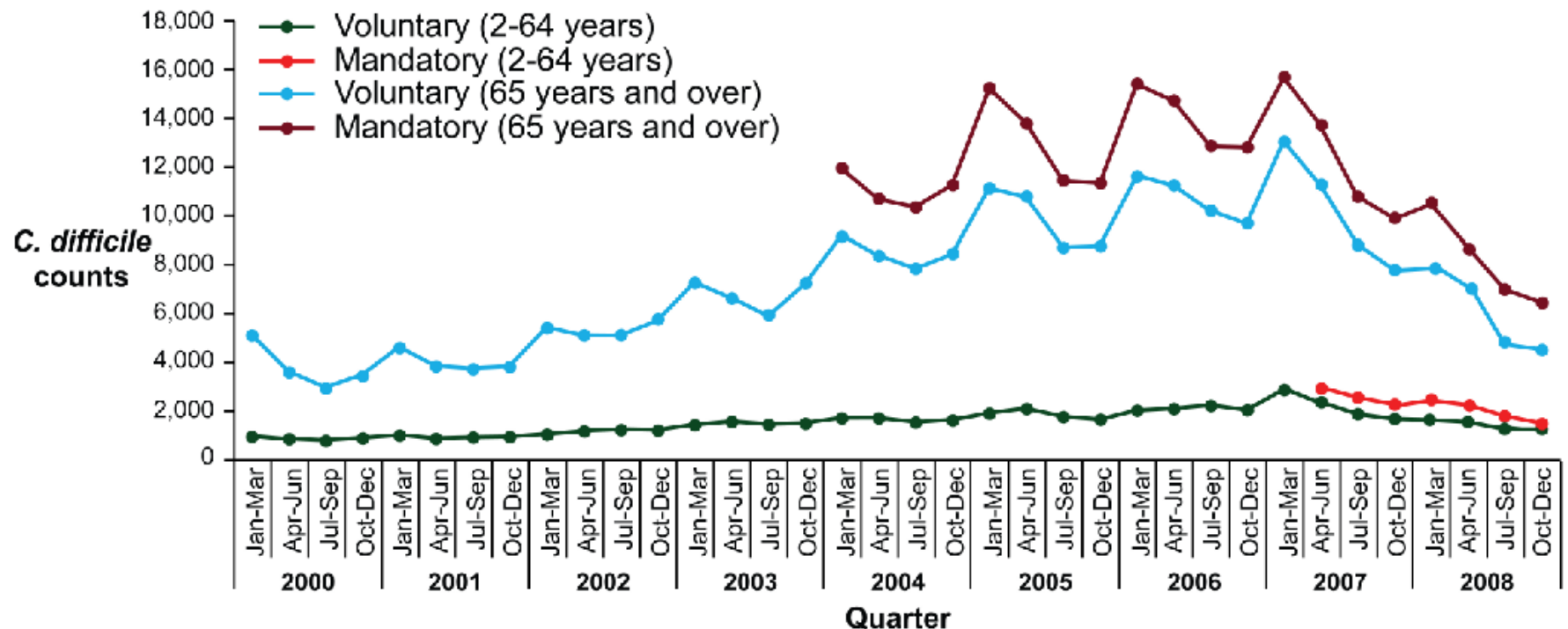




Emerging infectious diseases

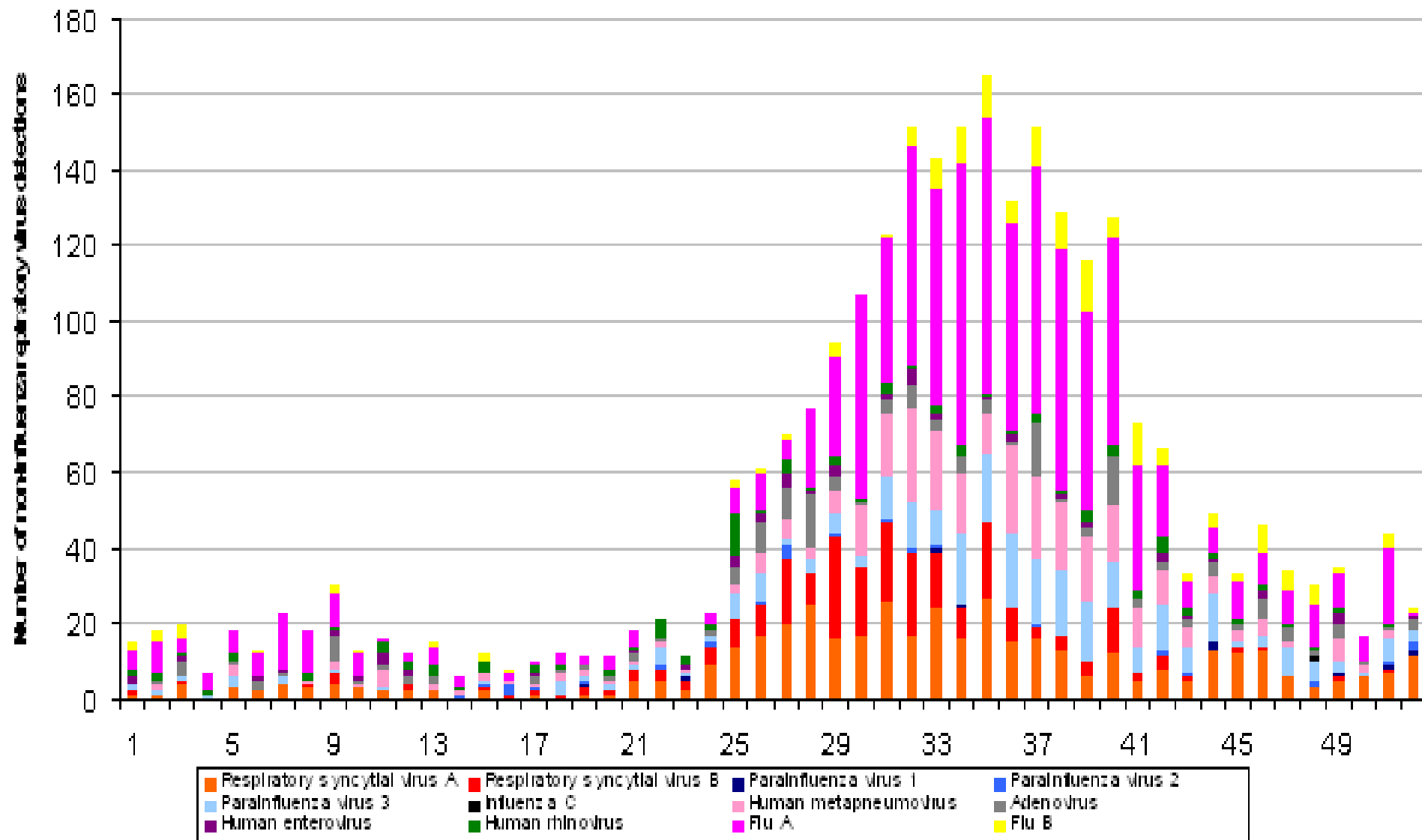


Quarterly counts of *C. difficile*: comparison of mandatory and voluntary quarterly reporting



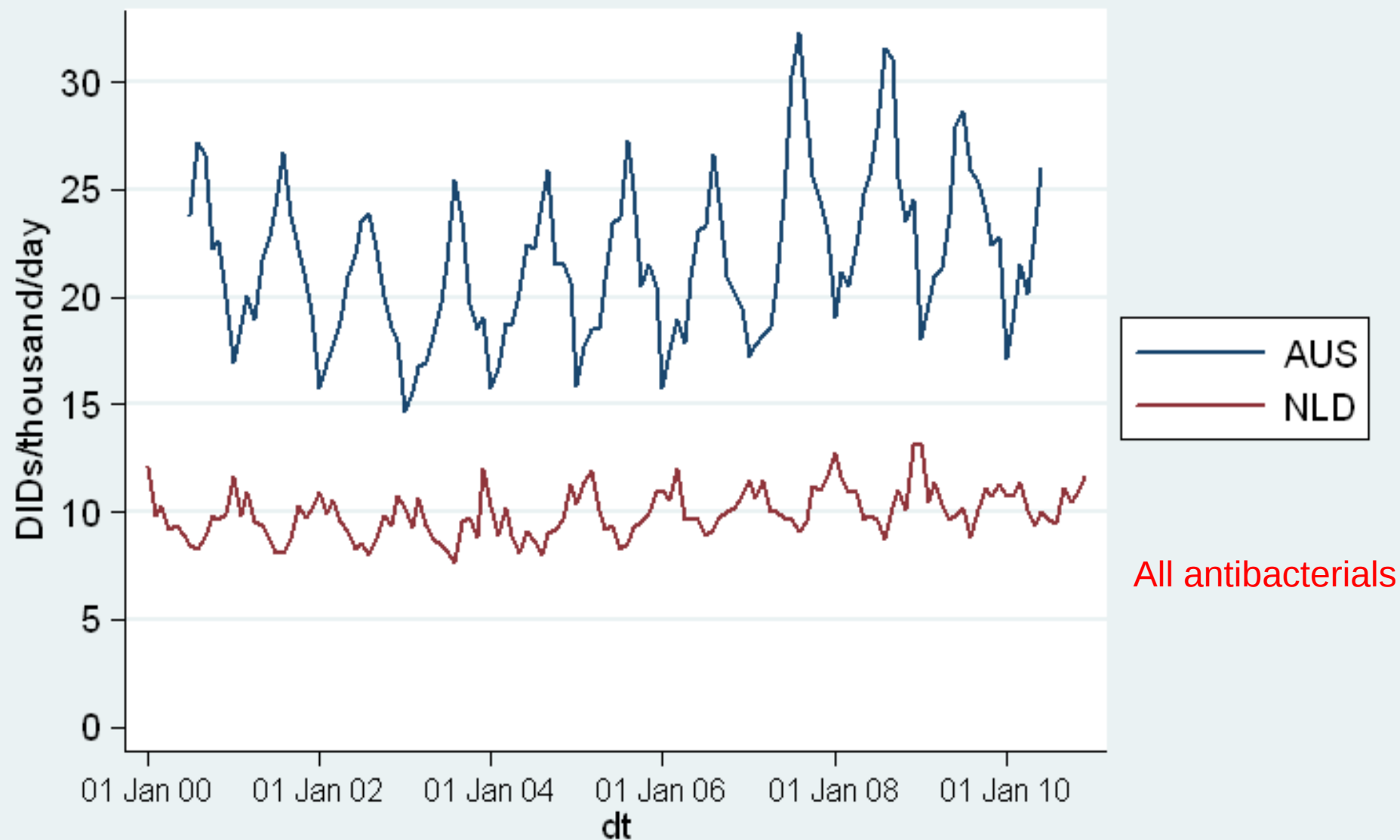
Please note that the voluntary *C. difficile* 2008 data at time of extraction may be under completed.
C. difficile voluntary data includes toxin negative reports.
Extraction date 26.01.2009

PathWest 2011 respiratory virus detections



1a: J01: AUS vs NLD

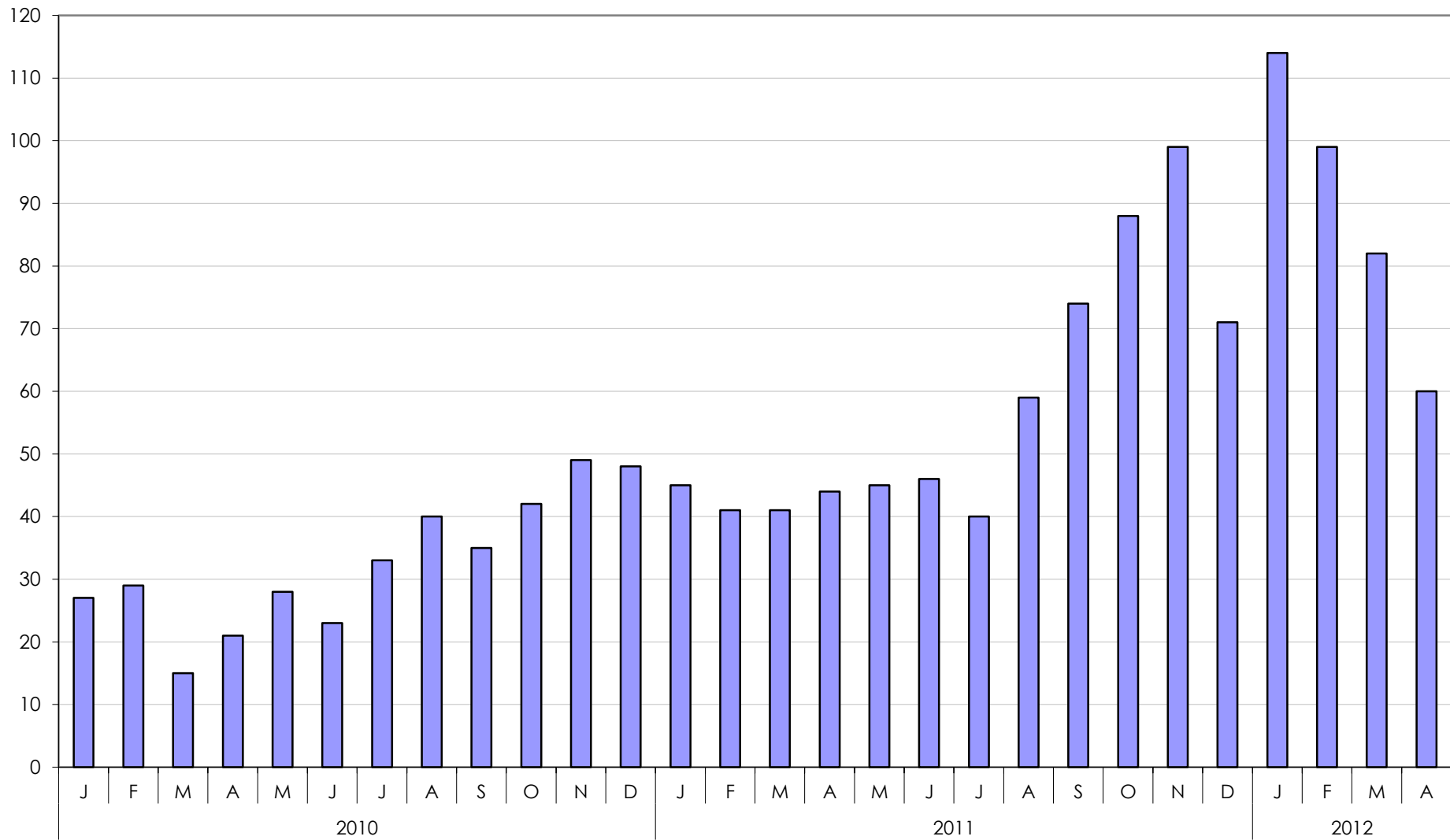
Generic prescribing indicators



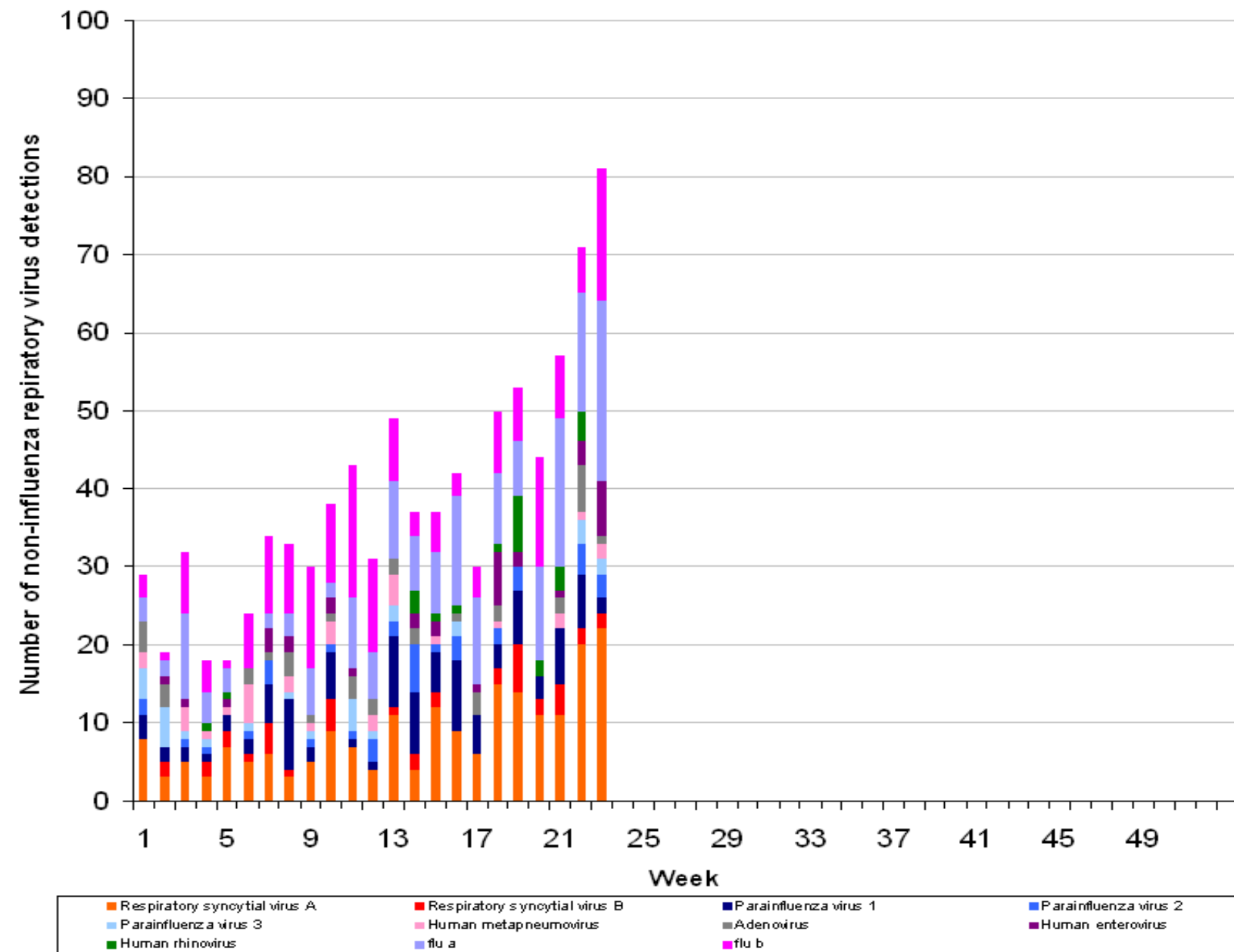
DUSC data: July 2000 - June 2010, GIP data January - December 2000-2010

Courtesy of John Turnidge

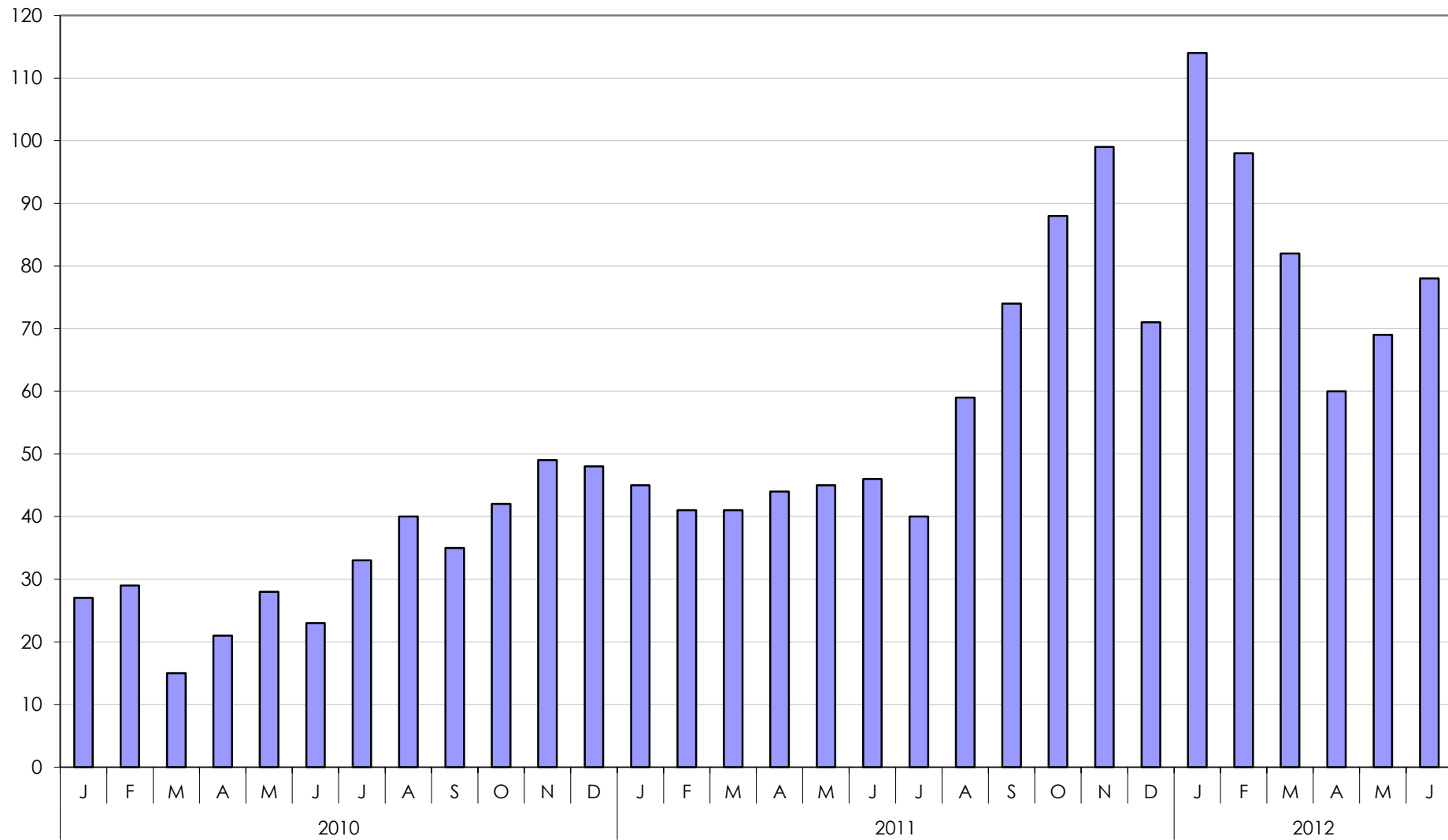
CDI CASES 2010 - 2012

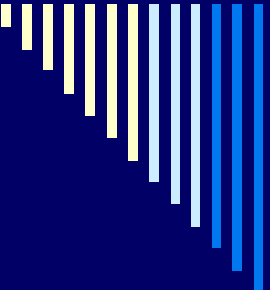


PathWest QEII 2012 respiratory virus detections



CDI CASES 2010 - 2012



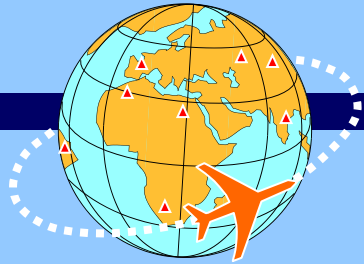


To summarise the issues

- ❑ Major new human health problem in Australia – community CDI
 - ❑ Need to find the source/reservoir
 - ❑ Need to prevent establishment of RT 244 in hospitals
 - ❑ Now a major animal health problem (pigs/horses)
 - ❑ Gross contamination of the environment OUTSIDE hospitals
 - ❑ Possible contamination of meat
 - ❑ CDI is a zoonosis
 - ❑ Will require a One Health approach to resolve
-

PANDEMIC

Global spread



Global travel and trade

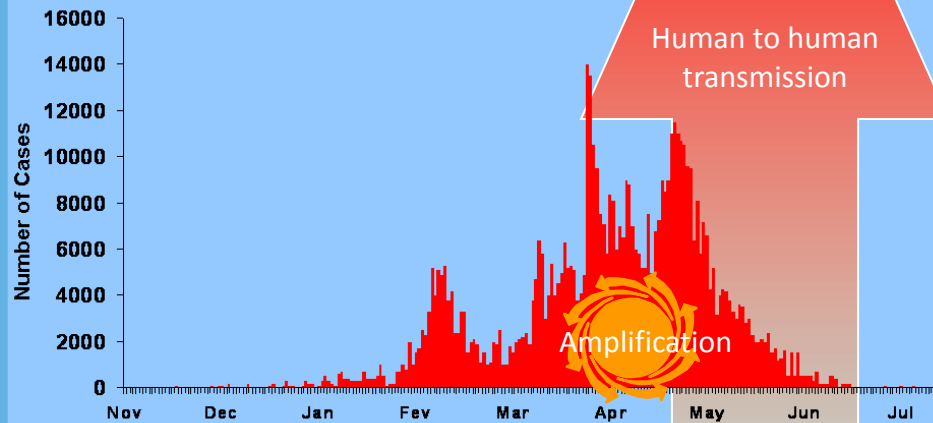
Global Alert & Response: the need for global surveillance

Globalization of pathogens

- Global travel: people, animals, vectors
- Global trade: animal and their products, vaccines, medical products, etc.

EPIDEMIC

Amplification

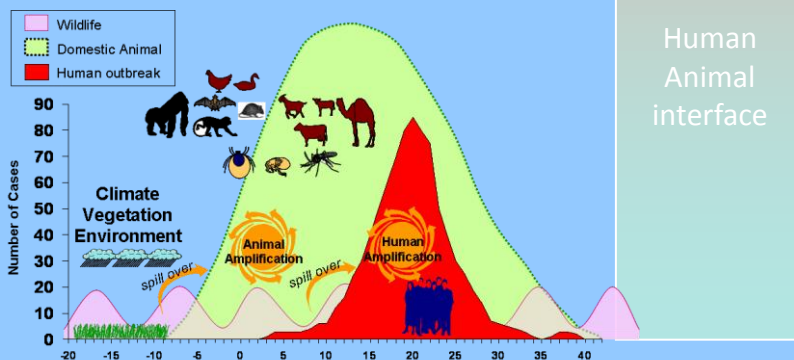


Amplification of pathogens

- Successful H2H transmission,
- Nosocomial transmission in health care centers
- New introduction from animals
- Urbanization
- Agricultural Intensification
- Technology And Industry

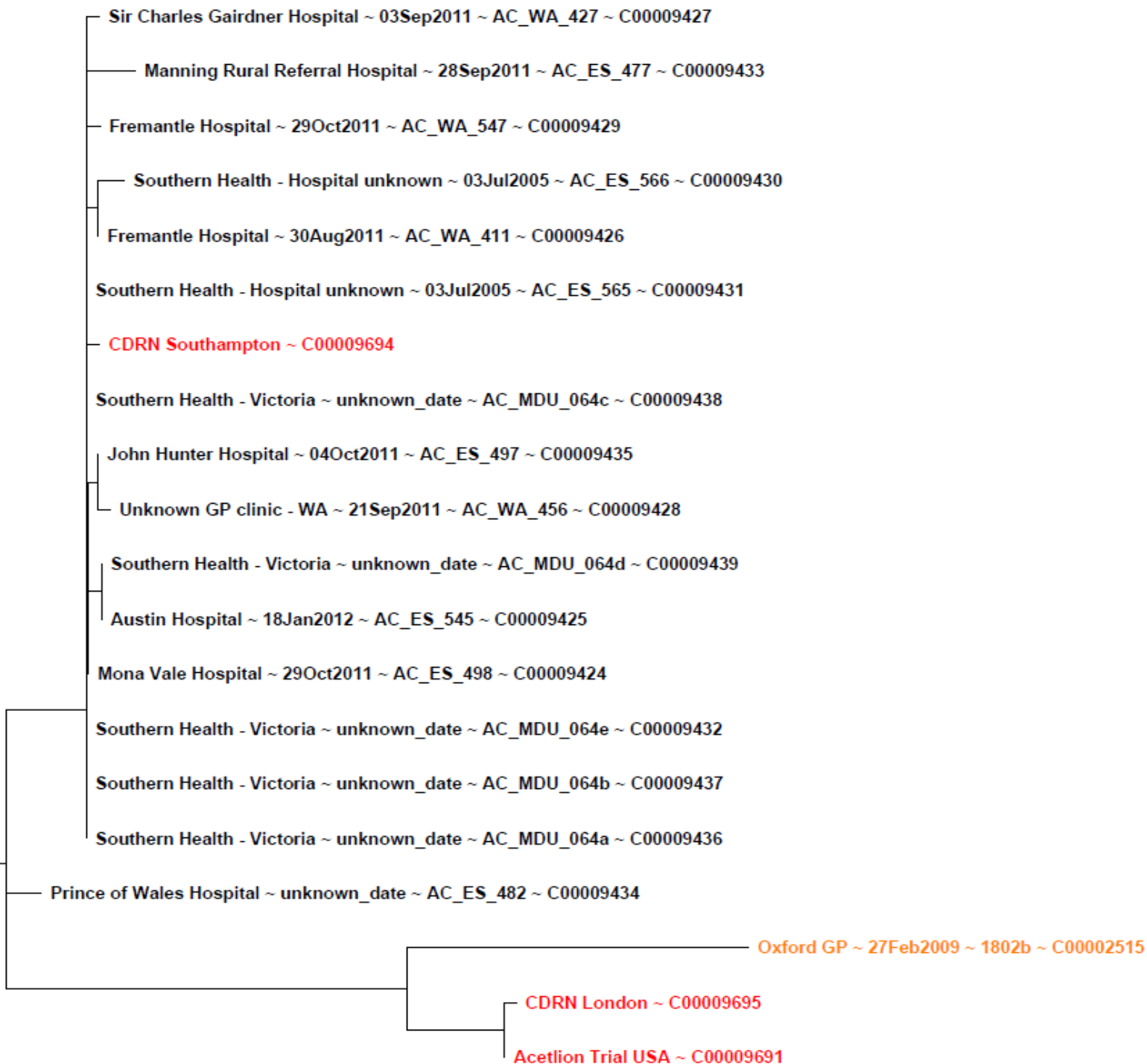
OUTBREAK

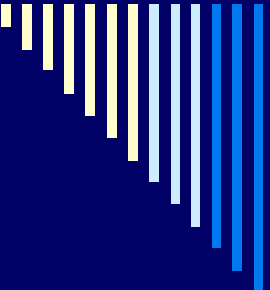
Emergence



Emergence of pathogens

- Encroachment introduction, “Spill over”
- At-risk behaviour
- Human encroachment, Ex situ contact, Ecological manipulation
- Translocation of wildlife





Acknowledgments

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