Meningococcal Disease a resurgence of an old foe?

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

The Immunisation Advisory Centre

To talk about

- NZ rates of meningococcal disease
- Changing serotypes
- Clinical presentations
- Meningococcal vaccines

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What is meningococcal disease?

- Important clinical and public health problem
- Rare but serious
- Disease onset is sudden and often dramatic
  - most common clinical presentations are meningitis and septicaemia
  - Significant case fatality rate despite treatment
  - 5-15% case fatality varies with age, capsular group, and clinical presentation

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The spectrum of meningococcal disease

Fulminant meningococcal
Purpura, limb ischaemia, coagulopathy, pulmonary oedema, shock, coma and death within hours despite appropriate management
Usually die in the first 12-18 hours

Meningitis (50%)

Meningococcaemia AND meningitis

Meningococcaemia (35-40%)

Septic arthritis

Bacteraemic pneumonia

Conjunctivitis

Red Book 2018 American Academy of Paediatrics

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Complications

- Sequelae associated with meningococcal disease occur in up to 15% of survivors and include
  - hearing loss
  - neurologic disability and/epilepsy
  - digit or limb amputations and skin scarring

- More subtle long-term neurologic deficits
  - impaired school performance
  - behavioural problems
  - attention deficit disorder

Red Book 2018 American Academy of Paediatrics

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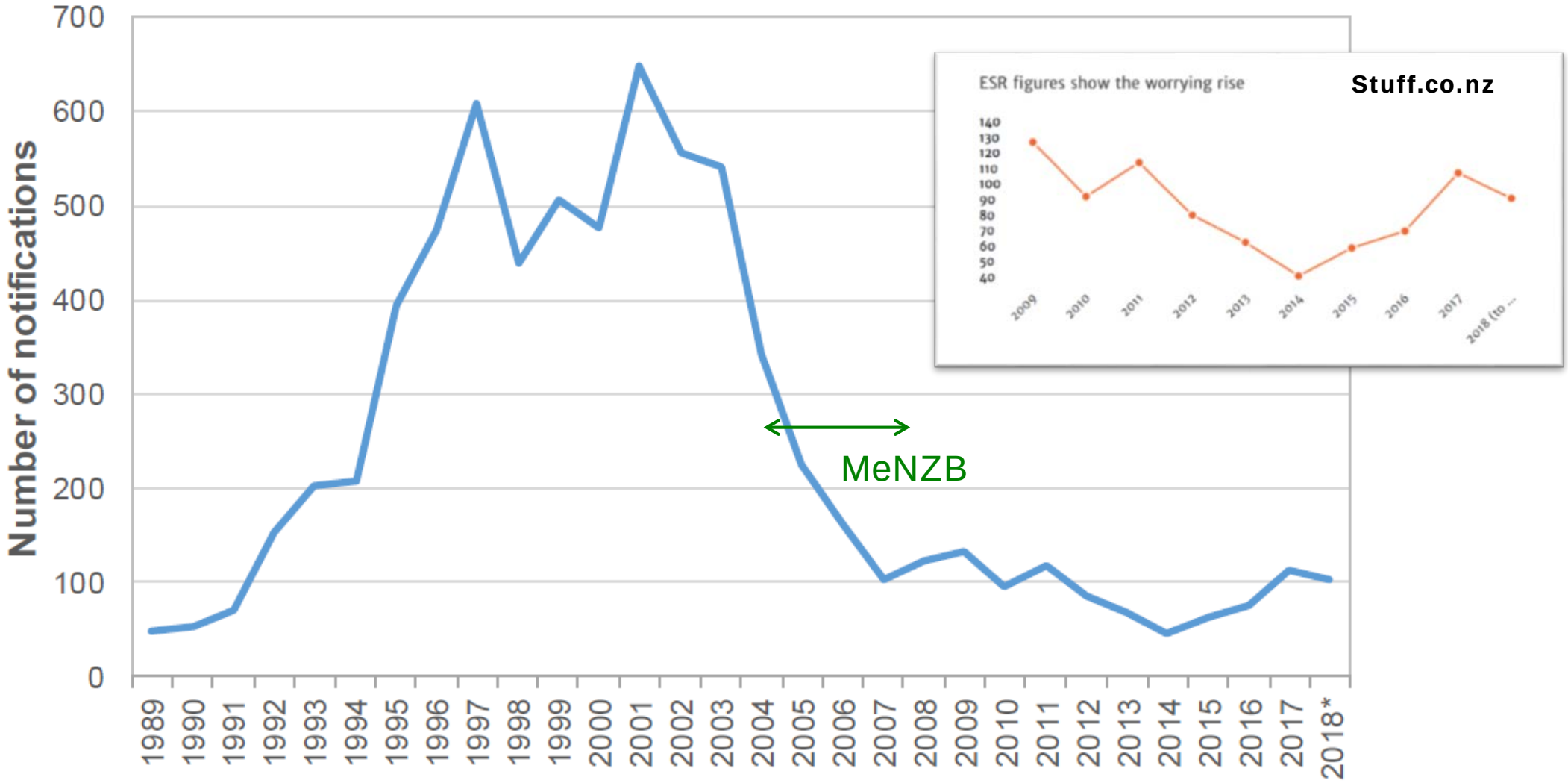
Figure 1. Meningococcal disease notifications by year, 1989–2018*



In NZ 102 cases of invasive meningococcal disease so far this year (to 16th Nov 2018)

Data courtesy of ESR

WHO classification of meningococcal disease burden

Category	Incidence rate (per 100,000 total population)
Epidemic (African meningitis belt)	**>100**
High endemic	**10 – <100 (NZ 1996-2003; max ~ 16)**
Moderate endemic	**2 – <10 (NZ 2004-2011 and 2017-18)**
Low endemic	**<2 (NZ 2012-2016)**

Outbreak (outside meningitis belt):
Substantial increase in invasive meningococcal disease in a defined population above that which is expected by place and time

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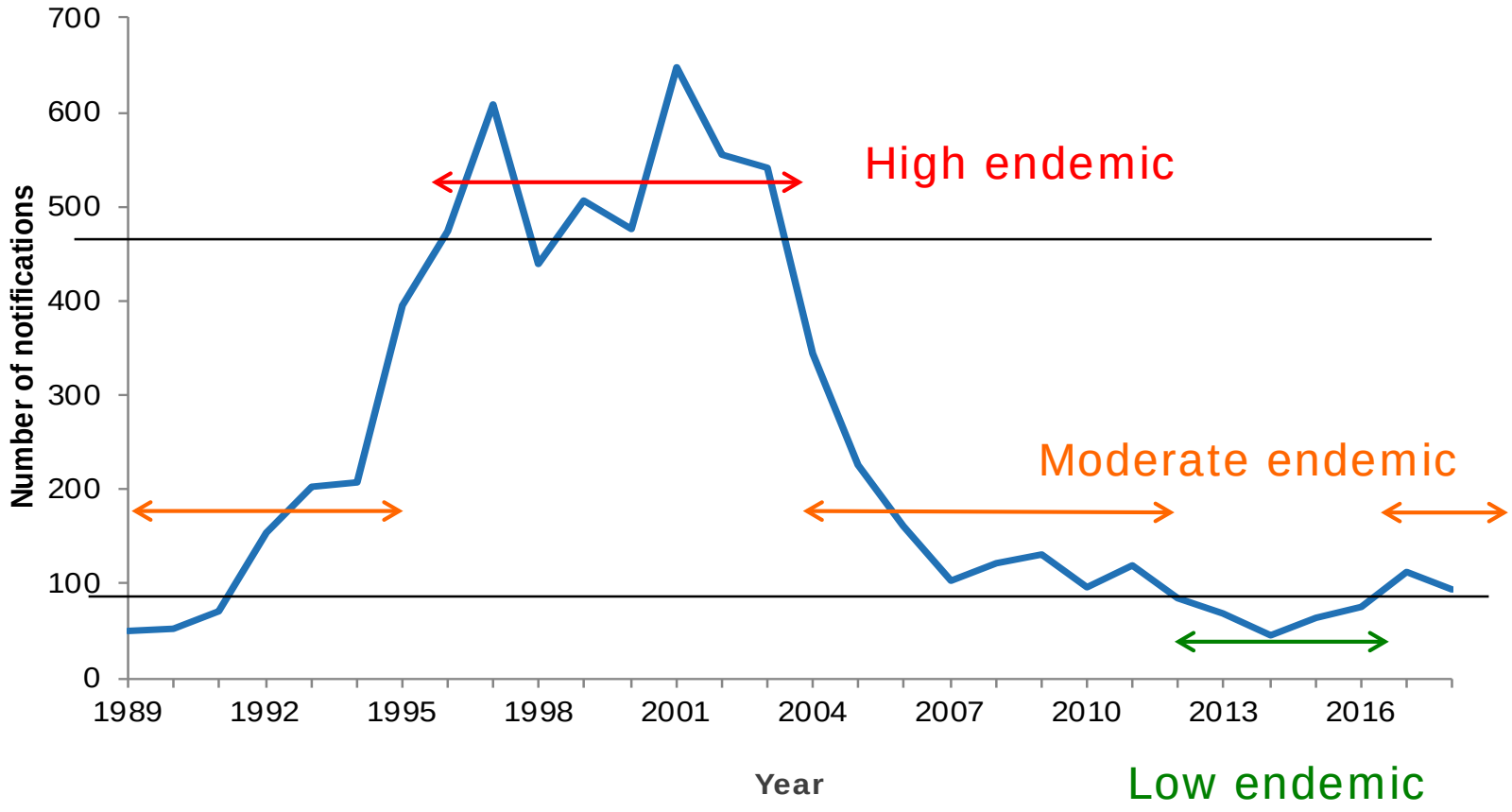
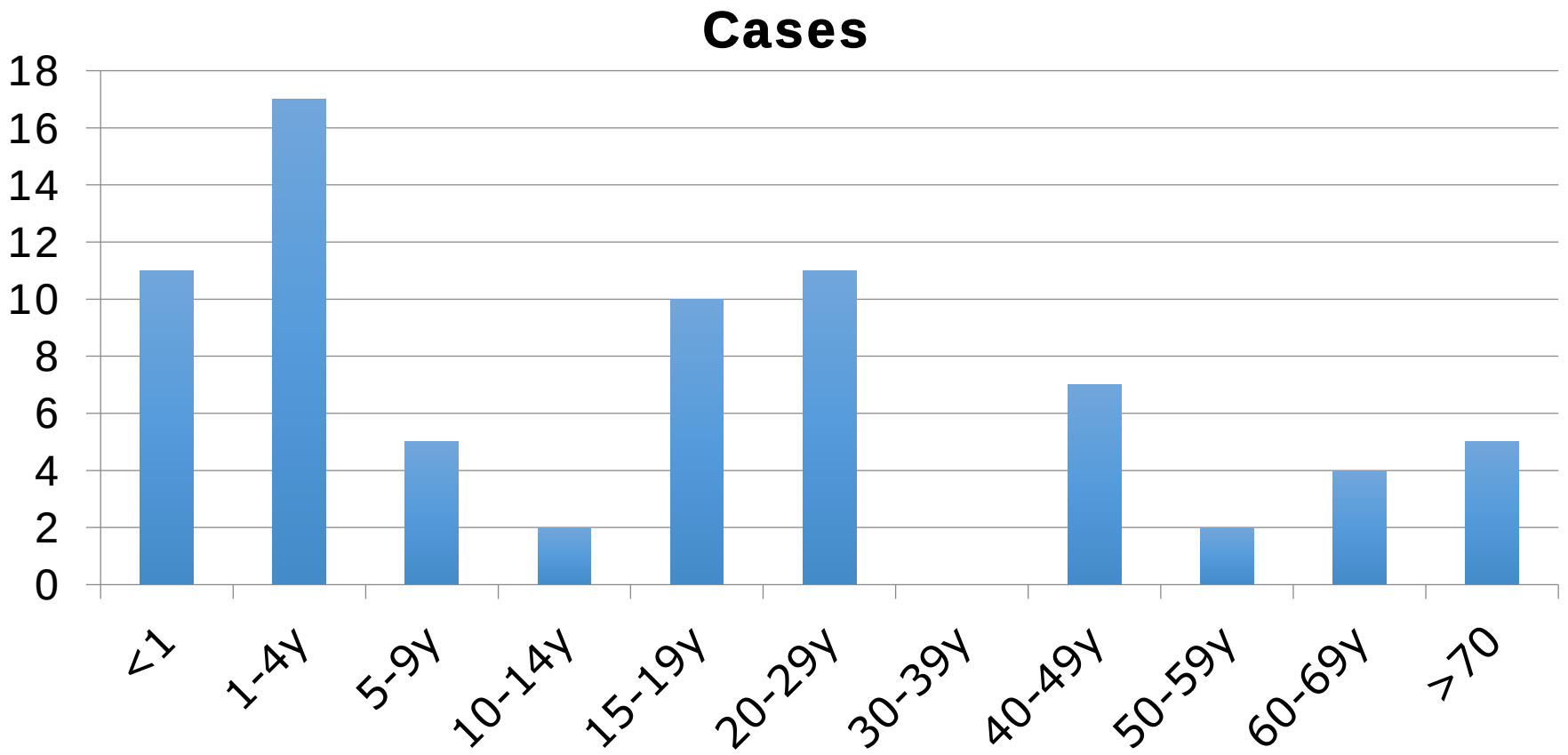
Ref: Meningococcal vaccines: WHO position paper, November 2011. WER (2011) 86 (47): p521–540

Meningococcal disease notifications by year, 1989–2018*



Data courtesy of ESR
Slide thanks to Professor Peter McIntyre

Meningococcal cases by age in NZ 2016



- [a]ESR estimates sensitivity of meningococcal surveillance to be “probably in excess of 87%”.[1]
- 1. ESR. Annual Report 2016. Wellington: The Institute of Environmental Science and Research; 2017

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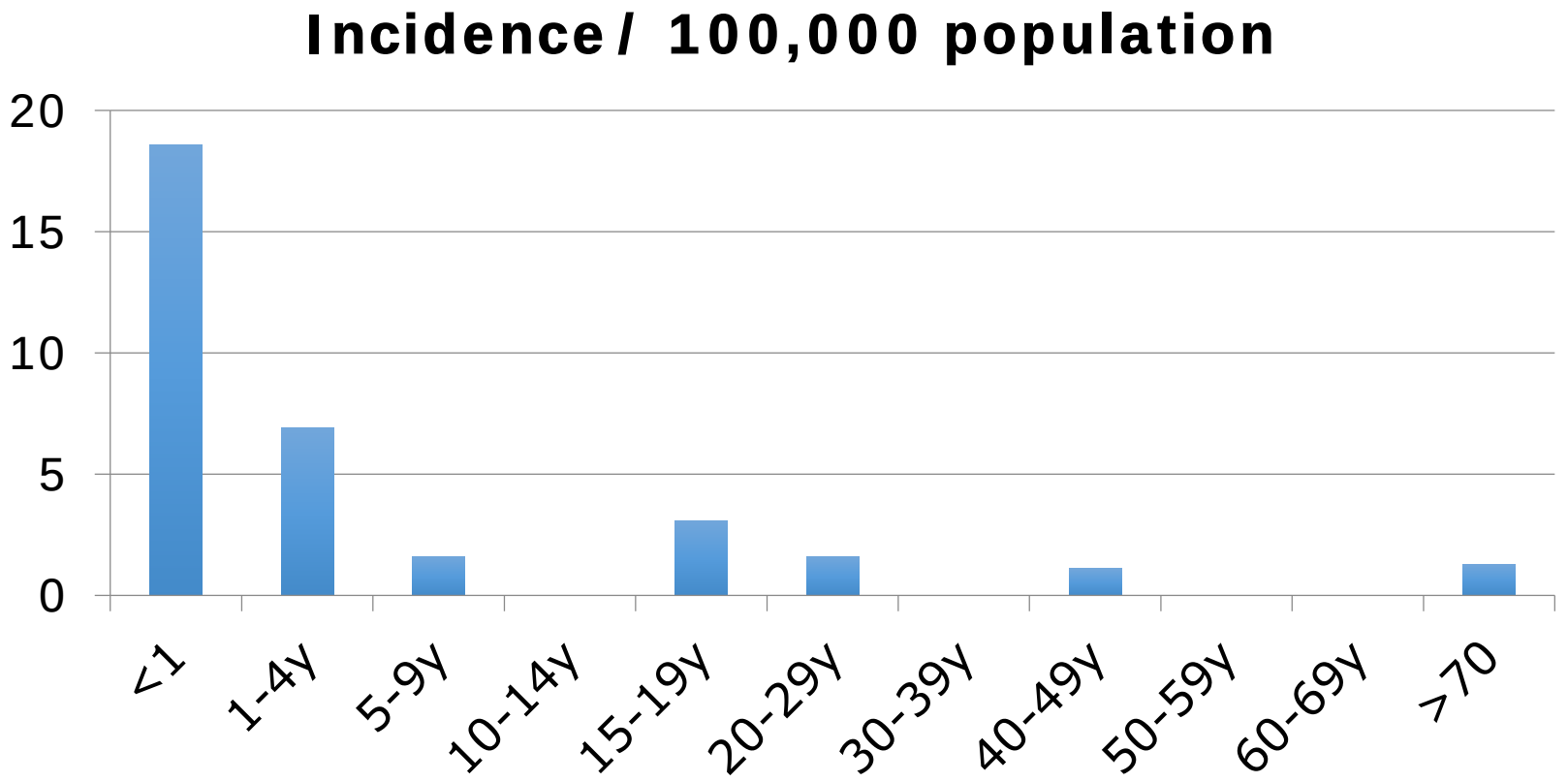
Meningococcal incidence by age in NZ 2016



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Meningococcal B Notification Rate

Meningococcal B Notification Rate (per 100,000) stratified by age and ethnicity over 2007-2016[1]

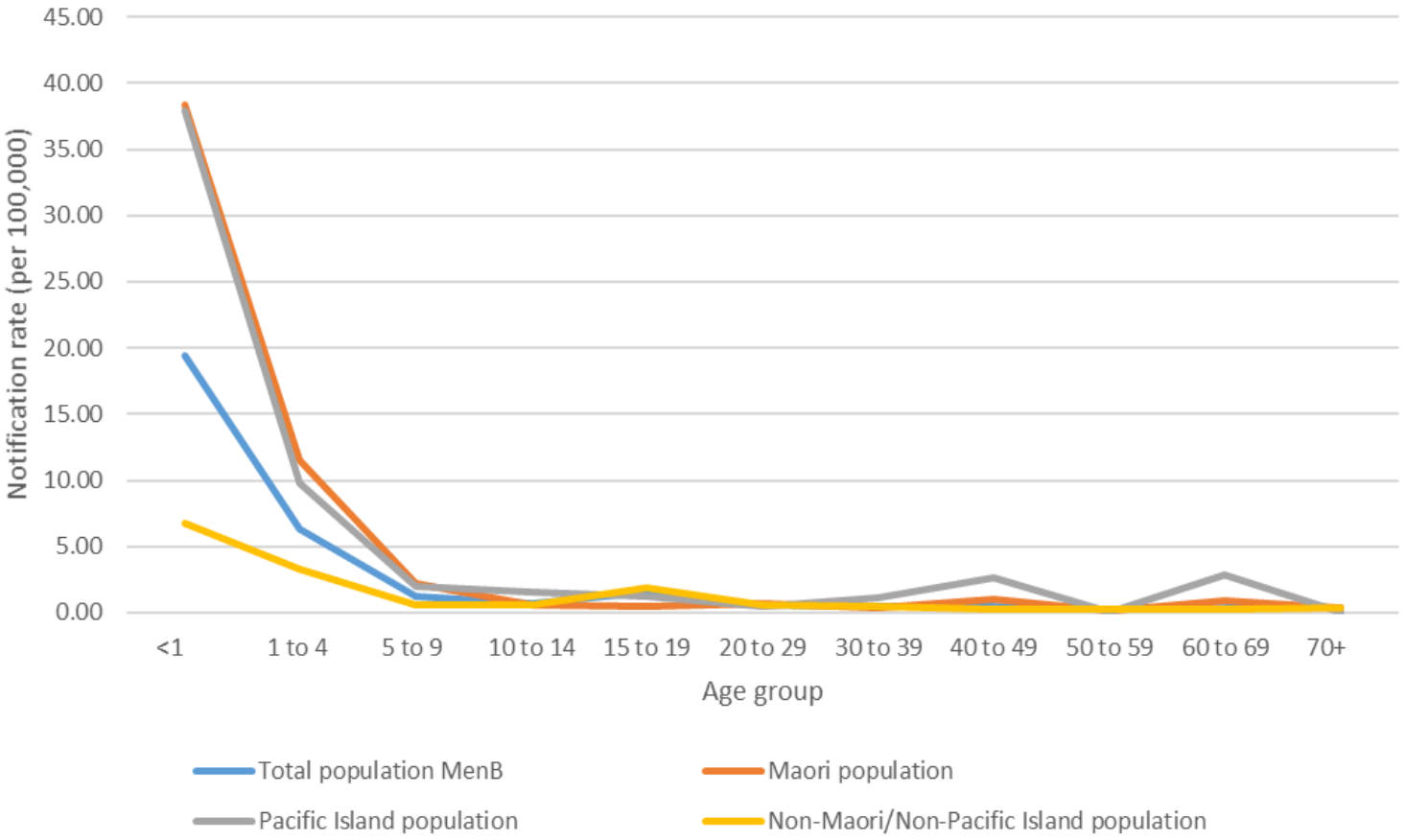

Figure based on ESR and Statistics NZ data.

1. GlaxoSmithKline New Zealand Limited.
Application to the Pharmaceutical Management Agency. 2018.

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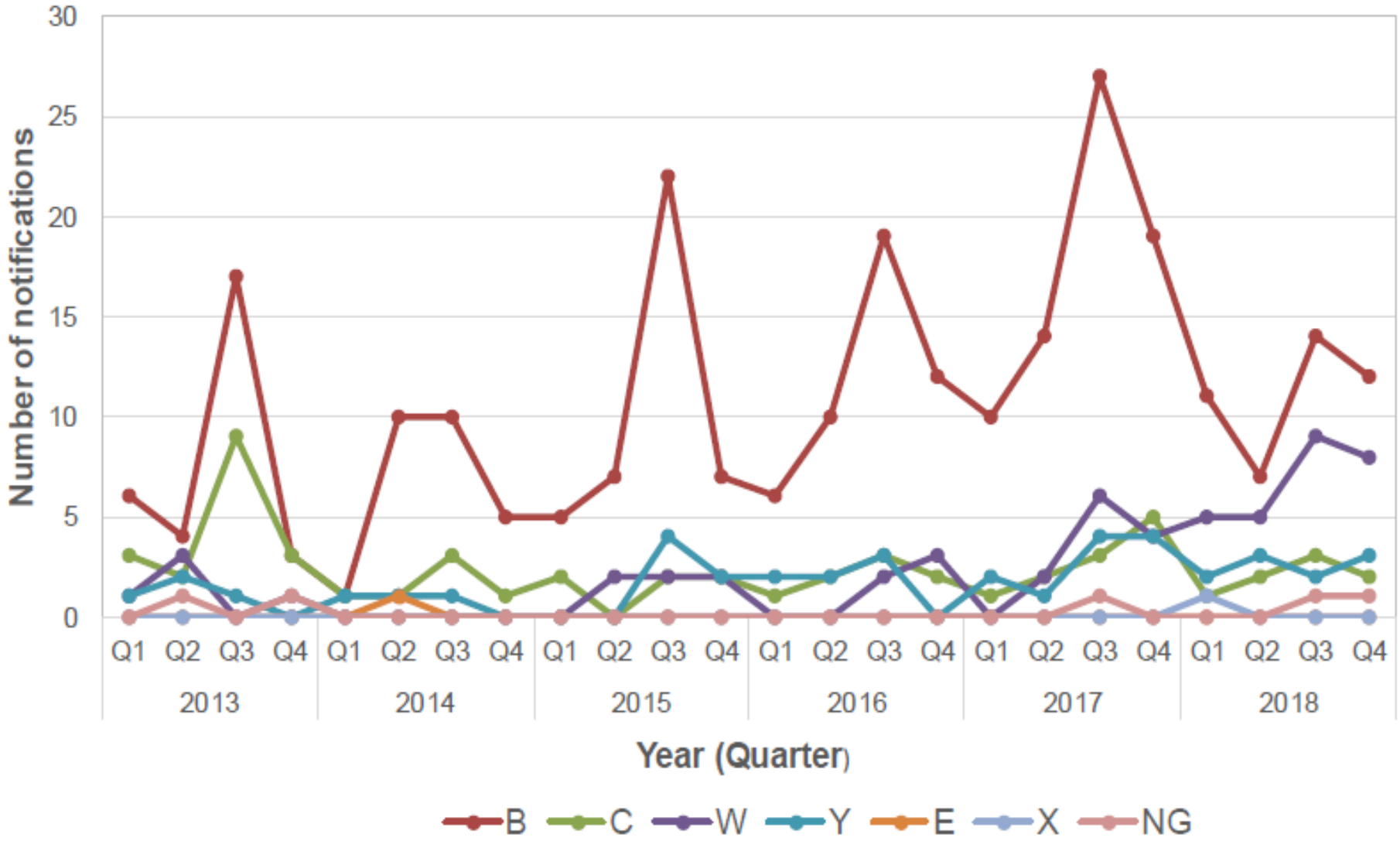
Figure 2. Meningococcal disease notifications by group by quarter by year, 2013–2018*



District health board	Group						Total	Rate per 100,000*
	B	W	Y	C	X	NG		
NORTHLAND		7	1	0	0	0	10	5.7
Waitemata	2	3	2	1	1	0	10	1.7
Auckland	3	4	1	1	0	0	11	2.1
Counties Manukau	8	2	1	0	0	0	12	2.2
Waikato	3	0	0	4	0	1	8	2.0
	0	2	1	0	0	0	3	2.8
BAY OF PLENTY	5	1	0	1	0	0	9	3.9
Tairawhiti	1	0	0	0	0	0	1	2.1
TARANAKI	3	0	0	1	0	0	4	3.4
Hawke's Bay	0	0	0	0	0	0	0	0.0
WHANGANUI	1	1	0	0	0	0	2	3.1
MidCentral	1	0	0	0	0	0	1	0.6
Hutt Valley	1	0	0	0	0	1	2	1.4
Capital & Coast	4	2	0	0	0	0	6	1.9
Wairarapa	0	0	1	0	0	0	1	2.2
Nelson Marlborough	1	0	1	0	0	0	2	1.3
West Coast	0	0	0	0	0	0	0	0.0
Canterbury	3	3	1	0	0	0	8	1.5
South Canterbury	0	0	0	0	0	0	1	1.7
SOUTHERN	8	2	1	0	0	0	11	3.4
Total	44	27	10	8	1	2	102	2.1

*Rates should be interpreted with caution for DHBs with <5 cases.

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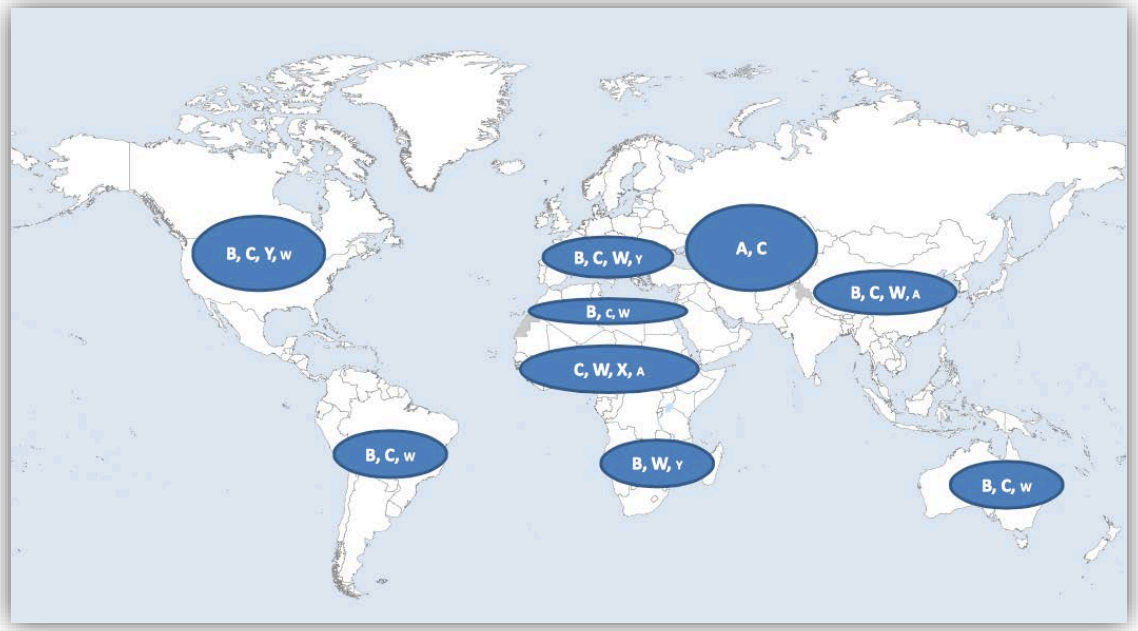
Microbiology and serogroups

- 13 serogroups based on capsular proteins
  - worldwide A, B, C, W, Y
- Neisseria meningitidis – gram negative diplococcus
- Only infects humans
- Traditionally B and C
  the most important serogroups
- Group A epidemic strain
  - esp Africa & Middle East



WHO www.who.int.emergencies/meningitis.serogroup-distribution

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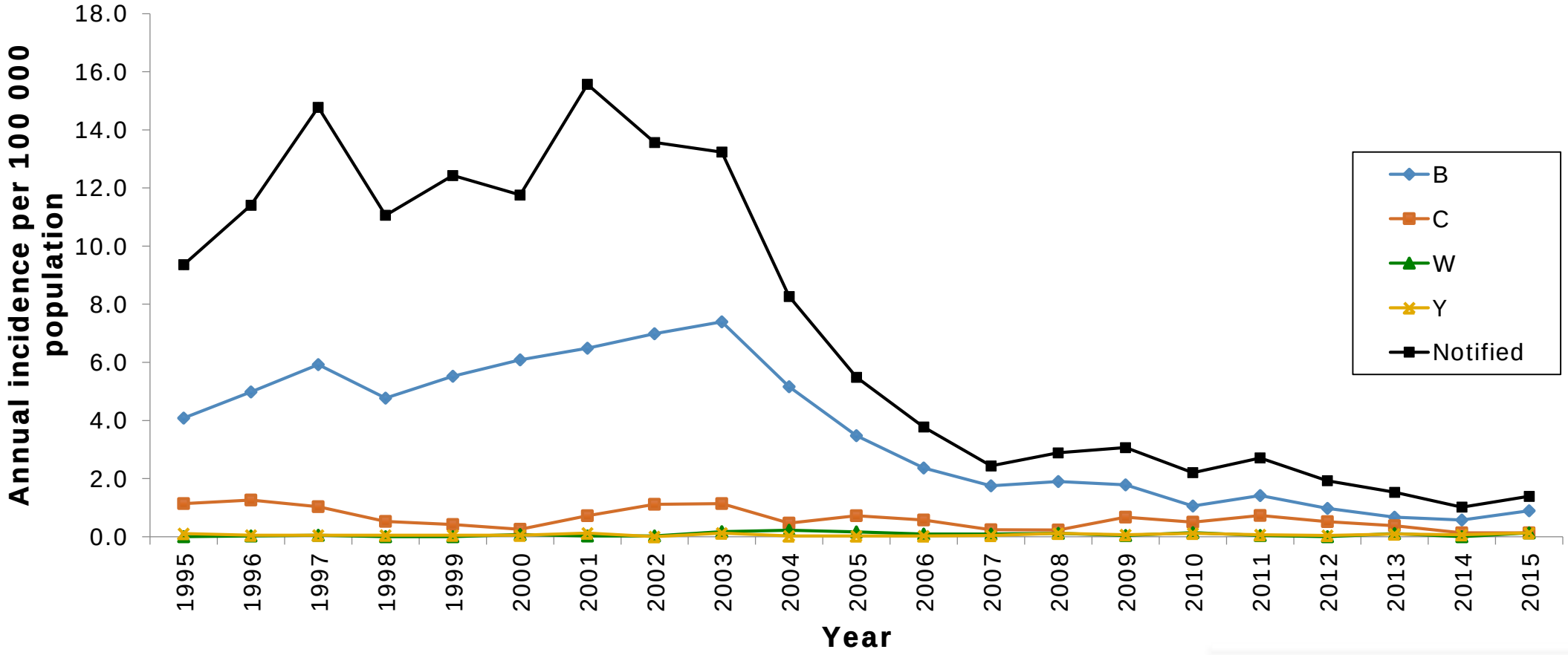
Incidence of all notified meningococcal disease and by serogroup 1995-2015 – data courtesy Dr Amanda Kvalsig



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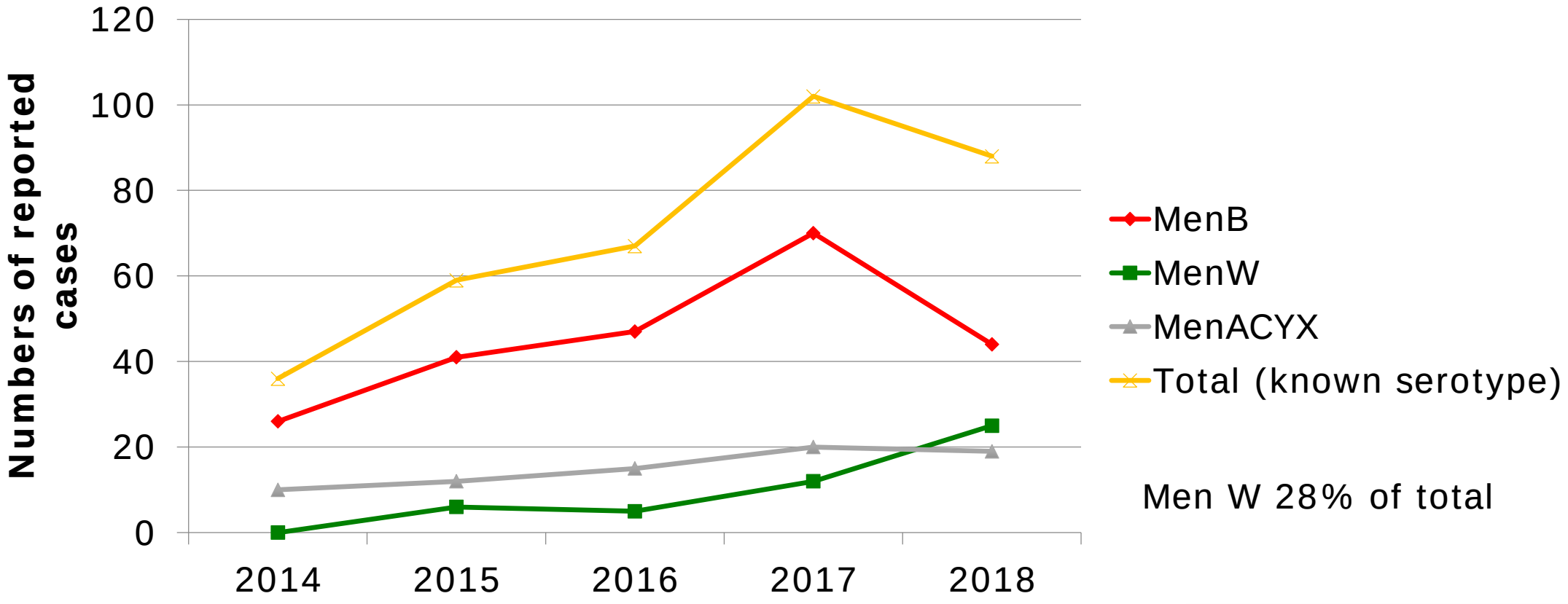
Meningococcal serotypes in NZ (2014-2018*)



Men W 28% of total

*to November 14th

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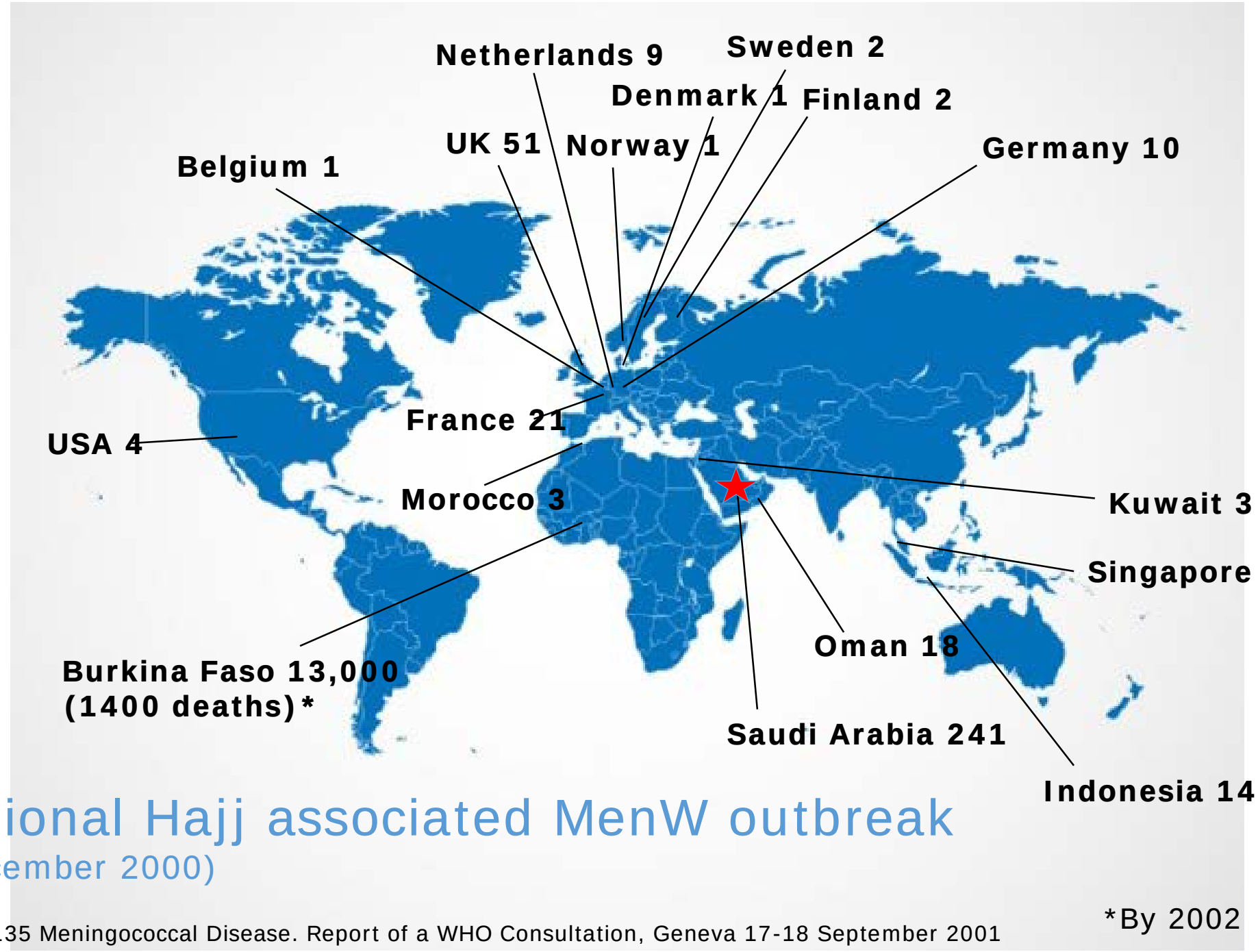
Meningococcal W

Thought to have little epidemic potential until 2000

Emergent clonal type ST11 associated with increase in disease and high case fatality



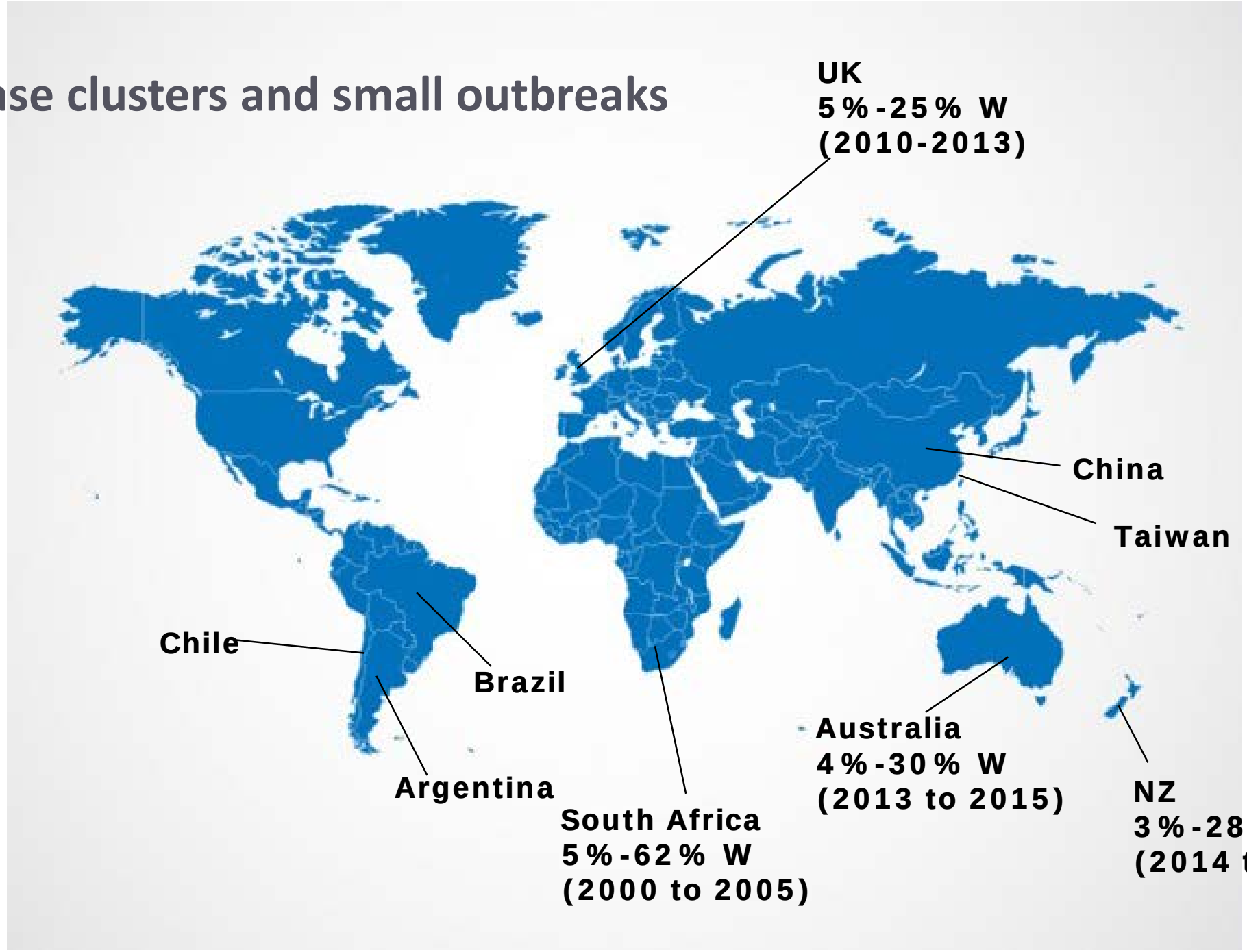
International Hajj associated MenW outbreak

(April to December 2000)

*By 2002

Emergence of W135 Meningococcal Disease. Report of a WHO Consultation, Geneva 17-18 September 2001

MenW case clusters and small outbreaks



UK data on 129 cases of MenW (2010-2013)

	<5 years (27%)	5-19 years (14%)	20-64 years (29%)	>65 years (30%)	Total
Septicaemia	17 (53%)	9 (43%)	18 (47%)	19 (50%)	63 (49%)
Septicaemia and meningitis	6 (19%)	2 (10%)	5 (13%)	5 (13%)	21 (16%)
Meningitis	4 (13%)	4 (19%)	6 (16%)	2 (5%)	16 (12%)
Pneumonia	-	2 (10%)	6 (16%)	7 (18%)	15 (12%)
Septic arthritis	4 (13%)	1 (5%)	1 (3%)	3 (8%)	9 (7%)
Epiglottitis/ supraglottitis	1 (3%)	-	2 (5%)	2 (5%)	5 (4%)

Case fatality 12%, higher in older age groups

Ladhani, Clin Infect Dis 2015

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Rapid communication

Presentation with gastrointestinal symptoms and high case fatality associated with group W meningococcal disease (MenW) in teenagers, England, July 2015 to January 2016

Helen Campbell[1], Sydel R Parikh[1], Ray Borrow[2], Ed Kaczmarski[2], Mary E Ramsay[1], Shamez N Ladhani[1,3]

- Seven teenagers (6 females, 1 male)
- Presented with acute (24–48 hour) history of gastrointestinal symptoms
  - nausea, vomiting and/or abdominal pain
  - with/followed by diarrhoea in the 24 hours before attending hospital
- 4 had seen GP and been diagnosed with gastroenteritis
- 2 had a non blanching rash in ED

Outcomes

- 1 collapsed at home and died in ED
- 2 died soon after ED presentation before ICU – presumed gastrointestinal sepsis/peritonitis
- 2 died in ICU within 24 hours
- 2 survived- short histories and went straight to ED and aggressively resuscitated

Eurosurveillance: European communicable disease bulletin 2016

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Comparing serogroup B and W: 2013-17 (data courtesy ESR and Ministry)

	Serogroup B (%)	Serogroup W (%)
1- 4 years	45.8	21.2
>20 years	35.7	63.5
Maori/Pacifika	41.5	33.3
Case Fatality	6.0	14.3

- In 2018 after 24 Men W case fatality rate was 25%

With thanks to Professor Peter McIntyre

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Ministry of Health – currently being updated -antibiotic treatment of meningococcal disease presenting to primary care

	children	adults
Benzyl penicillin (has been first line treatment)	50mg/kg IV or IM to maximum of 2g	2.4g IV or IM
Ceftriaxone (alternative or first line treatment)	100mg/kg IV or IM up to 2g as a single dose	2g IV or IM

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Meningococcal transmission

- Transmission by respiratory droplets or direct contact with nasopharyngeal secretions
- Incubation 2-10 days (commonly 3-4 days)

Cefotaxime, **Ceftriaxone**, rifampicin or ciprofloxacin eradicate meningococcus from mucosa within 24 hours

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Public health/ contact prophylaxis

Close contact

- Household contact
  - Bedroom, dormitory, student hostel for at least 1 night
- Child care or preschool contact during 7 days before onset of illness (case by case)
- Direct exposure to index case secretions (kissing)
- Passengers seated directly next to index case during airline flight >8 hours

HCW: unprotected contact during intubation or other procedure in very close contact with patient's face

- (eg, throat examination) and no surgical mask
- aware of contamination of droplets directly onto your face

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