

Pertussis Retrieval

Case Study

Dedication

- Acknowledge the multiple people at both ends of the country involved in this retrieval
- Dedicate this presentation to the 2 flight teams
- Especially to my immediate colleagues, the 2 flight nurses involved.

Why this presentation??

- Highlight how devastating this preventable disease continues to be
- Demonstrate the length and intensity of some of our (PICU) retrievals.

Pertussis in New Zealand

- Epidemic in NZ since 2011

The New Zealand Herald

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Whooping cough epidemic rapidly escalating

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The epidemic of whooping cough, a potentially fatal infection, is rapidly escalating, the latest figures published by health authorities show.

The disease, spread by coughing and sneezing, is particularly dangerous for babies and other young children. It can lead to pneumonia, convulsions and brain damage.



[+ EXPAND](#)



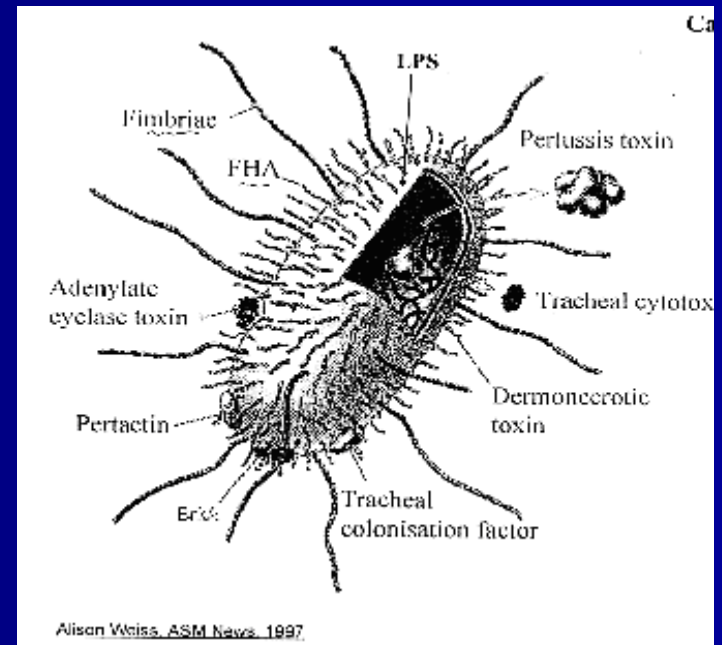
Whooping cough cases double in Auckland

• **Waikato DHB offers free whooping cough**

Health authorities say vaccination is

Pertussis toxins

- Respiratory compromise.
- This disease at worst causes cardiovascular collapse and multi organ failure.



New Zealand National Immunisation Schedule from 1 July 2011

Age	DTaP-IPV-HepB/Hib	PCV	Hib	MMR	DTaP-IPV	Tdap	HPV	Td	Influenza
6 weeks	Infanrix®-hexa	Synflorix®							
3 months	Infanrix®-hexa	Synflorix®							
5 months	Infanrix®-hexa	Synflorix®							
15 months		Synflorix®	Act-HIB™	M-M-R® II					
4 years				M-M-R® II	Infanrix®-IPV				
11 years (school year 7)						Boostrix®			
12 years (school year 8) Girls only							Gardasil®		
							Gardasil®		
							Gardasil®		
45 years								ADT™ Booster	
65 years								ADT™ Booster	Brand varies annually

Additional vaccines for special groups See Immunisation Handbook 2011 for details, including eligibility

Babies at high risk from tuberculosis (TB):
BCG vaccine at birth

Babies of hepatitis B carrier mothers:
Hepatitis B vaccine plus hepatitis B immunoglobulin at birth

Children < 5 years at high risk of invasive pneumococcal disease:
Pneumococcal vaccines, PCV13 and 23PPV

Pregnant women, children ≥6 months, and adults at high risk of influenza:
annual influenza vaccine

Children 0-16 years pre / post splenectomy or with functional asplenia and Adults pre / post splenectomy:
Pneumococcal, Hib and Meningococcal A, C, Y, W-135 vaccines

Household and sexual contacts of hepatitis B carriers:
Hepatitis B vaccine

Women of childbearing age who are susceptible to rubella:
MMR vaccine

Vaccine key: BCG: tuberculosis; DTaP: diphtheria, tetanus, acellular pertussis - child; Tdap: tetanus, diphtheria, acellular pertussis - adolescent; HepB: hepatitis B; Hib: *Haemophilus influenzae* type b; HPV: human papillomavirus; IPV: inactivated polio vaccine; MMR: measles, mumps, rubella; PCV10: 10-valent pneumococcal; Td: tetanus, diphtheria - children ≥7 years/adult; PCV13: 13 valent pneumococcal; 23PPV: 23 valent pneumococcal.

Immunisation Advisory Centre PO Box 17 360, Greenlane, Auckland Telephone: (09) 923 6191 Email: imac@auckland.ac.nz

For detailed vaccine prescribing information please refer to the data sheet via the Medsafe website www.medsafe.govt.nz or the Immunisation Handbook (Ministry of Health) www.moh.govt.nz or phone 0800 IMMUNE (466863)



GET THE FACTS ON IMMUNISATION

0800 IMMUNE
4 6 6 8 6 3

www.immune.org.nz

- Pregnant women now being offered a booster in their 3rd trimester (28-38/40 eligible for free Boostrix)
- Medical & nursing staff on PICU offered free Boostrix

Details of patient

- First call 5.11.12 / 22:00 hrs
- 3.7kg infant (ex 35/40)
- 5 weeks old (not received 1st immunisation)
- In HDU on the paediatric ward
- Positive for pertussis
- Treated with Azithromycin (5 days)
- Desaturations & apnoeas
- Still having coughing episodes
- Currently not ventilated - on CPAP 5
- Hb 83 – transfused & started on caffeine

- Increased W.O.B – moved to the adult ICU
- Ventilated – CV stable; no inotropes
- Seizures confirmed on EEG – phenobarb.

1st attempt to retrieve

- Referral accepted: 04:00/ 8.11.12 (3 days later)
- Flight time to CHCH: Metroliner 1hr 45mins

- Left PICU: 8.11.12 07:45
- Arrived CHCH ICU: 11:10
- Depart CHCH ICU: 20:25
- Back on PICU: 00:05
- Ambulance trips at either end

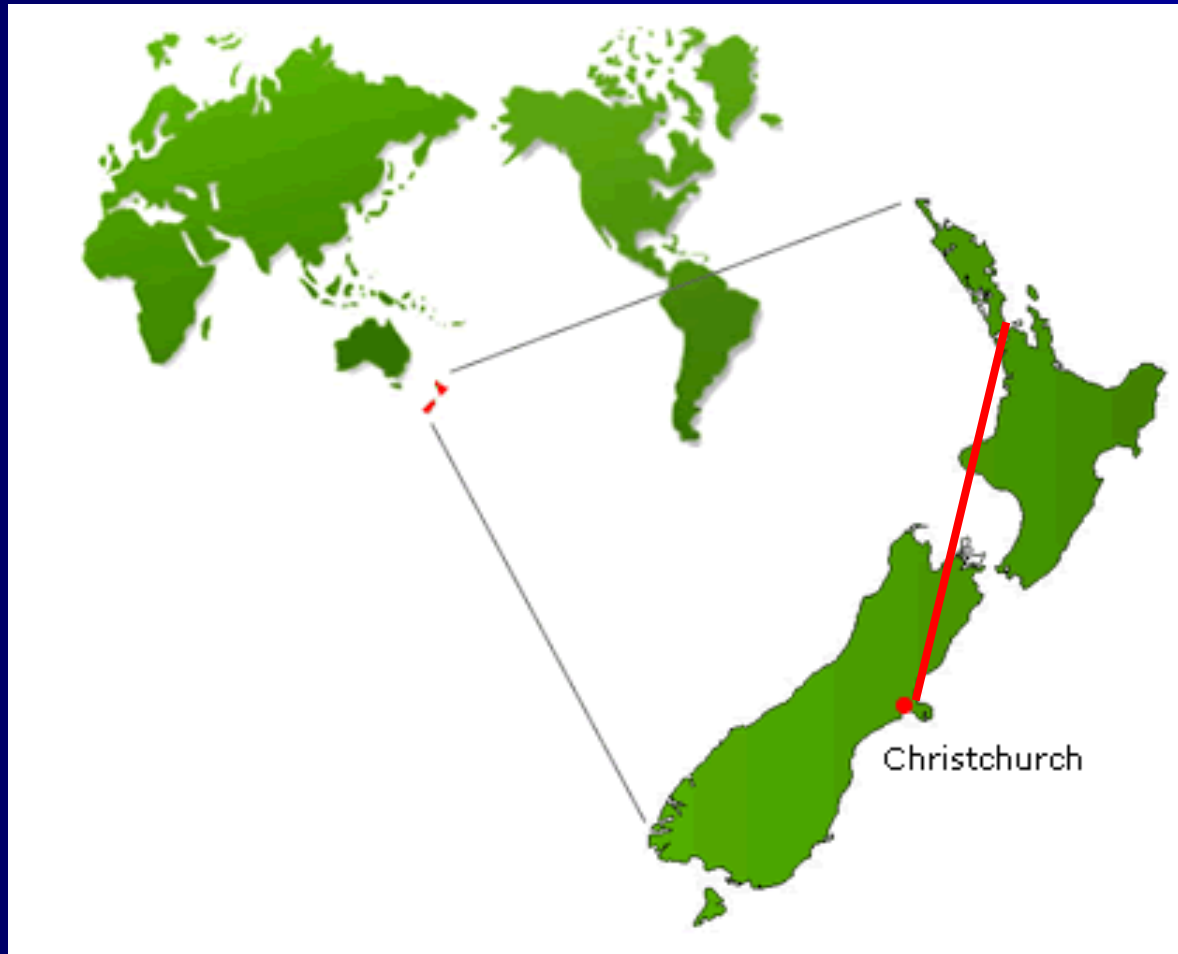
Total time away: 16hrs and 20mins

Why not leave @ 04:00?

- Too late to send the night transport team (on since 19:00 – finish 07:30)
- Best case scenario back late morning
- Place of safety
- Intubated
- Stable
- Weather??

- Wait for the morning transport team

Map of NZ



Findings on arrival

- HR: 202/min - sinus tachy
- BP: 45/26 (34)
- Ventilated: SIMV 24/8 RR: 50 FiO₂ 40% TV:20ml I:time: 0.5 (put onto CMV)
- Sats: 99%
- WCC: 32.6 – 70 overnight – 90
- CXR – RML collapse/consolidation
- Stopped passing urine (catheterised – patent)

Venous access:

- X1 saphenous long line
- X1 peripheral

Arterial access:

- Left radial arterial line

Interventions

- Volume for low MAPS (34) – 10ml/kg
- Commenced Dopamine through saphenous line
- Spontaneous desaturation just prior to transfer into incubator – MAPS also decreased
- 'bagged up' & more volume given
- Adrenaline infusion commenced 0.05mcg/kg/min over time increased to 0.15mcg/kg/min
- Moved across to incubator
- HR consistently >200/min

- Once in the incubator ABP plummeted
 - Transport BP cuff would not read
 - Hospital BP cuff did read (MAP 38-40)
 - Equipment problem or hypotensive baby??
 - Moved baby back to radiant heater
-
- Infant clinically looked hypotensive heading towards circulatory collapse

Plan

- Re-wire arterial line/insert femoral CVL
- Nitric oxide started – continued to de-saturate into the 70's
- Repeated bagging and suctioning
- Increasing ventilation requirements incl. 100% FiO₂
- Further CV deterioration – MAPS into the 20's – dopamine, adrenaline & noradrenaline infusions

- Unable to be touched (common for critically unwell infants/children)
- Proving to be refractory to inotropic support
- Decision to not transport as likelihood of dying during moving was high
- Family spoken to about gravity of the situation.

- Extensive phone conversations held

- Retrieval team had one 10 min break during this time.
- Talk about this team staying in a hotel and trying again in the morning
- Decision to return to Auckland as team exhausted.
- Send fresh team in the morning
- Pilots and crewman

Flight Nurse

- Walking out of CHCH hospital without the baby was one of the hardest transport decisions that she has been a part of.

- Exchange transfuse the baby overnight +/- oscillation
- Full exchange not done
- Oscillation attempted – dropped BP

Second attempt- different team

Following day 9.11.12

- Team left: 14:00 (team out for earlier retrieval got in 13:20)
- Arrived CHCH ICU: 19:30
- Depart CHCH ICU: 22:20
- Back on PICU: 01:30

- **Total time away: 11.5 hrs (+ the earlier retrieval)**

2nd day findings

- Ventilation CMV, 28/6, 30%, RR: 30, Nitric 20ppm
- HR: 197/min
- ABP: 45/20 (28) – despite inotropic support and vasopressin (28 was good) BP labile; diastolic as low as 18 @ one point
- profoundly oedematous (woody), shutdown peripherally, blue/purple mottled appearance; coagulopathic
- Distended, shiny abdomen
- Anuric
- Metabolic acidosis: 7.16, Bicarbonate 18

Interventions

- Na Bicarb, volume, blood

Inotropes

- Adrenaline 0.4-0.6mcg/kg/min
Dobutamine 20mcg/kg/min,
Calcium 1ml/hr (0.22mmol)
Noradrenaline 0.3mcg/kg/min,
Vasopressin (not long started)
- Calcium boluses had no effect – ominous sign

Interventions

- Hydrocortisone (steroid for profound sepsis/SIRS)
- M&M, paralysed (sedation & subclinical seizures)
- Inotropes 'up & running' on transport pumps - attempted to change over to these – MAP fell to 25 & unable to 'recover' it. (baby still on radiant heater)
- Never reached the point where the team could move the baby across to the incubator

Impression

- Critical pertussis
- Profound multi-organ failure & pulmonary hypertension due to circulating pertussis toxins

- Flight team discussion with PICU consultant – baby remains too unstable to successfully retrieve back to PICU
- Would not cope with plasmapheresis
- No discussion about ECMO
- No benefit in transporting & also removing family from immediate support structures

- Situation discussed with the family
- Decision made to withdraw treatment

In terms of the transport team.....what can't be portrayed in words.....

- Emotional intensity – ‘running on adrenaline’
- Absolute focus and concentration
- Expectation to ‘fix the baby’ so transport can happen (one’s own expectation, referring hospital & family)
- Physical effects – no break, minimal food and fluid
- Working with a critically ill patient without the normal back-up/resources/working with people meeting for the first time
- Complete exhaustion that can result

- Questioning:

- could we do this?? Would we make it?
- What else can we do/are we missing anything?
- If someone else were here, what would a fresh pair of eyes see and possibly suggest

- Lack of closure

- Apply this to any retrieval situation especially critical ones where emotions are running high
- Regardless of setting – winching off a boat in high seas, off a mountain side, RTA or an ICU

- Makes what we do as aero-medical practitioners very unique and special

Final Outcome

- Died in his mother's arms that evening

R.I.P

