

**PERTUSSIS**



*“Marie Antoinette and her children”, oil on canvas. Elisabeth Louise Vigée Le Brun, 1787. Château de Versailles*

*For all the care taken, and for all the faithfulness of the resemblance, which the Comte d'Hezecques praised as he looked from Queen to portrait when it hung at Versailles, it was not a lucky picture. The youngest member of the group, the baby Sophie, died on 19 June 1787, a few weeks short of her first birthday. Her figure had to be painted out, the Dauphin's finger pointing in the direction of the empty cradle was a sad memorial to his sister's short life. The Queen - "greatly afflicted" - told Princess Louise that the baby had never really grown or developed. This was confirmed by the autopsy, which was signed by the deputy Governess Madame de Mackau in the absence of the Duchess de Polignac in England. It made pathetic reading, down to the details of three little teeth that the baby had been about to cut and which had been responsible for the five or six days of convulsions that ended her life.*

*When Madame Elizabeth was invited by the Queen to view the corpse of "my little angel" she was struck by the pink and white appearance of the baby. Elizabeth added in her pious way that the baby Sophie was quite happy now, having escaped all life's perils, while her elder sister Marie Therese was left desolate "with an extraordinary sensibility for her age". Now the tiny form lay in a salon at the Grand Trianon, under a gilded coronet and a velvet pall. The Queen's foster brother Joseph Weber tried to cheer her by saying that the baby had not even been weened when she died, implying that the grief for one so young could not be very great. But he had struck the wrong note. "Don't forget that she would have been my friend" replied the Queen, a reference to her daughters, who were "mine", unlike their brothers who belonged to France, that sentiment first expressed at the birth of Marie Therese. Her tears continued to fall.*

*The Vigee Le Brun portrait was intended to be shown at the Salon of the Royal Academy at the end of August. In fact it needed to be withdrawn, as the Queen's unpopularity was so great that demonstrations were feared. Lenoir, the Chief of Police, had to tell her not to appear in Paris. The empty frame was left. Some wag, alluding to the scornful new nickname for the Queen, pinned a note to it: "Behold the deficit!"*

*...Madame Vigee Le Brun's unlucky portrait, showing the late Dauphin pointing to the newly empty cradle of Madame Sophie, was removed from the Salon de Mars in Versailles at the Queen's orders, she found it too painful a reminder of the recent deaths. At the official visit of condolence of the court on 7 June, she made a touching sight, leaning against the balustrade of her chamber, trying hard to choke back her tears.*

*Antonia Fraser, Marie Antoinette, Weidenfeld and Nicolson, 2001*

*Infant mortality took a fearful toll in the Eighteenth Century, even among the most privileged of classes. Some contemporary sources attributed the tragic death of the Princess Sophie to repeated convulsions caused by the simultaneous "cutting" of three teeth. In the 21<sup>st</sup> Century we know this to be nonsense, though the physicians of the Eighteenth Century who had no concept of the microbiological basis of infectious disease cannot fairly be ridiculed for this. Whilst it is impossible to ever be definitive about the cause of the death of an infant over two centuries ago, the evidence of contemporary sources that describe repeated convulsions in an infant less than one year suggest at least one possibility – pertussis. In the Eighteenth Century, once contracted at such an early age, nothing could be done to alter a course that could seemingly be determined only by God. In the 21<sup>st</sup> Century lethal pertussis is readily preventable by vaccination, and if contracted may be cured with antibiotics.*

# PERTUSSIS

## Introduction

**Pertussis** (commonly known as **whooping cough**) is a distressing and often serious illness particularly in children under one year of age.

The mortality rate is 0.5% in infants under six months.

High immunisation levels reduce the number of cases and good nutrition and medical care reduce case fatality.

Many vaccinated adults may have mild infection and act as a source of infection for younger children.

## Pathology

The infection damages respiratory epithelium, producing a degree of respiratory obstruction.

## Organism

- Bordetella pertussis, a gram negative bacillus.

## Epidemiology

- The World Health Organization (WHO) estimates there were 40 million cases of pertussis in 1994 and 360 000 deaths. WHO believes only one to two per cent of cases are reported.
- In industrialised countries four children out of every 10,000 infected die from pertussis and its complications.
- There is a clear seasonal pattern with 65% of notifications occurring over the spring and summer months.
- Australia tends to experience an epidemic of whooping cough about every three or four years.

Of recent concern is a sharp increase (48%) in the number of cases *reported* in Victoria between December 2007 and December 2008. The increase was particularly noted in infants less than 12 months of age.<sup>4</sup>

## Transmission

- B. pertussis is highly infectious.
- It may be spread from person to person by close contact, usually by respiratory aerosols, and can infect 70–100% of household contacts.

### Incubation Period

- The incubation period can range between six and 20 days.
- It is most commonly about 14 days.

### Reservoir

- Humans are the only known natural reservoir of B. pertussis.

### Period of communicability

- It is highly communicable in the early catarrhal stage before the onset of paroxysmal cough.
- Thereafter communicability decreases and becomes negligible in about three weeks.
- When treated with a macrolide antibiotic the period of infectivity usually lasts five days or less after commencement of therapy.

### Susceptibility and resistance

- Maternal antibodies do **not** protect newborns against infection.
- Severity is greatest in young infants while milder and atypical cases occur in all age groups.
- Incomplete immunisation, waning immunity and the fact that vaccine efficacy is 70–80%, results in cases occurring in older children and adults.
- Lifelong immunity is not guaranteed, even after clinical disease. **Immunity tends to wane within 6-10 years.**

### Clinical Features

**Pertussis is most serious in infants under 12 months of age.**

1. Fever:
  - There is little fever.
2. Catarrhal state:
  - The catarrhal state may be indistinguishable from a viral upper respiratory tract infection.
3. Paroxysmal coughing:
  - Episodes of **paroxysmal coughing** are characteristic.

- These can be **persistent**, lasting 2 weeks or more. In adults cough may persist for **3 months** or more. <sup>2</sup>
4. Whoop:
- There is often a characteristic **inspiratory “whoop”**. This is a crowing sound during inspiration that *precedes* a bout of coughing.
5. Following coughing:
- Paroxysms frequently end with the expulsion of clear, tenacious mucus or vomiting.
6. Atypical presentations:
- Apnoea may be the only manifestation in infants.
  - Infants aged less than six months often do not have the characteristic whoop.
  - Adults often do not have the characteristic whoop.
7. Severe complications:
- Pneumonia is the most common cause of death.
  - Apnoea in infants.
  - Encephalopathy, which is probably hypoxic, may manifest as seizures and may be fatal.
  - Severe dehydration from repeated vomiting
  - **Around 1 in 200 children under 6 months of age who contract whooping cough will die.** <sup>4</sup>

### Investigations

- Diagnosis is often on clinical grounds.
- Laboratory confirmation can be problematic but should be sought where possible.

### Nasopharyngeal aspirate:

- A **nasopharyngeal aspirate or swab** is the best specimen to obtain to culture the bacterium.

The likelihood of such cultures being positive however is reduced 21 days after the cough onset or if effective antimicrobial therapy has commenced against *B. pertussis*.

- **Polymerase chain reaction testing** can also be done on nasopharyngeal aspirate or swab samples.

### Serology:

- Serology for *B. pertussis* specific IgA may be performed.
- It is a reliable diagnostic indicator when positive and in the presence of appropriate symptoms.
- False negatives do occur however.

### Management

#### 1. Rehydration:

- IV fluid rehydration, as clinically indicated.
- Attempts at nasogastric rehydration should obviously be avoided.

#### 2. Antibiotics: <sup>3</sup>

Antibiotic therapy in the catarrhal and early paroxysmal stages will ameliorate the disease.

Treatment of established disease helps minimize spread of the organism to susceptible contacts; however, patients are seldom infectious after cough has been present for more than 3 weeks.

Advise the suspected case to avoid contact with other individuals, especially young children and infants, until at least 5 days of antibiotics have been received.

Macrolides are used, including:

- Erythromycin
- Clarithromycin
- Azithromycin

**See latest Antibiotic Therapeutic Guidelines for full prescribing details.**

#### 3. Antibiotic prophylaxis: <sup>3</sup>

There is limited evidence of the benefit of chemoprophylaxis for household and other close contacts of patients with pertussis.

Prophylaxis is recommended for:

- Infants <1 year of age regardless of immunization status.
- Children aged 1 to 2 years who have received less than 3 doses of pertussis vaccine
- Any woman in the last month of pregnancy
- Any child or adult who attends or works in a childcare facility.
- Prophylaxis should be given as soon as possible, but may be commenced up to 3 weeks after onset of symptoms in the index case.

**See latest Antibiotic Therapeutic Guidelines for full prescribing details.**

### Vaccination

#### Childhood vaccination:

- Acellular pertussis-containing vaccines are a component of the triple antigen vaccine routinely given in childhood. The acellular preparations have a much lower reaction incidence than the older whole-cell pertussis vaccines.
- As it is not possible to completely control pertussis with the current vaccine, the highest priority should be given to protecting infants under 12 months of age.
- The public should be educated to the dangers of whooping cough and the advantages of initiating immunisation at two months of age and adhering to the National Immunization Program schedule.

The infant and child formulation **DTPa** is given at two, four and six months and four years and at fifteen years of age (or year10) when the adult formulation is given.

- Delay immunisation only for **significant** intercurrent infection or an evolving neurological disorder. Minor respiratory infections are **not** a contra-indication for immunisation.
- It is important to check the immunisation status of children in the household under the age of 8 years and recommend catch-up of missed doses of pertussis vaccine.

#### Adolescent and Adult booster vaccination:

This is done with the Adolescent and Adult triple antigen preparation, **Boostrix**, (**dTpa**), providing they have previously completed a primary (childhood) course of vaccine.

**It contains tetanus toxoid, diphtheria toxoid and acellular pertussis.**

It should be given to:

- Adults before planning pregnancy or for both parents as soon as possible after birth of their child.
- Adults working with or caring for very young babies, especially health care workers and child care workers
- Any adult wishing to protect themselves against whooping cough.

**See the latest edition of the Australian Immunization Handbook for full vaccine prescribing details.**

*Notification:*

- Pertussis infection (Group B disease) requires written notification within five days of diagnosis.

*School exclusion:*

- School exclusion for cases and contacts is:
- Cases should be excluded for five days after commencing antibiotic treatment.
- Unimmunised sibling contacts under seven years of age and unimmunised close child care contacts must be excluded from school and children's services centers for 14 days from the last exposure to infection, or until they have taken five days of a ten day course of antibiotics.





*Kirsten Dunst as Marie Antoinette, Columbia Pictures, 2006*

References

1. The Bluebook Website.
2. The Australian Immunization Handbook 9<sup>th</sup> ed 2008.
3. Antibiotic Therapeutic Guidelines, 13<sup>th</sup> ed 2006
4. Chief Health Officer Alert, John Carnie, March 2009, DHS.

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