PERTUSSIS (WHOOPING COUGH)

Prof Dr NAJLAA FAWZI

Pertussis is acute highly infectious disease of children.

Causative Organism

Bordetella Pertussis (Pertussis bacillus)

Reservoir of Infection

Man, cases whether typical, or mild not showing the paroxysms, [No Carriers].

The organisms find exit in respiratory discharges.

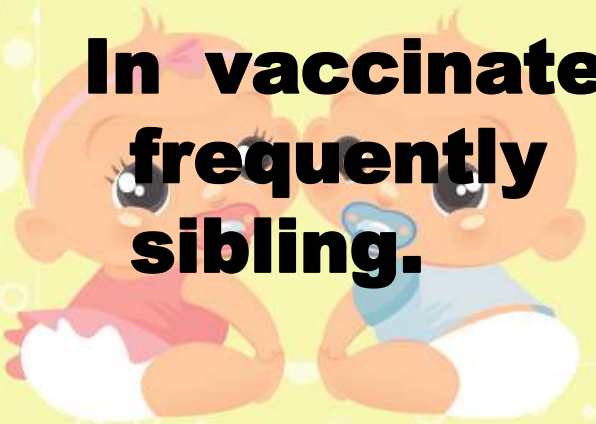
Modes of Transmission

1. **Direct droplet infection; direct case – contact infection is the main mode of spread.**

2. **Air borne infection, with in short distance of the case.**

3. **Using soiled articles & fomites.**

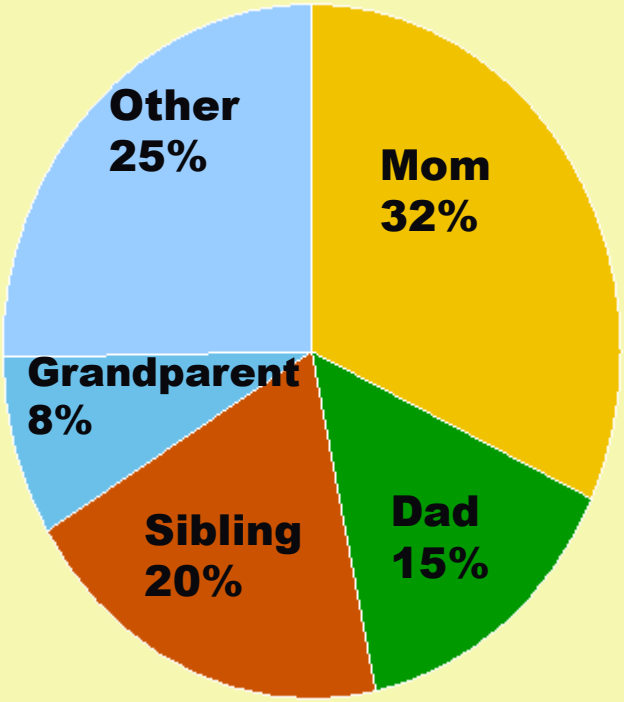
In vaccinated populations, bacteria are frequently brought home by an older sibling.



When the source of whooping cough was identified, mothers were responsible for 30-40% of infant infections.

75% Of Suspected Sources For Infant Pertussis Cases Were Family Members

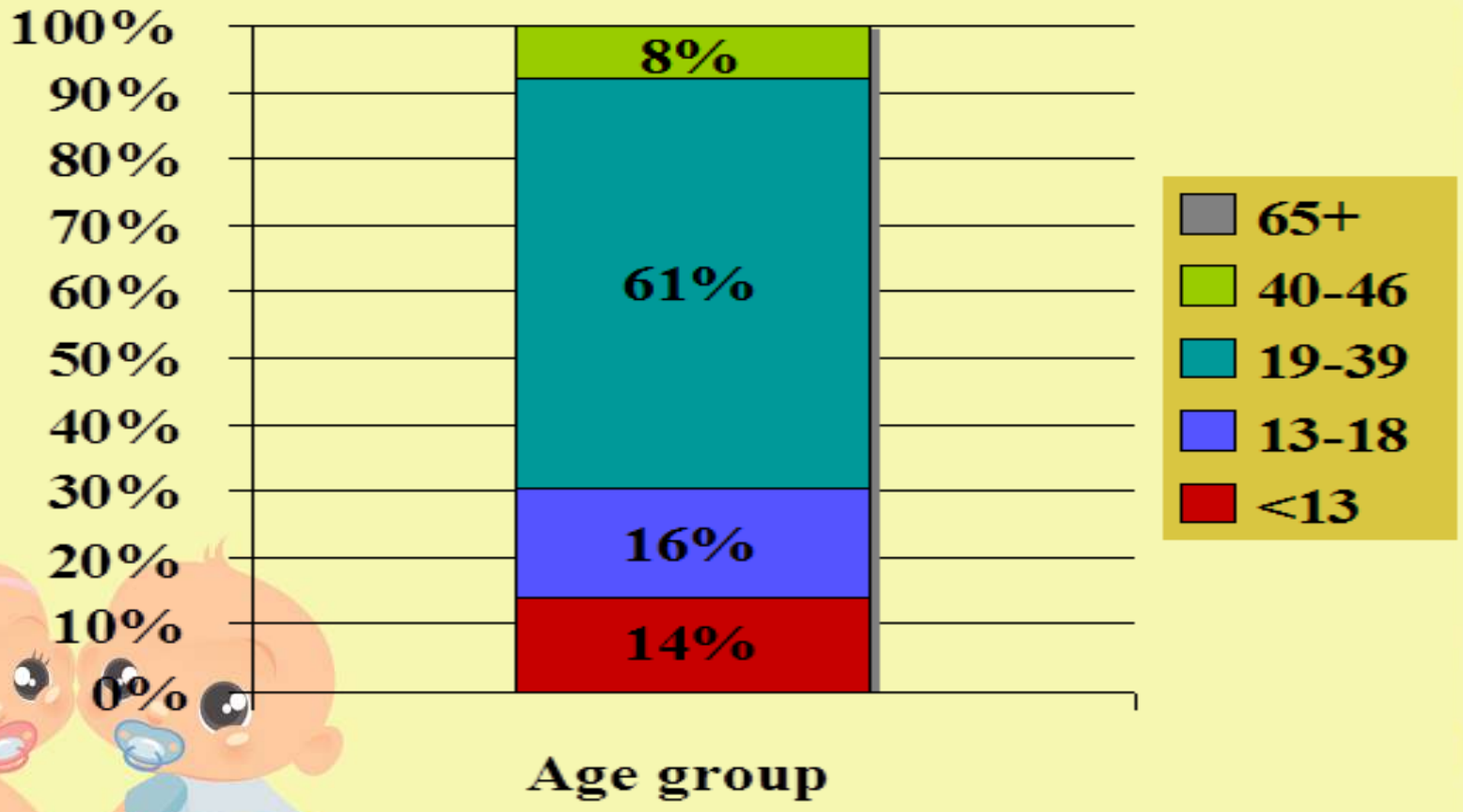
20% Other Adults



47% Mom or Dad

33% Other Children

Source of pertussis for infants according to age



Incubation period

Average 9-10days (range 6-20days)

Infectivity

- **Untreated Cases: from onset of disease, and for 3 weeks after onset of characteristic paroxysmal coughing, infectivity is highest during the early catarrhal stage.**

- **Treated Cases: specific antibiotics therapy eliminates infection in about 7 days after starting treatment.**

Clinical Picture

Pertussis is a local disease of respiratory tract.

- **In apparent [atypical] Cases: do not show the typical paroxysms, and so are difficult to diagnose clinically, they are met with partly immune children & young adults.**

Typical untreated Cases: they pass through the following stages:

- **Catarrhal stage:** 1-2 weeks, insidious onset, with slight or no fever; upper respiratory catarrh; rhinitis, sneezing, dry irritating cough & lacrimation. **This is the stage of maximum infectivity**

- **Paroxysmal stage: 2-4 weeks, paroxysmal attacks of spasmodic coughing.**

- **Can be more frequent at night**

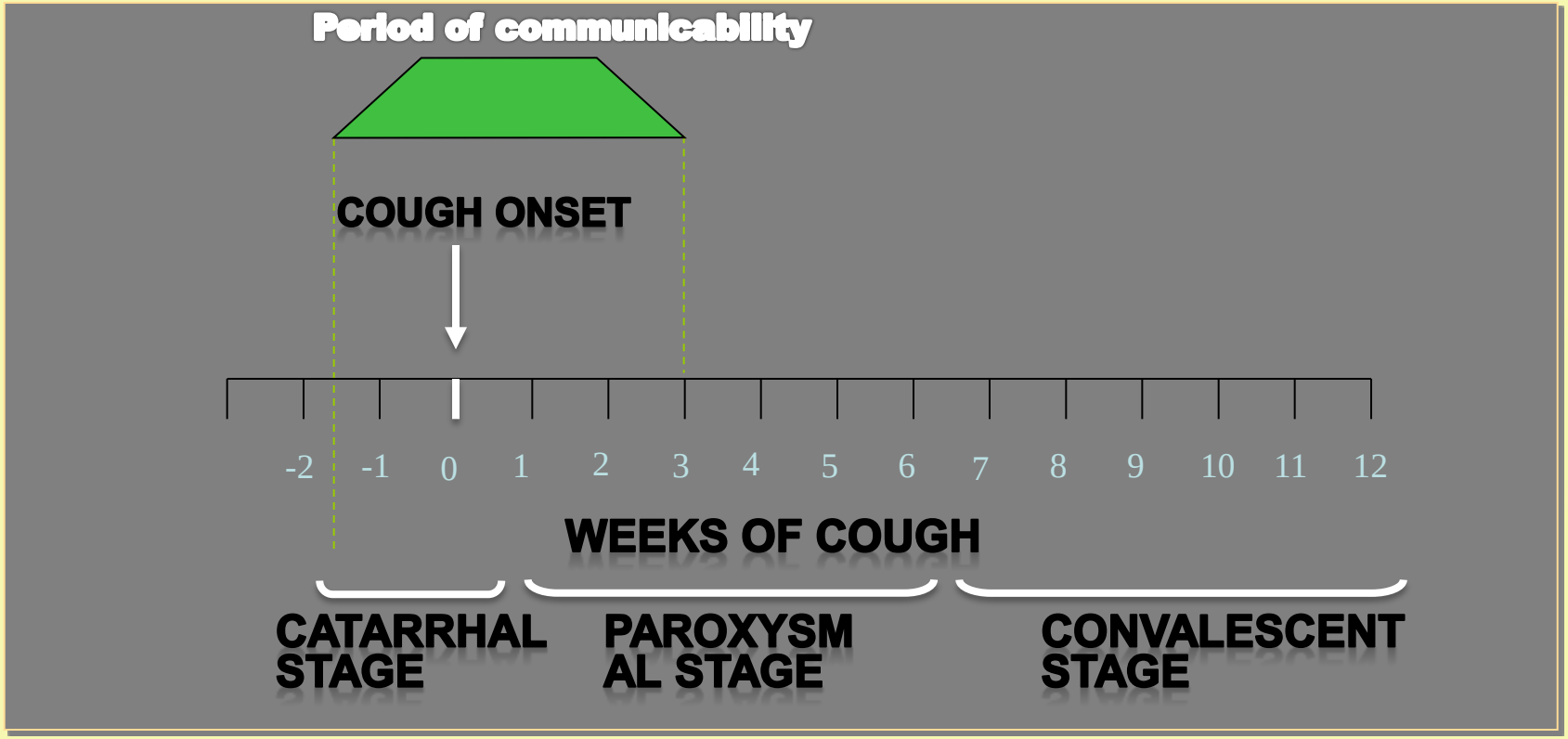
- **Each attack followed by characteristic whoop with expectoration of tenacious clear mucus & vomiting.**

Maximum complications occur in this stage.

- **Convalescence:** 1-6 weeks, begins when whooping & vomiting stop, though coughing may persist for some weeks there after.

- **Treated Cases:** Chemotherapy eliminates infection and the case progressively improves in short time.

Period Of Communicability Of Pertussis



- **Persons with pertussis are most infectious during the catarrhal period starting as early as one day of cough**
- **Some individuals, such as infants who remain culture-positive for several weeks, may be infectious for a longer period**

Complications

Arise from increased pressure during attacks of paroxysmal coughing, secondary bacterial infection, & malnutrition.

Complications occur in 5-6% of cases , most frequently in infants aged

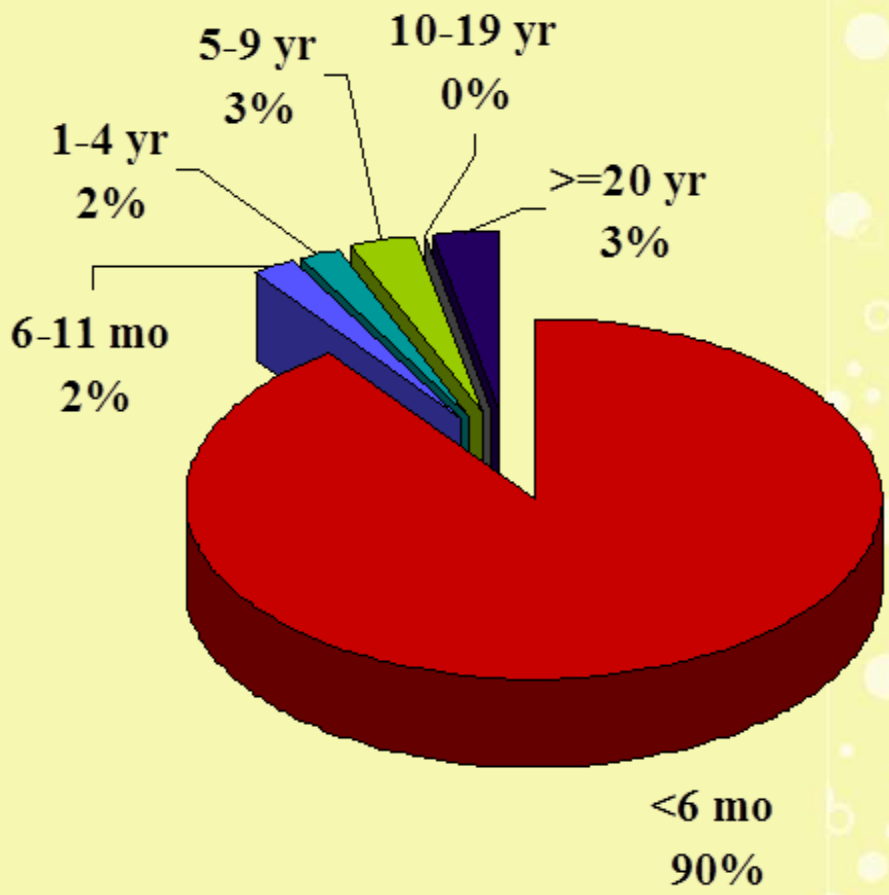
less than 6 months.

Fatality

Severe unmanaged cases, especially in infants & young children, are exposed to high case fatality, caused mainly by bronchopneumonia, enteritis, and cerebral complications, the majority of deaths reported below three years of age.

Pertussis Mortality

- **Death from pertussis occurs rarely but young infants <6 months of age are most at risk**
- **Risk factors for mortality**
  - **Female sex**
  - **BW <2500 grams**
  - **Apgar <8**
  - **Mother with <12 years of education**



In developed countries , lethality of pertussis is very low (<1/ 1000),whereas in developing countries the average mortality is estimated at 3.9 % infants and 1% in children aged 1-4 years.

Diagnosis

- **Clinical:** based on finding the typical paroxysmal attacks of coughing, ending in high pitched inspiratory whoop.

- **Laboratory:**

Diagnosis of pertussis should only be attempted in patients with symptoms compatible with pertussis, such as prolonged coughing with paroxysms and/ or whooping or choking.

In infants, older vaccinated children, adolescents and adults the clinical course may not be typical, and prolonged coughing may be the only symptom.

In these cases, diagnosis of pertussis requires laboratory methods for confirmation

Direct and indirect diagnostic tests are available.

Direct tests are real-time polymerase chain reaction (PCR) and culture whereas serological tests measure specific antibodies

- **Pertussis can only be recovered in first 3-4 weeks of illness, very hard to culture.**

Susceptibility

1. Begins at birth, no maternally acquired immunity ??

2. The highest around school age [5-7] years, and almost all become immune by the age of 15 years.

3. sex ;incidence and fatality being more in females than in males.

4-The median age of infection is between20-30 months in developing countries comparing to 50 months in developed countries.

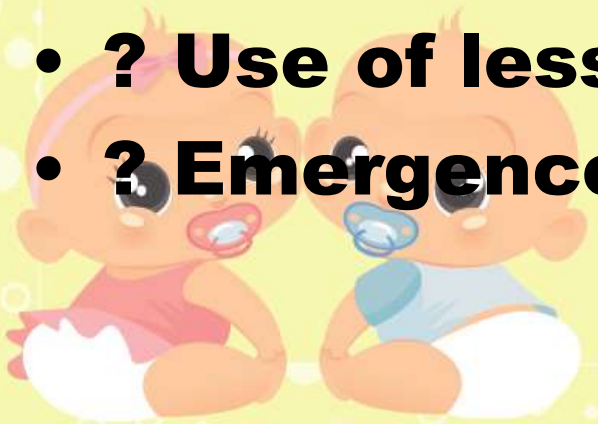
5-Adults may occasionally be affected

Pertussis remains endemic world wide and tends to be a cyclic disease, peaking every 3–5 years.

Since 2011, increases in the number of cases of pertussis have been repeatedly reported in different regions of the world, even in those with sustained high vaccination coverage.

Reasons for rising incidence

- **Waning of vaccine- and infection-induced immunity (wanes after 5-10 years)**
  - **~ 15 years after active disease**
  - **~ 5-10 years after vaccination**
- **Increased recognition and reporting**
- **Availability of better diagnostic tests**
- **? Use of less potent pertussis vaccines**
- **? Emergence of vaccine-resistant strains**



PREVENTION and CONTROL

Prevention

General preventive measures of respiratory [droplet] infection must be followed, but specific prevention is the effective measures by immunization [active & seroprophylaxis], and chemoprophylaxis.

- **Active Immunization:**

By Pertussis vaccine & toxiod.

Pertussis vaccine is killed vaccine, used in form of DPT vaccine for children below 4 years.

Protective value: around 80%, prevents the disease, and lowers duration, severity & fatality of disease in the vaccinated children.

Pertussis vaccine must not be given to:

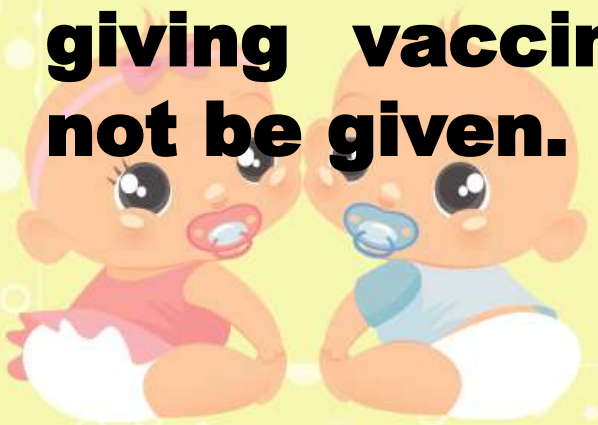
⇒ **all children over 4 years**

⇒ **at risk , below 4 years children**

❖ **Cases of convulsions ; history given by the mother**

❖ **History of epilepsy in 1st degree relatives**

❖**Those showing adverse reaction after giving vaccine; further doses should not be given. [give DT].**

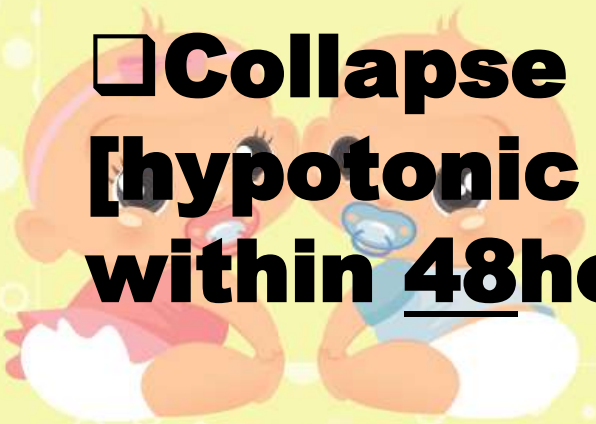


The Reactions are

- **Persistent crying lasting 3 hours or more or unusual high pitched cry occurring with in 48 hours.**

- **Fever of 40 Cº or greater within 24 hours.**

- **Collapse or shock like state [hypotonic hypo responsive] episode within 48hours.**



- **Acute encephalopathy with in 7 days, risk of acute encephalopathy is 1in 40,000 cases following DPT vaccine, including severe alteration in consciousness with generalized or focal neurological signs.**

- **Convulsion with or without fever occurring within 3 days.**

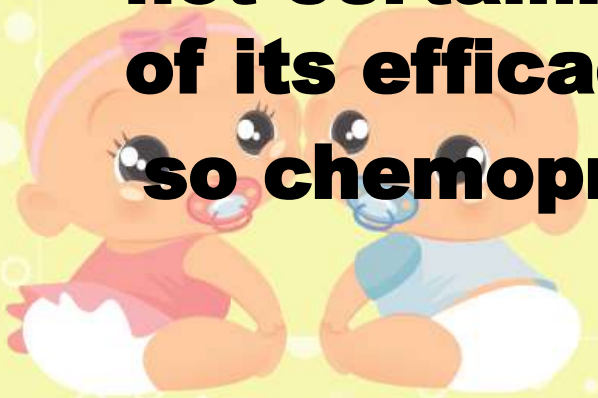
Pertussis vaccine or DPT must not be given to those having infection, until becoming well.

Pertussis Toxiod

since the major Pathogenicity of the disease [Pertussis bacillus] is due to secreted exotoxins, Pertussis toxiod was developed from formal- inactivated, a cellular [cell free] toxiod, giving better protection & less reaction than the vaccine. aP (a cellular pertussis)

- **Health Education:** of parents, for basic knowledge of the disease & the protective value and precautions with the vaccination.

- **Seroprophylaxis:** antipertussis immunoglobulin; 2.5 ml IM, can be given to protect susceptible intimate contacts, especially infants & young children. Protective value, however, is not certain. So far, there is no evidence of its efficacy in well-controlled trials, so chemoprophylaxis is preferred.



- **Chemoprophylaxis: oral erythromycin or clarithromycin can be given in proper dosage, for 5 days after the last contact with the case.**

- **If within 3 weeks of exposure, prophylaxis recommended for all household and close contacts (regardless of age or vaccination status).**

- ✓ **If 3 weeks have passed since exposure, still consider prophylaxis for households with high risk contacts:**

  - ➢ **Young infants**
  - ➢ **Pregnant women**
  - ➢ **People who have contact with young infants**

CONTROL

Control measures are taken for:

- ✓ **Cases**
- ✓ **Contacts**
- ✓ **School**

1- Control of Cases :

- ✓ **Reporting to local health authority.**
- ✓ **<u>Isolation at home</u>; practically difficult to fulfill, since the majority of cases are mild, with no or slight fever, they usually move in the community and go to school, and so spread infection to exposed susceptible children.**
- ✓ **Infants younger than 6 months generally require hospitalization**

- ✓ **Cases should be removed from the presence of young infants , especially non immunized infants , until the patients have receive at least 5 days of a minimum 14 days course of antibiotics.**

- ✓ **Suspected cases who do not receive AB should be isolated for 3 weeks.**

- ✓ **Concurrent disinfection of respiratory discharges; & any soiled objects, and terminal cleaning & airing of the room.**

Treatment

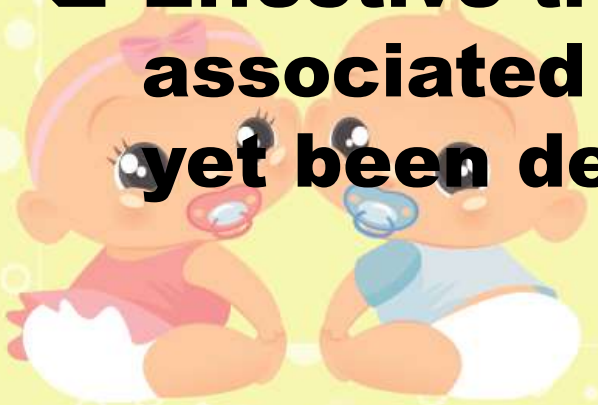
- Primary role of treatment is to accelerate clearance of organisms and limit transmission
  - Treat as late as 3 weeks after cough onset if age >1 year
  - Treat as late as 6 weeks after cough onset if age <1 year
- Treatment during catarrhal or early paroxysmal stage *may* modify duration and severity of illness
- Otherwise treatment generally does not affect clinical course

- **The antibiotic erythromycin or azithromycin is a front line treatment .**

Newer macrolides are frequently recommended due to lower rates of side effects.

- **Trimethoprim- sulfamethoxazole may be used in those with allergies to first line agents or in infants who have a risk of pyloric stenosis from macrolides.**

- **Effective treatments of the cough associated with this condition have not yet been developed**



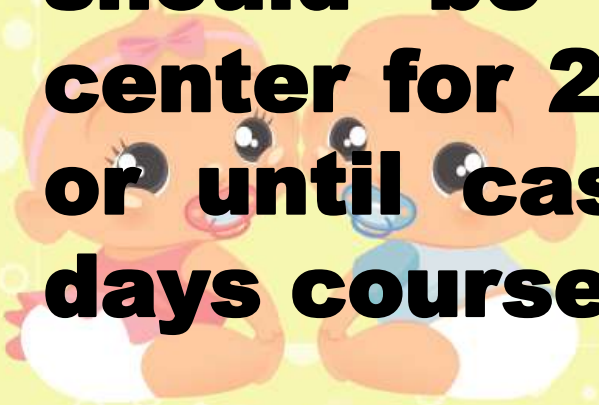
- ✓**Proper feeding**

- ✓**Release :** **pupils can return to school ; with proper chemotherapy [one week after starting AB], with no ,or not sure of chemotherapy [3weeks after onset of whooping stage, and satisfactory general condition]**

- **Protection of contacts:** passive immunization is not effective, and the initiation of active immunization to protect against recent exposure is also not effective.

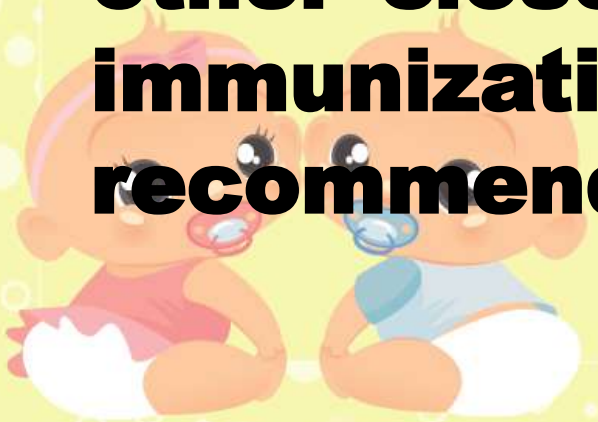
2- Control of Contacts :

- Inadequately immunized household contacts less than 7 years of age should be excluded from day care center for 21 days after last exposure or until cases & contacts receive 5 days course of AB



- **Close contacts under 7 years who not received 4 DPT doses or have not receive a dose within 3years should be given a dose as soon as after exposure as possible.**

- **A 7 days course of erythromycin or clarithromycin for household & other close contacts, regardless of immunization status and age is recommended.**



Control of Pertussis in School: when case appear in school:

- Isolation of cases , and return to school according to case management.
- Segregation of susceptible family contacts for 2 wks.
- Surveillance of susceptible school contacts for 2wk, to exclude any; once respiratory catarrh appears

- **Surveillance of all school children until no more cases appear [case finding]**

- **Chemoprophylaxis of susceptible family & school contacts**