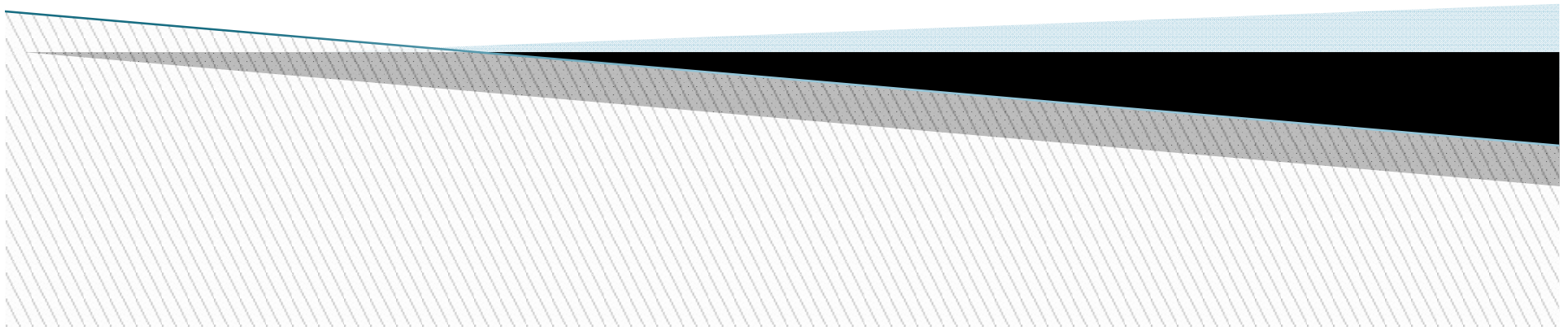
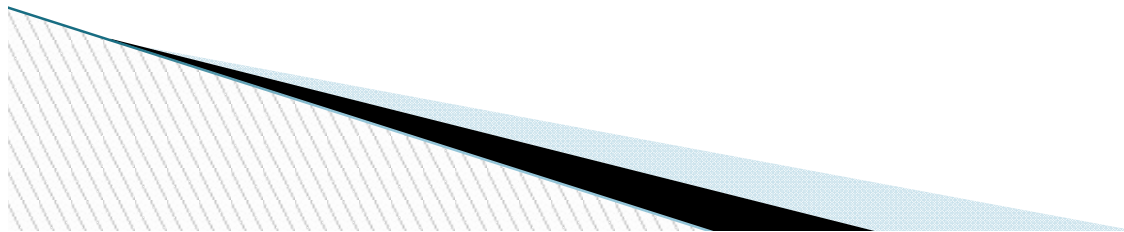


CONGENITAL PNEUMONIA

By
Dr. venu. A
Pg in paediatrics



- } Introduction
- } Incidence and risk factors
- } Etiology and pathogenesis.
- } Clinical manifestations
- } Complications
- } Diagnosis
- } Treatment
- } Prevention

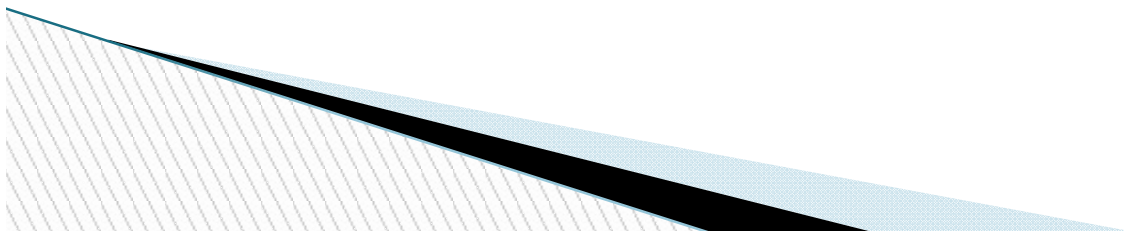


INTRODUCTION

} Pneumonia is an important cause of neonatal infection and accounts for significant morbidity and mortality especially in developing countries.

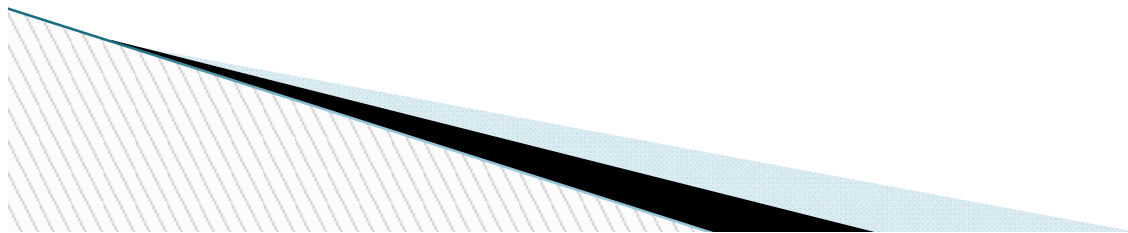
} The WHO estimates that almost 8 lakh neonatal deaths occur each year from acute respiratory infections, mostly due to pneumonia.

} In a rural area of central India, mortality secondary to pneumonia in the first month was 29 per 1000 live births and more than one half of all pneumonia deaths in newborn period.



Introduction contd.....,

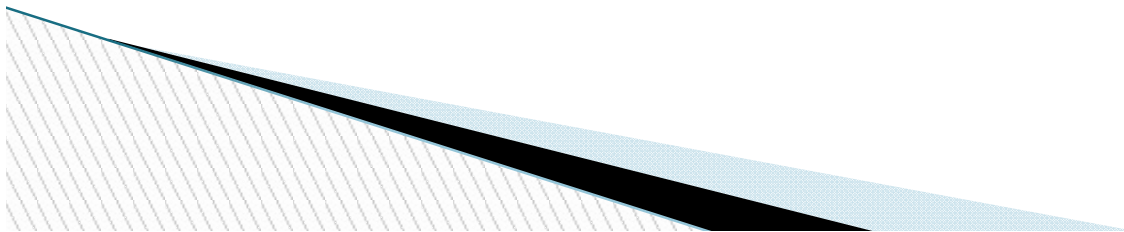
- } In developed countries, the estimated incidence of pneumonia in term infants is less than 1 percent.
- } However , among ill infants of normal and low birth weight, the incidence may be up to 10 percent.
- } At autopsy the incidence of neonatal pneumonia ranges from 20 to 32 percent of live born and from 15 to 38 percent of stillborn infants.
- } In one series, infection was the most common etiology of death in extremely low birth weight infants (56 of 111); congenital pneumonia accounted for 30 of these 56 babies.



Definition

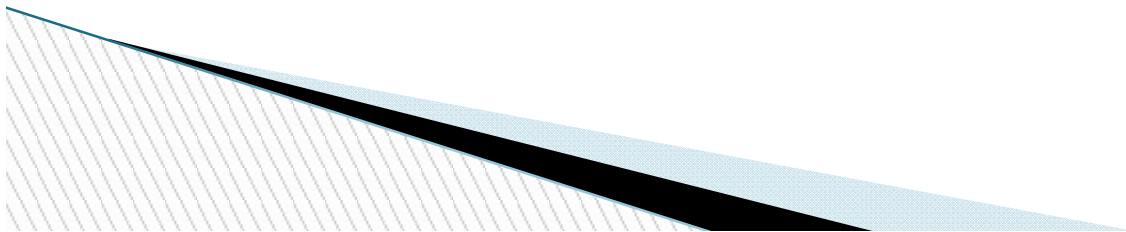
} congenital pneumonia is pneumonia with clinical and radiological evidence present at birth.

} Defined as a ' pneumonia present at birth with a positive tracheal aspirate culture obtained within 4 hours of delivery ', based on study of Sherman *et al.*



Incidence

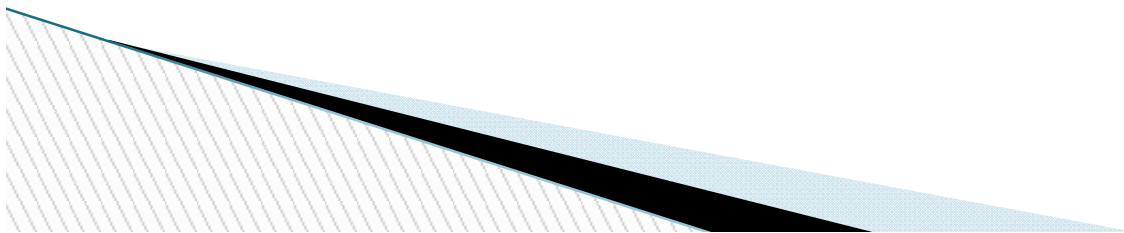
- } Review of literature showed that no large population studies have been reported on the incidence of congenital pneumonia.



Incidence contd....,

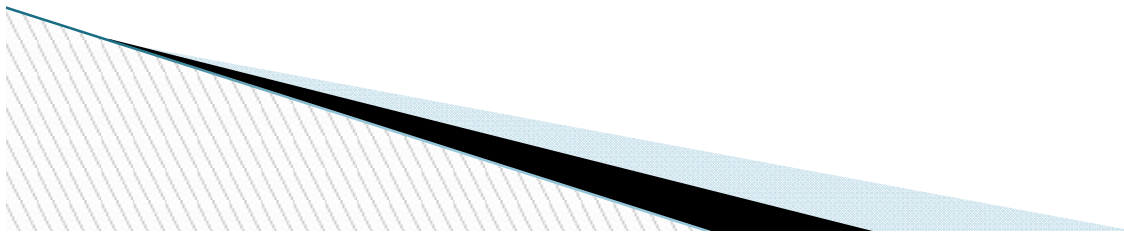
} Barnett and Klein estimated that congenital pneumonia accounted for 10–38% of still births and 20–63% of live newborns who subsequently died.

} Duke estimated that neonatal pneumonia including congenital pneumonia contributed globally to 750,000 – 1.2 million deaths annually.



Risk factors

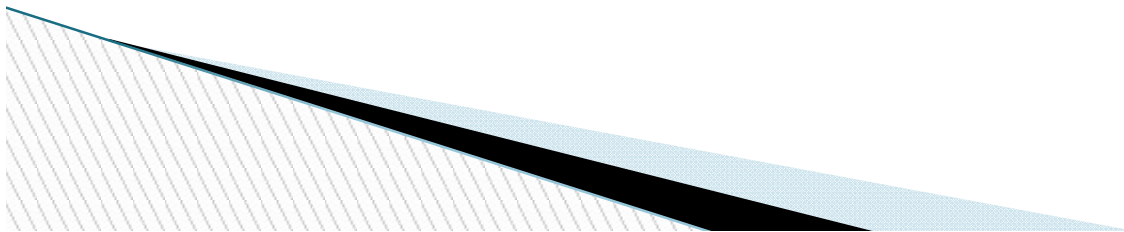
- } Maternal systemic infection
- } Maternal chorioamnionitis
- } Prolonged rupture of membranes.
- } Low socioeconomic status.



Routes of infection

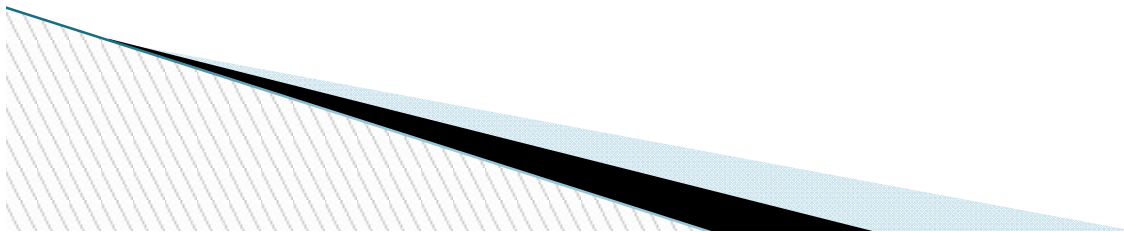
} Either trans-placentally or peri-natally.

} Barton et al found that aspiration or ingestion of organisms in the amniotic fluid during the intra partum period was the most common cause in ELBW babies.



Mechanism of the disease

} Histological findings of amniotic fluid and/or maternal WBCs in affected neonatal lung suggests that congenital pneumonia from infected amniotic fluid or colonization is linked with maternal chorioamnionitis and fetal asphyxia.



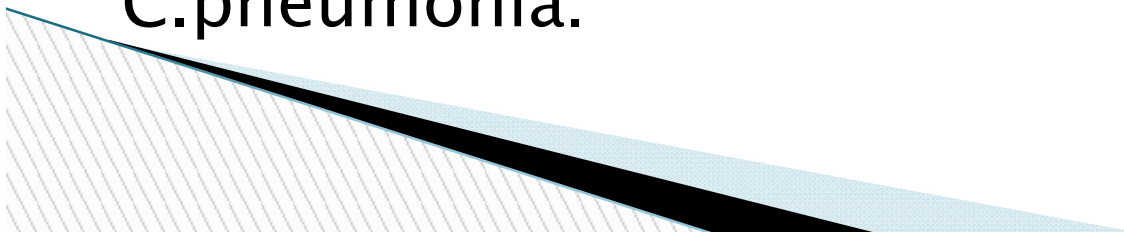
Contd....,

} Fetal asphyxia leading to gasping in the fetus and aspiration of infected amniotic fluid with resultant development of cong. Pneumonia.

} In over whelming infection this may lead to development of septicemia and multi organ infection.

} If infection occurs trans-placentally, cong. Pneumonia is the part of systemic infection.

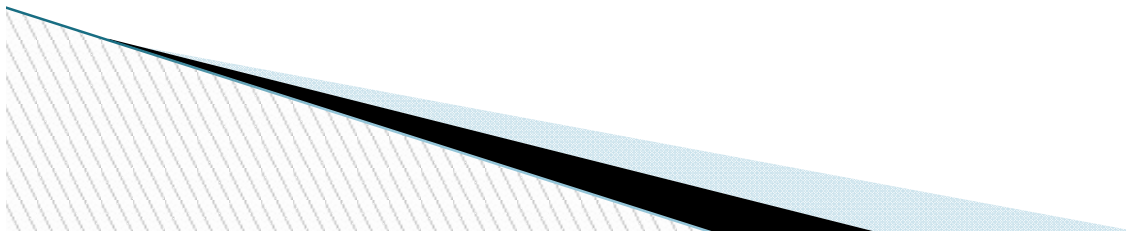
} Maternal HIV is associated with higher rates of C.pneumonia.



Causative organisms

} **Bacteria** : E.coli, Enterobactor spp, Klebsiella spp, P.aeroginosa, Group B streptococcus, S.epidermidis, S.aureus, H.influenza.

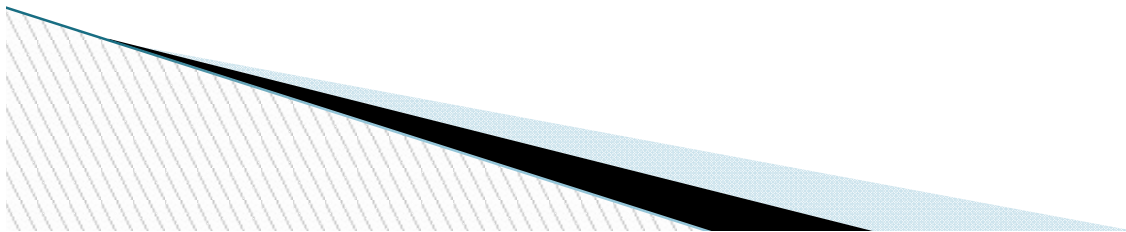
} **Atypical bacteria:** chlamydia trachomatis, Ureaplasma urealyticum, Mycoplasma hominis, M.pneumoniae, Listeria monocytogenus, M.tuberculosis.



Contd....,

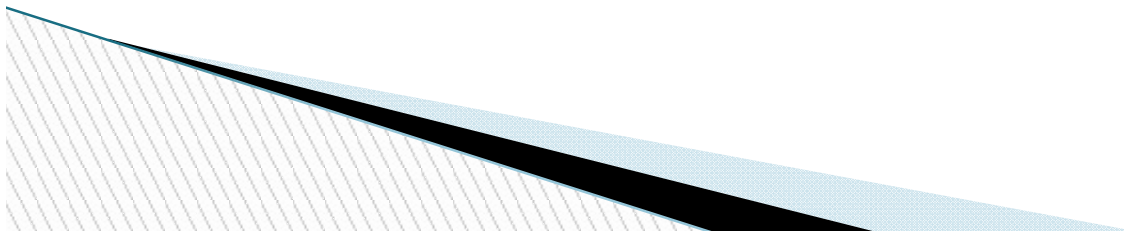
} **Virus** : Herpes simplex, RSV, Rubella

} **Fungi** : candida albicans



Contd....,

- } Congenital HIV pneumonia is common in developing countries .
- } GBS and L.monocytogenes– commonly reported in developed countries
- } Bacteriological studies and lung tissues showed both gram positive and gram negative could cause cong. Pneumonia.

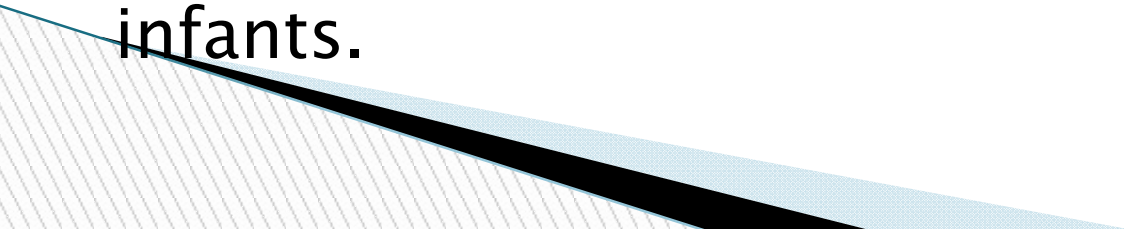


} The four most frequently isolated organisms are *S.epidermidis* (18%), GBS(13%), *E.coli* (9%), and *ureaplasma urealyticum* (9%)

} GBS has been recognized as an important cause of Cong. Pneumonia in developed countries.

} They may present within 1 hour of birth with RD, apnea and died within 48 hours of birth.

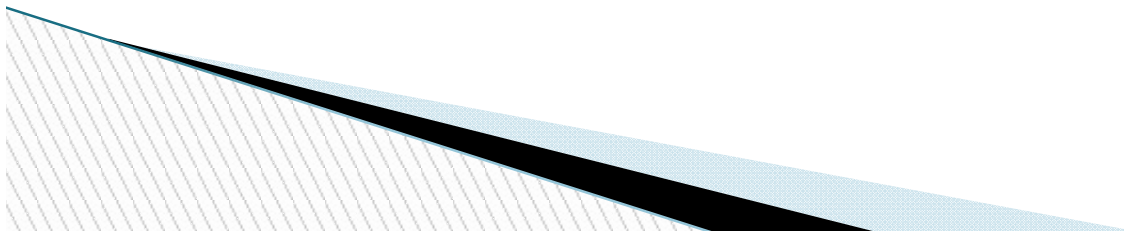
} *Ureaplasma urealyticum*, *M.hominis* are rapidly gaining recognition especially in premature infants.



Contd....,

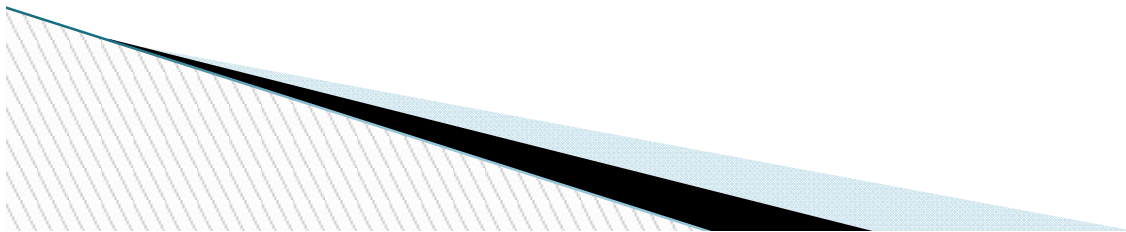
} Risk of developing Cong.pneumonia or conjunctivitis in neonates with maternal colonization of chlamydia trachomatis is 1.4%.

} studies using immunofluorescent staining of nasopharyngeal aspirates suggests that c.pneumonia due to chlamydia is much higher 16–28%.



} Fatal cases of congenital syphilis are usually associated with pneumonia.

} Congenital tubercular pneumonia is acquired either by transplacentally or aspiration of infected amniotic fluid.

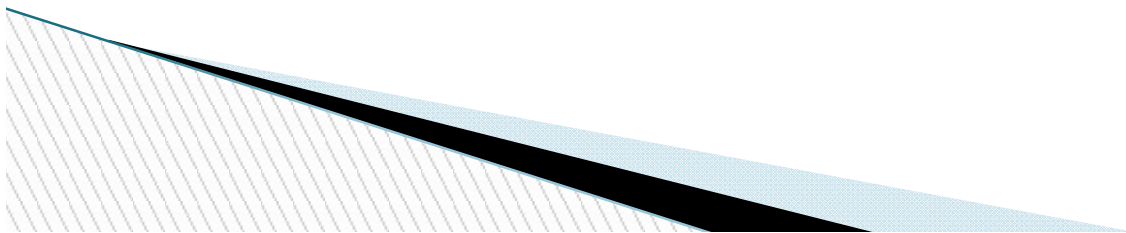


Contd....,

} **Viruses:** most commonly reported are HSV and HIV.

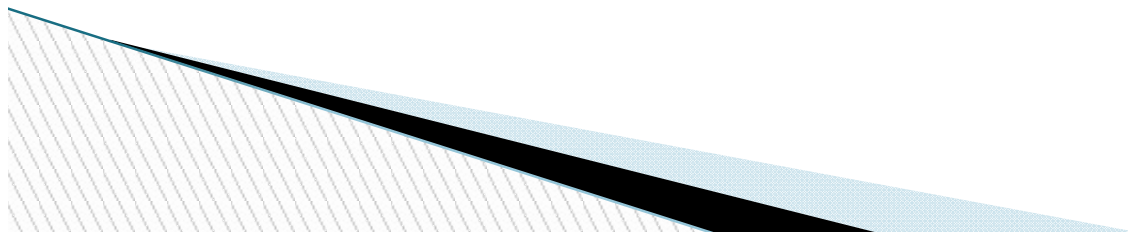
} Congenital HSV pneumonia is acquired during delivery through infected maternal genital tract. Trans placental infection is uncommon.

} The risk of neonatal Herpes infection is high (30–50%) when infants are born to mothers who acquire the infection during 3rd trimester .



Contd....,

- } infants with congenital HIV infection present with pneumonia and have rapid progression.
- } Coinfection is common with tuberculosis, syphilis, cytomegalo virus.



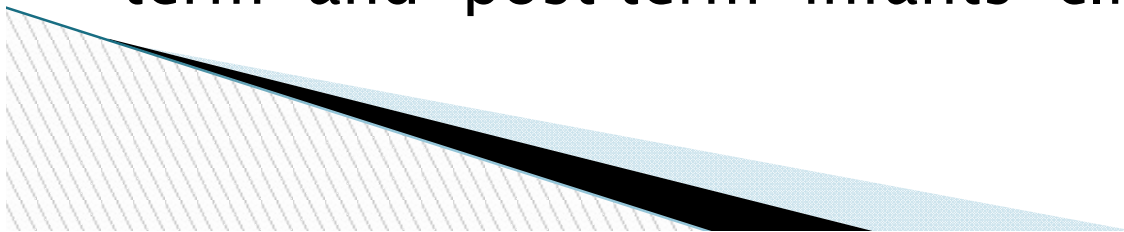
CLINICAL MANIFESTATION

} May become apparent before delivery : in the form of fetal distress, or tachycardia.

} At delivery: low APGAR score ,as severe RD. Cough is rare in newborns.

} There may be a latent period of few hours or an interval of 1 to 2 days before RD develops.

} Primary pneumonias more commonly diagnosed in term and post term infants clinically.



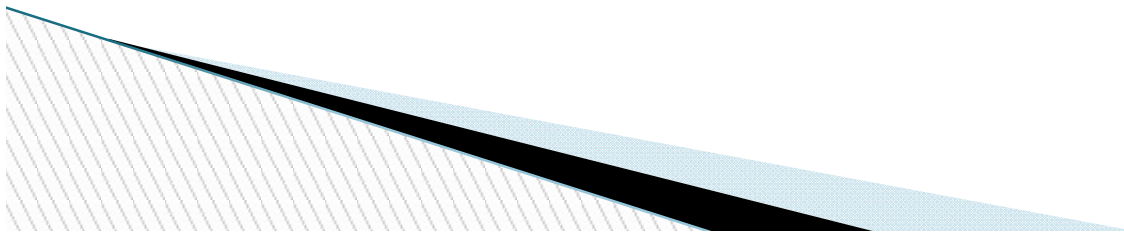
Contd....,

} In preterm infants the signs of progressive RD may superimpose on Respiratory distress syndrome .

} In some infants the early signs and symptoms are non specific– poor feeding, lethargy, irritability, cyanosis, temperature instability, dull activity.

} Lung crackles may be difficult to detect on physical examination.

} Hepatosplenomagaly is often present in infants with cong.syphilis, cong. Tuberculosis, HIV, cytomegalo virus infection.



Criteria of neonatal pneumonia used in one Indian study

} A neonate with respiratory distress who has

A) A positive blood culture or

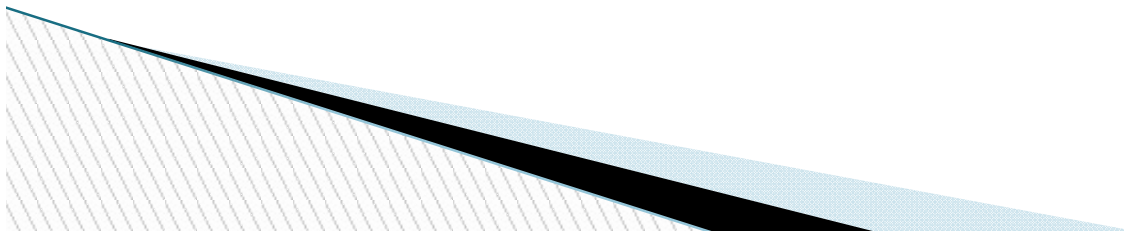
B) any of 2 or more

(1) predisposing factors.

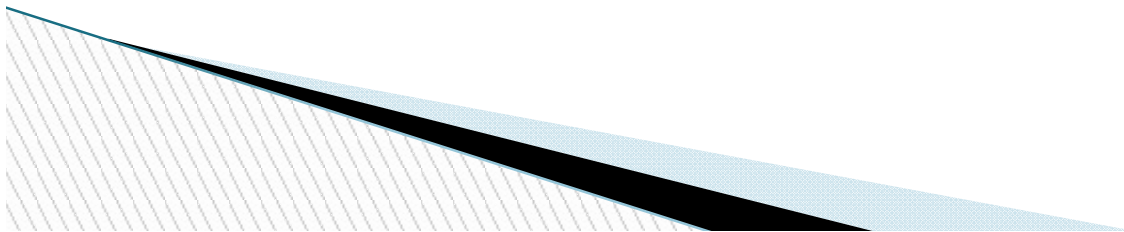
(2) clinical picture of sepsis.

(3) radiograph suggestive of pneumonia.

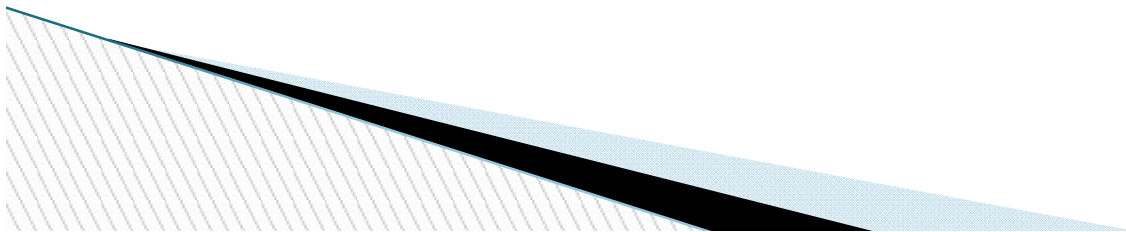
(4) positive septic screen.



- } 1) predisposing factors
 - maternal fever($>38^{\circ}\text{c}$)
 - foul smelling liquor.
 - Premature rupture of membranes.
- } 2) clinical picture of sepsis
 - lethargy
 - poor reflexes
 - hypo or hyperthermia.
 - abdominal distention.

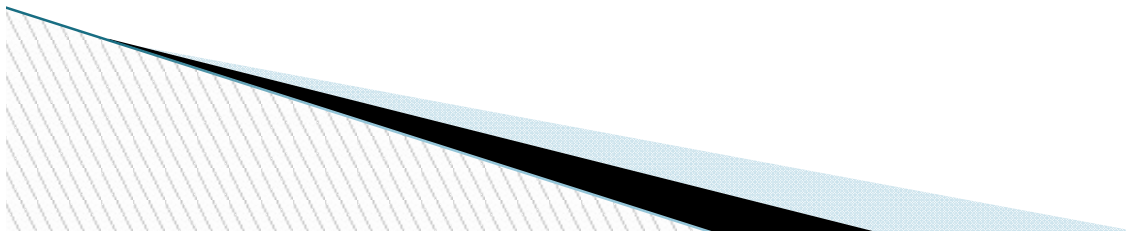


- } 3) radiograph suggestive of pneumonia (nodular or coarse patchy infiltrates, diffuse haziness or granularity, air bronchogram, lobar or segmental consolidation.) Radiological changes do not resolve within 48 hours.
- } 4) positive septic screen.
 - Band cells > 20%
 - Leukocyte count out of reference range
 - C-reactive protein > 1 mg/dl.
 - Raised ESR > 10 mm/1st hour.



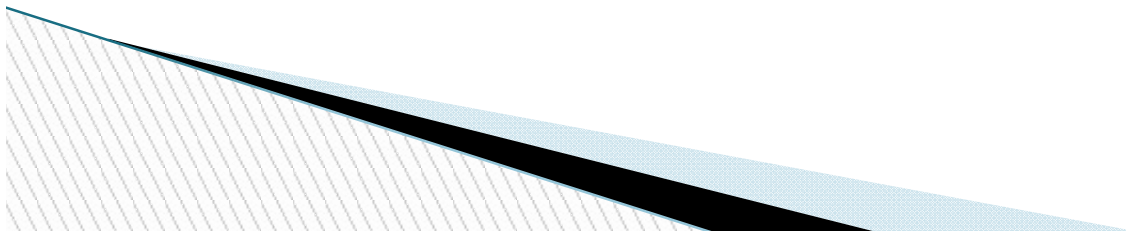
complications

- } Abscess formation
- } Pleural effusion
- } Air leak syndromes
- } Disseminated infection
- } Pericardial effusion
- } Bronchopulmonary dysplasia.
- } Respiratory failure
- } Pulmonary hypertension.

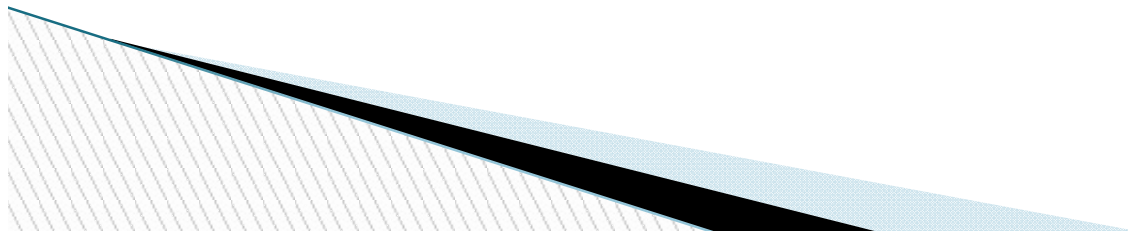


DIAGNOSIS

A definitive diagnosis can be made in the presence clinical manifestation of pneumonia shortly after birth with associated chest radiographic changes.



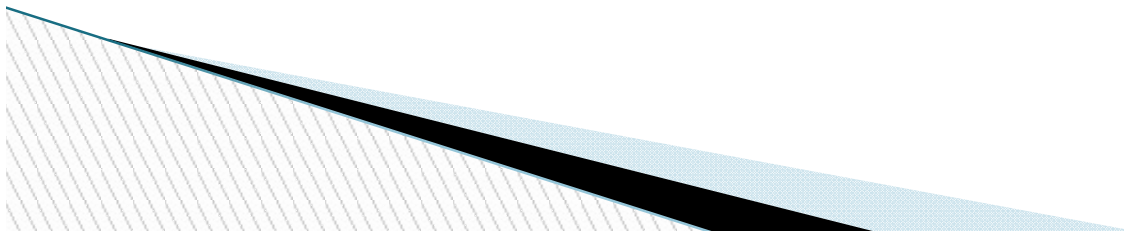
Chest radiographs: show nodular or patchy infiltrates/,
diffuse haziness or granularity/
air bronchogram changes/
lobar or segmental consolidation



Contd....,

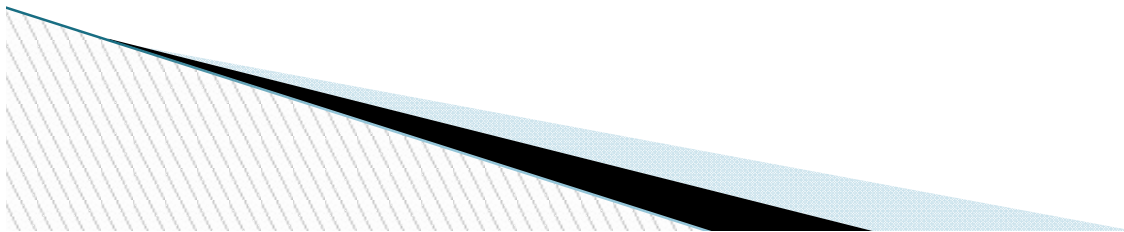
} **Preterm infants with RDS**: it may be difficult to determine whether the radiographic changes represent a new process or worsening of the underlying disease.

} **Term infants with MAS**: the radiographic changes may be difficult to differentiate between the two conditions.



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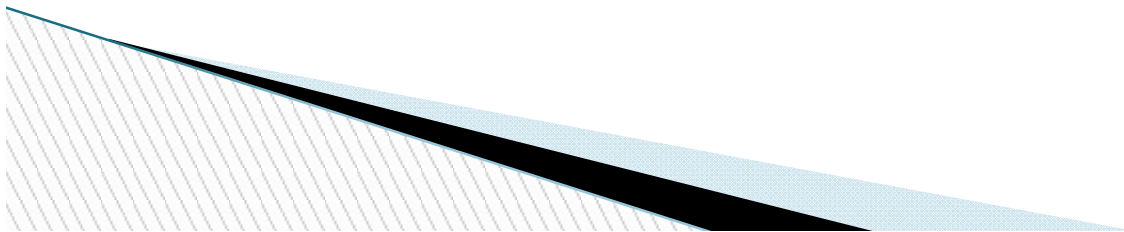
- } **Percutaneous lung aspirates**: for microbiological testing of the etiological agent is rarely performed in neonates.
- } Tracheal aspirates: obtained aseptically before 8th hour of age is recommended, before colonization of the airways.
- } Quantitative culture technique of bronchoscopic alveolar lavage is reported to have specificity of > 80%, it is difficult to use in newborns.



Contd....,

} In newborn with maternal history of PROM or respiratory distress soon after birth should collect gastric aspirate in a heparinized tube and examined for cytology.

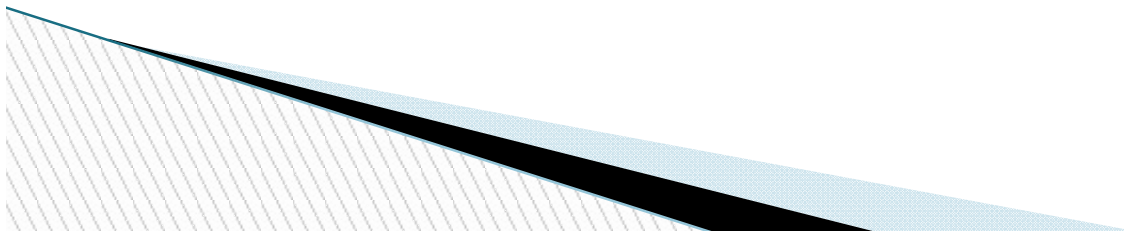
} >5 Polymorphonuclear cells per high power field or Polymorphonuclear cells >3 times than epithelial cell count is suggestive of congenital pneumonia.



Contd....,

} In infants who are not intubated, Gram staining and culture of specimen of gastric aspirate obtained within 1–2 hrs after birth will often help to identify the causative bacteria.

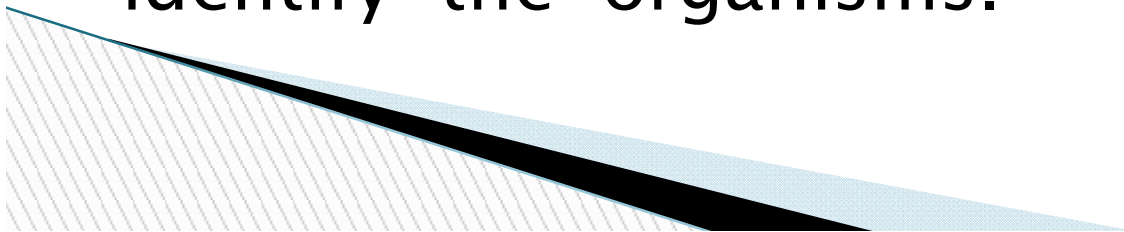
} Most common mechanism of acquisition of cong. pneumonia is via intrauterine aspiration of infected amniotic fluid into both the lungs and stomach.



Contd....,

} Although aerobic incubation during bacteriological culture recovers most causative organisms, anaerobic incubation should be considered in the presence of chorioamnionitis.

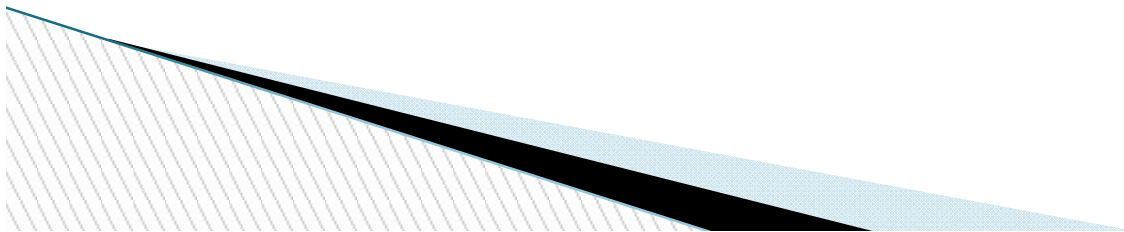
} Direct immuno fluorescent staining or PCR testing of nasopharyngeal aspirates for viruses and specific bacteria will help to identify the organisms.



Contd....,

} PCR testing has increased the sensitivity to detecting *Chlamydia trachomatis* and mycoplasma.

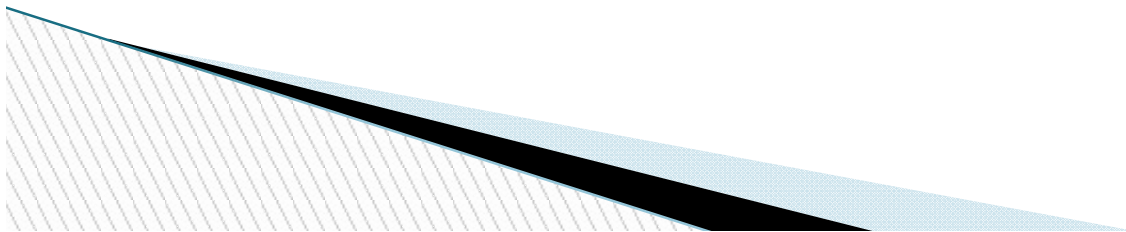
} These are expensive and not readily available thus preventing diagnosis of cong. Pneumonia by atypical bacteria and viruses.



Contd....,

} **Blood culture** : positive blood culture helps to identify the possible organism not all cases of cong. Pneumonia are associated with positive blood culture.

} To improve the yield , an adequate volume of blood specimen of at least 0.5 to 1 ml must be obtained.

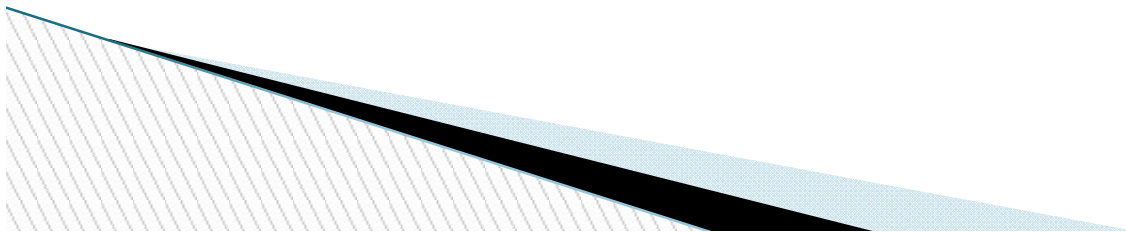


Contd....,

} In infants with systemic manifestation serological tests such as the TORCH test for detection of some bacterial and viral infection may help to identify the possible organism .

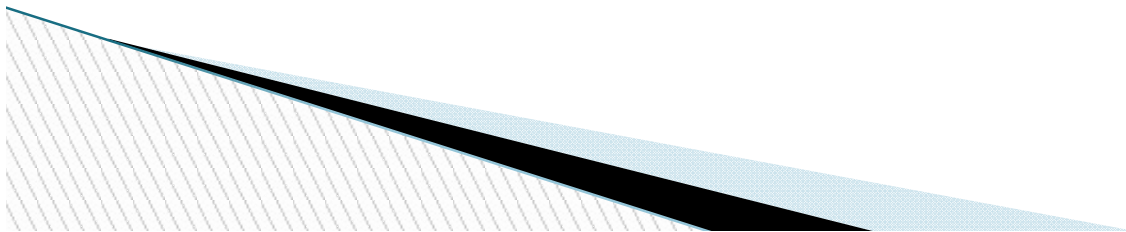
} However, the negative test does not exclude the possibility of these infections when they occur during intrapartum period.

} Under such circumstances, a repeat serological test carried out 2 to 3 weeks later may help to identify these organisms in infants who survive.



Contd....,

- } As pneumonia is common cause of fetal death , so histological examination and microbiological culture should be carried out on lung specimens of all still births to detect the presence of this problem.



TREATMENT

} WHO recommends ampicillin and gentamycin as the first line of antibiotics to cover GBS, other Gram positive and enteric organisms.

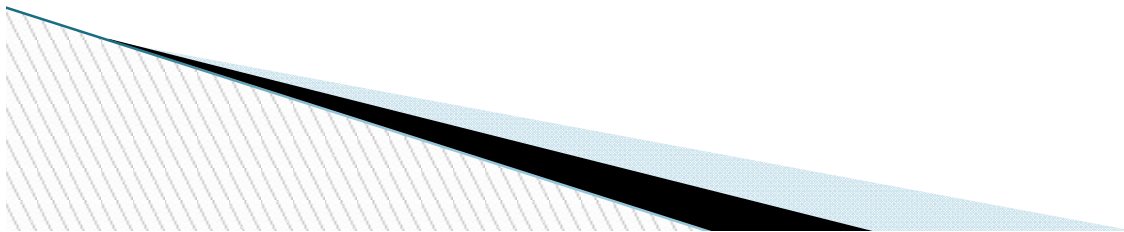
} The choice of first line of antibiotic should be based on the most common organisms isolated and their antibiogram.

} Antibiotics can be changed depending on culture report.



Contd....,

- } Acyclovir should be considered in a critically ill infant when a clinical evidence is highly suggestive of herpes simplex infection and the infant is not responding to antibiotic treatment.
- } In infants with persistent pneumonia not responding to first line ampicillin+gentamicin, atypical infection with mycoplasma and chlamydia should be considered.
- } The drug of choice in this case is macrolides – erythromycin..



} Congenital pneumonia in preterm infants is often associated with respiratory insufficiency requiring mechanical ventilation.

} Lung effluent of these infants has disturbed surface properties despite a sufficient amount of surfactant.

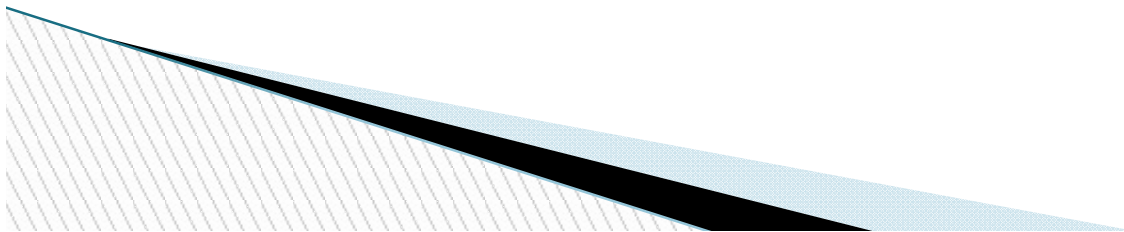
} Hence surfactant therapy may be beneficial.

} Supportive care: includes oxygen, i.v fluids, appropriate use of inotropes and nutrition, ventilatory support, blood transfusion if necessary.

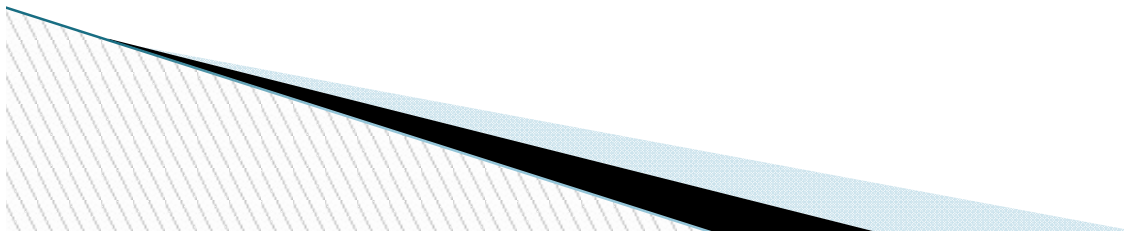


Prevention

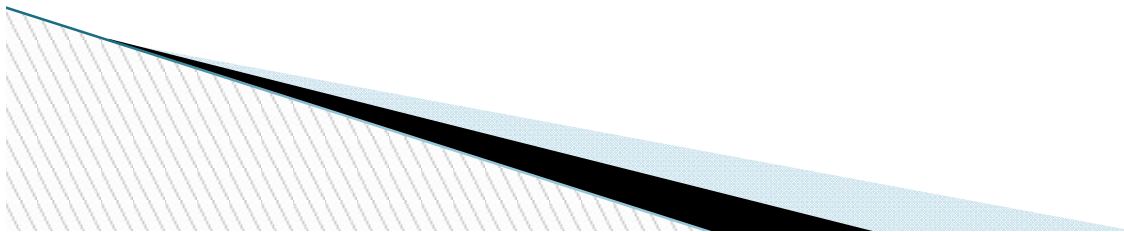
- } Active management of PROM (early administration of antibiotics and prompt management of delivering the baby or early referral may be necessary).
- } Promotion of basic newborn care in communities like breast feeding and hygiene.
- } Prevention of nasocomial infections by hand washing and proper care before any invasive procedure.



- } Maternal immunization against s.pneumonia and prevention and treatment of sexually transmitted infections, cleansing the birth canal with antiseptic solution may decrease incidence but further evaluation needed.
- } Vitamin A supplementation at birth showed decreased young infant mortality in one Indian study but further evaluation is needed.

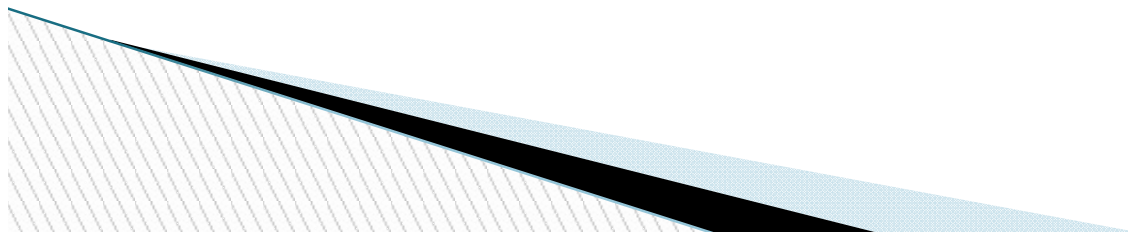


} Early recognitions of cases in the community by health care workers and timely referral and initiation of treatment will decrease the mortality.

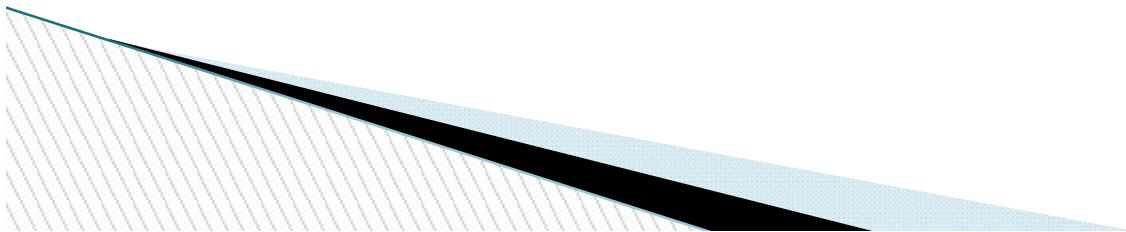


CONCLUSION

- } Autopsy findings suggest that cong. Pneumonia is the common cause of neonatal death especially in preterm infants.
- } It should be considered as the possible diagnosis in any infant with RD at or shortly after birth irrespective of gestation.



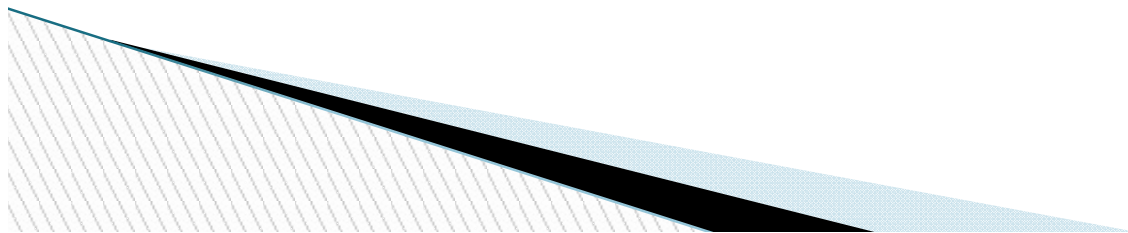
} Microscopic examination and culture of the specimen of gastric aspirate or tracheal aspirate obtained shortly after birth may help to identify the organisms.



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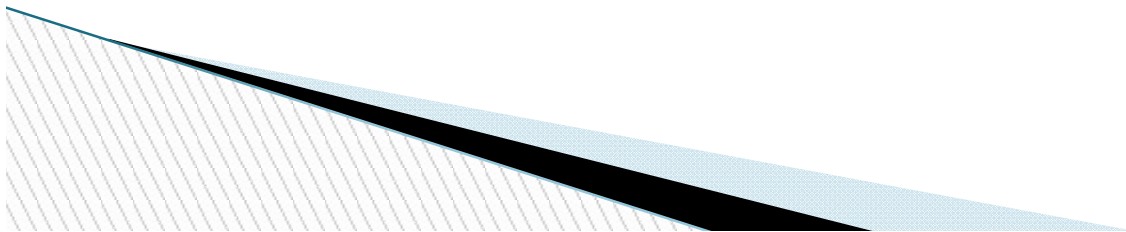
} In critically ill infants atypical bacteria and viral etiology should be thought of.

} Administration of antibiotics after premature rupture of membranes and intrapartum antibiotic prophylaxis against GBS in carrier mothers have reduced the risk of cong. Pneumonia.

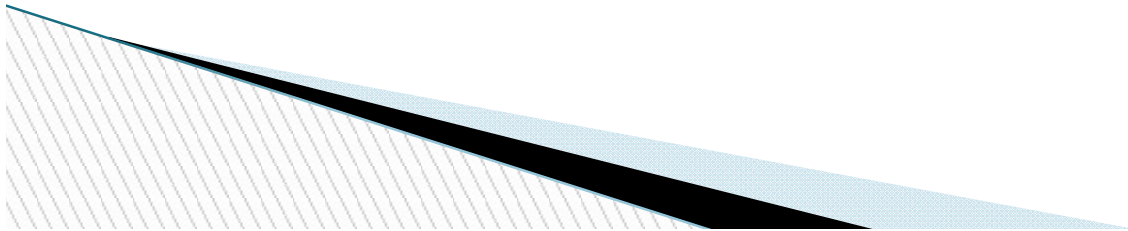


Future perspectives

- } To enable rapid and accurate identification of the etiological agents, there is a need for the development of cheap and reliable diagnostic test kits for use in NICUs and labor rooms to enable early commencement of appropriate antibiotics.



THANK YOU



References

- } Care of newborn Meharbansingh. 8TH Edt.
- } Avery text book of newborn care.10 th Edt.
- } Duck M .Neonatal pneumonia In developing countries.

