

PREVENTIVE MEASURES OF MODERATE PNEUMONIA IN YOUNG CHILDREN

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Abstract. *Pneumonia is a form of acute respiratory infection that affects the lungs. The lungs are made up of small sacs called alveoli, which fill with air when a healthy person breathes.*

When an individual has pneumonia, the alveoli are filled with pus and fluid, which makes breathing painful and limits oxygen intake. Pneumonia is the most common serious bacterial infection in newborns after sepsis and is classified as

- *Early-onset pneumonia: Begins at or within hours of birth*
- *Late-onset pneumonia: Begins after 7 days of age*

Late-onset pneumonia most commonly occurs in newborns in neonatal intensive care (NICUs) who need a breathing tube (endotracheal intubation) for lung problems. Having a breathing tube increases the risk of pneumonia.

Various etiologic agents including bacteria, viruses and atypical organism are responsible for childhood pneumonia. Recent studies suggest that viruses are one of the major causes of childhood and newborn pneumonia. Among viruses, respiratory syncytial virus has got great attention and several recent studies are reporting it as an important organism for pneumonia.

Lack of exclusive breast feeding during first six months, improper timing of start and content of complimentary feeding, anemia, undernutrition, indoor pollution due to tobacco smoking and use of coal and wood for cooking food and lack of vaccinations are important risk factors. Hypoxia is significantly associated with childhood pneumonia. Therefore, use of pulse oximetry should be encouraged for early detection and prompt treatment of hypoxia to prevent adverse outcomes. Among the available tools for risk of mortality assessment in children due to pneumonia, PREPARE score is the best but external validation will be needed. Children can be protected from pneumonia, it can be prevented with simple interventions, and it can be treated with low-cost, low-tech medication and care.

Key words: *Childhood pneumonia, under five, antibiotics, hypoxemia, biomarker.*

ПРОФИЛАКТИЧЕСКИЕ МЕРЫ УМЕРЕННОЙ ПНЕВМОНИИ У МАЛЕНЬКИХ ДЕТЕЙ

Аннотация. *Пневмония — это форма острой респираторной инфекции, которая поражает легкие. Легкие состоят из небольших мешочков, называемых альвеолами, которые наполняются воздухом при дыхании здорового человека. Когда у человека пневмония, альвеолы заполнены гноем и жидкостью, что делает дыхание болезненным и ограничивает поступление кислорода. Пневмония — самая распространенная серьезная бактериальная инфекция у новорожденных после сепсиса и классифицируется как*

- *Ранняя пневмония: начинается во время или в течение нескольких часов после рождения*
- *Поздняя пневмония: начинается после 7 дней*

Поздняя пневмония чаще всего возникает у новорожденных в отделениях интенсивной терапии новорожденных (ОИТН), которым требуется дыхательная трубка (эндотрахеальная интубация) из-за проблем с легкими. Наличие дыхательной трубки увеличивает риск пневмонии.

Различные этиологические агенты, включая бактерии, вирусы и атипичные организмы, ответственны за детскую пневмонию. Недавние исследования показывают, что вирусы являются одной из основных причин детской и неонатальной пневмонии. Среди вирусов респираторно-синцитиальный вирус привлек большое внимание, и несколько недавних исследований сообщают о нем как о важном микроорганизме для пневмонии. Отсутствие исключительно грудного вскармливания в течение первых шести месяцев, неправильное время начала и содержание прикорма, анемия, недоедание, загрязнение помещений из-за курения табака и использования угля и дров для приготовления пищи, а также отсутствие вакцинации являются важными факторами риска. Гипоксия в значительной степени связана с детской пневмонией. Поэтому следует поощрять использование пульсоксиметрии для раннего выявления и своевременного лечения гипоксии, чтобы предотвратить неблагоприятные исходы. Среди доступных инструментов для оценки риска смертности у детей из-за пневмонии лучшим является показатель PREPARE, но потребуются внешняя валидация. Детей можно защитить от пневмонии, ее можно предотвратить с помощью простых вмешательств, и ее можно лечить недорогими, низкотехнологичными лекарствами и уходом.

Ключевые слова: детская пневмония, до пяти лет, антибиотики, гипоксемия, биомаркер.

Introduction. Childhood pneumonia is still a significant clinical and public health problem. No other childhood ailment comes close to its impact on the lives of children, community, and the healthcare system. India contributes the highest number of deaths due to pneumonia, which accounts for about 20% of global mortality among under five children.

Pneumonia is infective inflammation of lung parenchyma due to various pathogenic organisms including bacteria, viruses, fungi and parasites. The key symptom to suspect childhood pneumonia is tachypnea. The World Health Organization (WHO) has defined tachypnea as respiratory rate >60 per min for infants less than 2 mo, >50 per min for infants between 2 -12 mo and >40 per min for children 13 to 59 mo of age. WHO has categorised pneumonia in children under-five years of age into two categories, pneumonia and severe pneumonia. Tachypnea with or without chest retraction is categorised as pneumonia while tachypnea with any danger signs (unable to feed or drink, hypothermia, unconsciousness, convulsion, signs of hypoxia including cyanosis, grunting, groaning, head nodding) as severe pneumonia. Antibiotic therapy should be given in most cases of pneumonia and severe pneumonia. Severe pneumonia may require additional supportive care, such as oxygen, to be given in hospital.

Pneumonia can be spread in several ways. The viruses and bacteria that are commonly found in a child's nose or throat can infect the lungs if they are inhaled. They may also spread via air-borne droplets from a cough or sneeze. In addition, pneumonia may spread through blood, especially during and shortly after birth. The presenting features of viral and bacterial pneumonia are similar. However, the symptoms of viral pneumonia may be more numerous than the symptoms of bacterial pneumonia. In children under 5 years of age who have cough and/or difficult breathing, with or without fever, pneumonia is diagnosed by the presence of either fast breathing or lower chest wall indrawing where their chest moves in or retracts during inhalation (in a healthy person, the chest expands during inhalation). Wheezing is more common in viral infections.

Common symptoms include: fever, tachypnea, tachycardia, coughing, central cyanosis or oxygen saturation <90% on puls oximetry, chest auscultation signs (decreased breath sounds, bronchial breath sounds, crackles). Symptoms of bacterial pneumonia in newborns vary depending on when the child is infected. Newborns who have early-onset pneumonia have symptoms similar to symptoms of sepsis in newborns, including appearing listless and not feeding well.

Newborns who have late-onset pneumonia develop unexplained breathing problems and may need extra oxygen or more breathing support. The amount of sputum (thick or discolored mucus) increases and changes (for example, becomes thicker and brown). Infants may be very ill and have an unstable temperature.

Pneumonia in children is primarily diagnosed clinically. A peripheral blood smear typically reveals leucocytosis with neutrophilic predominance. It is not always necessary to diagnose childhood pneumonia using a chest X-ray. When there is an uncertainty about the diagnosis, persistent symptoms, or there is suspicion of complications such as pleural effusion or pneumothorax, an X-ray of the chest may be necessary. The ability of an X-ray chest to distinguish between bacterial and viral pneumonia is generally poor. However, the WHO states that end point consolidation and pleural effusion radiological findings are likely caused by bacterial etiology.

There is growing evidence that lung ultrasound (LUS) has potential to replace the X-ray chest not only at the point of care but also in routine use. LUS has high sensitivity and specificity for detecting consolidation (96% and 93%) and pneumothorax (88% and 100%). C-reactive protein (CRP) and procalcitonin (PCT) are the most widely used biomarkers in pneumonia.

Pneumonia should be treated with antibiotics. The antibiotic of choice for first line treatment is amoxicillin dispersible tablets. Most cases of pneumonia require oral antibiotics, which are often prescribed at a health centre. These cases can also be diagnosed and treated with inexpensive oral antibiotics at the community level by trained community health workers.

Hospitalization is recommended only for severe cases of pneumonia.

Preventing pneumonia in children is an essential component of a strategy to reduce child mortality. Immunization against Hib, pneumococcus, measles and whooping cough (pertussis) is the most effective way to prevent pneumonia. Adequate nutrition is key to improving children's natural defences, starting with exclusive breastfeeding for the first 6 months of life. In addition to being effective in preventing pneumonia, it also helps to reduce the length of the illness if a child does become ill. Addressing environmental factors such as indoor air pollution (by providing affordable clean indoor stoves, for example) and encouraging good hygiene in crowded homes also reduces the number of children who fall ill with pneumonia.

Conclusion. Even though there has been a reduction in the global incidence and corresponding mortality due to pneumonia in children under-five years of age, yet concentrated efforts are required at global and country levels, health systems strengthening and operations, implementation as well as basic research aimed at surveillance for etiology of pneumonia, vaccine

development and identifying point of care tests, perhaps by using novel biomarkers with clinical signs, to differentiate viral from bacterial pneumonia to ensure rational use of antibiotics and prevent development of antimicrobial resistance. In addition, improved nutritional status through appropriate feeding practices, hand hygiene *etc.* will have to be augmented along with improved case management algorithms and health systems preparedness to fight pneumonia.

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