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PULMONOLOGY

RESPIRATORY DISTRESS IN PRETERM NEONATES - A PRACTICAL APPROACH

**** Sridhar Kalyanasundaram***
***** Vidya Kanamkote Narayanan***

Abstract: *Respiratory distress syndrome is one of the most common morbidities faced by a preterm neonate. Many interrelated factors impact the approach to the management of respiratory distress. In this review, a practical and evidence-based approach to the management of preterm babies with respiratory distress, right from the delivery to the period when the respiratory distress gets resolved, is discussed*

Keywords: *Prematurity, Respiratory distress, Surfactant, Ventilation.*

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Points to Remember

- ***Respiratory distress syndrome (RDS) is a continuously evolving problem-and though the guidelines are important, an individualized care plan that is constantly reviewed based on the immediate clinical picture is essential to ensure optimal care. Early surfactant therapy will improve outcomes in preterm babies with RDS who need this treatment.***
- ***In babies who need surfactant therapy, the option to use the less invasive surfactant delivery methods, using LISA or INSURE is evaluated.***
- ***All units should strive for a standardized evidence-based approach to care for preterm babies, including the golden hour approach, IVH prevention, RDS management and infection prevention.***

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PULMONOLOGY

RESPIRATORY DISTRESS IN TERM NEONATES - AN APPROACH

**** Sindhu Sivanandan***

Abstract: *Respiratory distress in a neonate manifests as tachypnea, chest retractions or grunting. In a term neonate the etiology of respiratory distress is more varied and includes transient tachypnea of newborn, respiratory distress syndrome due to surfactant deficiency, meconium aspiration syndrome, pneumonia, air-leak syndrome and congenital malformations. Early recognition of respiratory distress and prompt initiation of appropriate treatment improves outcomes.*

Keywords: *Respiratory distress, Term neonate, Meconium aspiration syndrome.*

Points to Remember

- ***The major signs of neonatal respiratory distress are tachypnea, chest retractions and grunting whereas cyanosis is a late sign.***
- ***The common causes of RD in a term neonate are transient tachypnea, meconium aspiration syndrome, pneumonia, air-leak syndrome and rarely surfactant deficiency.***
- ***Cardiac causes must be ruled out in any neonate presenting with respiratory distress.***
- ***Management involves supportive care, maintaining oxygen saturation targets through optimal respiratory support.***

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PULMONOLOGY

PNEUMONIA - MANAGEMENT UPDATE

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Abstract: *Pneumonia kills more children under the age of five years than any other disease. It is defined as infection of lung parenchyma and viruses are the most common infective cause. World Health Organization has revised the classification and treatment of childhood pneumonia at health facilities with the objective of providing appropriate treatment to more children. These revised guidelines will simplify the management of pneumonia at first level health facility and outpatient department and achieve better treatment outcomes. Oral amoxicillin is recommended as the first-line treatment for the treatment of both fast breathing pneumonia and chest in drawing pneumonia.*

Keywords: *Pneumonia, World Health Organization, Amoxicillin.*

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Points to Remember

- ***Pneumonia is the leading infectious cause of mortality in children aged less than 5 years globally.***
- ***Tachypnea is the most sensitive and consistent clinical sign of pneumonia.***
- ***Pneumonia is a clinical diagnosis in stable children who are being managed in outpatient settings and investigations are required only in sick children requiring admission.***
- ***As per the WHO revised classification, the respiratory symptoms of children 2 to 59 months of age are classified into three categories instead of four.***
- ***Oral amoxicillin replaces oral co-trimoxazole as first-line treatment of pneumonia.***

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PULMONOLOGY

ASTHMA - CURRENT GUIDELINES

**** Pallab Chatterjee***

Abstract: *Asthma is a common disease condition in children that leads to significant morbidity. The understanding of the disease has changed from a single disease to an umbrella term covering a group of diseases with similar symptoms as a result of different etiologies, phenotypes and endotypes. There is now a sea change in the initial management, which emphasizes on confirming the diagnosis before starting controller medications, avoidance of short-acting beta2 agonists alone and to use single maintenance and reliever therapy (SMART) in adolescents and adults. Add-on therapies like tiotropium and biological monoclonal antibodies have been approved for use in some children with severe asthma.*

Keywords: *Asthma, Phenotypes, Short-acting beta2 agonists, Tiotropium.*

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Points to Remember

- ***Asthma is diagnosed by typical history with characteristic symptoms and evidence of variable expiratory airflow limitation obtained from bronchodilator reversibility testing or other tests.***
- ***Risk factors for exacerbations may be modifiable and non-modifiable and an important modifiable risk factor is having uncontrolled asthma symptoms.***
- ***The preferred step 1 treatment is low-dose ICS taken whenever SABA is taken, and SMART (single maintenance and reliever therapy) is suggested for step 3 and step 4 in children as per GINA 2022 guidelines.***
- ***The children with severe asthma should be evaluated for the clinical or inflammatory phenotype to decide on add-on therapy.***
- ***Primary prevention strategies include encouraging vaginal delivery where possible, avoidance of exposure to environmental tobacco smoke during pregnancy and after birth, and it also includes avoiding the use of paracetamol and broad-spectrum antibiotics during the first year of life.***

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PULMONOLOGY

BRONCHIOLITIS - RECENT UPDATE

**** Hema Gupta Mittal***
**** Sonia Bhatt***

Abstract: *Bronchiolitis is a common respiratory illness in infants which contributes considerably to hospitalization There are many variations in practice in diagnosing, monitoring and managing bronchiolitis. The focus of this review is on updates on various diagnostic and treatment recommendations which will be helpful to practicing pediatricians. Bronchiolitis is a clinical diagnosis. No recommendation exists for routine use of laboratory / radiological investigations. Most guidelines recommend fluid management and oxygen and supportive care as mainstay of treatment. Evidence suggests no benefit with the use of salbutamol, glucocorticoids and antibiotics. Parental education and counselling remain essential.*

Keywords: *Bronchiolitis, Hypertonic saline, Steroids, Adrenaline, Oxygen therapy, Heated humidified high flow nasal cannula.*

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Points to Remember

- ***Bronchiolitis is a common condition in infants and children under 2 years of age and diagnosed on the basis of history and clinical examination.***
- ***Respiratory syncytial virus remains the most common cause.***
- ***It may be mildly symptomatic or lead to a severe disease with fulminant course and respiratory failure.***
- ***The mainstay of treatment remains supportive in the form of humidified oxygen therapy, adequate hydration and proper nutrition.***
- ***There is no role of nebulised drugs (salbutamol, adrenaline, steroids, magnesium sulphate), antibiotics, azithromycin, antivirals or chest physiotherapy in routine management.***
- ***In severe bronchiolitis with respiratory failure, HHHFNC and other non invasive respiratory support have been successful in reducing the need for invasive ventilation.***
- ***Preventive strategies includes hand hygiene and immunoprophylaxis in preterm infants.***

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PULMONOLOGY

MANAGEMENT OF CHILDHOOD TUBERCULOSIS

**** Kalpana S***

Abstract : *The National Strategic Plan 2017-2025 has set an ambitious target of elimination of tuberculosis by 2025. In India, an estimated 3.33 lakh children in the 0-14 years' age group become ill with tuberculosis each year which contributes to 28% of global childhood tuberculosis burden. Improving the diagnostic and treatment strategies in children will contribute in a major way in controlling this menace. Investigations for the diagnosis includeboth radiological and microbiological. Treatment includes preventive strategies , treatment of drug sensitive and drug resistant tuberculosis.*

Keywords: *Cartridge based nucleic acid amplification test, Treatment regimen, Preventive therapy.*

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Points to Remember

- ***Nucleic acid amplification tests CBNAAT and Truenat have improved case diagnosis of tuberculosis.***
- ***Radiology, inspite of modest specificity still remains an important part of the armamentarium.***
- ***Point of care test like urine LAM have been approved in children with HIV.***
- ***Shorter treatment regimens have been proposed by WHO in non severe TB, adolescents and TB meningitis.***

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PULMONOLOGY

PROTRACTED BACTERIAL BRONCHITIS

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Abstract: *Protracted bacterial bronchitis is not an uncommon cause to consider in a child with chronic (>4weeks) wet cough without constitutional symptoms and specific cough pointers. It is increasingly being recognised across the globe after introduction of diagnostic clinical criteria. It is a forerunner of bronchiectasis and needs to be treated with appropriate antibiotics for adequate (2-4 weeks) duration. But in countries like India, common causes such as tuberculosis and foreign body should be ruled out before considering the possibility of PBB.*

Keywords: *Protracted bacterial bronchitis, Chronic cough.*

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Points to Remember

- ***PBB is increasingly being recognised globally as a common cause of chronic wet cough in healthy under five children.***
- ***PBB should be suspected in all healthy children who develop persistent wet cough of more than 4 weeks duration with normal physical examination and imaging.***
- ***This condition responds promptly to a course of amoxycillin-clavulanic acid given for 2-4 weeks .***
- ***Other conditions like foreign body airway and tuberculosis should be ruled out.***

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PULMONOLOGY

BRONCHIECTASIS - NON CYSTIC FIBROSIS

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Abstract: *'Non-cystic fibrosis bronchiectasis' is an end stage lung disease characterized by dilatation and thickening of airways secondary to diverse etiologies causing chronic inflammation and recurrent infections. It is a common chronic respiratory morbidity in children. The etiologies are diverse and depend on the geographic region and availability of diagnostic work up of underlying illness. The most common cause is idiopathic followed by post-infectious. The diagnosis should be suspected in children presenting with chronic wet cough of >4 weeks duration. Clinical presentation depends on the severity of illness and underlying cause and Computed Tomograph of chest is the diagnostic modality of choice. Management is mainly medical with surgery reserved for localized disease not responding to medical management.*

Keywords: *Suppurative lung disease, Primary ciliary dyskinesia, Chronic cough, Wet cough, Protracted bacterial bronchitis.*

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Points to Remember

- ***Non-CF bronchiectasis occurs secondary to diverse etiologies except cystic fibrosis.***
- ***Common causes of non-CF bronchiectasis in Indian children are post-infectious, primary cilliary dyskinesia, and allergic bronchopulmonary aspergillosis.***
- ***The diagnosis should be suspected in children presenting with chronic wet cough of >4 weeks duration.***
- ***Clinical presentation depends on the severity of illness and underlying cause; CT chest is the diagnostic modality of choice.***
- ***Management is mainly medical with surgery reserved for localized disease not responding to medical management.***

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PULMONOLOGY

CYSTIC FIBROSIS

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Abstract: *Cystic Fibrosis (CF), an autosomal recessive condition is being increasingly recognised in India. Early diagnosis followed by prompt initiation of treatment is important to minimize malnutrition and to preserve lung functions. With the availability of highly effective modulator therapy, the prognosis of the disease has improved remarkably. Global disparities in access to care need to be addressed.*

Keywords: *Cystic Fibrosis (CF), Cystic fibrosis transmembrane receptor (CFTR) gene, Pancreatic sufficient (PS), Pancreatic insufficient (PI), Highly effective modulator therapy (HEMT).*

Points to Remember

- ***Cystic fibrosis (CF) an autosomal recessive condition exists in India, determination of its precise magnitude is urgently needed considering its implications on childhood mortality.***
- ***Sweat chloride estimation is the gold standard test for diagnosis of CF. Elevated sweat chloride level >60mmol/L or demonstration of the presence of two disease causing variants in the CFTR gene confirms the diagnosis.***
- ***Early initiation of treatment with pancreatic enzyme replacement therapy, good nutrition and airway clearance therapies minimizes malnutrition, improves quality of life and is associated with better lung functions.***
- ***In this era when highly effective modulator therapy (HEMT) has changed the trajectory of disease progression, global disparities in access to care need to be urgently addressed.***

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PULMONOLOGY

PULMONARY MANIFESTATIONS IN PRIMARY IMMUNODEFICIENCY

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Abstract: *Primary immunodeficiency diseases are a group of inherited disorders characterized by susceptibility to infections, allergies, autoimmunity and malignancies. These disorders are better known as inborn errors of immunity. While inborn errors of immunity can affect every organ system, the respiratory system is the most commonly afflicted. Sinopulmonary infections cause significant morbidity and mortality, however, the spectrum of sinopulmonary involvement also includes immune dysregulation, bronchiectasis, interstitial lung disease and malignancies. In this article, we discuss the pulmonary manifestations of inborn errors of immunity and provide a diagnostic approach and simplified algorithms to ensure a timely diagnosis in these patients.*

Keywords: *Inborn errors of immunity, Pneumonia, Immune dysregulation.*

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Points to Remember

- ***Respiratory system is the most commonly affected system in patients with primary immunodeficiencies (PIDs), also known as Inborn Errors of Immunity (IEI).***
- ***Humoral defects (antibody deficiencies) are the most common group of IEI known to present with recurrent sinopulmonary infections.***
- ***IEIs can also manifest with immune dysregulation, bronchiectasis, interstitial lung disease and malignancies.***
- ***Certain organisms may point towards the underlying diagnosis - Aspergillus pneumonia in chronic granulomatous disease, Pneumocystis jirovecii pneumonia in severe combined immune deficiency (SCID) and hyper IgM syndrome (HIgM).***

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PULMONOLOGY

INVESTIGATIONS IN OBSTRUCTIVE SLEEP APNEA

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Abstract: *Quality sleep is essential for normal growth and development of a child. Obstructive sleep apnea in children is an under-recognized entity, which if present, significantly affects a child's quality of life. Early recognition of the condition and formal evaluation with a polysomnography, the gold standard for diagnosis of OSA, enhances the child's daytime functionality. Other supportive investigations that help identify the cause of upper airway obstruction are useful. Clinical correlation of the data obtained from tests is essential. Untreated obstructive sleep apnea can have adverse long term metabolic, cardiovascular and neurobehavioral effects.*

Keywords: *Pediatric obstructive sleep apnea, Polysomnography.*

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Points to Remember

- ***A good sleep history is part of pediatric history taking in the outpatient department.***
- ***Children with craniofacial syndromes such as Pierre Robin sequence, Trisomy 21, neuromuscular disorders and obesity are at high risk for developing OSA.***
- ***Polysomnography or level 1 sleep study is the gold standard investigation for the diagnosis of pediatric OSA.***
- ***Untreated OSA can have adverse neurobehavioral, cognitive, metabolic and cardiovascular effects.***
- ***Salivary and urinary biomarkers have been evaluated for diagnosis but still further data are needed for better evaluation.***
- ***Multidisciplinary approach is the key to optimal* management of *OSA*.**

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PULMONOLOGY

OXYGEN THERAPY

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Abstract: *Oxygen therapy is inherent part of pediatric critical care, with supplemental oxygen offered to nearly every acutely ill child. However, there are potential risks related to the administration of oxygen and therefore only the lowest amount of oxygen should be given for the shortest period of time to maintain required oxygen saturation. Observational data suggest harm from too generous use of supplemental oxygen in children.Oxygen therapy is useful in treating hypoxemia but is often thought of as harmless. Risk, cost and benefits of oxygen therapy should be considered in the same way as other drugs. This review highlights the benefits ,various oxygen delivery devices with indications and potential risk of oxygen administration.*

Keywords: *Oxygen delivery, Oxygen therapy, Oxygen review, Gas therapy.*

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Points to Remember

- ***Oxygen administration should be considered in the same way as other drugs and titrated to a measured end point to avoid excessive or inadequate dosing.***
- ***Both hypoxemia and hyperoxemia are harmful, oxygen treatment should be commenced or increased to avoid hypoxemia and should be reduced or ceased to avoid hyperoxemia.***
- ***For children receiving oxygen therapy, SpO_2 targets will vary according to the age of the child, clinical condition and trajectory of illness.***
- ***Oxygen treatment is usually not necessary unless the SpO_2 is less than 92%.***
- ***Device selection is vitally important in pediatric population as the size of the patients is highly variable, and their acceptance of a device is an additional consideration.***

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PULMONOLOGY

ALLERGEN IMMUNOTHERAPY

**** Krishna Mohan R***

Abstract : *Allergen immunotherapy is a disease-modifying therapy, used in the treatment of many allergic conditions where gradually increasing doses of specific allergen extracts are administered to achieve clinical tolerance to the allergens which produce symptoms in patients. The major indications for allergen immunotherapy are allergic rhinitis, asthma, insect venom hypersensitivity and allergic conjunctivitis.There are different types of immunotherapy based on the route of administration and duration of therapy. It is highly imperative to use high quality standardised allergen extracts in adequate doses where possible.*

Keywords : *Allergen immunotherapy, Subcutaneous immunotherapy, Sublingual immunotherapy.*

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Points to Remember

- ***Allergen specific immunotherapy is effective and provides long term disease remission.***
- ***It is the only disease modifying treatment available for diseases like allergic rhinitis and asthma.***
- ***Allergen immunotherapy prevents new sensitization and prevents progression of the allergic disease.***
- ***High quality standardised allergen extract have to be used in adequate doseswhere possible.***
- ***Subcutaneous immunotherapy should only be administered at a medical facility with personnel trained in emergency treatment and kept under observation for 30 minutes after each injection.***
- ***Sublingual immunotherapy is a safe, effective, convenient and promising route especially in pediatric age group.***

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PULMONOLOGY

WHAT'S NEW IN CONGENITAL DIAPHRAGMATIC HERNIA ?

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Abstract: *Despite great strides in surgical and ventilatory management of congenital diaphragmatic hernia, survival rates and long term outcomes seem to have plateaued out. This article attempts to review the advances in the early detection of and antenatal management of diaphragmatic hernia and the outcomes of postnatal management of these children.*

Keywords: *Congenital diaphramatic hernia.*

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Points to Remember

- ***Prenatal diagnosis of CDH is crucial so that the labour room team is prepared for the infant and the birth occurs in a center equipped for management of CDH.***
- ***As pulmonary hypertension is a key factor that translates into increased mortality and morbidity in CDH, addressing the same with medication and ventilation and balancing both should be the key.***
- ***Preoperative stabilization and post operative care are the two pillars of success.***

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GENERAL ARTICLE

ENTERAL NUTRITION IN PICU

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Abstract : *Nutrition is an important component of patient management in pediatric intensive care unit (PICU). Malnutrition in children hospitalized in PICU is associated with increased risk of hemodynamic instability, with the potential to adversely influence the outcome of critical illness. Enteral nutrition is preferred because it is simple, economical and relatively free of complications. Contraindications to enteral nutrition are very few, such as intestinal dysmotility, toxic megacolon, peritonitis, gastrointestinal bleeding, high output enteric fistula, severe vomiting and intractable diarrhea. Despite its simplicity, there are some complications during enteral feeding in critically ill children, such as aspiration, bacterial contamination of feeds, feed intolerance and refeeding syndrome. Nutrition is an important component of patient management in pediatric intensive care unit (PICU). Accurate assessment of energy requirements and provision of optimal nutrition support therapy through appropriate route is an important goal of pediatric critical care. Enteral nutrition is preferred in children with functioning gastrointestinal tract. Organizing a nutrition support team constituted by a pediatrician specialized or interested in nutrition and a dietician along with pharmacist and nurses within the PICU team is a wise idea to plan and execute enteral nutrition. Close monitoring is required to reduce the complications and increase the success rate.This review describes the science and challenges related to enteral nutrition prescription and delivery in critically ill children.*

Keywords: *Enteral nutrition, Children, Critical illness, PICU.*

Points to Remember

- ***Among children admitted in PICU, common conditions which predispose to under nutrition are congenital heart disease, chronic lung diseases and cystic fibrosis, neuromuscular diseases and genetic syndromes requiring long term nutritional support***
- ***Benefits of enteral nutrition include its simplicity and ability in maintaining physiological and functional integrity of gastrointestinal mucosa.***
- ***Absolute contraindications to enteral nutrition include, paralytic or mechanical ileus, intestinal obstruction, bowel perforation and necrotizing enterocolitis.***
- ***Disease specific formulations are available for specific conditions such as renal disease or hyperammonemia and cow's milk protein allergy (with reduced proteins, extensively hydrolyzed protein or amino acid formulas).***
- ***Complications are minimal and include tube dislodgement, aspiration and refeeding syndrome.***
- ***Monitoring of vital signs, growth parameters, abdominal girth and biochemical parameters are essential to identify the complications***

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DRUG PROFILE

DOSAGE ADJUSTMENTS IN PATIENTS WITH RENAL IMPAIRMENT - ANTIBIOTICS - PART 1

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Abstract: *Dosages of commonly used antibiotics need to be modified in renal impairment to ensure antimicrobial efficacy and to avoid toxicity. Based on the pharmacodynamics of the antibiotic, modifications may be either by adjusting dosage itself or by adjusting the the interval between doses . With antibiotics exhibiting time dependent killing properties, dosage adjustment is required Whereas,with those exhibiting concentration dependent bacterial killing like aminoglycosides, dosing interval needs to be adjusted. In this article, dosage adjustments for beta lactams, cephalosporins, carbepenems and macrolides are discussed.*

Keywords: *Renal impairment, Glonurelar filtration rate, Creatinine clearance, Dosage adjustment.*

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Points to Remember

- ***No dose modification is required with GFR > 30mL/min, while with lower GFRs, dose alteration or spacing out of doses is recommended. Modifications depend on the individual antibiotic.***
- ***Beta-lactam antibiotics are hydrophilic molecules and most beta-lactams are eliminated primarily through the kidneys.***
- ***For macrolides like erythromycin or azithromycin which are predominantly excreted in the bile, there is no dosage change in renal impairment.***

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CASE REPORT

COATOMER ASSOCIATED PROTEIN COMPLEX SUB UNIT ALPHA GENE SYNDROME PRESENTING AS INTERSTITIAL LUNG DISEASE IN AN INFANT

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Abstract: *Childhood interstitial lung disease encompasses a heterogeneous group of innate, genetic, infectious and inflammatory diseases, quite different from that seen in adulthood. Although histopathological evidence along with clinical assessment and radiology have helped in making specific diagnoses, wider availability of genetic studies has made noninvasive diagnosis a possibility in these children. Coatomer associated protein complex subunit alpha gene syndrome is a rare genetic autoimmune disorder where new evidence is emerging as a cause of interstitial lung disease in young children.*

Keywords: *COPA syndrome, Interstitial lung disease, Infant.*

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CASE VIGNETTE

INFANT WITH RECURRENT INFECTIONS

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LEARNING TOGETHER

ARTERIAL BLOOD GAS ANALYSIS MIXED DISTURBANCE

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