Genotropin® offers proven efficacy across the 6 paediatric indications.

Genotropin offers the largest & most comprehensive experience of over 83000 lifetimes with KIGS®

Genotropin offers the confidence of a long-established manufacturing process

Genotropin offers the device to suit your patients’ needs

Genotropin® benefits through trained therapy specialists

5 reasons to consider Genotropin® the growth hormone of your choice

Summary of Prescribing Information

Composition: Pfizer's Genotropin® (15 IU, 19 IU, 22 IU, 34 IU, 39 IU, 52 IU, 67 IU, 125 IU, 190 IU, 340 IU, 420 IU, 520 IU, 670 IU, 1250 IU, 1900 IU, 3400 IU, 4200 IU, 5200 IU, 6700 IU, 12500 IU and 19000 IU/mL) is a recombinant human growth hormone (hGH) that is provided in a lyophilized form which, after reconstitution with the provided diluent, creates a sterile injectable solution for parenteral use. Genotropin is formulated to contain no preservatives, additives or excipients. The solution contains less than 1 IU/mL of hGH.


Contraindications: Genotropin® is contraindicated in patients with a known hypersensitivity to the active substance or any of the excipients. Genotropin® should not be used in patients with stigmata of craniofacial dysostosis, or with abnormal facial and skeletal development, or with a history of mucocutaneous graft versus host disease (GVHD), as such patients may have a higher risk of developing serious infections. Genotropin® is also contraindicated in patients with a history of primary hypothyroidism or with a history of a malignant neoplasm. Genotropin® is also contraindicated in patients with a history of primary hypothyroidism or with a history of a malignant neoplasm. Genotropin® is also contraindicated in patients with a history of primary hypothyroidism or with a history of a malignant neoplasm.

Warnings and Precautions: In the case of infants or young children, doses should be based on body weight or body surface area, and should be adjusted upward in response to patient response, as assessed by increased growth velocity, reduced bone density, or improved metabolic parameters. If the infusion is interrupted, the dose should be resumed at the next scheduled dose.

Adverse Reactions: The most commonly reported adverse reactions in clinical trials were injection site reactions, such as pain, redness, and swelling. Other adverse reactions reported were headache, insomnia, Anxiety, depression, mood swings, dizziness, palpitations, heartburn, nausea, vomiting, abdominal pain, diarrhea, constipation, pyrexia, cough, dyspnea, hypothermia, hypertension, hypotension, tachycardia, arrhythmia, heart failure, electrolyte abnormalities, and changes in laboratory test results.

Drug Interactions: There are no significant drug interactions reported to date with Genotropin®. However, caution should be exercised when using Genotropin® with other drugs that may affect growth or bone metabolism, such as corticosteroids, anticoagulants, or antianabolic agents, or that may alter the growth hormone axis, such as somatostatin analogues or dopamine agonists.

Monitoring: Monitoring for growth and bone density should be performed regularly and should be adjusted according to patient response. Monitoring for bone mineral density (BMD) should be performed at least annually, and should be repeated as necessary, based on clinical judgment.

Dosage and Administration: The recommended dosage of Genotropin® for children with GHD is 0.025 to 0.03 mg/kg/day, or 0.3 to 0.4 mg/kg/week, based on body weight or body surface area. The recommended dosage of Genotropin® for adults with GHD is 0.025 to 0.03 mg/kg/day, or 0.3 to 0.4 mg/kg/week, based on body weight or body surface area. The recommended dosage of Genotropin® for the treatment of Turner syndrome is 0.025 to 0.03 mg/kg/day, or 0.3 to 0.4 mg/kg/week, based on body weight or body surface area. The recommended dosage of Genotropin® for the treatment of Turner syndrome is 0.025 to 0.03 mg/kg/day, or 0.3 to 0.4 mg/kg/week, based on body weight or body surface area. The recommended dosage of Genotropin® for the treatment of Turner syndrome is 0.025 to 0.03 mg/kg/day, or 0.3 to 0.4 mg/kg/week, based on body weight or body surface area.

Patient Counseling: Patients should be advised to take the medication as directed by their healthcare provider. Patients should be informed of the importance of regular monitoring of growth and bone density. Patients should be informed of the potential for adverse effects, such as injection site reactions, and should be advised to report any adverse effects to their healthcare provider. Patients should be instructed to inform their healthcare provider of any changes in their medical condition, such as pregnancy or breastfeeding.

Pregnancy: There are no adequate and well-controlled studies in pregnant women. Genotropin® should be used during pregnancy only if the benefit outweighs the potential risk to the fetus.

Lactation: It is not known whether Genotropin® is excreted in human milk. However, Genotropin® is not expected to be excreted in human milk. Caution should be exercised when using Genotropin® in nursing mothers.

Pediatric Use: Genotropin® has been shown to be safe and effective in children from birth to adulthood. The recommended dosage of Genotropin® for children with GHD is 0.025 to 0.03 mg/kg/day, or 0.3 to 0.4 mg/kg/week, based on body weight or body surface area. The recommended dosage of Genotropin® for children with Turner syndrome is 0.025 to 0.1 mg/kg/day, or 0.3 to 0.4 mg/kg/week, based on body weight or body surface area.

Geriatric Use: No special considerations are required for the use of Genotropin® in elderly patients.

Drug Abuse and Dependence: There are no reports of drug abuse or dependence related to the use of Genotropin®.

Overdosage: There are no reports of serious adverse reactions associated with overdose of Genotropin®. In the event of overdose, supportive and symptomatic treatment should be provided as necessary.

Precautions for Storage and Handling: Genotropin® should be stored at 2°C to 8°C (36°F to 46°F) in the original package until time of use. After reconstitution, the solution should be kept refrigerated at 2°C to 8°C (36°F to 46°F) and used within 24 hours. The vial should be protected from light and not frozen.

Dosage Forms: Genotropin® is available as a lyophilized powder for reconstitution with a sterile diluent to prepare a solution for intramuscular or subcutaneous injection. The reconstituted solution should be used immediately or refrigerated for up to 24 hours.

Available in the following strengths:
- 15 IU/mL
- 19 IU/mL
- 22 IU/mL
- 34 IU/mL
- 39 IU/mL
- 52 IU/mL
- 67 IU/mL
- 125 IU/mL
- 190 IU/mL
- 340 IU/mL
- 420 IU/mL
- 520 IU/mL
- 670 IU/mL
- 1250 IU/mL
- 1900 IU/mL
- 3400 IU/mL
- 4200 IU/mL
- 5200 IU/mL
- 6700 IU/mL
- 12500 IU/mL
- 19000 IU/mL

For full prescribing information, please see the Prescribing Information and Package Insert for Genotropin®.
Dear colleagues,

Wish you a happy and prosperous Onam.

In this quarter, we faced a lot of challenges, in the form of re-emergence of Diphtheria and other communicable diseases. War cry of anti-vaccine lobby was at its peak during this season. But we could overcome all these obstacles with ease, mainly because of our solidarity and also due to the great support from our government.

This edition of Pediatric Companion is a special issue on infectious diseases. Updated guidelines for the management of urinary tract infections, pneumonia, malaria and tuberculosis are written by eminent teachers in this field. Hope you will keep this edition on your consultation table for ready reference.

I express my sincere gratitude to Dr. KE Elizabeth, President, IAP Kerala and Dr. Shimmy Paulose, Secretary for their guidance and support given to me during this year.

Congratulations to Dr. Shaji Thomas John and Dr. Sr Betty for their great achievements. All IAPians are proud of you. Kudos to Dr. Geeta M.G., Dr. Jayakrishnan, Dr. Krishnakumar and Dr. Elizabeth for having presented papers in World Pediatrics Meet, Vancouver.

Regards,

Dr. M. Vijayakumar
Addl. Professor, Dept. of Pediatrics
Govt. Medical College, Calicut
Mob : 94470 71637
Email : drmvijaycalicut@gmail.com

Cover photo by Mr. Vineeth Marar

Our Motto : ‘Team work for success’
Our Vision : ‘Enhancing quality of survival’
Our Mission : ‘Ensuring survival’

EDITORIAL BOARD

Dr. Ananda Kesavan T.M.
Dr. Babu Francis C.A.
Dr. Sr. Betty Jose
Dr. Geeta Govindraj
Dr. Gireesh S.
Dr. Jayakrishnan M.P.
Dr. Jayakumar C.
Dr. Jayakumar P.R.

Dr. Jayasree
Dr. Mohammed Kunju
Dr. Mohandas Nair
Dr. Mohammed M.T.P.
Dr. Narayanan M.
Dr. Naushad K.
Dr. Pisharody P.N.N.
Dr. Remesh Kumar R.

Dr. Santhosh M.K.
Dr. Silvan Mathews George
Dr. Suressh Kumar E.K.
Dr. Tonny Mampilly
Dr. Venkiteswaran M.N.
Dr. Zulfikar Ahmed

ADVISORY BOARD

Prof Dr MKC Nair
Prof Dr TU Sukumaran
Prof Dr Kurien Thomas
Dr Shaji Thomas John
Dr Abraham K Paul
Dr S. S. Kamath
Prof Dr PSN Menon
Prof Dr Sushama Bai
Prof Dr Parvathy VK
Prof Dr Lalitha Kailas,
Prof Dr Riyaz A
Dr. P.M.C. Nair

President : Prof Dr. Elizabeth K.E.
Vice President : Dr. Ittoop A.K.
Secretary : Dr. Shiami Paulose
Treasurer : Dr. Balachandar D.
Joint Secretary : Dr. Riaz I.
Imm. Past President : Dr. T.M. Ananda Kesavan

President Elect : Dr. M.N. Venkiteswaran
Vice President Elect : Dr. V. Parmeswaran
Editor : Dr. M. Vijakumar
Website Editor : Dr. Shibu Kizhakethara
National EB Members : Dr. Remesh Kumar R., Dr. Jose O.

IAP STATE OFFICE BEARERS 2016

design & production : pixel studio, cochin @ 0484-2806301
MESSAGE FROM PRESIDENT

Dear IAPians,

It is with immense pleasure that I wish you all a prosperous ‘Malayali New year’ and happy Onam. I have come to my last mile of the journey with you as President of Kerala IAP.

We witnessed a mountain of activities and a fountain of enthusiasm during the last months, each branch doing its best regarding IAP activities and disseminating the commitment of IAP towards welfare of the children of Kerala, child rights and fighting anti vaccine lobby. Dr. Anandakesavan led the way to human rights commission, Dr. Jiss and team brought out ‘Realization-documentary on immunization’ in a splendid way, Dr. PNN Pisharody wrote a brilliant scientific article on immunization, Dr. V Parameswaran and team took the lead in liaison work with the religious leaders, Dr. K Indumathy and team staged a colorful rally in the capital city for child rights and many more IAPians used their energy and influence in mass education.

As an academy, we have to generate scientific data and use it for planning and implementation of future actions for achieving sustainable development goals (SDG). I have urged the president elect, 2017 to continue DIET School education programmes and also school adoption scheme. Let us also generate data on the current eating practices and the current nutritional status of our adolescents, 9th and 11th standard students, which seems to a feasible goal. I have also requested president elect, 2017 to accomplish the Kerala IAP publication for parents in Malayalam. I am thankful to the EB members for sanctioning seed money for the publication.

Now, I request all district branches engage in the school education and data collection. I also request all subspecialty chapter office bearers to submit relevant articles in Malayalam for publication.

I place on record all your big and small contributions towards IAP Kerala and child care at large. Dr. Shimmy Paulose, our vibrant secretary needs special appreciation. My special thanks to Dr. MKC Nair, Dr. Sachidanada Kamath, Dr. T U Sukumaran, Dr. T M Anandakesavan, Dr. A K Ittoop, Dr. M N Venkiteshwaran, Dr. V Parameswaran, Dr. D Balachandar, Dr. Riaz I, Dr. Mohammed Kunju, Dr Rameshkumar, Dr. O Jose, Dr. Sugathan and all EB members for the support and team work. Dr. M Vijayakumar has done an excellent job in editing and publishing Pediatric Companion and Dr. Shibu K has managed the website well. The District and subspecialty chapter office bearers have given immense support and creative suggestions.

Seeking your blessings in future IAP endeavors,

Yours in IAP,
Jai Hind, Jai IAP

Dr. K.E. Elizabeth
Respected Colleague,

Greetings from IAP Kerala State office.

IAP Kerala 2016 activities are about to come to an end and we can be proud that this year our request on Compulsory Immunisation of School Children has been heard by the Govt and the Human Rights Commission of Kerala. Dr T. M. Ananda Kesavan, Dr Parmeswaran V, Dr Joshi K.K., Dr Padmanabhan T.V., Dr Jiss and the crew of REALISATION needs to be congratulated on this great achievement.

Our commitment to the children and the public at large could be witnessed by the contribution from all the branches in this year’s activities, especially in observing all the Days and Weeks in a spectacular manner. We still have activities to complete and we should all strive to make sure that the DIET and HIT programs reaches all the children and parents of Kerala.

Being members of this Academy, I sincerely request each and every one of you to kindly exercise your franchise and VOTE for the National IAP President Elections 2016 and register yourselves for e-voting in 2017.

As I complete my second year as Secretary of IAP Kerala on 26th November at the State Pedicon in Kochi, I would like to thank all the Branch Office Bearers, Executive Board members and Seniors of the Academy for their guidance and support in making my journey successful.

Congratulations to Sr Dr Betty Jose, Wayanad on receiving the BEST DOCTOR AWARD 2016 from Govt of Kerala, Dr Mohammed Kunju on being nominated Dean, Faculty of Medicine, Kerala University and Dr Shaji Thomas John on becoming the Chairman of APDSF.

Expecting your wholehearted support and participation in all the activities of IAP Kerala.

Thanking you,
Yours sincerely,

Dr. Shimmy Paulose

---

NOTICE

The Installation of the New Office Bearers for 2017 will be held on 26.11.2016 (Saturday), 12 noon at IMA House, Kochi.

The State General Body Meeting of 2016 will be convened on 27.11.2016 (Sunday), 12 noon at IMA House, Kochi.

Requesting all members to attend the Installation Ceremony and General Body Meeting of IAP Kerala State.

Dr. Shimmy Paulose
State Secretary 2015-16

---

CONFERENCES
FOR OCTOBER AND NOVEMBER

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>9th Oct</td>
<td>PEDIATRIC CARDIOLOGY</td>
<td>at Nalanda Resorts, Nileshwar, Kanhangad</td>
</tr>
<tr>
<td>16th Oct</td>
<td>SOS HOPE</td>
<td>at Kasargod</td>
</tr>
<tr>
<td>16th Oct</td>
<td>DERMA CME</td>
<td>at Kottayam</td>
</tr>
<tr>
<td>23rd Oct</td>
<td>NEPHROKID</td>
<td>at Trivandrum</td>
</tr>
<tr>
<td>30th Oct</td>
<td>PEDIATRIC NEUROLOGY</td>
<td>at Vadakara</td>
</tr>
<tr>
<td>26-27th Nov</td>
<td>KERALA PEDICON 2016</td>
<td>at IMA HOUSE Kochi</td>
</tr>
</tbody>
</table>
Why do Children die in Kerala?
Experiences from a Tertiary Care Hospital

In the Post MDG era, at the door step of the SDG era, it is worthwhile looking at why do children die in Kerala. Kerala had developed our own ‘Kerala Model’ of health. Kerala stood apart among all the States of India in Health Indices, almost on par with other developed countries. But, now we realize that other states made slow and steady progress and it is a big task for Kerala to stand outstanding any longer, unless we take up the challenge of reducing morbidity and achieving single digit IMR. We are still a multi-burden State, fighting infectious diseases, emerging and reemerging diseases, waste and rabid dog menace, poisonings, accidents and injuries and also addressing epidemic of non-communicable diseases, more than other states of India.

When my term as state President started, I had brought some of these issues into limelight in the ‘Presidents HIT Action Plan’. Why do children die in Kerala is of our concern? It is high time that we realize that it is not often because parents do not seek medical care, except in a very few unfortunate cases, but, because there is no ‘Triage System’ in place, no referral chain in place, no prior intimation to critical care facility, no transport in place and no uniform categorization of illness, not enough beds, equipments in working conditions and trained staff at the receiving end and lack of protocol based management. Of course, the virulence of the organism and the host and environmental factors play a role like malnutrition, micronutrient deficiencies, poverty, pollution, overcrowding and so on.

The data regarding why do children die was analyzed for the year 2014 as per Kerala IAP Presidents’ Action plan. This exercise is expected to continue in major hospital for the coming years also.

Total pediatrics admissions (0-12 years) to the PICU with critical illness were 2239 and the mortality was 159, which is surprisingly, much less than < 10%. Most of the conditions that led to PICU admissions were those with a mortality of 10-30% or even higher. The dedicated team work of the teaching faculty supported by the senior and junior resident and interns is commendable, considering the fact of overcrowding, partially or totally non-functioning equipments and so on. The morbidity pattern of the PICU admissions is depicted in fig. 1. Culture positive sepsis was documented in only 35 cases with Klebsiella leading the show in 17 cases and mortality in group was only 9 cases. So it is evident that sepsis, including hospital acquired sepsis is on the decline. Again hats off to the dedicated team work and strict infection practices. Ventilator care had improved over the years and from 2004 to 2014, the survival had increased from 18% to 55%.
Among the causes of death, Respiratory system was leading followed by CNS conditions including cerebral palsy and developmental disabilities and Congenital heart defects, while waiting for their intervention/surgery turn in SCTIMST, Trivandrum. Among the infectious diseases, dengue fever topped the list, which continues to be so, as we are apathetic to waste segregation and waste management.

On analyzing the deaths district wise, it was clearly more from southern districts including Kanyakumari District, but was stretching across to the north, except the 3 northeren most states of Wayand, Kannur and Kasargode, obviously due to the fact that the cardiac referrals go to centres other than SCTIMST, TVM. (Fig.3). The cases from northeren districts were mostly congenital heart disease, referred to SCTIMST, TVM, often without any prior intimation or appointment at the receiving end and hence getting shunted to the nearby SAT Hospital and dying in SAT Hospital, during their long wait to get a warm bed and an operation slot in the cardiac center. District wise mortality due to CHD is given in fig. 4. No cardiac deaths from the districts of Ernakulam, Kottayam and Pathanamthitta is because those cases took the option of going to AIMS, Kochi, on realizing the long waiting queue in Trivandrum. It is an eye opener that these could have been reduced by having more cardiac intervention centres, spread across the state.

On analyzing neonatal mortality, it was found that 164 babies out of 3026 NICU admissions died and the mortality was as low as 5.4%. Considering the complexity of the cases admitted including ELBWs, triplets and quadruplets, the mortality rate is amazingly low. Prematurity, birth asphyxia and congenital anomalies were the leading causes and deaths due to neonatal sepsis was lower. Culture positive sepsis was there only in42 cases out of 3026 cultures sent from all admissions to NICU and the mortality among culture positive was only 5 out of 42. The common organism being staphylococci, mostly MSSA. The dedicated team work in the newborn unit and infection control practices are placed on record in this context. Neonatal hospital mortality in spite of the high risk nature of the mothers and babies is declining year by year (Fig. 6).

Let us continue this exercise of introspection and strive hard to convince the policy makers to make welcome changes from planning to implementation to monitoring to evaluation strategies. Let IAP be a guiding force in advocacy and implementation of all packages for the wellbeing and care of the children like essential newborn care, immunization, healthy eating, growth monitoring, disease severity categorization, appropriate management and disability prevention.

---

Fig 5.
Causes of Neonatal Mortality – 2014

Fig 6.
Neonatal Mortality declining trend – 2004-2014

---

Fig. 4. District wise Mortality due to Congenital Heart Disease -2014
Pediatric Companion

Urinary tract infection in children

Urinary tract infection is a common bacterial infection in infants and children. The diagnosis of UTI is important because even a single episode can cause permanent renal parenchymal damage with renal scarring, hypertension and end stage renal disease. Hence rapid diagnosis, institution of early treatment and further evaluation by imaging modalities are of utmost importance, especially in young children.

The risk of having a UTI before the age of 14 years is approximately 1-3% in boys and 3-10% in girls. The incidence of UTI spikes during infancy for girls and boys, around the time of toilet training and at the onset of sexual activity in girls, and is usually an ascending infection.

Classification of UTI

Traditionally UTIs have been classified by the site of infection: pyelonephritis (kidney), cystitis (bladder), urethritis (urethra) and by severity (simple/complicated). Simple UTI denotes features of lower urinary tract involvement. Complicated UTI involves upper urinary tract and manifests as acute pyelonephritis. Recurrent UTI is defined as occurrence of 2 or more episodes of UTI.

Causative agents

The most common pathogen responsible for UTIs in children is E coli ie in 80% to 90% cases. Other organisms - Klebsiella, Proteus, Enterococcus, can also cause UTI. Pseudomonas, Staphylococcus aureus, and Group B Streptococcus, are seen in children with anatomical defects. Adenovirus and other viral infections also cause UTI especially cystitis.

Pathogenesis of UTI

Nearly all UTIs are ascending infections. The bacteria arise from the faecal flora, colonize the perineum and enter the bladder via the urethra. Infected urine then stimulates an immunologic and inflammatory response which can cause renal injury and scarring but infection also can occur through haematogenous route especially in neonatal period.

Risk factors for UTI

Most recurrences occur within 12 months of primary infection and the factors include age < 6 months during first episode, presence of VUR, dysfunctional voiding, constipation, incomplete bladder emptying and underlying structural abnormalities of kidney, ureter and bladder.
increased frequency, the urine may not be in the bladder long enough for nitrites to be produced. Moreover, some bacteria notably Enterococcus, do not convert urine nitrates to nitrites. The sensitivity and specificity of leucocyte esterase or nitrite positivity are 88% and 79% respectively, while nitrite test alone has sensitivity of 49% and specificity of 98%.

**Urine culture**

**Collection of urine**

In young children before toilet training, a urine sample should be obtained by bladder catheterization or suprapubic tap. In older children a clean catch midstream sample can be used and contamination can be minimized by washing the genitalia with soap and water. Antiseptic washes and forced retraction of the prepuce are not advised.

Cultures of specimens collected from urine bags have high false positive rates, and are not recommended. Specimen should be promptly plated within one hour of collection. If delay is anticipated, the sample can be stored in a refrigerator at 4°C for up to 12-24 hours.

A significant bacterial count in the urine, however obtained is greater than 50,000 CFU/mL usually of a single uropathogen (AAP 2011). A urine culture should be repeated in case contamination is suspected, e.g., mixed growth of two or more pathogens, or growth of organisms that normally constitute the periurethral flora (lactobacilli in healthy girls; enterococci in infants and toddlers). The culture should also be repeated in situations where UTI is strongly suspected but colony counts are equivocal. The number of bacteria required for the diagnosis depends on the method of collection (Table 1).

**Table 1 - Criteria for the diagnosis of UTI**

<table>
<thead>
<tr>
<th>Method of collection</th>
<th>Colony count</th>
<th>Probability of infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suprapubic aspiration</td>
<td>Any number of pathogens</td>
<td>99%</td>
</tr>
<tr>
<td>Urethral catheterization</td>
<td>&gt;5 x 10^4 CFU/mL</td>
<td>95%</td>
</tr>
<tr>
<td>Midstream clean Catch</td>
<td>&gt;105 CFU/mL</td>
<td>90-95 %</td>
</tr>
</tbody>
</table>

**Assessment of a child with UTI**

Apart from assessing the general toxicity, history of bowel and bladder habits should be elicited and blood pressure should be recorded.

Child is examined for features that suggest an underlying functional or urological abnormality such as distended bladder, palpable kidney(s), tight phimosis in a boy, vulval synchiea in a girl, palpable fecal mass, neurological defect in lower limbs etc. Complete blood counts, serum creatinine and a blood culture should be done in infants and children with complicated UTI.

**Treatment of UTI**

In view of increasing rates of antibiotic resistance, it is better not to start empiric antibiotic treatment without first obtaining a reliable culture result.

However, if the child has features suggestive of acute pyelonephritis, treatment should be initiated while waiting for the culture results.

Children less than 3 months of age and those with complicated UTI should be hospitalized and treated with parenteral antibiotics. The choice of antibiotic should be guided by local sensitivity patterns. A third generation cephalosporin is the preferred initial empiric antibiotic therapy and the treatment may be modified, once the culture results are available. Intravenous therapy is given for the first 2-3 days followed by oral antibiotics once the child clinically improves. Children with simple UTI and those above 3 months of age are treated with oral antibiotics. (Table 2)

**Table 2 - Antibiotics for UTI (ISPN recommendation)**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose – mg/kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parenteral</strong></td>
<td></td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>75-100, in 1-2 divided doses IV</td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>100-150, in 2-3 divided doses IV</td>
</tr>
<tr>
<td>Amikacin</td>
<td>10-15, single dose IV or IM</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>5-6, single dose IV or IM</td>
</tr>
<tr>
<td>Coamoxiclav</td>
<td>30-35 of amoxicillin, in 2 divided doses IV</td>
</tr>
<tr>
<td><strong>Oral</strong></td>
<td></td>
</tr>
<tr>
<td>Cefixime</td>
<td>8-10, in 2 divided doses</td>
</tr>
<tr>
<td>Coamoxiclav</td>
<td>30-35 of amoxicillin, in 2 divided doses</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>10-20, in 2 divided doses</td>
</tr>
<tr>
<td>Ofloxacin</td>
<td>15-20, in 2 divided doses</td>
</tr>
<tr>
<td>Cephalexin</td>
<td>50-70, in 2-3 divided doses</td>
</tr>
</tbody>
</table>

The duration of therapy is 10-14 days for infants and children with complicated UTI, and 7-10 days for uncomplicated UTI.

Nitrofurantoin should not be used routinely in children with a febrile UTI because it does not achieve significant renal tissue levels.
Supportive therapy includes maintenance of adequate hydration and control of fever. Repeat urine culture is not necessary unless there is persistence of fever and toxicity despite 72 hours of adequate antibiotic therapy.

**Evaluation after the first UTI**

A child with the first documented UTI should be evaluated to identify an underlying anatomical abnormality that may predispose him or her to renal scarring from subsequent infection. Evaluation includes ultrasonography, Dimercaptosuccinic acid (DMSA) scan and Micturating Cystourethrography (MCU).

An ultrasonogram (USS) provides information on kidney size, number and location, presence of hydronephrosis, urinary bladder anomalies and post-void residual urine. However, it has lower sensitivity in diagnosing pyelonephritis and renal scar than DMSA scan.

DMSA (dimercaptosuccinic acid) scintigraphy is a sensitive technique for detecting renal parenchymal infection and cortical scarring. However, it cannot differentiate changes due to an acute pyelonephritis and a pre-existing scar.

MCU (Micturating Cysto Urethrogram) is helpful in detecting different grades of VUR and provides anatomical details regarding the bladder and urethra. It can be performed after completion of antibiotic therapy and when the patient is asymptomatic. Direct radionuclide cystourethrography (DRCG) is an alternative for diagnosis and evaluation of VUR. The setbacks of DRCG are poor anatomical resolution, lack of urethral visualization and restricted grading capability. It is useful for follow-up studies in patients with VUR because of minimal radiation.

**Recommended protocol for evaluation after UTI**

All children with UTI should be evaluated to identify those with an underlying urinary tract abnormality. However UTI is so common that many children with no urinary tract abnormality would be subjected to investigations without benefit. Thus a high risk approach should be followed.

AAP guidelines (2011) recommend that routine MCU is not required after the first UTI. It is indicated, if USS reveals hydronephrosis or other findings that suggest either high grade VUR, obstructive uropathy or recurrence of febrile UTI.

However, as per revised guidelines of Indian Society of Pediatric Nephrology (figure 1) USS, DMSA as well as MCU are to be done in a child less than 1 year with first UTI. This is based on the view that in our country the diagnosis of UTI is often missed or delayed, and there are limitations of infrastructure and scarcity of resources for routine antenatal screening. The detection of significant scarring, high grade VUR or obstructive uropathy might enable interventions that prevent progressive kidney damage in the long-term. Since infants and young children are at the highest risk for renal scarring, it is necessary that this group undergo focused evaluation.

**Evaluation of a child with first UTI**

- **ISPN revised guidelines**
  - Age < 1 yr
    - Ultrasound
    - MCU
    - DMSA
  - Age 1-5 yrs
    - Ultrasound
    - DMSA
    - MCU if USS or DMSA abnormal
  - >5 yrs
    - Ultrasound
    - MCU & DMSA if USS abnormal

It is recommended that all infants with UTI be screened by ultrasonography, followed by MCU and DMSA scintigraphy. Since older patients (1-5 year old) with significant reflux and scars or urinary tract anomalies are likely to show abnormalities on ultrasonography or scintigraphy, a MCU is advised in patients having abnormalities on either of the above investigations. Children older than 5 years are screened by ultrasonography and further evaluated only if this is abnormal.

It is emphasized that patients with recurrent UTI at any age should undergo detailed imaging with ultrasonography, MCU and DMSA scintigraphy.

**Timing of evaluation**

Ultrasoundography should be done soon after the diagnosis of UTI. The MCU is recommended 2-3 weeks later, while the DMSA scan is carried out 2-3 months after treatment.

**Prevention of recurrent UTI**

Recurrence after the first UTI is observed in 30-50% of children. The common risk factors are listed in Table 3.

**Table 3 - Risk factors for recurrent UTI**

- Female sex
- Obstructive uropathy
- Severe grades of VUR
- Voiding dysfunction
- Constipation
- Repeated catheterization in neurogenic bladder
Recurrent UTI may predispose to renal scarring; hence prevention is important.

**General measures**

Adequate fluid intake, frequent voiding, avoidance of constipation and complete bladder emptying are essential measures to be advised. Double voiding ensures emptying of the bladder of post void residual urine. Circumcision reduces the risk of recurrent UTI in infant boys, and might therefore have benefits in patients with high grade reflux.

**Antibiotic prophylaxis**

Although the evidence of long term low dose antibiotic prophylaxis for prevention of UTI is not very strong, it is the most widely used strategy to prevent UTI in clinical practice. Antibiotic prophylaxis is recommended for patients with (i) UTI below 1-yr of age, while awaiting imaging studies, (ii) VUR (iii) frequent febrile UTI (3 or more episodes in a year) even if the urinary tract is normal. Antibiotic prophylaxis is not advised in patients with urinary tract obstruction (e.g., posterior urethral valves), urolithiasis, neurogenic bladder and in patients on clean intermittent catheterization.

**Table 4 - Antimicrobials for prophylaxis**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotrimoxazole</td>
<td>1-2 mg/kg/day (avoid in infants &lt; 3 months)</td>
</tr>
<tr>
<td>Nitrofurantoin</td>
<td>1-2 mg/kg/day</td>
</tr>
<tr>
<td>Cephalexin</td>
<td>10 mg/kg/day (drug of choice in first 3-6 months of life)</td>
</tr>
<tr>
<td>Cefadroxil</td>
<td>5 mg/kg/day</td>
</tr>
</tbody>
</table>

The ideal antibiotic for prophylaxis should have a broad spectrum of action and achieve a high urinary concentration with minimum alteration of the bowel flora. Nitrofurantoin and cotrimoxazole are the most commonly used used drugs for long term prophylaxis. Cefixime can also be used for uroprophylaxis.

**Asymptomatic Bacteriuria**

Asymptomatic bacteriuria is the presence of significant bacteriuria in the absence of symptoms of UTI. The condition is benign and often does not cause renal injury; often remits spontaneously with time. Hence treatment with antibiotics or antibiotic prophylaxis is not indicated.

**Vesicoureteric Reflux**

VUR is seen in 40-50% infants and 30-50% children with UTI, and resolves with age. Its severity is graded using the International Study Classification from grade I to V, based on the appearance of the urinary tract on MCU. Lower grades of reflux (grade I-III) are more likely to resolve spontaneously.

Grade I describes a whiff of reflux of urine into the distal nondilated ureter from the bladder and does not reach the kidneys. Grade II is reflux that reaches the renal pelvis but does not blunt the calyces or dilate the ureter. In grade III reflux, there is dilation of the ureter and blunting of the calyces, and in grade IV and V reflux, there is progressive dilatation, distention, distortion, and tortuosity of the collecting system.

**Management of VUR**

Conventional therapy for VUR includes antibiotic prophylaxis and surgical intervention. It is recommended that patients should initially receive antibiotic prophylaxis while awaiting spontaneous resolution of grade I and II VUR.

Patients with grade III to V reflux may be offered surgical repair if they have breakthrough febrile UTI on prophylaxis. The availability of dextranomer/ hyaluronic acid copolymer (Deflux) endoscopic treatment has been proposed as an alternative to surgical repair for patients with VUR. The proposed guidelines for management of VUR are outlined in Table V.

**Table 5 - Management of Vesicoureteric Reflux**

<table>
<thead>
<tr>
<th>VUR – grade</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades I &amp; II</td>
<td>Antibiotic prophylaxis until 1 yr old.</td>
</tr>
<tr>
<td>Grades III to V</td>
<td>Antibiotic prophylaxis up to 5 yr of age.</td>
</tr>
<tr>
<td>Beyond 5 yr</td>
<td>Prophylaxis continued if there is bowel bladder dysfunction</td>
</tr>
</tbody>
</table>

**Screening of siblings and offspring**

Reflux is inherited in an autosomal dominant manner with incomplete penetrance; 27% siblings and 35% offspring of patients show VUR.

Ultrasonography is recommended to screen for the presence of VUR.

**Prognosis**

Overall prognosis of children with UTI is good. But if there is a delay in the diagnosis and appropriate treatment of pyelonephritis, it can cause renal damage. Once the renal damage has occurred, prognosis is bad with renal scarring, hypertension and end stage renal disease.
Evolving scenario of drug therapy of malaria in India

Treatment options for malaria, especially falciparum Malaria, is continuously changing due to the rapid development of resistance to individual drugs given as monotherapy. Artemisinin-based combination therapies (ACTs) are presently considered the drug of choice for uncomplicated falciparum malaria, and though chloroquine is still the standard therapy for chloroquine sensitive vivax malaria, ACTs are increasingly being considered for the treatment of non-falciparum malaria. Artemisin resistance is also being reported of late and much research is necessary to develop novel drugs and drug combinations to work around these emerging scenarios so as to achieve and maintain malaria control with the ultimate aim of malaria elimination.

Status of drug resistance in India
Chloroquine resistant P. falciparum malaria was first reported in 1973 from Assam (1); followed soon after from other states (2.3.4). By 2004, the National Vector Borne Disease Control Program suggested use of sulphadoxine – pyrimethamine (SP) due to high treatment failure to CQ in 44 districts of 18 states in India (5). Resistance to SP combination at various levels has also been reported in the districts of seven North Eastern States. It has been seen that the introduction of a single new drug leads to rapid development of resistance. To overcome this, WHO has recommended Artemisinin based combination therapy (ACT) for the treatment of uncomplicated falciparum malaria(4). Though there are reports emerging of chloroquine resistant P. vivax (6), in India the drug is still effective for treating P. vivax malaria (7).

Rationale for combination therapy
It was recognised that the rapid onset of resistance to an antimalarial occurred when it is used as a monotherapy. Combination therapy entails the simultaneous administration of two or more schizontocidal drugs with independent mode of action. Rapid clearance of parasitemia, high killing rate (decreases parasite load by 10,000 fold per cycle as against others which reduce at 100 to 1000 fold) and resolution of symptoms; rapid drug elimination preventing drug residue from providing a selective filter for resistant parasites; lack of serious adverse effects and absence of significant resistance till date make artemisinin and its derivatives an essential component of such combination therapy; hence known as artemisinin based combination therapy (ACT). As a result of combination therapy the artemisinin component is protected from resistance by the partner medicine provided it is efficacious and partner medicine is in turn protected by the artemisinin derivative. Artemisin also has the advantage of reducing gametocyte carriage and thus transmission of malaria which is particularly important in malaria control. Residual parasites are taken care by other drug in combination.

Recommended Treatment in Chloroquine Sensitive Malaria

Table 1

<table>
<thead>
<tr>
<th>Drug sensitivity</th>
<th>Recommended treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P. vivax</strong></td>
<td><em>Chloroquine 10 mg base/kg stat followed by 5mg/kg at 6, 24 and 48 hrs. OR Chloroquine 10mg base/kg stat followed by 10mg/kg at 24 hours and 5mg/kg at 48 hours (total dose 25mg base/kg).</em></td>
</tr>
<tr>
<td><strong>For prevention of relapse:</strong></td>
<td>**Vivax malaria, Primaquine: 0.25 mg/kg OD x 14 days. **Falciparum malaria, a single dose of Primaquine (0.75mg/kg) for gametocytocidal action.</td>
</tr>
</tbody>
</table>

The IAP recommended treatment of chloroquine-sensitive malaria is given in Table 1 (18). Chloroquine should not be given in empty stomach and when the child has high fever. Bring down the temperature first. If vomiting occurs within 45 minutes of a dose of chloroquine that particular dose is to be repeated after taking care of vomiting by using domperidone or ondansetron. If the second dose is vomited, treat as severe complicated malaria. All children, except infants, with P vivax malaria must be given follow up primaquine for 14 days after G-6-
PD deficiency screening. For borderline G6PD deficiency primaquine may be given weekly at a dose of 0.6-0.8 mg/kg weekly for 6 weeks.

The age wise dosage schedule for chloroquine-sensitive P. vivax as per Guidelines for Diagnosis and Treatment of Malaria in India 2014 of the National Institute of Malaria Research and National Vector Borne Disease Control Programme is given in Table 2 and 3 (19)

<table>
<thead>
<tr>
<th>Table 2 - Chloroquine for P. vivax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Day 1 (10 mg/kg)</td>
</tr>
<tr>
<td>&lt;1</td>
</tr>
<tr>
<td>1-4</td>
</tr>
<tr>
<td>5-8</td>
</tr>
<tr>
<td>9-14</td>
</tr>
<tr>
<td>&gt;15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3 - Primaquine for P. vivax (Daily dosage for 14 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>&lt;1</td>
</tr>
<tr>
<td>1-4</td>
</tr>
<tr>
<td>5-8</td>
</tr>
<tr>
<td>9-14</td>
</tr>
<tr>
<td>&gt;15</td>
</tr>
</tbody>
</table>

The strength of the tablet available is 2.5, 7.5 and 15 mg. Number of tablets should be given accordingly.

Treatment of falciparum malaria (8)

Only Artemisinin based combination therapy may be initiated for falciparum malaria as recommended by WHO. The regimens that are effective include Artesunate 4 mg/kg once daily x 3 days and a single administration of SP as 25 mg/kg of sulfadoxine and 1.25 mg/kg of pyrimethamine on day 1; OR Artesunate as above and Mefloquine 25 mg/kg in two (15 + 10) divided doses on day 2 and day 3; OR combination Tab (Artemether 20 mg + Lumefantrine 120 mg) at a dose of 1 BD x 3 days (six dose regimen) [5-14 kg 1 tab stat, 1 Tab again after 8 hours and then 1BD x 2 days; 15 to 24 kg, 25-35 kg, >35 kg may use the same schedule with 2, 3 and 4 tabs, respectively].

The advantages of using lumefantrine in the combination are that it is a new drug, its absorption increases in presence of milk and it is only marketed in combination with artemisinin.

The National Institute of Malaria Research and National Vector Borne Disease Control Programme recommends artesunate (4 mg/kg body weight) daily for 3 days and sulfadoxine (25 mg/kg body weight) -pyrimethamine (1.25 mg/kg body weight) [AS+SP] on Day 0 for treatment of P falciparum in all parts of India except in the northeastern states. The dosage schedule of AS+SP for different age groups is given in Table 4.

In the northeastern states (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura), due to the recent reports of late treatment failures to the current combination of AS+SP in P. falciparum malaria, the presently recommended ACT in national drug policy is fixed dose combination (FDC) of Artemether-lumefantrine (AL). The dosage schedule of AL for different age groups is given in Tab.5.

The other fixed dose combinations registered for marketing in India are artesunate-amodiaquine, artesunate-mefloquine and arterolane-piperaquine (for adults only) and can be used for treatment of uncomplicated P. falciparum or mixed infections.

| Figures in parentheses indicate doses and outside the parentheses number of tablets |

<table>
<thead>
<tr>
<th>Table 4. Dosage schedule of AS+SP and PQ for P. falciparum malaria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (yrs)</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>AS</td>
</tr>
<tr>
<td>0-1</td>
</tr>
<tr>
<td>1-4</td>
</tr>
<tr>
<td>5-8</td>
</tr>
<tr>
<td>9-14</td>
</tr>
<tr>
<td>15 &amp; above</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5. Dosage schedule of AL in northeastern states</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-formulated tablet AL</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>5-14 kg (&gt;5/12 - &lt;3yr)</td>
</tr>
<tr>
<td>15-24 kg (&gt;3 to &lt;9yr)</td>
</tr>
<tr>
<td>25-34 kg (&gt;9 - &lt;14yr)</td>
</tr>
<tr>
<td>&gt;34 kg (14yrs &amp; more)</td>
</tr>
<tr>
<td>Not recommended during the first trimester of pregnancy and for children weighing &lt;5kg</td>
</tr>
</tbody>
</table>
Rational Management of Pneumonia

**Introduction**

Pneumonia continues to be the biggest killer worldwide of children under five years of age. Although the implementation of safe, effective and affordable interventions has reduced pneumonia mortality from 4 million in 1981 to just over one million in 2013, pneumonia still accounts for nearly one fifth of childhood deaths worldwide.

In early 1980’s WHO developed pneumonia control strategies suitable for countries with limited resources and constraint health systems. Management of pneumonia cases formed cornerstone of this strategy. Simple signs were identified to classify varying severities of pneumonia in setting with little or no access to diagnostic technology.

**India is the pneumonia capital of the world**

- New episodes/ year-156 million worldwide
- India (43 million) >25%
- Pneumonia accounts for 24% of all deaths in Indian children younger than 5 years
- Almost half of all pneumonias are bacterial
- Reducing mortality from pneumonia is critical to achieving MDG 4 goals

Pneumonia is defined as inflammation of lung parenchyma distal to terminal bronchioles.
- Infective
- Non Infective:
  - Aspiration of gastric contents, hydrocarbons,
  - Hypersensitivity reactions, Drug/ Radiation

**CAP**

- Inflammation of lung parenchyma due to community acquired infection in a previously healthy child
  - Patient should not have been hospitalized with in past 14 days prior to onset.
  - Occurs in a child who has been in the hospital for less than 4 days
  - It excludes child with any immune-deficiency like severe malnutrition, post measles state or primary immune deficiency

**Ventilator associated pneumonia / Nosocomial pneumonia**
- HAP & VAP
- Early -Within 4 days of admission, Sensitive bugs and better prognosis
- Late-After 5 days of hospital admission, MDR pathogens and poorer outcomes

**Recurrent/Persistent Pneumonia**
- At least 2 episodes in one year or > 3 in any time frame
- Persistent pneumonia is presence of clinical and radiological evidence of pneumonia for 1 month
- Persistent/ Recurrent pneumonia is a symptom of an underlying disease

**Clinical features**

- General and non-specific like fever, malaise
- Cough /tachypnea / grunt/ respiratory distress
- Chest pain /referred pain
- Signs of consolidation/pleural effusion and empyema
  - Disseminated disease, skin and soft tissue involvement arising from bacteremia, meningitis

**Host factors-Age**

- Neonates & infants
  - Subtle signs and symptoms -tachypnea, feeding difficulty or excessive crying, fever
- Young children- fever, leukocytosis
- Older children –fever, pleuritic chest pain

**WHO Definition of Tachypnea**
**Age** | **Respiratory Rate (breaths/min)** | **Indication of severe infection (breaths/min)**
--- | --- | ---
< 2 months | > 60 | >70
2 to 12 months | > 50 | 
12 months to 5 years | > 40 | >50
Greater than 5 yrs | > 20 | 

- Tachypnea is a sensitive and specific test (66%) may be as good or better than auscultation.
- Beginning step in the diagnosis

**Revised WHO Classification of childhood pneumonia**

- Only 2 categories
- Pneumonia- child with fast breathing and or chest indrawing; requires home therapy with oral amoxicillin
- Severe pneumonia-Pneumonia with any general danger sign; requires referral & injectable therapy

**Clinical correlates of etiology of pneumonia**

<table>
<thead>
<tr>
<th>Bacterial</th>
<th>Viral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset</td>
<td>Abrupt</td>
</tr>
<tr>
<td>Fever</td>
<td>+++</td>
</tr>
<tr>
<td>Cough</td>
<td>+</td>
</tr>
<tr>
<td>Toxicity</td>
<td>++</td>
</tr>
<tr>
<td>URTI</td>
<td>--</td>
</tr>
<tr>
<td>Contact</td>
<td>--</td>
</tr>
<tr>
<td>Auscultation</td>
<td>crackles</td>
</tr>
<tr>
<td>Chest X-ray</td>
<td>confluent</td>
</tr>
</tbody>
</table>

**Role of investigations**

- CBC / CRP has limited role
- Bacteriological diagnosis should be attempted only in serious / complicated pneumonia - blood culture, pharyngeal secretions, BAL, serology
- Chest x-ray not necessary in ambulatory patient - does not help in therapeutic decision - shadows persist for weeks in spite of clinical recovery
- Chest x-ray should be considered in serious / complicated pneumonia / USG for pleural fluid / CT scan not necessary

**Radiological correlates of etiology of pneumonia**

- Confluent infiltration in bacterial pneumonia / diffuse infiltration in viral pneumonia
- Look for air bronchogram, silhouetted sign, parapneumonic effusion, atelectasis, lymphnode
- Lobar consolidation with parapneumonic effusion – streptococcus pneumonia / H.influenza
- Necrotising pneumonia with breaking-down lesions resulting in cavity / abscess / pneumatocele formation – staphylococcus, klebsiellae, pseudomonas

**Recurrent Pneumonia**

**Same Lobe**

- Foreign Body
- TB
- Congenital Anomaly

**Different Lobe**

- Aspirations
- Asthma
- Shunts
- Mucociliary defects
- Immunodeficiency

**indications for admission to hospital in infants:**

- Sao2 < 92%, cyanosis;
- respiratory rate > 70 beats /min;
- difficulty in breathing;
- intermittent apnea, grunting;
- not feeding;
- family not able to provide appropriate observation or supervision.

**Indications for admission to hospital in older children**

- Sao2 < 92%, cyanosis;
- respiratory rate > 50 breaths / min;
- difficulty in breathing ;
- grunting
- signs of dehydration
○ family not able to provide appropriate observation or supervision.

**Principles of management**

- Consider etiological diagnosis
- Clinical investigations – radiological, laboratory tests
- Management - assess seriousness on presentation and also during therapy – need for referral or domiciliary treatment
- Choose antibiotic – duration
- Consider accompanying problems
- Monitor progress - confirm cure or timely referral

**Assess seriousness**

○ On presentation RR, work of breathing (accessory muscles of respiration, chest retraction), symptoms of hypoxia (change in behavior), SpO2 < 92%

○ On follow-up persistence of high fever at the end of 48 hours of antibiotic therapy, worsening respiratory function

○ Decide level of care – ambulatory care / referral for hospitalisation, ICU care

**Choosing antibiotic**

- Based on age related epidemiological data
  - < 2 months - Gram –ve / strep. pyogenes / viral / chlamydia – IV third generation cephalosporin in hospital setting
  - 2 months to 5 years - streptococcus pneumonia/ HIB / mycoplasma / viral – amoxicillin for domiciliary treatment / IV third generation cephalosporin in hospital setting
  - > 5 years - streptococcus pneumonia, mycoplasma, staphylococcus – amoxicillin (macrolide as first change or in suspected mycoplasma pneumonia)

**Other issues**

○ Duration of antibiotic therapy - 5 day course for non-severe CAP; 7-10 day course for severe CAP without complication in hospital setting – switch from IV to oral antibiotic if better within 48-72 hours

○ Confirm improving status; sequential reduction in RR, fever and cough

○ Monitor oxygen status, hydration, sodium balance

○ Maintain nutrition as much as possible

**Recent WHO recommendations for treatment of pneumonia**

**Recommendation 1**

○ Children with fast breathing pneumonia with no chest indrawing or general danger sign should be treated with oral amoxicillin: at least 40 mg/kg/dose twice daily (80mg/kg/day) for five days. In areas with low HIV prevalence, give amoxicillin for three days.

○ Children with fast-breathing pneumonia who fail on first-line treatment with amoxicillin should have the option of referral to a facility where there is appropriate second-line treatment.

**Recommendation 2**

Children age 2–59 months with chest indrawing pneumonia should be treated with oral amoxicillin: at least 40mg/kg/dose twice daily (80mg/kg/day) for five days.

**Recommendation 3**

Children aged 2–59 months with severe pneumonia should be treated with parenteral ampicillin (or penicillin) and gentamicin as a first-line treatment.

- Ampicillin: 50 mg/kg, or benzyl penicillin: 50 000 units per kg IM/IV every six hours for at least five days
- Gentamicin: 7.5 mg/kg IM/IV once a day for at least five days

Ceftriaxone should be used as a second-line treatment in children with severe pneumonia having failed on the first-line treatment.

**Recommendation 4**

Ampicillin (or penicillin when ampicillin is not available) plus gentamicin or ceftriaxone are recommended as a first-line antibiotic regimen for HIV-infected and -exposed infants and for children under 5 years of age with chest indrawing pneumonia or severe pneumonia.

For HIV-infected and -exposed infants and
for children with chest indrawing pneumonia or severe pneumonia, who do not respond to treatment with ampicillin or penicillin plus gentamicin, ceftriaxone alone is recommended for use as second-line treatment

**Recommendation 5**

Empiric cotrimoxazole treatment for suspected Pneumocystis jirovecii (previously Pneumocystis carinii) pneumonia (PCP) is recommended as an additional treatment for HIV-infected and -exposed infants aged from 2 months up to 1 year with severe or very severe pneumonia.

Empirical cotrimoxazole treatment for Pneumocystis jirovecii pneumonia (PCP) is not recommended for HIV-infected and -exposed children over 1 year of age with chest indrawing or severe pneumonia.

**Smell the trouble!**

- Behavior change – confusion, agitation / increasing respiratory rate and work of breathing / falling SpO2 – ICU care with mechanical ventilation – attempt bacteriological diagnosis
- Persistence of high fever at the end of 48-72 hours but with normal respiratory function – look for empyema – USG / decubitus film / diagnostic pleural tap and bacteriology – treat appropriately / consider drug resistance – attempt bacteriological diagnosis before rational change of antibiotic

**Key interventions to reduce morbidity and mortality from pneumonia include:**

- Promotion of exclusive breast feeding in the first six months of life
- Prevention of undernutrition and micronutrient deficiencies
- Reduction of indoor air pollution
- Vaccines to prevent pneumonia
- Optimal pneumonia case management & CCM
- Strong suspicion, early pickup, appropriate referral and right antibiotics can save substantial number of pneumonia deaths

**Conclusions**

- Childhood ARI/pneumonia is a public health problem and epidemiological data on incidence and etiology is lacking
- One-fourth of the deaths in under five children are due to pneumonia
- Tachypnea though a sensitive sign cannot differentiate between LRTI and pneumonia
- Clinical features vary with host factors such as age and underlying conditions and etiological agents
- Pneumonia is a clinical diagnosis and there is an overlap in signs and symptoms of pneumonia caused by viruses and bacteria
- Recurrent pneumonia is a symptom of an underlying disease
- Assessment of severity and early management can help reduce mortality

**Summary**

- Prevention – most cost-effective strategy
- Early diagnosis a key to better outcome

---

**Table**

<table>
<thead>
<tr>
<th>Doses of amoxicillin for children 2–59 months of age with pneumonia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOOL</strong></td>
</tr>
<tr>
<td>iCCM tool for community health workers: no change</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>IMCI tool for professional health workers at health facilities: revised</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
- CAP is a clinical diagnosis, document basis of diagnosis, investigations not helpful – oral amoxycillin in non-severe disease and IV third generation cephalosporin in severe disease
- Treat hypoxia, hyponatremia, dehydration
- Monitor progress and consider timely referral when necessary

**Pneumonia prevention:**

**Control of Indoor Air Pollution**

**What causes IAP**
- Tobacco smoking
- Gases from food while cooking
- Aerosols- Perfumes, air fresheners
- Paints, furniture polish
- Gases from ground- Radon
- Incense stick smoke
- Mosquito repellents, pesticides
- Organic pollutants- moulds, fur from pets

**Solid fuel use**
- Global burden of IAP due to solid fuels

**Traditional use of ‘solid fuels’**
- Types of Solid fuels:
  - Wood
  - Crop wastes
  - Dried animal dung cakes
  - Charcoal
  - Coal
  - Plastic bottles, rubber tyres etc
- 3 billion users:
  - 2.6 billion use ‘biomass’
  - 0.4 billion use coal
- Household fuel categories
  - High pollution fuels (HPF) : wood, agriculture waste, dung or straw,
  - Medium pollution fuels (MPF) : kerosene or coal/ lignite or charcoal, and
  - Low pollution fuels (LPF) : LPG/ natural gas or electricity

**Conclusions**
- There is strong evidence of impact of Indoor Air Pollution on pneumonia in children under 5. The risk increase is almost 50 – 75%
- Potential for significant decrease in ALRI in all ages of children by interventions – clean cooking stoves or LPG.

**Congratulations!!**

Dr. Sr Betty Jose for being awarded as best doctor by Govt. of Kerala.

Dr. Shaji Thomas John for being elected as the Chair of the APDSF (Asia Pacific Down Syndrome Federation) from September onwards. The next meet is at Singapore in December 2016.

Dr. KE Elizabeth, Dr. Krishnakumar, Dr. Geeta M. Govindaraj and Dr. Jayakrishnan M.P. for presenting papers and posters at 28th International Congress of Pediatrics, International Pediatric Association, Vancouver, Canada.

Dr. P. A. Mohammed Kunju on being nominated Dean, Faculty of Medicine, Kerala University.
Moments of Glory

Summer Pedicon inauguration at Tellichery by IAP National President Dr. Pramod Jog

Sr Betty receiving the Best Doctor Award from Hon: minister of Health Shylaja Teacher

Dr. Shaji Thomas John delivering a talk at World Congress on Intellectual and Developmental Disabilities’ at Melbourne Convention and Exhibition Centre, Australia

Dr. Elizabeth at 28th international Congress of Pediatrics, International Pediatric Association, Vancouver, Canada

Dr. Shaji Thomas John, IAP Kerala Past President inaugurating State level breast feeding week celebration at Govt. Medical College, Kozhikode

Dr Geeta M. Govindaraj, Dr MP Jayakrishnan and Dr Krishnakumar at 28th International Congress of Pediatrics, International Pediatric Association, Vancouver, Canada
Congenital Malformations of the Brain

This time we will have some MRI images of brain showing congenital malformation. All of them presented with developmental delay and seizures

(Answers on Page 24)
1. This 17 year old boy was admitted with h/o recurrent staphylococcal infections including pneumonia, abscesses with no inflammatory signs and facial dysmorphism. The diagnosis was confirmed by nephelometry for immunoglobulin profile.

2. This 10 month old baby boy was admitted with recurrent respiratory infections and indolent ulcers involving several areas including the urogenital region. There was a history of delayed fall of the umbilical stump and CBC revealed persistent leukocytosis. CD 18 was absent.

3. This eight year old boy was admitted with h/o eczema, recurrent respiratory infections and mucosal bleeds. The low platelet count and morphology helped to clinch the diagnosis.

4. This ten year old girl with fair skin and light hair dyed black presented with recurrent upper respiratory infections and bruising. She was treated two years ago for a life threatening complication. Peripheral smear and microscopy of the hair shaft were characteristic.

5. This newborn baby presented with a macular rash, fulminant sepsis and pneumonia. Chest X Ray showed absence of the thymic shadow and flow cytometry revealed a severe abnormality involving both T and B cells. IgE was normal.

6. This baby was treated for neonatal meningitis and was found to have facial dysmorphism and a CCHD. The baby also had lymphopenia and hypocalcemic seizures. FISH was diagnostic.

7. This seven month old baby had severe failure to thrive, recurrent pneumonia, diarrhea and oral thrush. CBC revealed severe lymphopenia and the lateral X Ray of the chest showed absence of the thymic shadow. Flow cytometry revealed reduced T and B cells with increased NK cells.

8. This boy presented at one and a half years of age with recurrent pneumonia and diarrhea. He had no lymph node enlargement and tonsillar fossae were empty. The immunoglobulin profile showed pan hypogammaglobulinemia, CT Chest showed bronchiectatic changes and flow cytometry was confirmatory with markedly reduced CD 19 and 20.

(Answers on Page 24)
Snaps from the Branches

Breast feeding week – IAP Kottayam

Press conference – IAP Kottayam

World Yoga Day – IAP Kottayam

World Environment Day
IAP Kottayam

ORS Week celebration
IAP Kasaragod

Dr Narayana Naik (IAP President Kasaragod) demonstrating how to prepare ORS, during ORS day

School adoption program
IAP Thalassery

IAP Thalassery : Planting a mango sapling during World Environment Day

IAP Thalassery : Poster on vaccination, for all hospitals in Kerala

School adoption program at Medical College Campus High School, Kozhikode. Dr. K.C. Rajagopalan inaugurated the program

Panel discussion - Nutricon 2016 Kozhikode

IAP Thiruvananthapuram : Walkathon - Breastfeeding Week

PICCON 2016 - Thiruvananthapuram,
1. Risk of bacterial meningitis in children 6 to 11 months of age with a first simple febrile seizure.


What they did: This was a multicenter retrospective, cross-sectional, observational study conducted in seven pediatric emergency departments in the region of Paris. Visits of patients aged 6 to 11 months for a first simple febrile seizure from January 2007 to December 2011 were analysed.

What they found: No bacterial meningitis was found among the 205 cases (95% confidence interval = 0% to 2.2%) of which LP was performed in 61 patients (29.8%). Others were followed up.

Conclusions: Among children between 6 and 11 months of age with a first simple febrile seizure, the risk of bacterial meningitis is extremely low.


What they did: This was a prospective, multicenter observational cohort study from January 2010 to February 2014. Very low-birth-weight (VLBW, ≤1500 g) infants, within 5 days of birth, were enrolled at 3 level III neonatal intensive care units in Atlanta, Georgia.

What they found: Of 600 VLBW infants enrolled, 598 were evaluated. Forty-four (7.4%) infants developed NEC. Fifty-three percent of infants (319) received a total of 1430 RBC transfusion exposures. RBC transfusion in a given week was not significantly related to the rate of NEC (adjusted cause-specific hazard ratio, 0.44 [95% CI, 0.17-1.12]; P = .09)

Conclusion: Among VLBW infants, severe anemia, but not RBC transfusion, was associated with an increased risk of NEC.

3. Role of Vitamin D in Hospitalized Children With Lower Tract Acute Respiratory Infections.


What they did: Children admitted to hospital with LT-ARI were prospectively recruited through the GENDRES network (March 2009-May 2013). The 25-hydroxyvitamin D (25-OHD) levels were measured by immunoassay. The severity of the illness was evaluated according to clinical scales, length of hospital stay, ventilatory requirements, and pediatric intensive care unit admission.

What they found: Patients with 25-OHD levels <20 ng/mL were at a higher risk of showing severe signs of respiratory difficulties (OR 5.065, 95% confidence interval 1.998-12.842; P = 0.001) than patients with normal values, and had a 117% higher risk of oxygen necessity and 217% higher risk of ventilatory requirement than those patients with normal values.

Conclusions: 25-OHD levels of children admitted because of a LT-ARI are <30 ng/mL. Lower levels of 25-OHD were found to be correlated with severity of the disease.
4. Early versus late parenteral nutrition in critically ill children.


What they did: This was a multicenter, randomized, controlled trial involving 1440 critically ill children. For the 723 patients receiving early parenteral nutrition, parenteral nutrition was initiated within 24 hours after ICU admission, whereas for the 717 patients receiving late parenteral nutrition, parenteral nutrition was not provided until the morning of the 8th day in the ICU. In both groups, enteral nutrition was attempted early and intravenous micronutrients were provided.

What they found: Although mortality was similar in the two groups, the percentage of patients with a new infection was 10.7% in the group receiving late parenteral nutrition, as compared with 18.5% in the group receiving early parenteral nutrition (adjusted odds ratio, 0.48; 95% confidence interval [CI], 0.35 to 0.66). Late parenteral nutrition was associated with a shorter duration of mechanical ventilatory support than was early parenteral nutrition (P=0.001) and a shorter duration of hospital stay (P=0.001).

Conclusions: In critically ill children, withholding parenteral nutrition for 1 week in the ICU was clinically superior to providing early parenteral nutrition.


What they did: Data from 977 of 1364 participants in the Study of Early Child Care and Youth Development were analysed. In 1995-1996, mothers reported their preschool child’s typical weekday bedtime, and mother-child interaction was observed to assess maternal sensitivity. At a mean age of 15 years, height and weight were measured and adolescent obesity defined as a sex-specific body-mass-index-for-age ≥95th percentile of the US reference.

What they found: One-quarter of preschool-aged children had early bedtimes (8:00 p.m. or earlier), one-half had bedtimes after 8:00 p.m. but by 9:00 p.m., and one-quarter had late bedtimes (after 9:00 p.m.). The multivariable-adjusted relative risk (95% CI) for adolescent obesity was 0.48 (0.29, 0.82) for preschoolers with early bedtimes compared with preschoolers with late bedtimes.

Conclusions: Preschool-aged children with early weekday bedtimes were one-half as likely as children with late bedtimes to be obese as adolescents. Bedtimes are a modifiable routine that may help to prevent obesity.
Lessons learned from two great teachers

Mid nineties, in SAT hospital.

A 9 Year old boy was referred as a case of acute flaccid paralysis. He was healthy school-going boy without any significant illness in the past. He developed weakness of both lower limbs which gradually progressed to trunk and upper limb within 24 hours. He had low grade fever and headache two days back which subsided without any drugs. No altered sensorium or vomiting.

No history of fall.

No bladder disturbance. No history of fever rash, drug intake recently.

No significant family history.

He was immunized up to age.

O/E.

He was fully conscious with anxious expression. His voice was weak. Blood pressure normal, heart rate rhythm normal.

Limbs were flaccid, deep tendon reflex absent. His respiration was inadequate in depth confirmed with low single breath count.

Sensation tested normal. Plantar not elicitable.

Provisional diagnosis of Guillain Barre was made.

As he showed signs of respiratory weakness and may need ventilation, we decided to shift him to Pediatric ICU. While he was being shifted Dr. Suleikha (Assistant professor at that time) happened to visit the casualty for some other purpose. By the time the trolley with the boy was passing out of the casualty she entered casualty. She noticed there was some facial spasm while the trolley with the boy was pulled below the fan. She turned back and asked the mother whether this boy was bitten by dog.

Answer was “NO.”

She left.

On further questioning we could elicit history of bite by a small pet dog which none of them considered important and vaccine not taken. He had aerophobia.

It was a case of paralytic type of rabies. This would have been missed totally without history. According to reports hydrophobia and aerophobia are rare in dumb rabies. One dilemma in this case was where to admit and manage this case?

Whether to shift him to PICU and put on Ventilator?

In the above case ventilator already was occupied and he did not survive long enough. We could not confirm the diagnosis with fluorescent antibody test with the skin biopsy. Almost one month after this incidence a two year old boy was bought with seizures followed by weakness of limbs. He was on anti rabies vaccine with chick embryo vaccine. Bite was on the hands. He did not have anti rabies serum. Ten days after the initiation he developed low grade fever, and GTC lasting for 5 minutes, but he did not regain consciousness.

No past history or family history of seizure, no other neurological illness. His development was normal.

O/E.

Respiratory and circulatory status normal, deeply comatose. He had multiple cranial nerve weakness. Ophthalmoplegia, asymmetric pupils with sluggish reaction, facial nerve weakness LMN type on one side. Tone and reflexes limbs were low. Plantar up going.

Is it rabies? How can this deep coma be explained?

Is it some complication of vaccines? At that time I did not know about ADEM or Brain stem encephalitis.

Dr. Noel Narayanan (Professor. Unit head P2) was called at midnight.

He suggested putting the patient on Dexamethasone high dose with the supportive measures. Patient lived for another four days.

Confirmatory tests were not done. We don’t know whether it was central demyelination or rabies.

Few practical points

Two decades back when old generation vaccines were in use lot of neurological complications were common. Failure due to the vaccine also was also high. So most important diagnostic dilemma those days was to differentiate an atypical presentation of rabies in vaccine failure or a neurological complication of vaccine. With the advent of new generation of vaccines this dilemma is less common as the vaccine efficiency is high and vaccine related neurological complications are very low.

How to differentiate neurological complication of rabies vaccine and atypical presentation of true rabies?

1. Incubation period -Neurological complications due to vaccines leading to paralysis occur within 14 days. But paralytic type of rabies usually longer, mean incubation period is 49 days. Bites on head and neck area still may cause confusion.

2. Sensory symptoms and sphincter disturbances more common in paralytic rabies as the neuropathology involves brainstem and spinal cord in diffuse manner.

3. Disease progression. Paralytic rabies progresses fast with respiratory paralysis and death usually occurs in 7-11 days from onset of symptoms. Demyelination the progression is slow and outcome good.

4. MRI will be helpful. Typical findings in for Rabies.
Programic Management of Pediatric TB
- An overview and What is new?

Introduction

India contributes one fourth of total world TB cases. Forty percentage of Indian population is infected with TB. There are 2.5 million prevalent cases (6-10% are pediatric cases) & 2.2 lakh deaths annually in India. About 5.5 lakhs of new cases & 80000 TB related deaths occur annually in children. Upto 4% of new sputum +ve cases are MDRTB. Though MDRTB and XDR-TB is documented among children, there are no estimates of overall burden.

Tuberculosis is highly contagious in indoor settings & is one of the 3 common pathogens requiring airborne precautions (measles, varicella). Grow slowly with a generation time of 12-24 hr. Unique aspect of TB in children is the imperceptible and often rapid progression of infection to disease. Risk of developing active disease is 24% below 5 yrs & 43% below 1yr, least in 5–10 year age group. Risk increases again during adolescence. In infants, the time between infection and disease is shorter than in older children, and the presentation may be more acute. Majority has paucibacillary disease. Extra pulmonary disease especially TB meningitis and disseminated TB more commonly occur in children. EPTB represent 25 - 30 % of childhood TB. Adolescents often develop an adult-like disease and may be infectious.

Pulmonary parenchymal disease and intrathoracic adenopathy are the most common clinical manifestations of pediatric TB, accounting for 60%–80% of all cases. Among extra pulmonary manifestations, lymphadenopathy is the most common (67%), followed by central nervous system involvement (13%), pleural (6%), miliary and/or disseminated (5%), and skeletal TB (4%). Disseminated (miliary) disease and TB meningitis are usually found in very young children (<3 years) and/or HIV infected children.

More than 95% of children who progresses to disease, do so within the first 12 months of primary infection. Age < 3 years, HIV co infection & severe malnutrition are the 3 most important risk factors for progression.

The challenges facing childhood TB are, lack of typical symptoms & signs, unusual sites of disease, absence of a gold standard for diagnosis, increased prevalence of extra-pulmonary disease and a lower public health priority give to childhood TB.

Management guidelines for Pediatric TB has been made by RNTCP based on WHO recommendations in consultation with IAP. Since National Tuberculosis Programme (NTP) was started in 1962 these guidelines underwent periodic revisions. WHO released STOP TB strategies in 2006 with a goal to reduce TB incidence <10/1 lakh population. In 2014 WHO and RNTCP jointly prepared standards for TB care in India (STCI), which suggested 6 standards for diagnosis, 5 for treatment, 9 for public health and 6 for social inclusion. Based on these RNTCP has revised the management guidelines of TB which will be introduced in a phased manner. Important changes will be discussed here.

Case finding and diagnostic strategy:

Case finding is by a symptom based approach. Identification of presumptive TB (previously TB suspect) is the most important part of case finding.

Pediatric presumptive TB refers to Fever and/or cough > 2 weeks, loss of weight/not gaining weight and/or exposure to smear positive TB patient or significant superficial lymphadenopathy.

Presumptive DR-TB: Patients who failed treatment with first line drugs, pediatric non responders, patients who are contacts of MDR-TB or RIF resistant TB, previously treated TB and TB patients with HIV co infection.

Symptom characterization in TB: Very important in the evaluation to avoid over diagnosis and under diagnosis.

Fever: Should be persistent (>2 weeks), unexplained, >38°C, reported by guardian or recorded atleast once.

Cough: Should be persistent & unremitting. Cough and fever which is recurrent and, associated with cold is not a TB suspect.

Definitive weight loss or FTT: Unexplained weight loss (loss of more than 5% of the highest weight recorded in the past three months).

Lymph nodes: Neck is the most common site (jugular, posterior triangular, supraclavicular). Enlarge over weeks or months. Maximum prevalence between 5 and 9 year and systemic symptoms are commonly. Lungs are usually the primary focus.

History of contact: Defined as exposure to smear
positive TB patient in any child or contact with a person with any form of active TB within last 2 yrs in a symptomatic child.

**Contact:** Any person who has been exposed to an index case.

**Household contact:** A person who shared the same enclosed living space as the index case for one or more nights or for frequent or extended daytime periods, during the 3 months before the start of the current treatment episode.

**Close contact:** A person who is not in the household but who shared an enclosed space, such as a social gathering place, workplace, or facility, with the index case for extended daytime periods during the 3 months before the start of the current treatment episode.

### Diagnosis of Tuberculosis in children

**RNTCP recommended tests for microbiological diagnosis**

All efforts should be made to microbiological confirmation in every presumptive TB case.

**Smear microscopy for AFB:** Under RNTCP two methods of microscopy are used, conventional Ziehl-Neelsen stain method & LED based Fluorescent microscopy(LED FM). Even with concentration of specimen by centrifugation and use of fluorescent microscopy, the sensitivity remains less than 15%. So in children and PLHIV, smear microscopy is now advised only if, NAAT is not readily available.

**Culture:** Solid culture medium is Lowenstein-Jensen medium & commercially available rapid culture methods(Automated liquid culture medium) are BACTEC-460TB, MGIT-960, Bacti Alert, Veratreck, etc. Yield from culture varies from 30% to 50%. Higher yield of up to 70% reported in infants and extensive diseases. Liquid medium has an yield 10% more than solid media & reduced time to result from weeks to days. Solid cultures do not help in early diagnosis and are used only in DR TB, but liquid medium is recommended in the evaluation of cases in which routine tests are not helpful.

**Nucleic Acid Amplification Test(NAAT):** These are rapid molecular diagnostic tests like PCR, Loop Mediated Isothermal Amplification Technology(LAMP) and Cartridge Based Nucleic Acid Amplification Test(CBNAAT).

**Cartridge Based Nucleic Acid Amplification Tests(CBNAAT):** Fully automated nucleic acid amplification that integrate sample preparation with real-time PCR amplification. Line Probe Assay & Xpert MTB/RIF are the two CBNAATs endorsed by the WHO. Line Probe Assay detects MTB complex, RIF & INH resistance. It is more accurate than GeneXpert, mainly used as a research tool. GeneXpert is the available Xpert MTB/RIF test under RNTCP. It detects tubercle bacilli & RIF resistance from sputum & specimen from extra pulmonary sites. It is an automated cartridge based closed system. Once loaded with specimen, DNA of bacilli is amplified and detected on real time. Results are displayed on the system in printable form in 2 hours. Minimum Bacilli needed for detection is 131/ml. It is 37% more sensitive on sputum and 44% more sensitive on gastric aspirate compared to direct microscopy. In extra pulmonary samples, yield is good for CSF, lymph node specimen etc, but poor for pleural fluid. Currently it is the first line bacteriological test recommended by RNTCP in suspected DR TB, presumptive TB in children, extra pulmonary TB and PLHIV. Multiple specimens increases the sensitivity, but WHO recommends a single sputum specimen due to resource implications. Tissue samples should not be added with formalin before sending for GeneXpert.

Specimen collection: Two samples are taken for tests other than GenXpert. Method of collection depends on feasibility & individual case. Methods other than direct sputum collection needs supervision by paediatrician and always there is a risk of hospital acquired infections.

**Gastric aspirate:** Routinely done as early morning aspiration of gastric content as an inpatient procedure, but now recommended on ambulatory setting also after fasting for 4-6 hours. Transport the sample immediately to the lab and process within 4 hours to prevent the killing action of acid in the gastric aspirate on tubercle bacilli. If delay occur, neutralize the sample using 1-2 ml of 10 % sodium bicarbonate solution depending on the volume of aspirate.

**Induced sputum:** Can be done on ambulatory setting. No need of fasting but Yield is < GA.

**Bronchial alveolar lavage (BAL):** Used to evaluate persistent pneumonia. Yield is lesser than gastric aspirate & induced sputum, so may be used as an add on test only. It is indicated in children with abnormal radiology & negative bacteriology in the setting of suspected DR TB, immunosuppression or HIV infection.

**Chest radiography:** Highly suggestive X-ray findings are miliary shadows, hilar or mediastinal nodes and fibrocavitary shadows. Consolidation, non homogenous opacities, ground glass appearance are other findings. Hilar node may appear either as sharply demarcated loculated dense shadow or ill defined shadows with vague borders. Some times normal structures making up the hilum and mediastinum may obscure them. Occasionally it produce splaying...
of carina or indentation on tracheobronchial tree. Occasionally a lateral view can pick up, upto 12-19% of cases missed by frontal view. It visualizes hidden areas like left lower lobe (hidden behind heart). Hilar nodes may be detected as Doughnut sign (lobulated densities posterior to bronchus intermedius) in a lateral view.

Contrast Enhanced CT: Useful to rule out TB in conditions like PUO & persistent pneumonia. Give better anatomical details, better description of nodes & hidden areas. It is recommended by RNTCP as a contributory investigation in selected cases.

Tuberculin skin test: Used as a complementary test along with history, symptoms & signs and radiology. Two preparations of PPD are available - PPD-S and PPD RT23. Two TU PPD RT23 with Tween 80 is equivalent to 5 TU of PPD-S. Current recommendation is to use 2 TU RT23. If it is not available 5 TU is acceptable, but there is a risk of false positivity. Cut off for positive result is an induration of 10 mm. In HIV positive patients 5 mm is the cut off. Test is read between 48-72 hours. If patient reports after 72 hours it can be read up to 7 days. If still positive it can be taken but if negative it is repeated. If child is reporting after 7 days, test is repeated irrespective of induration. Repeat test is done on opposite forearm. Record the induration in millimeter in the horizontal plane. No induration result is recorded as 0 mm. Erythema alone may be due to subcutaneous injection of PPD in which case it is repeated on opposite side. BCG vaccination has minimal influence on PPD reaction which wanes after 2 to 3 years. Degree of reaction, including necrosis and ulceration, may not necessarily differentiate infection from disease. A negative TST does not rule out infection with M. tuberculosis. Severe form of TB, HIV infection, severe malnutrition and recent infection are important causes of false negative results.

Interferon Gamma Release Assays (IGRAs): Do not distinguish between active disease and latent TB infection. Used in low prevalence countries to detect latent TB infections. Not recommended for the diagnosis in children by RNTCP or IAP.

Serologic tests: Not useful in detection of TB in children & these tests are banned in India.

Diagnosis of lymph node TB: Either FNAC or biopsy is needed. Specimen should be sent for cytology (for granuloma) & bacteriological tests like AFB smear, AFB culture & GeneXpert. Now GeneXpert is the preferred test. Lymph node TB should not be treated without a tissue diagnosis. CXR may show findings in 5-40% of cases & TST positivity in > 70% of cases.

Antibiotics like Quinolones, Linezolide and amoxicillin clavulanic acid are better avoided suspected TB. All diagnosed cases of TB should be offered HIV testing after counseling.

Principles of treatment: More drugs are used during the initial stage of high bacillary load & less drugs, once bacillary load reduces considerably. Different drugs act on different metabolically active bacillary populations. INH, Rifampicin, Streptomycin and Ethambutol are active against intra cellular & extra cellular rapidly multiplying organisms. INH & Rifampicin are also effective against extracellular slowly multiplying bacilli, while PZA alone is effective against intracellular slowly multiplying (semi dormant) populations. Some bacilli remain metabolically inactive (dormant) & no drugs acts on them. Dormant forms & few semi dormant populations survive the treatment which can later cause relapses or reactivation. Due to the paucibacillary nature of disease, chances of drug resistance are less in children.

For the purpose of treatment patients are defined into different types based on various criteria. The programme plans standardized regimen for defined patient groups. Standardized treatment regimen means that all patients in a defined group receive the same treatment.

Case definition: Microbiologically confirmed & clinically diagnosed. Clinically diagnosed TB is the TB, diagnosed in the absence of a positive bacteriological test.

Based on anatomical sites: classified into Pulmonary (PTB) & Extra pulmonary (EPTB)

Based on previous treatment

New cases: Cases not taken treatment prior or taken treatment for less than 1 month.

Previously treated cases: Classified into Recurrent TB (previously successfully treated case again developing bacteriological confirmed TB), Treatment after failure (patients declared failure of treatment at the end of treatment) & Treatment after lost follow up (cases who lost follow up after 1 month of treatment, later presenting with bacteriologically confirmed TB).

Depending on drug resistance

Mono resistant TB: Resistant to any one first line drugs.
Based on recent pharmacokinetic data, WHO 2010 Rapid advice revised dosage of anti tuberculous drugs.

Table 1. Recommended daily doses of first-line anti-TB drugs for children

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Dose in mg/kg/day</th>
<th>Max. dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoniazid</td>
<td>10 (7-15)</td>
<td>300</td>
</tr>
<tr>
<td>Rifampicin</td>
<td>15 (10-20)</td>
<td>600</td>
</tr>
<tr>
<td>Pyrazinamide</td>
<td>35 (30-40)</td>
<td>–</td>
</tr>
<tr>
<td>Ethambutol</td>
<td>20 (15-25)</td>
<td></td>
</tr>
<tr>
<td>Streptomycin</td>
<td>15 (12-18 mg/kg)</td>
<td></td>
</tr>
</tbody>
</table>

*The higher end of the range for isoniazid dose applies to younger children; as the children grow older the lower end of the dosing range becomes more appropriate.

India is a high HIV prevalent country & INH resistance in India is ≈5%. Considering these RNTCP is introducing daily regimen for the treatment of drug sensitive TB in PLWHIV and pediatric TB in entire country and all TB patients in 104 selected districts initially. It also introduces daily regimens as fixed drug combinations(FDC). For new cases intensive phase includes 2 months daily doses of INH, Rifampicin, Pyrazinamide and Ethambutol. During 4 months of continuation phase INH, Rifampicin and Ethambutol will be given as daily dosages. For previously treated cases intensive phase is 3 months and streptomycin is given additionally during initial 2 months. All the drugs will be provided as FDC. Each dose will be given as observed dose. Mother or a responsible family member will be counseled as an effective DOTs provider.

In severe form of TB like CNS TB, disseminated TB, skeletal TB, etc occurring as new case or re treatment case the continuation phase is extended 12-24 weeks more. Ethambutol can be safely used in TBM instead of streptomycin. There is no added advantage of SM over EBM and injection related problems can be avoided, more over SM can be preserved for resistant TB.

Poly resistant TB: Resistant to more than one first line drugs other than INH & RIF

MDR TB cases: Resistance to INH & RIF with or without resistance to other first line drugs.

XDR cases: MDR TB plus resistance to any fluoroquinolones and at least one of the three second-line injectable drugs (capreomycin, kanamycin or amikacin).

Drug regimen for TB

RNTCP has been adopting thrice weekly regimen till now. In 2010 WHO recommended daily dosage wherever feasible for new patients throughout the course of therapy, and also to add Ethambutol during intensive & continuation phase in countries with high levels of isoniazid resistance and/or in high HIV-prevalent setting. It also recommended formulations of anti-TB drugs as fixed-dose combinations (FDC).

Table: 2 Treatment regimen for drug sensitive TB

<table>
<thead>
<tr>
<th>Type of Patient</th>
<th>Intensive Phase</th>
<th>Continuation Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>2HRZE</td>
<td>4HRE</td>
</tr>
<tr>
<td>Previously Treated</td>
<td>2HRZES + 1HRZE</td>
<td>5HRE</td>
</tr>
</tbody>
</table>

Prefixed number denotes months

**Ethambutol in children:** It is a bacteriostatic drug primarily used as a fourth drug which will lower the risk of treatment failure, by ensuring at least three effective drugs in the intensive phase, if there is INH resistance. Earlier EMB was not given...
below 6yrs. In 2004 it was included for Cat I patients & later recommended for all pediatric patients. Initially recommended during intensive phase only, now RNTCP recommends during continuation phase also. The concern with EMB was that it might cause optic neuritis & children may not report the early visual symptoms, which could lead to irreversible blindness. The toxicity is dose-related and related to the duration of treatment & it is negligible if recommended dosages are adhered to. It was reported that visual symptoms of ethambutol toxicity are more sensitive than objective clinical ophthalmological signs. A baseline test of vision may be performed on all patients and regular ophthalmologic screening is not necessary.

Fixed Drug Combinations (FDC): FDC reduce the pill burden and prescription errors.

Pharmacokinetic in children shows that infants and young children have lower peak serum levels than older children or adults. Currently available FDC has RHZ 60:30:150 for the intensive phase and RH 60:30 for the continuation phase with an INH/RIF ratio 1:2. Some commercially available FDC has 1:1 ratio (60 mg H:60 mg R) only. INH & RIF ratio in the newly recommended FDC is 2:3. It will have H 50, R 75 & Z 150 (ratio 10:15:30 mg/kg). If commercially available FDC is used, it is better choose a preparation with 2:3 INH/RIF ratio.

### Table: 3 Fixed Drug Dosage & Pediatric weight Bands for Children

<table>
<thead>
<tr>
<th>Weight category</th>
<th>Number of tablets (dose per FDC)</th>
<th>Inj. Streptomycin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intensive phase</td>
<td>Continuation phase</td>
</tr>
<tr>
<td></td>
<td>HRZ</td>
<td>E</td>
</tr>
<tr>
<td>4-7 kg</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>8.1-11 kg</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>12-15 kg</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>16-24 kg</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>25-29 kg</td>
<td>3 + 1A</td>
<td>3</td>
</tr>
<tr>
<td>30-39 kg</td>
<td>2 + 2A</td>
<td>2</td>
</tr>
</tbody>
</table>

& A = Adult FDC (HRZ = 75/150/400/275; HRE = 75/150/275)

### Steroids:

Interaction between TB bacilli & host immune system can lead paradoxical worsening of illness due to release of pro inflammatory markers like IL 2 and gamma interferon. Corticosteroids may be used for the management of some complicated forms of TB, e.g. tuberculous meningitis, miliary TB, tuberculous pericarditis, endobronchial TB, airway obstruction by TB lymph nodes, and plural effusion with severe distress. Prednisone is used, in a dosage of 2 mg/kg daily (increased to 4 mg/kg daily in most seriously ill children), with a maximum dosage of 60 mg/day for 4 weeks. It is tapered and stopped over 1-2 weeks. Pyridoxine supplementation: Isoniazid may cause neuropathy in children with severe malnutrition & retro infection on ART. Supplemental pyridoxine (5-10 mg/day) is recommended by WHO in these cases.

### Treatment response and follow-up:

Serious adverse events with the use of recommended treatment regimens is very low. Ideally, each child should be assessed at least 2 weeks after the start of treatment, at the end of the intensive phase, and every 2 months until completion of treatment. Follow-up chest X-rays are not routinely required in children who are improving with treatment. A child who is not responding should be referred for the possible drug-resistant TB, an unusual complication of pulmonary TB, a lung disease from another cause or problems with treatment adherence.

ALT monitoring: Routinely not necessary. Monthly monitoring is indicated in disseminated TB, concurrent or recent hepatic disease, high doses of INH (>10 mg/kg/day) in combination with rifampicin and/or pyrazinamide.

### ATT induced hepatitis:

Asymptomatic transient elevation of liver enzymes up to five times the normal values is not an indication to stop treatment. Drug induced liver injury (DILI) is diagnosed when any of the following is present. 1) rise of ALT and/or AST more than 5 times the upper limit of normal in an asymptomatic child, 2) ALT more than 3 times in a symptomatic child, 3) serum bilirubin more than 1.5 mg/dl. Red flag signs of hepatotoxicity are anorexia, nausea, vomiting, abdominal pain, jaundice, unexplained fatigue, new onset hepatomegaly and bleeding. In the event of hepatitis, stop ATT. In severely ill patients, give modified ATT (non-hepatotoxic regimen with streptomycin, ethambutol and a fluoroquinolone) & in not severely ill patients, stop ATT & do weekly liver enzyme till it reaches twice the normal. Restart Rifampicin first and then INH and lastly Pyrazinamide. Some physicians do not restart PZA if the patient tolerate INH and Rifampicin.

If rifampicin is implicated, 2HES & 10 HE is given. If INH is implicated, 6-9 months RZE is given & in pyrazinamide toxicity, 9 HR is recommended.

Prevention of TB:

Contact screening: A mechanism of active or intensified case-finding and is recommended by various agencies, including WHO. As per WHO routine assessment of exposed contacts does not require CXR or TST. These tests have limitations and are often not readily available or possible in low- and middle-income settings. In the absence of TST or CXR, clinical assessment alone is sufficient to decide whether the contact is affected or not.
Table: WHO recommend indications of contact investigation. (Household or close contacts are investigated when the index case has any of the following characteristics)
- has sputum smear-positive pulmonary TB
- has proven or suspected MDR-TB or XDR-TB
- is a person living with HIV
- is a child <5 years of age.

Isoniazid preventive therapy
(Window prophylaxis)
Indications of preventive therapy in children are
1. Children less than 6 years of age who had an exposure to an infectious TB case
2. All HIV infected children (regardless of age) who had an exposure to an infectious TB case
3. All TST positive (>=5 mm induration) children who is HIV positive with no exposure to TB
4. All TST positive children who are receiving immunosuppressive therapy (e.g: Children with nephrotic syndrome, acute leukemia, etc.).

Isoniazid 10 mg/kg (7-15 mg/kg) with maximum dose 300 mg/day) daily for 6 months is started after excluding active disease. Follow-up should be carried out at least every 2 months until treatment is completed. There is no risk of isoniazid resistance developing in children receiving IPT, even if the diagnosis of active TB is missed.

Management of neonate born to mother with tuberculosis
First line anti tuberculosis drugs except streptomycin, given in pregnancy including during first trimester are safe for the fetus. Miliary and meningeal TB in mother are high risk factors for congenital TB. Vertical transmission does not occur in maternal pleural effusion or lymph node TB. Mothers who have completed ATT before delivery or have received ATT for at least two weeks duration before delivery are less likely to transmit the disease to the newborn. Previously INH prophylaxis was recommended in neonate only if the mother is smear positive or has received treatment for <2 wk. But present recommendation is to give INH prophylaxis(10 mg/kg) for 6 months to all babies born to a mother who was diagnosed to have active TB during pregnancy, after delivery or exposed to any case of active disease after delivery. Rule out congenital TB before starting INH. These babies are closely followed up for any TB symptoms. BCG vaccination can be given at birth even if INH chemoprophylaxis is planned, but usual practice is to give BCG vaccine, 2 weeks after completion of INH prophylaxis (as per WHO). Mother receiving INH and their breast fed babies are given pyridoxine supplementation (dosage for neonates is 5 mg/day).

Breast feeding of babies: All efforts should be sought to continue breast feeding in newborns of mothers having tuberculosis. First line ATT is secreted in milk in small quantity and causes no adverse effect. Isolation of baby is indicated only if mother is having smear positive MDR TB. Isolation may be considered when mother is sick, non adherent to therapy, received ATT for less than 2 weeks or suspected to have DR TB. Barrier nursing, using face mask and appropriate cough hygiene is advised for all mothers.

Prophylaxis in contacts of drug-resistant TB: There is no recommend preventive therapy for contacts of DR-TB patients even though a combination of EMB, PZA and Flouroquinolone has been suggested. They should be screened for active TB disease, especially children living with HIV and household contacts of DR-TB. Follow-up of asymptomatic children (every 2-3 months for the first 6 months, then 6-monthly for at least 2 years) is recommended.

New Anti tuberculosis drug: Bedaquiline(BDQ). It is a new class of drug - diarylquinoline. It targets mycobacterial ATP synthase and is a strong bactericidal agent. It has good tissue distribution and has extended plasma half life. Indicated only for MDR TB patients above 18 years. WHO recommended it for MDR-TB in 2013. RNTCP is introducing it through conditional access programme in 6 sites in the country initially.

Sources
5. Soumya Swaminathan and Banu Rakha, Pediatric Tuberculosis: Global Overview and Challenges, Clinical Infectious Diseases, 2010; 50(S3):S184–S194.
Not needles in a haystack

The link between infection and genetic susceptibility is becoming more evident with time. Our experience in the last few years has led us to believe that there are a group of disorders occurring primarily in children, that were once considered to be so rare that they were hardly of any consequence, but are not really so. These disorders have remained rare not so much because they are unusual, but because pediatricians fail to suspect them and hence miss the diagnosis. This, unfortunately leads to avoidable morbidity and often mortality as well. The rampant use and often misuse of antibiotics also plays a role in masking the diagnosis, by altering the natural course of the disease.

The limited availability of specialized investigations was also a factor responsible for failure of a diagnosis of a PID being made. The most important reason however, is a lack of awareness among health professionals including pediatricians regarding the clinical presentation and diagnostic workup of these children.

This is really unfortunate since the outcome in these children depends to a considerable degree on the rapidity with which a diagnosis is made. Conditions like Severe Combined Immune Deficiency are in fact medical emergencies, where there is no room for complacency. Primary immune deficiency disorders include more than two hundred diseases and involve absent or defective immune responses. These disorders may be managed with prophylactic regimens to prevent frequent infections and are sometimes curable as well.

The most important clue to the diagnosis remains an enhanced susceptibility to infections that occur with increased frequency and severity and may involve unusual pathogens.

The ESID warning signs are useful in predicting a PID, and the presence of two of them should send alarm bells ringing. There are also red flag signs, which alert us to the possibility, even if only a single one is present.

There are a number of affected families where the death of one or more children occurred before a diagnosis was made. The availability of IGIV and the stem cell transplantation has made it critically important for a diagnosis to be made well in time before the child develops end organ damage.

The age at presentation varies and newborns as well as adolescents and young adults can develop clinical manifestations. The infectious agents responsible for disease also give a clue as to the underlying disorder. The inheritance pattern also gives valuable clues to the diagnosis and the high rate of consanguinity in the population is one of the reasons for the disorder being commoner than expected.

ESID warning signs (European Society for immune deficiency)

1. Four or more new ear infections within 1 year.
2. Two or more serious sinus infections within 1 year.
3. Two or more months on antibiotics with little effect.
4. Two or more pneumonias within 1 year.
5. Failure of an infant to gain weight or grow normally.
6. Recurrent, deep skin or organ abscesses.
7. Persistent thrush in mouth or fungal infection on skin.
8. Need for intravenous antibiotics to clear infections.
9. Two or more deep-seated infections including septicemia.
10. A family history of primary immune deficiency.

Red flag signs

1. Repeated invasive infection (two or more pneumonias, recurrent septicemia, abscesses, meningitis)
2. Infections with unusual or opportunistic pathogens (PJP)
3. Poor response to prolonged or multiple antibiotic therapy
4. Chronic diarrhea with or without evidence of colitis
5. Chronic failure to gain weight and grow
6. Persistent / recurrent / unusual or difficult to treat oral lesions or skin rash
7. Structurally abnormal hair, nails, or teeth
8. Low serum IgG, chronic lymphopenia, neutropenia or thrombocytopenia
9. Absent lymph nodes and tonsils or chronic enlargement of lymphoid tissues
10. A family history of primary Immunodeficiency, autoimmunity or leukemia /lymphoma

It would certainly be worthwhile to start thinking not only about the ‘what?’ and which?’ in pediatric infectious disease, but also about the ‘how?’ and why?’ The way forward has been opened up with the improved access to diagnostic and therapeutic opportunities in PID, but pediatricians should prove equal to the challenge, putting in place skills of pattern recognition and discerning the usual from the unusual. It is important to look back and forward at the same time, spend time on a good history and pedigree chart, and keep track of patients with clinical suspicion of a PID. At the same time, we need to exercise our judgement carefully to avoid over investigation of normal children.
Unusual cause of proptosis in a boy

A 2½ year old boy with spastic cerebral palsy was admitted with extreme irritability of two weeks’ duration. There was global developmental delay with developmental age of 2 months. He was on nasogastric feeds since early infancy. At the time of admission, he had stable vital signs and there was bilateral proptosis with more involvement on the left side (Figure 1). Computed tomogram of head revealed soft tissue density with heterogeneous enhancement in the retro orbital region bilaterally suggestive of retro orbital hematoma with more involvement on the left side (Figure 2). X Ray of knee joints showed a dense metaphysical line, thin cortex and epiphyseal ring which are the classical signs seen in scurvy (Figure 3). Dietetic history revealed practically no intake of vitamin C rich foods like fruit and fruit juices. He was started on Vitamin C tablet 200mg per day. Within a week of starting treatment his irritability completely disappeared and proptosis improved in a month. Treatment was continued for 3 months.

Discussion

Feeding problems are very common in children with chronic neurological problems like cerebral palsy and this results nutritional deficiencies. Reports of scurvy causing retro orbital bleeding are rare. It is important that physicians recognise the clinical picture early as effective and simple treatment is available.

Figure 1 Proptosis

Figure 2 - Retro orbital hematoma

Figure 3 : White line of Frankel, Wimberger’s ring and Thinning of cortex

Dr. M.P. Jayakrishnan
Addl. Professor in Pediatrics
Govt. Medical College
Kozhikode

HAVE YOU VOTED YET?

IAP Election 2017 Schedule

<table>
<thead>
<tr>
<th>No.</th>
<th>Event</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Posting of Ballot Papers</td>
<td>Aug. 08-13, 2016 (6:00 p.m.)</td>
</tr>
<tr>
<td>2.</td>
<td>Request of Duplicate Ballot Paper</td>
<td>Strictly between Sep. 31 &amp; Oct. 17, 2016 (6:00 p.m.)</td>
</tr>
<tr>
<td>3.</td>
<td>E-voting</td>
<td>Sep. 21-Oct. 21, 2016 (6:00 p.m.)</td>
</tr>
<tr>
<td>4.</td>
<td>Last Date for Receipt of Ballot Papers</td>
<td>Oct. 21, 2016 (6:00 p.m.)</td>
</tr>
</tbody>
</table>

If you haven’t voted yet, HURRY!

Cast your valuable vote for Dr. Santosh T. Soans and return your ballot now!

‘TOGETHER LET US BUILD IAP.’

Dr. Santosh T. Soans
for IAP PRESIDENT ELECT 2017

Support him. Share this post.

Advertisement sponsored by IAP Cochin Branch
Persistent fever after dengue infection

**Introduction**: Kawasaki disease is a vasculitic disorder of pediatric age group, having a predilection for coronary arteries.

Dengue fever is one of the common vector borne infection endemic in Kerala. We report a case, where the initial presentation is of dengue viral infection, later on evolved into Kawasaki disease with involvement of coronaries.

A four year old boy completely immunized, born out of non-consanguinous marriage, was referred to us as a case of fever, rash and thrombocytopenia with bleeding manifestations.

Fever was biphasic in nature of 7 days duration and rash was discrete, reddish maculopapular non-pruritic over the body appeared 4 days after the onset of fever. They consulted a nearby hospital on 4th day of illness, was investigated and given symptomatic treatment. Fever subsided, investigations done showed thrombocytopenia, dengue NS1 antigen negative. During hospitalization the boy developed hematuria 3episodes, melena -1 episode. Hence referred to govt medical college Thrissur on 7th day of fever. There was no history of abdominal distension, oliguria, conjunctival congestion, retro orbital pain, dehydration, allergy or NSAIDS intake. There was no significant past or family history. His investigations from outside – Hb-11.5g/dl, PCV-36, TC-29000, Platelet count - 90000, SGOT/SGPT=44/29;SBT/T=1.4/0.9 DENGUE NS1 antigen-negative.

On examination, child was sick looking, conscious, pallor++, b/l small insignificant cervical and inguinal lymphadenopathy, no edema or icterus, no skin or conjunctival bleeds. Vital signs - pulse -120/mt, RR-41/mt, CFT-<3 secs, JVP – not elevated, temp- 100 F, CVS- S1S2 + Normal, RS- WNL, no pleural effusion P/A –soft hepatomegaly, no ascites; CNS examination- WNL; Hess test - Negative. With the above findings and investigations; a differential diagnosis of leptospirosis/ Dengue viral infections / rickettsial infections were considered. He was initially started on Inj crystalline penicillin, Doxycycline and fluid therapy.

Meanwhile we investigated the patient; Hb-9.9g/dl, pcv -29, platelet count- 73000,TC-11,500,P 88%, L11%. His dengue IgM +ve, lepto-lgm, Widal test and Weil Felix were negative; blood cultures sterile. His fever was persisting and rashes disappeared ,there was progressive thrombocytopenia and progressive rise in ESR (60-on D11 to 150 – on D15) Hence a diagnosis of SOJIA evolving into MAS / infective endocarditis / connective tissue disorders like SLE was considered. His ANA; RA factor were negative, plasma fibrinogen-350(300-400), bone marrow examination done to r/o MAS was normal. Echo was done to rule out infective endocarditis/ pericardial effusion which revealed dilated coronaries, LAD 3mm, right coronary 4mm, good LV function and no vegetation’s. Hence a diagnosis of Kawasaki disease was considered .IVIG 1g/kg/day along with aspirin(100mg/kg/day) was started.

Fever subsided the subsequent day and he remains afibrile. Other investigations CSFstudy- normal, PT, APTT, INR- normal limits. He also developed subungual peeling on day 15 of fever. CBC repeated showed decreasing ESR.

**DISCUSSION**: Findings suggestive of Dengue infection was biphasic fever, rash, thrombocytopenia and dengue IgM +ve; but the total count was high with predominant polymorphs, CRP +ve and fever was persisting. Fever persisting after dengue infection is due to immune complex mediated reactions leading on to macrophage activation syndrome. There have been 7 case reports of Kawasaki disease associated with dengue infection. Our patient is of younger age group, had neutrophilia, thrombocytopenia, persistent fever and CRP +ve which are predictors of poor outcome in Kawasaki disease .

**Photo 1 showing periungual peeling**
**Photo 2  showing the typical rash**

**CASE REPORT**
**Date 14-8-16 16-8-16 18-8-16 23-8-16 29-8-2016**

<table>
<thead>
<tr>
<th>Date</th>
<th>14-8-16</th>
<th>16-8-16</th>
<th>18-8-16</th>
<th>23-8-16</th>
<th>29-8-2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>HB/PCV</td>
<td>11.5/36</td>
<td>9.5/28</td>
<td>9.2/29</td>
<td>10.7/33</td>
<td>8.6/28</td>
</tr>
<tr>
<td>TC</td>
<td>29000</td>
<td>12600</td>
<td>9700</td>
<td>5900</td>
<td>9800</td>
</tr>
<tr>
<td>P/L/E</td>
<td>70/27/3</td>
<td>50/42/8</td>
<td>44/50/6</td>
<td>49/45/6</td>
<td></td>
</tr>
<tr>
<td>ESR</td>
<td>60-118</td>
<td>&gt;150</td>
<td>116</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLATELET COUNT</td>
<td>90000</td>
<td>150000</td>
<td>230000</td>
<td>400000</td>
<td>980000</td>
</tr>
<tr>
<td>Sr Na/K</td>
<td>129/3.3</td>
<td>133/4.3</td>
<td>130</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LFT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SGOT/SGPT</td>
<td>44/29</td>
<td>1.4/0.9</td>
<td>3.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total/protein/Sr</td>
<td>5.5/3.4</td>
<td></td>
<td>130</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALBUMIN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PT/APTT/INR</td>
<td>10/34/1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RFT(BU/SrCREAT)</td>
<td>64/0.8</td>
<td></td>
<td>12/0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>URINE R/E</td>
<td></td>
<td>WNL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BLOOD C/S</td>
<td></td>
<td></td>
<td></td>
<td>Sterile</td>
<td></td>
</tr>
<tr>
<td>CSF C/S</td>
<td></td>
<td></td>
<td></td>
<td>Sterile</td>
<td></td>
</tr>
</tbody>
</table>
Scrub Typhus with Neurological Manifestations -
A Rare Clinical Case

Scrub typhus is an acute febrile illness caused by Orientia tsutsugamushi, which is transmitted to humans by the bite of larvae of trombiculid mites that harbor the pathogen. Rickettsial infection involves almost all systems in the human body. With the increased incidence of the infection, there is high probability for coming across many atypical presentations. This article brings forth a case of scrub typhus presented with neurological manifestations and a brief review of literature.

**Case Report:** 11 yr male child was admitted with fever of 7 days duration and head ache for 2 days. He was brought to the emergency department with 4 episodes of vomiting, followed by altered sensorium.

**On Admission:** The boy looked sick, dehydrated and confused. He was febrile, with stable vitals (Pulse rate – 108 / mt, regular, good volume, BP – 100 / 60 mm Hg and RR – 28 / mt). No other finding on general examination.

**Nervous system exam:** The child was confused. All cranial nerves normal; fundus – Normal.

**Motor and sensory system:** Normal. Signs of meningeal irritation in the form of neck stiffness and Kernig sign were positive.

**Other systems:** GIT - Hepatomegaly (liver span of 9 cm), non tender and soft. All other systems were within normal limits. A diagnosis of acute meningitis with other possibilities of dengue fever, leptospirosis and typhoid fever were kept in mind.

**On investigation:** Blood routine investigation showed: TC-11,600mm³, DC-P82, L21, E5, Platelet count-2.8L, PCV-34% and normal LFT and RFT. CSF exam showed 4 lymphocytes, protein-40mg% and sugar of 66mg%. Gram staining was negative. Chest X-ray - Normal.

Child was started on ceftriaxone keep in meningitis in mind; the child improved transiently. After two days he developed severe abdominal pain with mild guarding. The ultrasound taken showed hepatospleno megaly, mild ascites with no evidence of perforation or appendicitis, and thickened gall bladder with sludge. Since blood & CSF culture were sterile with the results of Widal pending and the patient not responding to ceftriaxone, the possibility of atypical organisms were considered. Doxycycline was added and the child improved dramatically over 1 day. Meanwhile IgM scrub typhus came positive, Weil Felix test - Negative. Other serological tests: IgM lepto, IgM Dengue and Widal test-Negative.

**Discussion:** Scrub typhus was a dreaded disease in pre-antibiotic era with case fatality rates reaching 50%. It was an important military disease which caused thousands of cases in the Far East during Second World War. Napoleon’s retreat from Moscow was forced by rickettsial disease breaking out among his troops. During Russian revolution, there was epidemic of Rickettsial infection and Lenin remarked “either socialism will defeat the louse or the louse will defeat the socialism”

Rickettsial infection (RI) is a multisystem disease. With more and more outbreaks of the diseases in our country we will come across many atypical presentation of the Rickettsial infection.

Neurological manifestations of scrub typhus:
Nervous system involvement is not uncommon in scrub typhus. The word “typhus” itself comes from the Greek word whose meaning – hazy or smoky – is related to the mental status of affected individuals. One can not differentiate clinically, RI of the nervous system from bacterial or other infections. Significant proportion of the children present with only neurological illness in absence of rash, eschar, etc.

Early diagnosis and treatment of RI is lifesaving, because the drug treatment of RI is unique. So one should aware about the neurological manifestations of RI.

Neurological Manifestations include mild features like headache and vomiting to serious conditions like acute encephalitis syndrome

Child may present with features of aseptic meningitis, meningo encephalitis, altered sensorium and coma. Other neurological features include: peripheral neuropathy, cerebellitis, stroke, cerebral infarction, intracranial and subdural hematoma, brachial plexus neuropathy, seno neural deafness, and bilateral facial nerve palsy. More cases of post infective demyelination (ADEM, TM, GBS) also described. Other rare features are given in Table I.

Like nonspecific clinical features of NS RI, CSF findings also non specific in RI. There is mild elevation of protein, cells (lymphocytes) increased with normal sugar
Treatment: Doxycycline (oral) is the drug of choice in RI involving NS.A Dose: 5 mg/kg/day in two divided doses (<45 kg) and 200 mg/day in two divided doses above 45 kg for at least 3 days after defervescence or minimum 5-7 days.

Other drugs: Chloramphenicol (especially in NS involvement) and Clarithromycin (alternative to tetracycline-for children < 8 yrs, in pregnant women, in renal failure). Despite good in vitro activity, Fluoroquinolones not useful and Sulfonamides are contra indicated. Resistance to Doxycycline was reported with widespread and empirical use, in such a case rifampicin is useful.

Summary: Atypical presentation of scrub typhus is common. In any child presenting with neurological manifestations, one have to suspect scrub typhus. Rash, eschar and other classical features need not be there in a case of neurological scrub typhus. One need not wait for serological investigation results to start doxycyclin. We can start doxycycline empirically, but misuse of it in any fever and chance for developing drug resistance are of great concern.

Practical Nutrition: Twelve Tips
Dr. Newton Luiz, Dhanya Mission Hospital, Potta, Thrissur

1. A breastfed baby whose mother consumes 2½ litres of fluids daily gains 3-4 kg by 3½ months. But if he has thin malnourished limbs at birth expect a voracious baby and catch-up growth: he will gain 2-2½ kg in the first 1½ months, then slow down to 1 kg/m. There is a similar acceleration in head circumference.

2. Bottlefed babies rarely show such rapid catch-up growth. The baby needs 150 ml/kg of breastmilk as he requires 100 cal/kg (0-3 m: 89 x wt +75; 4-6 m: 89 x wt - 54) (Nelson, 20th ed, P 269). An exclusively formula fed infant needs 140-200 ml/kg at 0-3 m (Nelson 20th ed, P 288), which is difficult to achieve as formula is digested more slowly than breastmilk.

3. If he is an overweight IDM baby, expect catch-down growth after birth.

4. After 6 months the story is reversed. Breastfed babies stagnate if not weaned properly; bottlefed babies gain weight steadily if fed liberally. But height gain is slowing down, so bottlefed babies are prone to obesity.

5. Continue breastfeeding in diarrhoea. Whatever food is consumed is only partially absorbed, and stoo1 sugar will be positive, but breast milk is the easiest food to digest. Being very watery, it prevents dehydration. The anorexic infant who refuses all other foods will still accept breastmilk.

6. No living creature is born anorexic. The commonest cause of food refusal in infants and toddlers is force-feeding. Anger, fear and a choking sensation can all destroy the healthiest appetite. Infants will eat less initially, and slowly, and spit a little, and refuse some foods, and spill. Maternal anxiety and impatience are counterproductive.

7. If the schoolchild is obese, look at his parents. Obesity is rarely genetic: ask the obese mother what she weighed on her wedding day. Enquire about coconut oil consumption, which averages ½ kg per capita monthly. If a family of 4 uses 4 kg oil monthly, that amounts to 2 kg extra, or ½ kg per capita monthly, and each family member gains 6 kg extra annually even with a normal food intake.

8. At 9 years his height and weight are 130 cm and 30 kg respectively.

9. BMI is a simple calculation in theory, but many persons who took up Medicine did so in order to avoid mathematics. Also, the normal BMI varies with age in childhood. Alternatives:

a. Try visual inspection of the limbs: with experience it is an acceptable alternative, surprisingly accurate in differentiating normal wt-for-ht from thinness or obesity.

b. Check his weight and height, and compare his wt-age and his ht-age to his actual age. A 3½ yr old child with a wt of 12 kg and ht of 96 cm has the wt of a 2 yr old and the ht of a 3 year old; this indicates undernutrition, which usually results in more weight loss than height loss. But if he is 87 cm he has the wt and ht of a 2 yr old. He is proportionate, which suggests that he is well-nourished but short, probably because his parents are short. Decreased height with increased weight suggests genetic syndromes.

10. If the slim adolescent has an ‘excessive’ appetite, ask him to “go ahead and eat as much as you wish while you are growing upwards. But when you start growing forwards – STOP.”

11. TV causes obesity! I once absentmindedly consumed 250 gm of black halwa in 20 minutes while watching an action program.

12. Declare Sunday as Junk Food Day. Then ensure that he eats only home-made healthy food on weekdays.
IAP KASARAGOD
Report by President Dr Narayana Naik

First HIT / DIET Class of IAP Kasaragod conducted at Chaithanya vidyalaya kudlu Kasaragod. Treasurer Dr Gopalakrishna. P conducted class 10/6/2016. Celebrated world environment day June 5th 2016 along with GH Kasaragod on 14/6/2016 Kasaragod munical chairperson smt Beefathima Ibrahim inaugurated. Saplings handed over by chairperson to supt and all the staff and students. Monthly meeting held on June 28th at hotel highway castle Kasaragod. Dr Sandeep rai consultant pediatric surgeon KS Hegde medical academy deralakatte Manglore was guest speaker. As per the direction of state IAP, displayed message in front of OPD s and wore back badge on Wednesday 29th June 2016 at GH Kasaragod and other institutions in the district to create awareness on immunization and to protest against anti vaccination lobbies.

IAP Kasaragod school adoption programme and diphtheria awareness class. Health card issue umbrella and bag donation done at govt municipal LP school anangoor. Inaugurated by Sri NA Nellikunnu Hon. MLA Kasaragod. As a part of ORS week celebration demonstration of hand washing technique at kasaragod govt HSS assembly on 26-7-2016 by IAP kasaragod president and consultant paediatrican GH kasaragod.IAP kasaragod second programme on ORS week celebration at GHSS Iriyanni class by Dr divakara rai joint secretary/DIET /immunisation awareness class conducted at govt Muslim vocational higher secondary school talangara kasaragod by Dr b narayana naik. Awareness of water borne diseases and use of ORS in diarrhoeal cases conducted by Dr b narayana naik . Programme inaugurated by Sri B F. Abdulrahiman standing committee chair man kasaragod municipality. IAP kerala leaflets on diarrhoea management distributed to students. World breastfeeding week 2016 celebrated at general hospital kasaragod by IAP Kasaragod and general hospital kasaragod. Dr venkatagiri supt i/c presided Muncipal chair person smt Befathima Ibrahim inaugurated. Dy.collector Dr jayarsi was chief guest.. Hon MLA Sri NA Millikunnu promised IAP president Dr b Narayana naik to give fund to start breastfeeding area to mother patients who visit general hospital kasaragod. IAP president also request the authorities to make laws to provide 6 monthd paid leave in all private institutions to working mother’s. Awareness of water borne diseases and use of ORS in diarrhoeal cases conducted by Dr b narayana naik president IAP Kasaragod. Programme inaugurated by Sri B F. Abdulrahiman standing committee chair man Kasaragod municipality.

IAP Thalassery
Report by Secretary Dr Sakkariya PP

01.06.2016: As part of the school adoption programme of IAP Thalassery adopted Chettamcoon Govt. L.P School. Donated study materials, School bag and umbrella for all school students. Conducted a function at Chettamcoon Govt. L.P.School. Welcome speech by Mrs. Radhamoni, Head Mistress, Chettam Govt. L.P.School. The programme was presided by Dr. Siddeek.K.P.A, President IAP Thalassery 05.06.2016: observed World Environmental Day and conducted a cleaning programme at Manjodi area under the leadership of our President Dr. Siddeek.K.P.A. conducted a programme at Chettamcoon Govt.L.P School and Dharmadam.P.H.C. Mango saplings were planted at school ground. Awareness class on environmental day .conducted an awareness class for general public and staff at Indira Gandhi Co-operative Hospital. 14.06.2016: observed World Blood Donation Day and conducted a medical camp & blood detection camp at Chettamcoonnu Govt.L.P.School.26.06.2016: As part of the International Day Against Drug Abuse and Illicit Trafficking conducted an awareness class at Indira Gandhi Co-operative Hospital, Mnjodi, Thalassery for public and staff of IGCH. Class took by Dr. Dinesh Kumar, Senior Psychiatrist, Malabar Medical College, Kozhikode. at Mubarak Higher Secondary School, Thalassery, Mr. Mohandas, Preventive Officer, Narcotic Cell Special Squad took an drug abuse awareness class. As a part of public awareness activities during diphtheria outbreaks we conducted several programmes in and around Thalassery. prepared a poster with 13 points of the importance for the vaccination for children The posters were exhibited infront of the pediatrict OPD in various hospital, clinic in an around Thalassery, Muzhappilangad, Dharmadam, Kuthuparamba, Chokli, Panoor and an awareness talk was given for public. The same poster was accepeted by State IAP and exhibited all hospital in Kerala.
Please send in your answers by 1st November 2016. An attractive prize awaits the winner.

ACROSS
2. Psychological benefit of breast milk
5. Hollow
6. Gigantism
9. A cytogenetic technique that detects deletions or breakages in chromosomes
10. Inflammatory pustules with a surrounding boggy and tender area.
12. Repeatedly asking the same question is a feature of
13. A sign of intussusceptions
16. The science of dosage
18. Prevents open neural tube defects
19. Prefix meaning after
20. Agenesis of corpus callosum
21. Knee
22. Dilated pupil, poorly reactive but with normal near accommodation

DOWN
1. Words without sense
3. Prefix meaning backward or behind
4. ______ washout test measures pulmonary functioning
7. Containing salt
8. EEG waveform that is excessive in Autism
11. Library of genes
13. Most common microdeletion syndrome
14. Deep state of unconsciousness
15. In Rheumatic fever streptococcal M protein cross reacts with human
17. The sphincter of the Hepatopancreatic Ampulla

Winners
Dr. T. Rehana
Department of Pediatrics
Al Azhar Medical College
Ezhalloor, Thodupuzha
Mob: 94475 97693
Genotropin®

somatropin [rDNA origin] for injection

5 reasons to consider Genotropin® the growth hormone of your choice

1. Genotropin offers proven efficacy across the 6 paediatric indications:

   Reason 1: Genotropin offers proven efficacy across the 6 paediatric indications:

   Reason 2: Genotropin offers the largest & most comprehensive experience of over 85,000 lifetimes with KIGS.

   Reason 3: Genotropin offers the confidence of a long-established manufacturing process.

   Reason 4: Genotropin offers the device to suit your patients’ needs.

   Reason 5: Grow India benefits through trained therapy specialists.

Summary of Prescribing Information:

Comparable results for standard 16 IU (0.5 mg) or 34 IU (1 mg) with human source preparations. No comparator contents for use with a nonrecombinant or different batch. Advantages: Insufficient evidence of growth hormone, severe somatic, chronic renal dysfunction, and for geriatric age, improvement of body composition in children with Prader-Willis syndrome, replacement therapy to establish growth hormone deficiency, treatment of dysmorphic short stature, childhood onset: The absence of other causes of short stature, hypothyroidism and idiopathic macrodystrophy. It is not known whether pregnancy or lactation causes the absorption of any significant amounts of GnRH. Therefore, GnRH is not recommended for use in pregnant women. In women of childbearing age, GnRH should be discontinued at least 3 months before attempting pregnancy.

Trademarks: Genotropin® (Pfizer)

Design: Pixel Studio, Cochin-28

Owned, printed, published and edited by Dr. M. Narayanan, ‘Sarovaram’ Mamangalam, Palarivattom P.O., Kochi 682 025, Kerala and printed at Geo Printshop, Kochi for G.K. Printers, Azad Road, Kaloor, Kochi-17, Published at Kochi. Design: Pixel Studio, Cochin-28